

# User Information Satisfaction Survey on HealthNet Nepal

by

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Submitted to the Department of Urban Studies and Planning  
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## ABSTRACT

With the rapid information revolution we are witnessing today, applications of information technology within developing countries have been getting much attention. Many organizations have become involved in this field. Among them, SatelLife, a Boston-based non-governmental organization, is one of the pioneers and contributes to this emerging field through a worldwide computer-based telecommunication system named HealthNet. The main purpose of this computer network is to link health care workers around the world, especially in developing countries. HealthNet employs various telecommunication technologies, such as those of satellite, telephone and radio-networking, to facilitate information distribution and communication among users mainly through email. The research for this thesis was conducted on HealthNet Nepal, the Nepalese part of HealthNet. HealthNet Nepal has about 70 subscribers, of which most are organizations whose members have a right to use the net. There are also several individual subscribers.

The research had two main objectives. One was to evaluate users' satisfaction with HealthNet Nepal from the perspectives both of information content and of the way it provides information. The other objective was to identify what should be done to improve users' satisfaction. For data collection, the author conducted both online self-administered email questionnaires and face-to-face interviews, significant parts of which were based on a modification of the short form User Information Satisfaction (UIS) instrument (Baroudi and Orlikowski, 1988). For the treatment of the UIS-related data, the author modified the standardized UIS calculation process to adapt this research to the current situation of HealthNet Nepal. For data analysis, the author used standardized statistical data processing methods, including correlation coefficients, Fisher's exact tests and T-tests.

The results suggest that users are generally satisfied with HealthNet Nepal, especially with staff's responsibility, accountability and cordiality to users. However, they are not satisfied with the degree of training in use of the net and have the feeling that their knowledge of systems and services of the net is insufficient. The results also suggest that the majority of the primary users among organizational subscribers are non-specialist users, and that non-specialist users are less satisfied with the net than are specialist users.

The author makes two recommendations. One is to provide hands-on training class sessions to facilitate usage of the net to its fullest potential. The other is to introduce mailing lists that target specialist users in Nepal, in order to encourage more active communication between this often-isolated sub-group of users.

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# **1 Problem and Its Setting**

## ***1.1 General Background***

With the rapid information revolution we are witnessing today, applications of information technology in developing countries have been getting much attention. For example, the World Bank started its program called Information for Development Program (infoDev) in 1995. They claim, "Revolutionary advances in information technology and communications have two concurrent and complementary impacts on developing countries and economies in transition. They open up extraordinary opportunities to accelerate social and economic development, and they create a pressing reform and investment agenda both to capitalize on the new opportunities and to avoid the deterioration of international competitiveness" (World Bank, 1997).

Satellife, to which my research is related, contributes to this emerging field through a computer-based telecommunications system named HealthNet. The main purpose of HealthNet is to link health care workers around the world, especially in developing countries. For this purpose, HealthNet employs telecommunication technology, such as satellite, telephone and radio-networking technology. Its information distribution is mainly through email.

## ***1.2 Statement of the Problem***

### ***1.2.1 Main Objectives and Their Setting***

This research had two main objectives. One was to evaluate users' satisfaction with HealthNet Nepal from the perspectives both of information content and of the way it provides information. The other objective was to identify what should be done to improve users' satisfaction.

Implementation of HealthNet Nepal started in the fall of 1994. The implementation process is now moving from the incipient stage to the

expansion one. The main purpose in the incipient stage was not only to establish a local network manager and a steering committee, but also to connect a core group of users, mainly in the Kathmandu Valley region. The purpose in the following stage is basically to extend HealthNet to other parts of the country. About 70 subscribers that include a few users in mountainous rural areas are now using this expanding network through a dial-up access to email service.

However, a user satisfaction survey on HealthNet Nepal has never been done in a systematic way. My research is aimed at filling this void. In addition, my research can be a first step towards establishing a standardized user satisfaction survey instrument through further research of other countries' HealthNets.

With these objectives and setting, I conducted two surveys. One was a preliminary online survey through email; the other was a face-to-face interview survey in Nepal.

## *1.2.2 Operational Questions*

To achieve the main objectives, I set up operational questions listed below. Ideas for some of them came from concepts of User Information Satisfaction (UIS), which I will discuss later in Chapter 2.

### **1.2.2.1 Operational Questions for the Online Email Survey**

1. To what extent were users satisfied with the information products that are distributed by SatelLife?
2. To what extent did users understand the HealthNet systems and services?
3. To what extent were users satisfied with the HealthNet staff?
4. Did the results of the online survey suggest any further problems and questions that the subsequent face-to-face interview survey should deal with?

### **1.2.2.2 Operational Questions for the Face-to-face Interview Survey**

Purposes of the face-to-face interview survey were twofold. One was to confirm results of the preliminary online survey by expanding sample size. The other was to solve questions or problems that the results of the online survey had suggested. Thus, some of the operational questions would be the same as the online survey's ones. Below are the operational questions used in the survey design.

1. To what extent were users satisfied with the information products that are distributed by SatelLife? (The same question as the online survey's one.)
2. To what extent did users understand the HealthNet systems and services? (The same question as the online survey's one.)
3. To what extent were users satisfied with the HealthNet staff? (The same question as the online survey's one.)
4. What were answers to the problems and questions suggested by the results of online survey?
5. Were there any problems or questions that need further investigation?

### **1.2.3 Delimitation**

I did not make a survey on managerial and financial aspects, but I focused on mainly informational aspects, in terms of its contents, its distribution, and communication among users and staff.

### **1.3 The Definitions of Terms**

1. User Information Satisfaction (UIS) and End-User Computing Satisfaction (EUCS) are measurements of user satisfaction with information systems. For more detail, see Section 2.1, in which measurement instruments will be discussed.
2. SatelLife is a Boston-based international non-governmental organization employing telecommunication technology, such as satellite, telephone and radio-networking technology, to serve health

communication and information distribution, especially in the developing world (SatelLife, 1997).

3. HealthNet is a computer-based telecommunications system, which is conducted by SatelLife, to link health care workers around the world (SatelLife, 1997).

## **2 Background Review of Related Literature**

### ***2.1 Measurement of Users' Satisfaction with Information Systems***

Users' perceptions of satisfaction are the most commonly used measures of efficiency of an information system, although there are several other techniques used to measure efficiency in management of information systems, such as system usage, cost/benefit analysis, information economics, etc. (Kettinger and Lee, 1994).

#### ***2.1.1 Brief History of Development of Measurement Instruments***

In general, two types of user satisfaction evaluation instruments have been used (Kettinger and Lee, 1994). One is User Information Satisfaction (UIS) instrument; the other is End-User Computing Satisfaction (EUCS) instrument. UIS instrument was developed before EUCS instrument. Figure 1 presents a brief history of development of the UIS and EUCS, including trends of information systems.

##### **2.1.1.1 User Information Satisfaction (UIS) Instrument History**

The first standardized measurement instrument was developed by Bailey and Pearson (1983). The instrument contained 39 items. It measured user's satisfaction as the weighted sum of the user's positive and negative reactions to a set of aspects concerning the information system. This instrument was accepted as a reliable and valid instrument and made an important contribution to the further improvement of measurement instruments.

**Figure 1: History of Measurement Instruments of Users' Satisfaction with Information Systems**

User Information Satisfaction (UIS)	End-User Computing Satisfaction (EUCS)	Trends in Information System
<p>1983: by Bailey and Pearson <b>39-item instrument</b> (Long form instrument) This is the first standardized instrument.</p> <p>↓</p> <p>Improvement in the same year ↓</p> <p>1983: by Ives, Olson and Baroudi <b>13 item instrument</b> (Short Form Instrument) They suggested 13-item instrument based on the 39-item one. 3-category structure, into which 13 items were grouped, was also suggested. The categories are information product, staff and services, and user knowledge/involvement.</p> <p>↓</p> <p>&lt;Further efforts to establish a standardized short form instrument&gt;</p> <p>1988: by Baroudi and Orlikowski <b>Modified 13-item instrument</b> This is the most prevalent UIS instrument in use today. Baroudi and Orlikowski also confirmed the 3-category structure.</p> <p>↓</p> <p>&lt;Questioning to the modified 13-item instrument&gt;</p> <p>1995: by Doll et al. They confirmed reliability and validity of the modified 13-item instrument. Also, they proposed a 4-category structure.</p>	<p>1988: by Doll and Torkzadeh <b>12-item instrument</b> This is the first standardized and most prevalent EUCS instrument.</p> <p>↓</p> <p>&lt;Questioning to the 12 item instrument&gt;</p> <p>1994: by Hendrickson et al. They confirmed reliability of the 12-item instrument.</p> <p>↓</p> <p>1995: by Chin and Newsted They demonstrated alternative factor structure models.</p>	<p>1980's:</p> <ul style="list-style-type: none"> <li>• Management's desire to improve the productivity</li> <li>• Centralized information systems</li> <li>• Closed system architecture</li> </ul> <p>↓</p> <p>End of 1980's to 1990's:</p> <ul style="list-style-type: none"> <li>• Growth of end-user computing</li> <li>• Distributed systems (decentralized systems)</li> <li>• Open system architecture</li> </ul>

Based on the 39-item instrument, Ives, Olson and Baroudi tried to develop a more valid and reliable instrument in the same year. They proposed establishing a standardized "short form" instrument and suggested a 13-item instrument as one of its examples (Ives, Olson and Baroudi, 1983). (In contrast to this short form instrument, the 39-item instrument is called the long form instrument.) Ives, Olson and Baroudi also grouped these 13 items into 3 categories: information product, staff and services, and users' knowledge and involvement.

Baroudi and Orlikowski made a further improvement of the 13-item instrument. They examined its psychometric properties and confirmed its validity and reliability as well as its 3-category structure. Based on their examination, they proposed a modified 13-item instrument which will be shown later in this chapter (Baroudi and Orlikowski, 1988). This 13-item instrument is the most prevalent instrument in use today.

The development of these instruments was motivated by management's desire to improve the productivity of centralized information systems with a closed system architecture. However, in the last decade, we have experienced the growth of end-user computing and the decentralization of systems with an open system architecture. As a result, further testing of the validity and reliability of the instrument was required in order to examine whether or not the instrument worked well in this new information system environment.

Doll et al. tested the reliability and validity of the instrument (1995) and proved it to be both reliable and valid. They also proposed a 4-category structure rather than a 3-category one, keeping the same 13 items. The additional category came from dividing the staff-and-service category into staff category and service category. They demonstrated that the 4-category structure is more reliable and valid.

### **2.1.1.2 End-User Computing Satisfaction Instrument (EUCS) History**

The first standardized End-User Computing Satisfaction (EUCS) instrument was developed by Doll and Torkzadeh in response to the growth in end-user computing with distributed/decentralized information systems (1988). Doll and Torkzadeh also demonstrated EUCS reliability



using a test-retest correlation method (1991). This instrument was designed to evaluate the satisfaction of end-users with a specific application. It was not designed to assess information system staff and services directly. This instrument had 5 categories: content, accuracy, format, ease of use, and timeliness. These items and categories will be shown later in this chapter.

Major questions were raised by Etezadi-Amoli and Farhoomand (1991). They pointed out that the instrument had conceptual and methodological problems when it was developed. They argued that the purpose of EUCS measuring is to predict users' future behaviors; however, several items are not appropriate to predicting users' future behaviors. They also argued that Doll and Torkzadeh misapplied statistical techniques in the development process of the instrument, pointing out several questions one by one. Doll and Torkzadeh responded to Etezadi-Amoli and Farhoomand's concerns, and clarified the theoretical and methodological issues (1991). They argued that the purpose of the instrument was to evaluate computer applications in order to know how to develop better applications, not to predict users' future behaviors. They also explained each of the questions that had been raised by Etezadi-Amoli and Farhoomand.

The 12-item instrument has been basically accepted as reliable and valid. For example, Hendrickson et al. demonstrated further support for the reliability of the instrument using a test-retest correlation method (1994). In addition, responding to the question posed by Etezadi-Amoli and Farhoomand, Chin and Newsted demonstrated alternative factor structure models with the same 12 items so that the instrument might achieve higher validity (1995).

## *2.1.2 Contents of Measurement Instruments*

### **2.1.2.1 Contents of User Information Satisfaction (UIS)**

I will discuss the 13-item UIS instrument (the short form instrument) rather than the 39-item one (the long form instrument) because the short one is more prevalent today.

The UIS short form instrument has three sub-categories: (1) electronic data processing (EDP) staff and services; (2) information product; and (3) knowledge and involvement. Baroudi and Orlikowski defined these three sub-categories as: (1) the respondents' self-reported assessment of the attitude and responsiveness of the EDP staff; (2) the respondents' self-reported assessment of the quality of output delivered by the information system; and (3) respondents' self-reported assessment of the quality of training provided, their understanding of the system, and their participation in its development (1988, p. 48).

Based on Baroudi and Orlikowski's article (1988, pp. 46-47, 57-58) and Bailey and Pearson's article (1983, pp. 539-543), I re-created a list of 3 categories and 13 items of the short form instrument with their definitions, as follows:

#### **ELECTRONIC DATA PROCESSING (EDP) STAFF AND SERVICES**

1. Relationship with the electronic data processing (EDP) staff: The manner and methods of interaction, conduct, and association between the user and the EDP staff.
2. Attitude of the EDP staff: The willingness and commitment of the EDP staff to subjugate external, professional goals in favor of organizationally directed goals and tasks.
3. Communication with the electronic data processing staff: The manner and methods of information exchange between the user and the EDP staff.
4. Processing of requests for changes to existing systems: The manner, method, and required time with which the EDP staff responds to user requests for changes in existing computer-based information systems or services.
5. Time required for new systems development: The elapsed time between the user's request for new applications and the design, development, and/or implementation of the application systems by the EDP staff.

#### **INFORMATION PRODUCT**

1. Reliability of output information: The consistency and dependability of the output information.
2. Relevancy of output information (to intended function): The degree of congruence between what the user wants or requires and what is provided by the information products and services.
3. Accuracy of output information: The correctness of the output information.
4. Precision of output information: The variability of the output information from that which it purports to measure.

5. Completeness of the output information: The comprehensiveness of the output information content.

#### **KNOWLEDGE AND INVOLVEMENT**

1. Degree of EDP training provided to users: The amount of specialized instruction and practice that is afforded to the user to increase the user's proficiency in utilizing the computer capability that is unavailable.
2. Users' understanding of the systems: The degree of comprehension that a user possesses about the computer-based information systems or services that are provided
3. Users' feelings of participation: The degree of involvement and commitment which the user shares with the EDP staff and others toward the functioning of the computer-based information systems and services.

### **2.1.2.2 Contents of End-user Computing Satisfaction (EUCS)**

EUCS is a measurement of user satisfaction with a specific application in a computer information system. This does not include a direct assessment of relationships between end-users and system staff.

As I discussed earlier in this chapter, the most prevalent model of EUCS was developed by Doll and Torkzadeh (1988). This instrument is comprised by 12 items that measure 5 categories: content, accuracy, format, ease of use, and timeliness. Below is a list of the 5 categories and 12 items from Doll and Torkzadeh's article (1988, p. 268):

#### **CONTENT**

- 1: Does the system provide the precise information you need?
- 2: Does the information content meet your needs?
- 3: Does the system provide reports that seem to be just about exactly what you need?
- 4: Does the system provide sufficient information?

#### **ACCURACY**

- 1: Is the system accurate?
- 2: Are you satisfied with the accuracy of the system?

#### **FORMAT**

- 1: Do you think the output is presented in a useful format?
- 2: Is the information clear?

#### **EASE OF USE**

- 1: Is the system user friendly?
- 2: Is the system easy to use?

#### **TIMELINESS**

- 1: do you get the information you need in time?
- 2: Does the system provide up-to-date information?

## **2.2 Other**

As for more general methodology of the data collection process, Bernard's book (1995) discusses the process in great detail from both theoretical and practical viewpoints. As for more the practical process of personal interviews and mail surveys, Fink discusses the whole research process, such as development of questionnaires, design of surveys, sampling of data, etc., in six books (1995a; 1995b; 1995c; 1995d; 1995e; 1995f), as part of Sage Publication's *The Survey Kit* (1995). As for mail survey, Naumann and Giel's book has been very helpful in practical usage (1995). This book discusses consumer satisfaction measurement in detail, theoretically and practically, from the marketing viewpoint. These discussions have also been useful to the field of information systems.

## **3 Data Collection**

### **3.1 Overview of the Data Collection**

The data used in this research are primary data that were collected directly from users.

The data collection process had two stages with different instruments. The first one was an online email survey with a self-administered questionnaire. The second was a survey with face-to-face, structured interviews in Nepal.

There were two reasons why I conducted both the online survey and the interview survey: 1) Based on SatelLife's prior experience with an online survey<sup>1</sup>, it could be that an online survey would not collect sufficient numbers of samples; and 2) With results of an online survey, I could develop more appropriate interview questions.

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<sup>1</sup> According to the SatelLife headquarters, an email survey was sent out to the entire HealthNet. Only a dozen were returned.

In addition to these two main surveys, I had several informal conversations with a system operator in Kathmandu and observed his job in an unstructured way.

## **3.2 Detailed Discussion on Data Collection**

### **3.2.1 Population of the Online Survey and the Face-to-face Interview Survey**

#### **3.2.1.1 Target Population**

The target population was 63 in number. It consisted of all subscribers to HealthNet Nepal who had used the network more than one month at the time when the online questionnaire was distributed. The system operator and the head of steering committee of HealthNet Nepal were excluded.

#### **3.2.1.2 Eligibility Criteria**

There were neither inclusion nor exclusion criteria. This meant that all the subscribers in the target population were eligible for participation in the online questionnaire and the face-to-face interviews.

#### **3.2.1.3 Characteristics of the Target Population**

Based on geographic characteristics and the telecommunication situation in Nepal, I classified users in the following way:

- 1) Urban area in Kathmandu Valley and its adjacent areas: 49 subscribers. (Kathmandu Valley has been the most advanced area in terms of telecommunication in Nepal.)
- 2) Urban area in eastern Nepal except Kathmandu Valley area: 5 subscribers. (In Nepal, western regions have been less developed than eastern regions. Thus, it was better to divide urban areas by this criterion.)
- 3) Pokhara area: 4 subscribers. (Pokhara is an advanced area in terms of telecommunication in Nepal.)

- 4) Urban area in western Nepal except Pokhara area: 3 subscribers.
- 5) Rural mountainous area: 2 subscribers. (In Nepal, mountainous rural areas have had much more difficulty with telecommunication than flat rural areas.)
- 6) Rural flat field areas: No subscriber.

### *3.2.2 Online email survey*

#### **3.2.2.1 Framework of the Online Survey**

##### **3.2.2.1.1 Design of the Online Survey**

The design of this online survey was a descriptive cross-sectional design<sup>2</sup>.

It is noteworthy that I attached a cover letter to the questionnaire to notify users of the survey's purposes and of the confidential treatment of data that they would provide (Appendix A).

##### **3.2.2.1.2 Sampling in the Online Survey**

Given the relatively small size of the population, I sent the online questionnaire to all the eligible users.

##### **3.2.2.1.3 Limitation on the Online Survey**

Those who had a strong opinion of HealthNet, whether it might be positive or negative, were more likely to respond to the questionnaire; that is, whether they responded or not depended only on their willingness to do so.

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<sup>2</sup> A descriptive design produces information on groups that already exist. In this design, no new groups are created. This is also called observational design. A cross-sectional design is one of the descriptive designs. It provides descriptive data at one fixed point in time. (Fink, 1995c)

Users who had any difficulty in connecting HealthNet were more unlikely to respond to the questionnaire. For example, if users had trouble with stability of the telephone line, the emailed questionnaire or users' responses would not reach destinations. If users had to pay for their long distance calls to access the Kathmandu node of the HealthNet<sup>3</sup>, that payment would discourage users outside Kathmandu to respond to the questionnaire.

### **3.2.2.2 Contents of the Online Questionnaire**

The number of main question was 14. Some of them had sub-questions. Expected time to complete all the questions was 15 minutes. The questionnaire is printed in its entirety in Appendix B.

The main part of the questionnaire was based on the short form UIS instrument. The reason why I used UIS instrument rather than EUCS instrument was that, generally speaking, supports from system staffs are more important in developing countries than developed countries because there are more likely to be technical troubles and poorer information flow in developing countries.

The reason why I selected the short form UIS instrument rather than the long one was that this was the first survey conducted for HealthNet Nepal. The short form was appropriate for getting an initial overview that will be used for a subsequent interview survey.

However, parts of the UIS short form are not appropriate for HealthNet Nepal as it currently stands. Thus, I modified it so that it was more applicable to this particular case.

The point of the modification was to eliminate two items from the standard 13-item instrument. These items were included the category of users' knowledge of the system and involvement in system development. These deleted items<sup>4</sup> were (1) processing of requests for changes to

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<sup>3</sup> HealthNet Nepal has only one node, which is located in Kathmandu.

<sup>4</sup> According to Doll and others' 4-category structure model (1995), the deleted two items compose the service category. (See Section 2.1.1.1 for more detail.)

existing systems, and (2) time required for new systems development (See Section 2.1.2.1 for more detail).

The reason why I deleted them was that it was too early to apply these two items to HealthNet Nepal because the net is still under on-going implementation. I knew both from SatelLife in Boston and from the system operator in Kathmandu that at the present stage of implementation of HealthNet Nepal, users had a limited opportunity to get involved with system development.

In addition to the UIS-related questions, I also asked several questions about the types and frequency of services being used.

### **3.2.2.3 Administration of the Online Survey**

#### **3.2.2.3.1 Collecting of Email Addresses**

It was a difficult process to collect email addresses of all the users. The SatelLife headquarter did not have a complete email list, partly because they had a distributed communication system, which meant that HealthNet in each country took responsibility for its own managerial activities. Thus, I asked a system operator in Kathmandu, Nepal, to send me a list of email addresses and telephone numbers as well as location addresses.

#### **3.2.2.3.2 Distribution of the Questionnaire**

I distributed the questionnaire and its cover letter to all of the eligible subscribers for HealthNet Nepal. The date of the conduct was February 16 (Sunday), 1997. I set up the response deadline on February 28 (Friday).

#### **3.2.2.3.3 Follow-up Reminders**

I sent follow-up reminders two times to users who had not responded yet at the time. The first one was sent on February 24 (Monday). The second one was on the date of deadline, February 28, indicating that it was not too late to respond to the questionnaire. Both the reminders are available in Appendix C and D.



#### **3.2.2.3.4 Follow-up Telephone Calls**

I made follow-up international telephone calls to users who had not responded yet and whose telephone numbers were available at the time. I asked a system operator in Kathmandu, Nepal, to send me the list of users' telephone numbers in advance, which had 51 eligible subscribers' numbers. I called all of them and succeeded in contacting 24 users, asking them to respond to the questionnaire.

#### **3.2.2.3.5 Follow-up by a System Operator in Nepal**

The system operator of HealthNet Nepal in Kathmandu also followed-up by re-sending the questionnaire to all of the eligible users.

#### **3.2.2.3.6 Sending Acknowledgements of Reception**

I sent acknowledgements of reception to all respondents to facilitate the subsequent interview survey in Nepal by mentioning the survey. The Acknowledgement is printed in its entirety in Appendix E.

### ***3.2.3 Face-to-face Interviews***

#### **3.2.3.1 Framework of the Interview Survey**

##### **3.2.3.1.1 Design of the Interview Survey**

The design of this interview survey was a descriptive cross-sectional design<sup>5</sup>. The objective of this research was to evaluate current users' satisfaction. Thus, descriptive and cross-sectional design was appropriate to this research. (Fink, 1995c, p. 23)

It is noteworthy that I started each interview by notifying interviewees of purposes of the survey and confidential treatment of data that they would provide. (See Appendix F.)

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<sup>5</sup> See the footnote in Section 3.2.2.1.1.

### 3.2.3.1.2 Sampling in the Interview Survey

#### 3.2.3.1.2.1 *Sample size of the Interview Survey*

Krejcie and Morgan's formula for determining sample size (1970) suggested that the required sample size was 52 (with 5 % confidence interval and 50 % population parameter of a variable) when the target population size was 63.

However, it seemed impossible to achieve this sample size because of time, financial and transportation limitations. Instead of a 5 % confidence interval, I took a 10 % interval. In this case, required sample size was 33.

This low probability sample (90%) was one of the major limitations in this research.

#### 3.2.3.1.2.2 *Sampling methods of the Interview Survey*

I used a convenience sampling method; that is, I interviewed anyone who was willing to talk to me.

A stratified random sampling would have been best for this particular survey because characteristics of users' satisfaction could differ according to regions where they lived, especially whether they live in rural areas or urban areas.

Up until now, HealthNet Nepal has been centralized in Kathmandu. For example, not only has it been operated by a system operator and a steering committee in Kathmandu, but also it has had only one node in Kathmandu. In this sense, characteristics of users' satisfaction could vary according to regions where they live. Thus, a stratified random sampling was best for this survey using the groups I defined earlier in this chapter (Section 3.2.1.3).

However, time and financial limitations did not allow me to conduct the stratified random sampling. As a result, I conducted a convenience sampling basically in Kathmandu Valley region, although I decided to select one more region, an urban area in eastern Nepal, so that I could incorporate a quota sampling flavor somehow.

There were no interviews taken with users in the rural areas or urban areas of western Nepal.

One of the major limitations of this research was that I used a convenience sampling, not a stratified random sampling.

Another important issue concerning sampling was that, in the case of organizational subscribers, I conducted interviews with only a primary user in each organization. The interviews did not involve other users in each organization.

### **3.2.3.2 Contents of Interview Questions**

The purposes of the face-to-face interview survey were twofold. One was to increase the sample size for the purpose of the UIS evaluation. The other was to solve the questions that had been suggested by the results of the online survey.

For these purposes, I developed two series of questions. One was for users who responded to the online questionnaire; the other was for those who did not respond to the questionnaire. The latter one includes all the questions of the former one, as well as all the UIS related questions that the online questionnaire had.

To achieve the second purpose of the interviews, I included a new series of questions. I will discuss this issue later in Chapter 6.

The number of questions in the shorter form was 63. The number in the longer one was 76. Some of questions had sub-questions. Expected time to complete the shorter one was 30 minutes, and that of the longer one was 40 minutes. The longer form is printed in its entirety in Appendix F.

### **3.2.3.3 Administration**

#### **3.2.3.3.1 Arrangement of Appointments**

For the first three days of the survey in Nepal, I arranged some appointments with users through international telephone calls. However, my arrival was delayed one day because of an airplane delay. I re-

arranged the first day's appointments by calling from Singapore, where I was forced to stay.

After arriving in Kathmandu, I arranged new appointments everyday. I called all of the eligible users for an interview appointment (as long as I knew their telephone number). I also asked the system operator in Kathmandu to arrange appointments for interviews. As a result, I completed 30 interviews from March 15 to March 27 in the Kathmandu Valley region. 8 of the 30 were through arrangements by the system operator.

### 3.2.3.3.2 Interviews in Eastern Nepal Urban Areas

In eastern Nepal, I completed four interviews in three towns on March 22 and 23. These towns were located in the eastern Nepal plain field region. They were Biratnagar (the second largest town in Nepal), Damak (a town on the main highway in Nepal) and Dharan (a town at the edge of the plain region that has had a close relationship with the mountainous regions). Both Damak and Dharan are located within a two to three hour drive from Biratnagar. I completed two interviews in Damak and one interview in each of the other towns.

## 4 Data Treatment

### 4.1 Calculation of UIS

The main part of the online questionnaire was for the UIS evaluation purposes. This part was also used for the face-to-face interview questions for those who did not respond to the online questionnaire.

This part had eleven questions that were items of the overall UIS. (A traditional UIS short form has 13 questions. However, as I discussed in Chapter 3, I deleted two of them.) Each of the eleven questions had two closed sub-questions that contained a seven rank ordinal scale with neutrality in the middle. These 7 rank options were sometimes in reverse order to prevent the respondents from simply marking down one column of the questionnaire (Baroudi and Orlikowski, 1988). The ranks

were converted to numbers from -3 to +3. The questionnaire is available in Appendix B.

As I discussed in Chapter 2, 11 questions were grouped into three categories: (1) the quality of information products produced by SatelLife; (2) the level of the user's knowledge and involvement in system development; and, (3) user attitudes towards the SatelLife staff and services. I will call these three categories: info category, knowledge category and staff category respectively.

#### *4.1.1 Process for Calculating the UIS*

The calculation of UIS has been standardized and simplified for the case when there is no mission data. According to Baroudi and Orlikowski (1988), the process is as follows:

- 1) The value of each of the 11 questions (items) is an average of values of two sub-questions. The value should range from -3 to +3.
- 2) The value of each of the 3 categories, info category, knowledge category and staff category, is an average of its items. The value should range from -3 to +3.
- 3) The overall UIS of each user is a summation (not an average) of all averages of each of the eleven items. It should range from -33 to +33, assuming the number of items is 11.
- 4) The overall UIS of the whole user population is an average of the overall UIS of each user.

However, there were missing data. To deal with these missing data, I modified the calculation as follows:

- 1) The value of each of the 11 questions (items) is an average of its non-blank sub-question(s). If both of its sub-questions are blank, it also remains blank.
- 2) The value of each three category is an average of its non-blank item(s). If all of its items are blank, it also remains blank.

3) If none of the 3 categories are blank, the overall UIS is an average of them. If any of three categories are blank, the overall UIS remains blank.

4) The overall UIS of the whole user population is the average of non-blank overall UIS of each user.

Whether or not this modification represents true values was not tested. This is another limitation of this survey.

#### ***4.2 Other Statistical Methods Employed***

As for descriptive statistics and measures of central tendency, I followed standardized methods in statistics (i.e., mode, mean, T-test etc.)

As for the relationship between two variables, I used correlation coefficients and Fisher's exact test<sup>6</sup>.

A correlation coefficient was used for analyses among UIS related items. It was also used for one non-UIS-related question that asked users to what extent they were satisfied overall with HealthNet Nepal. This non-UIS question has a seven rank ordinal scale that can be converted to -3 to 3 numerical numbers exactly like UIS items. This question is traditionally included in a UIS questionnaire form.

With the UIS related questions and the one non-UIS-related question, there was a standardized way to convert their ordinal data into numerical data. In addition, sample sizes of these questions were relatively high, because their samples were summations of samples of the online survey and the interview survey. Thus, I selected correlation coefficients to analyze their relationships.

When I reported correlation coefficients, I added the value of 4 to each value of the UIS items, which ranges from -3 to +3, so that the

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<sup>6</sup> This is a substitution for chi-square when data are grouped in a 2x2 table and there is any cell where the expected number of frequencies is less than 5. (Bernard, 1995, p. 442)

values would range from 1 to 7. This was for the purpose of ease of handling, especially in creating graphs. There was no bias produced by this modification.

Spearman's rho could also be used instead of a correlation coefficient. It was difficult to decide which should be employed.

Spearman's rho is designed to analyze the relationship between two ordinal variables or one ordinal and one numerical variables (Fink, 1995e, pp. 38-39). UIS related questions have ordinal scales. In this sense, Spearman's rho could have been used for them. However, as I discussed above, the UIS ordinal scales were designed to convert to numerical data. In addition, the UIS itself is calculated numerically. Thus, I selected a correlation coefficient rather than Spearman's rho.

Fisher's exact test was employed to analyze relationship among non-UIS closed questions as well as the relationship between non-UIS questions and UIS items.

Some of the non-UIS questions had two category nominal data like 'yes' or 'no'. In this case, Fisher's exact test or chi-square was appropriate tools.

The others have ordinal scales with 7 options from negative to positive including a neutral option in the middle. They were like UIS-related questions. For them, I could have employed a correlation coefficient. However, conversion from ordinal scale to numerical one was not standardized in this case. Also, sample sizes for those questions were smaller than UIS-related questions, because samples of the UIS-related questions were summations of samples of the online survey and ones of the interview survey. In addition, I needed to compare these non-UIS ordinal data with two category nominal data within that small sample size. Thus, I dichotomized the non-UIS ordinal data to two category nominal data, that is, negative opinion and positive opinion, so that I could use Fisher's exact test or chi-square. As for those who had neutral opinion, I ignored them.

Validity of this conversion from 7 rank ordinal scales to two category nominal data is not tested. This is another limitation of this survey.

I did not conduct multivariate statistical analysis because of the small sample size.

## **5 Results of the Online Survey**

In this chapter, I will discuss only the part of the results that were directly related to designing the next interview survey or that were not included in the results of the interview survey. Other results of the online survey will be covered in Chapter 8, in which the results of the face-to-face interviews will also be discussed.

Interpretations of the results will be shown in the following chapter, Chapter 6.

### ***5.1 The Number and Rate of Responses***

The number of responses was 33. The online questionnaire was sent to all of the 63 users in the eligible population, which was the same as the target population. Thus, the response rate was 52%, covering also 52% of the target population. It is not uncommon for a response rate in mail surveys to be around 20 percent (Bourque and Fielder, 1995, p. 15). In view of this, the response rate of 52% was fairly good.

However, from the viewpoint of sample size, this number was relatively small for quantitative analysis. As I discussed earlier in the Chapter 3, Krejcie and Morgan's formula for determining sample size (1970) suggested that the required sample size was 52 (with 5 % confidence interval and 50% population parameter of a variable). The number of respondents did not achieve this number. Instead, it achieved 33, which corresponds to a 10% confidence interval. Through face-to-face interviews in Nepal, I increased the total sample size to 44, still not enough. In addition, some responses had missing data. I will discuss the issue of sample sizes again later in Chapter 8.

Geographic distribution of the respondents were as follows:

1) Kathmandu Valley area: 26 respondents; 2) Urban area in eastern Nepal except Kathmandu Valley area: 3 respondents; 3) Pokhara area: 2



respondents; 4) Urban area in western Nepal except Pokhara area: 1 respondent; 5) Rural mountainous area: 1 respondent.

The first response came on February 19. The last response came on March 7.

## 5.2 Description of Respondents

I will describe respondents along with data from the subsequent interview survey later in Chapter 8.

## 5.3 UIS at the end of the Online Survey

UIS results will be discussed not only in this chapter, but also in Chapter 8, in which the results of the face-to-face interviews are discussed. In this section, I will discuss data only from the online survey.

**Table 1: Correlation Coefficients among UIS items, Overall UIS and Overall non-UIS Satisfaction at the End of the Online Survey**

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 relationship		0.42	0.54	0.37	0.38	0.36	0.68	0.14	0.57	0.35	0.39	0.67	0.76
2 training			0.19	0.74	0.72	0.17	0.48	0.42	0.22	0.44	0.37	0.76	0.51
3 reliability				0.10	0.14	0.26	0.43	0.05	0.22	0.03	0.15	0.39	0.50
4 understanding					0.73	0.44	0.53	0.54	0.23	0.39	0.31	0.79	0.59
5 relevancy						0.26	0.28	0.65	0.20	0.41	0.40	0.76	0.57
6 participation							0.41	0.35	0.18	0.43	0.15	0.56	0.56
7 attitude								0.08	0.65	0.20	0.24	0.64	0.66
8 accuracy									0.24	0.45	0.52	0.70	0.45
9 communication										0.36	0.59	0.57	0.61
10 completeness											0.55	0.66	0.55
11 precision/clarity												0.65	0.53
12 overall UIS													0.83
13 Non-UIS overall													

- |                                      |                                  |
|--------------------------------------|----------------------------------|
| 1. Relationship with staff           | 8. Accuracy of information       |
| 2. Degree of training                | 9. Communication with staff      |
| 3. Reliability of information        | 10. Completeness of information  |
| 4. Understanding of systems/services | 11. Precision/Clarity of info    |
| 5. Relevancy of information          | 12. Overall UIS                  |
| 6. Feelings of participation         | 13. Overall Non-UIS satisfaction |
| 7. Attitude of staff                 |                                  |

First of all, it is worth paying attention to high correlation coefficients between each of the UIS items and non-UIS overall satisfaction<sup>7</sup>. As you see in Table 1, correlation coefficients between each item and the overall satisfaction ranged from 0.45 to 0.76. In addition, a correlation between the overall UIS and overall non-UIS satisfaction was very high (0.83). These relationships support the inter-item reliability of the UIS methodology in measuring total user satisfaction in the form of UIS. These relations were also observed after the subsequent interview survey, as I will discuss briefly in Chapter 8.

### 5.3.1 Overview of the UIS at the End of the Online Survey

Table 2 presents a summary of the UIS and the overall non-UIS satisfaction. Using the adjective qualifiers of Baroudi and Orlikowski (1988), -3 to -2 corresponds to 'extremely unsatisfied'; -2 to -1: 'quite unsatisfied'; -1 to 0: 'slightly unsatisfied'; 0: 'neither satisfied nor unsatisfied'; 0 to +1: 'slightly satisfied'; +1 to +2: 'quite satisfied'; +2 to +3: 'extremely satisfied'.

The overall UIS score, which could range<sup>8</sup> from -3 to +3, was 0.94 at the end of the online survey. Overall non-UIS satisfaction score, which could also range from -3 to +3, was 1.17. Average of these two scores was 1.06.

**Table 2: Summary of UIS at the End of Online Survey**

Info Category	Staff Category	Knowledge Category	Overall UIS	Overall Non-UIS Satisfaction
1.04	1.63	0.17	<b>0.94</b>	<b>1.17</b>

<sup>7</sup> This is a different measure from UIS. This numerical data came from a question that had a 7 rank ordinal scale.

<sup>8</sup> As I discussed in Chapter 2, an overall UIS score typically ranges -33 to +33 in a standardized way, assuming the number of items is 11. However, a modification of the calculation led to this range, -3 to +3.

As for the three UIS category score, which could also range from -3 to +3, the info category was 1.04, the staff category was 1.63 and the knowledge category was 0.17.

The result showed that the score of knowledge category value was very low. On the other hand, the score of the staff category was very high. The score of the info category was somewhere in between.

Next is more detailed discussion on each category.

### 5.3.2 Detailed Discussion on Each of the Tree Categories

#### 5.3.2.1 Knowledge Category

Table 3 presents scores of each item of UIS.

As I discussed in Chapter 2, this category had 3 items: 1) degree of training, 2) understanding of the systems/services and 3) feeling of participation. Definitions of each item are in Chapter 2. All of their scores, which can range from -3 to +3, were low. In particular, the scores of the degree of training and the understanding of systems/services were slightly negative (-0.02 and -0.07 respectively).

**Table 3: Scores of Each Items of UIS at the End of Online Survey**

(Descriptions in brackets indicate one of the three UIS categories.)

1	2	3	4	5	6	7	8	9	10	11
(staff)	(knowledge)	(info)	(knowledge)	(info)	(knowledge)	(staff)	(info)	(staff)	(info)	(info)
1.88	-0.02	1.46	-0.07	0.95	0.59	1.47	1.02	1.53	0.59	1.16

- |                                      |                                 |
|--------------------------------------|---------------------------------|
| 1. Relationship with staff           | 7. Attitude of staff            |
| 2. Degree of training                | 8. Accuracy of information      |
| 3. Reliability of information        | 9. Communication with staff     |
| 4. Understanding of systems/services | 10. Completeness of information |
| 5. Relevancy of information          | 11. Precision/Clarity of info   |
| 6. Feelings of participation         |                                 |

### **5.3.2.2 Staff Category**

Staff category also had 3 items: relationship with the HealthNet staff, attitude of the staff, and manner of communication with the staff. As shown in Table 3, scores of all these factors were around 1.5.

### **5.3.2.3 Info Category**

As presented in Table 3, scores of the 5 items of this category were around 1, except for completeness (comprehensiveness) of information, with a value of 0.59.

## **5.3.3 Relationship among UIS Items**

Table 1 presents results of the shotgun approach (Bernard, 1995, pp. 468-470) of correlation coefficients among all the items of the UIS, including overall UIS and overall non-UIS satisfaction. This table is based on the data of the online survey only. Major findings related to this table are as follows.

### **5.3.3.1 Relationship between Items of Staff Category and Overall non-UIS Satisfaction**

The most significant finding related to the staff category was that each of three items had a high correlation coefficient with non-UIS total satisfaction. As I discussed above, each item should have had positive correlation with the total satisfaction variable. Even if we take this into consideration, correlation coefficients between each factor and the total satisfaction were high. They were 0.76 for relationship with staff, 0.66 for attitude of staff and 0.61 for communication with staff. These three numbers were the top three ranking correlation coefficients. This suggested there were strong relationships among these three items. Additional discussion of this findings appears in Section 6.2.

### **5.3.3.2 Relationship among Degree of Training, Understanding of Systems/Services and Relevancy of Information**

Correlation coefficients among degree of training, understanding of systems/services and relevancy of information were high. They were 0.74

(the degree of training and the understanding of systems/services); 0.72 (the degree of training and relevancy of information); and, 0.73 (relevancy of information and the understanding of systems/services).

## **6 Questions Suggested by the Results of the Online Survey**

In this section, I will discuss what questions the results of the online survey raised for the subsequent face-to-face interview survey.

Other interpretations suggested by the results will be discussed along with data of the interview survey, later in Chapter 9 and Chapter 10.

### **6.1 New Question Related to the Knowledge Category**

Low UIS scores in the knowledge category suggested that users do not have enough knowledge of how to use HealthNet, nor do they know what kinds of services are available from HealthNet. It is one thing that users 'think' that they do not have enough knowledge; it is another that they 'really' do not have it. It would take an experimental research to prove that they are same. However, let us accept this suggestion by these low UIS scores in the knowledge category, and the suggestion leads to the following question.

New Question 1: Did the low level of understanding of systems/services prevent users from using HealthNet to its fullest potential?

Actually, as I discussed in Chapter 5, we observed a strong relationship between two UIS items: "understanding systems/services" and "relevancy of information". In addition, the UIS score of the "understanding of systems/services" was very low (slightly negative). These results suggested that the low level of understanding of systems/services might have prevented users from finding the relevant information that they needed.

In this sense, New Question 1 was an important question to answer.

## ***6.2 New Question Related to the Staff Category***

High UIS scores in the staff category suggested that users were quite satisfied with the work of the staff. In addition, this satisfaction has a strong relationship with overall satisfaction (Section 5.3.3.1). In this sense, users' satisfaction with the staff's performance might be taking a main role in keeping up users' overall satisfaction. However, these scores did not say anything about which staff they were satisfied with, local staff in Kathmandu, staff in the USA headquarter, or both. Thus, the question should be:

New Question 2: Is the high satisfaction which the users reported in the staff category based on local staff in Kathmandu, USA staff, or both?

## ***6.3 New Question Related to the Info Category***

In the info category, only completeness of information earned low score. This raised the following question:

New Question 3: Why was the degree of users' satisfaction with the completeness of information low?

## ***6.4 New Questions Related to System Stability***

Two of 24 respondents who wrote additional comments to the online questionnaire pointed out system instability. Below are new questions related this.

New Question 4: Have users experienced system instability?

New Question 5: Were users who experienced system instability different from other users in terms of their usage of HealthNet?

## **7 Design of Interview Questions**

As for the framework of a design of questions, I have already discussed in Section 3.2.3.2.

### ***7.1 Interview Design for the First Question in Chapter 6: Did the low level of understanding of systems/services prevent users from using HealthNet to its fullest potential?***

To answer New Question 1, whether or not the low level of the understanding of the system prevents users from making the most of HealthNet, I did two things:

- 1) I asked users some questions about their knowledge of HealthNet services (seven rank ordinal scale question and yes/no questions).
- 2) I asked users whether HealthNet has met their professional needs (seven rank ordinal scale question and yes/no question).

To those who had not responded to the online survey, I asked questions about usage status of electronic conferences, data retrieve services from databases and electronic publications. The questions were in the same format as in the online survey. Some of them were yes/no questions; the others were 6 category nominal scale questions. The 6 categorical answers were: 'zero', '1-5', '6-10', '11-15', '16-20' and '21 and more'.

### ***7.2 Interview Design for the Second Question in Chapter 6: Is the high satisfaction which the users reported in the staff category based on local staff in Kathmandu, USA staff, or both?***

To answer this question, not only did I ask users which was more helpful to them, local staffs or USA staffs, but I also developed two kinds of questions. The first was how frequently users communicated with each of the respective staffs. (These were a yes/no question or an open-ended question.) The other was to ask to what extent users were satisfied with each of the respective staffs. (They were seven rank ordinal questions.)

### ***7.3 Interview Design for the Third Question in Chapter 6: Why was the degree of users' satisfaction with the completeness of information low?***

Two of the respondents to the online questionnaire pointed out their needs for full text articles or non-text data, such as pictures, graphs, tables, etc. I thought that the lack of full text articles and non-text data could be one of the reasons that the satisfaction with completeness of information was low. Thus, I did two things.

I included questions that asked users if they wanted non-text data such as graphs, pictures, tables, etc. (seven rank ordinal scale question).

In addition, I included questions that would help me determine whether users wanted full text articles in their fields. If I asked users in a direct way like "would you like read full text articles through HealthNet?", almost all the users would answer yes. Thus, I asked users if there were any journals that they wanted to read through HealthNet.

### ***7.4 Interview Design for the Fourth and fifth Questions in Chapter 6: Have users experienced system instability? Were users who experienced system instability different from other users in terms of their usage of HealthNet?***

I included questions about stability<sup>9</sup> of the HealthNet node in Kathmandu and users' telephone line stability. They were seven rank ordinal scale questions.

## **8 Results**

In this chapter, I will discuss the results from the accumulated data from both the interview survey and the online survey. Interpretations of the results will be shown in Chapter 9 and Chapter 10.

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<sup>9</sup> The meaning of system stability here is accessibility to a node and dependability of email delivering.



## **8.1 *The Number and Rate of Responses***

### **8.1.1 *Sample Size***

Sample size was 34. Six of the interviewees were interviewed in pairs, such as a doctor with an information system manager, a manager with his/her secretary, etc. When their opinions were different, for the purpose of statistical data analysis, I took one of their answers which was given by the primary user in each organization. The other interviewee's answers were noted as additional data.

Response rate was 100%, though there were some missing data for several reasons.

13 of 34 interviewees were those who did not respond to the online survey. The other 21 were those who responded to it.

The total sample size of the online survey and the interview survey was 46. This was 73% of the eligible population, 63. The actual sample size of 46 was less than the target sample size of 52, which was derived from Krejcie and Morgan's formula for determining sample size (1970) to achieve a 5% confidence interval and 50% population parameter of a variable. The actual sample size did surpass 33, which achieves a 10% confidential interval. This low probability sample (90%) is one of the major limitations in this research.

## **8.2 *UIS at the End of the Interview Survey***

### **8.2.1 *Brief Discussion on Inter-item Reliability of UIS***

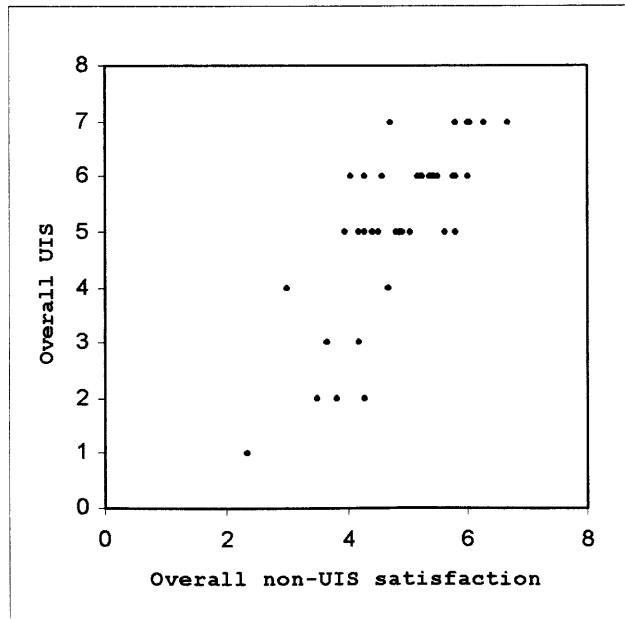
Table 4 shows that there are high correlation coefficients between each of the UIS items and overall non-UIS satisfaction. Correlation coefficients between each item and the overall satisfaction ranged from 0.33 to 0.73. In addition, a correlation between the overall UIS and overall non-UIS satisfaction was very high, 0.78. Figure 2 shows this relationship visually.

**Table 4: Correlation Coefficients among UIS Items, Overall UIS and Overall Non-UIS Satisfaction at the End of the Interview Survey**

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 relationship		0.36	0.52	0.23	0.30	0.38	0.68	0.20	0.62	0.35	0.32	0.66	0.72
2 training			0.25	0.62	0.66	0.20	0.53	0.42	0.34	0.50	0.26	0.75	0.53
3 reliability				0.04	0.16	0.38	0.36	0.25	0.45	0.31	0.19	0.57	0.33
4 understanding					0.68	0.26	0.36	0.45	0.31	0.35	0.19	0.66	0.45
5 relevancy						0.17	0.23	0.45	0.20	0.44	0.31	0.69	0.45
6 participation							0.46	0.41	0.30	0.45	0.16	0.58	0.57
7 attitude								0.17	0.66	0.34	0.22	0.68	0.73
8 accuracy									0.43	0.49	0.31	0.70	0.39
9 communication										0.53	0.43	0.71	0.58
10 completeness											0.42	0.73	0.55
11 precision/clarity												0.52	0.46
12 overall UIS													0.78
13 overall non-UIS													

- |                                      |                                  |
|--------------------------------------|----------------------------------|
| 1. Relationship with staff           | 8. Accuracy of information       |
| 2. Degree of training                | 9. Communication with staff      |
| 3. Reliability of information        | 10. Completeness of information  |
| 4. Understanding of systems/services | 11. Precision/Clarity of info    |
| 5. Relevancy of information          | 12. Overall UIS                  |
| 6. Feelings of participation         | 13. Overall non-UIS satisfaction |
| 7. Attitude of staff                 |                                  |

**Figure 2: Relationship between Overall UIS and Overall Non-UIS Satisfaction**



These relationships support the inter-item reliability of the modified UIS instrument that I employed in this survey to measure total user satisfaction in the form of UIS.

These analyses are not enough to calculate the precise inter-item reliability of the instrument; however, they suggest its inter-item reliability qualitatively.

### 8.2.2 Overview of the UIS at the End of the Interview Survey

The UIS results of the interview survey, along with the data from the preceding online survey, were very similar to the results of the online survey by itself. As I have already shown in Section 5.3.1, translations of scores are as follows: -3 to -2 corresponds to 'extremely unsatisfied'; -2 to -1: 'quite unsatisfied'; -1 to 0: 'slightly unsatisfied'; 0: 'neither satisfied nor unsatisfied'; 0 to +1: 'slightly satisfied'; +1 to +2: 'quite satisfied'; +2 to +3: 'extremely satisfied'.

The overall UIS score, which could range from -3 to +3, was 0.87. The overall non-UIS satisfaction score, which also could range from -3 to +3, was 1.19. The average of these two scores were 1.03.

As for scores of the 3 UIS categories, which also could range from -3 to +3, the results were as follows:

The info category was 0.91; the staff category was 1.52; and the knowledge category was 0.19.

**Table 5: Summary of UIS Results at the End of Interview Survey**

Info Category	Staff Category	Knowledge Category	Overall UIS	Overall Non-UIS Satisfaction
0.91	1.52	0.19	0.87	1.19

The results clearly showed that, compared with the others, the score of knowledge category was very low, though it was slightly positive. On the other hand, the score of the staff category was very high. That of info category was somewhere in between.

### 8.2.3 Detailed discussion on each of the tree categories

#### 8.2.3.1 Knowledge Category

All of the scores of these variables were low, especially the value of the degree of training and the understanding of systems, which was around zero (Table 6).

#### 8.2.3.2 Staff Category

As shown in Table 6, scores of all these factors were quite high. They were all around 1.5.

#### 8.2.3.3 Info Category

Scores of the 5 items of this category were around 1, except for completeness (comprehensiveness) of information, which was 0.55 (Table 6).

**Table 6: Scores of Each Item of UIS**

(Descriptions in brackets indicate one of three UIS categories.)

1 (staff)	2 (know- ledge)	3 (info)	4 (know- ledge)	5 (info)	6 (know- ledge)	7 (staff)	8 (info)	9 (staff)	10 (info)	11 (info)
1.77	-0.10	0.99	-0.03	0.94	0.51	1.43	0.86	1.36	0.55	1.20

- |                                      |                                      |
|--------------------------------------|--------------------------------------|
| 1. Relationship with staff           | 7. Attitude of staff                 |
| 2. Degree of training                | 8. Accuracy of information           |
| 3. Reliability of information        | 9. Communication with staff          |
| 4. Understanding of systems/services | 10. Completeness of information      |
| 5. Relevancy of information          | 11. Precision/Clarity of information |
| 6. Feelings of participation         |                                      |

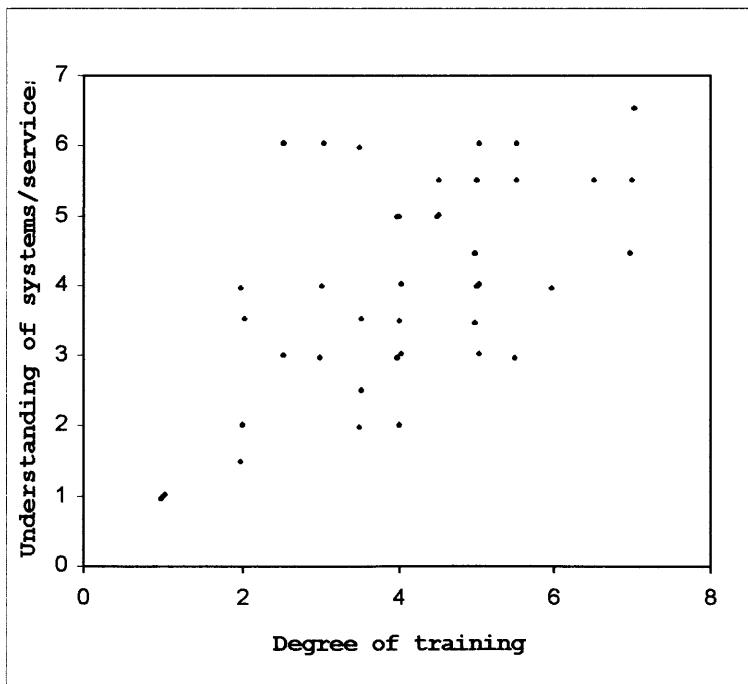
### 8.2.4 Relationships among items of the UIS survey

Table 4 presents results of the shotgun approach<sup>10</sup> of correlation coefficients among all the items of the UIS, including non-UIS overall satisfaction. As I mentioned in Chapter 5, the overall satisfaction here is a different statistic from overall UIS. In this section, I will discuss major findings relating to this table.

#### 8.2.4.1 Relationships among 3 Items of the Staff Category and Overall non-UIS Satisfaction

These relationships in Table 4 are similar to results described earlier in Section 5.3.3.1. Each of three items has high correlation

**Figure 3: Relationship between Degree of Training and Understanding of Systems/Services**

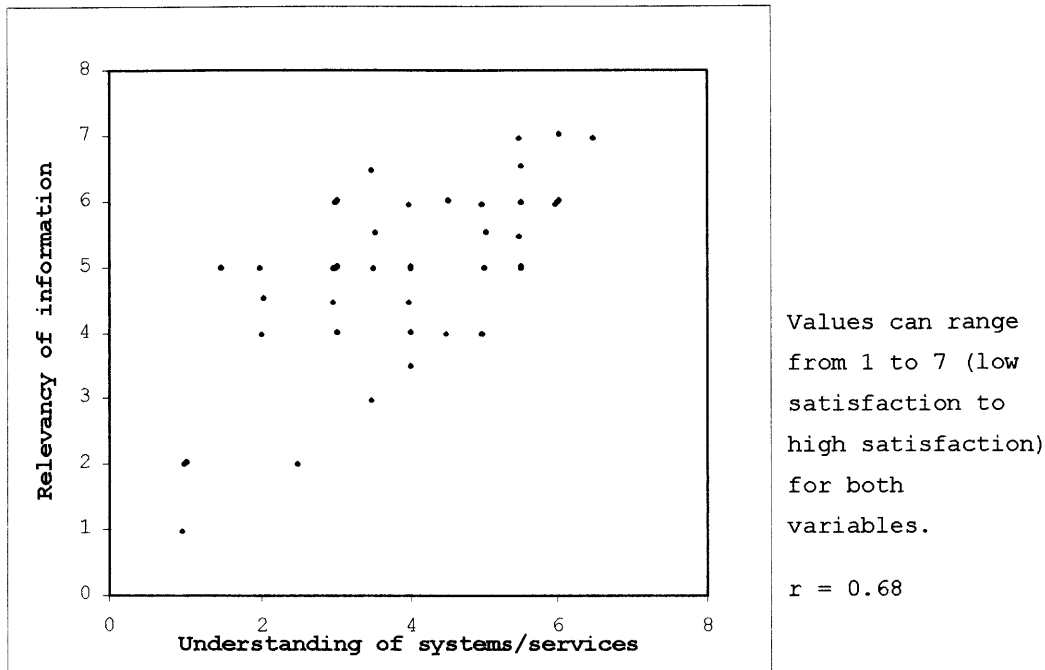


Values can range from 1 to 7 (low satisfaction to high satisfaction) for both variables.

$r = 0.62$

<sup>10</sup> This is the approach that involves constructing a correlation matrix of all combinations of variables in a study. (Bernard, 1995, pp. 466-471.)

**Figure 4: Relationship between Understanding of Systems/Services and Relevancy of Information**



coefficient with the total satisfaction. They are 0.72 for relationship with staff, 0.73 for attitude of staff and 0.58 for communication with staff. These were the three highest correlation coefficients.

#### **8.2.4.2 Relationships among Degree of Training, Understanding of Systems/Services and Relevancy of Information**

Correlation coefficients among relevancy of information, degree of training and understanding of systems/services were still high. They were 0.68 (relevancy of information and the understanding to systems/services); 0.66 (relevancy of information and the degree of training); and 0.62 (the degree of training and the understanding of systems/services). Figure 3 and 4 show two of these relationships visually. These suggested that there were strong relationships among these three items. More discussion on the interpretation will be in Chapter 9.

### **8.3 Non-UIS Related Results and Their Relationship with UIS**

#### **8.3.1 Descriptive Statistics**

##### **8.3.1.1 User Types and Status**

1) 87% of 46 respondent were organizational subscribers. The remainder were individual subscribers.

2) The mode of the number of the users per organizational subscriber was somewhere from 1 to 5.

3) 72% of organizational subscribers were non-governmental organizations. (The number of respondents to related questions was 29.) There was one organization that had combined governmental and non-governmental aspects. The remainder were governmental organizations, including United Nations related ones.

**Table 7: Characteristics of Organizations**

(Values are the number of organizations.)

Hospital / clinic	Educational organization	Research center	Consulting organization	Other
13	6	9	6	14

4) Table 7 shows the distribution of the types of organizations. Hospitals were the most common organizations. Some organizations had two or more types of activities. In that case, each type was counted. This table also includes organizations in which individual subscribers work.

5) Table 8 shows the distributions of types of profession of the interviewees. If interviewees had two or more types of professions, each type was counted. Physicians (and their assistants) and managers were the most common professions.

**Table 8: Characteristics of Users' Professions**

(Values are the number of persons.)

Physician and his/her assistants	Pharmacist	Researcher	Community health worker	Manager	Secretary	Librarian	Other
13	2	5	1	8	6	4	5

6) In 16 of the 29 organizational-subscriber respondents, primary users in each organization were non-specialist users. All of the 5 individual subscriber interviewees were specialists.

### **8.3.1.2 Current Pattern of Usage of Services**

1) The mode of the number of electronic conference subscriptions per user was 1 (Table 9). The number of conferences offered in HealthNet is over 20.

2) The percentage of users who had used data retrieval services in the previous 3 months was 41% (Table 10).

3) The mode of the number of electronic publication subscriptions per user was two. The number of publications offered in HealthNet is about 20.

4) Table 11 presents the number of users subscribing to each publication. Besides *HealthNet News*, the distribution was quite flat.

5) Table 12 shows that 11 (30%) of 37 users had posted messages on electronic conferences at least once in the previous 3 months.

6) Table 13 presents the reasons users had never posted any message in the previous 3 months. The three major reasons were: (a) there were no conferences that were relevant to their specialty or their organizational activities; (b) they were not familiar with how to post a message; and (c) they had nothing to post. ((a) and (c) could overlap each other.)



**Table 9: # of Conferences Subscribed for**

	# of conferences						Total
	0	1	2	3	4	5 or more	
# of subscribers (%)	8 (19%)	13 (30%)	9 (21%)	10 (23%)	3 (7%)	0 (0%)	43 (100%)

**Table 10: Users of Database Services in the Previous 3 Months**

	Yes	No	Total
# of users (%)	17 (41%)	24 (59%)	41 (100%)

**Table 11: Distribution of # of Users among Publications**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
36 (90%)	3 (8%)	6 (15%)	5 (13%)	15 (38%)	13 (33%)	13 (33%)	7 (18%)
<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	
10 (25%)	4 (10%)	5 (13%)	4 (10%)	6 (15%)	7 (18%)	6 (15%)	

- |  |   |
|--|---|
| 1. HelathNet News                      | 9. AIDS Action                            |
| 2. African Medical Librarians Bulletin | 10. CBR News                              |
| 3. WHO Library Digest for Africa       | 11. Health Action                         |
| 4. WHO/AFRO Infodigest                 | 12. HDDFlash                              |
| 5. AIDS Bulletin                       | 13. Emerging Infectious Diseases          |
| 6. Population Issues                   | 14. Morbidity and Mortality Weekly Report |
| 7. Practical Pointers on Primary Care  | 15. Other                                 |
| 8. Child Health Dialogue               |   |

**Table 12: Proportion of Users Posting Messages on Conferences**

	Yes	No	Total
# of users (%)	11 (30%)	26 (70%)	37 (100%)

**Table 13: Reasons Users Never Posted Any Message on Conferences in the Previous 3 Months**

	Reason 1	Reason 2	Reason 3	Reason 4	Reason 5	Other	total
# of users (%)	6 (19%)	7 (22%)	0 (0%)	7 (22%)	11 (34%)	1 (3%)	32 (100%)

Reason 1: They were too busy with their work.

Reason 2: They had nothing to post.

Reason 3: They don't like to post anything.

Reason 4: They were not familiar with how to post a message.

Reason 5: There were no conferences that were relevant to my specialty or my organization's activities.

### 8.3.1.3 Users and Kathmandu/USA staffs

1) Table 14 shows that 29 of the 32 respondents requested information from local staffs in Kathmandu in the previous month through email, telephone, in person, or anyway else. On the contrary, 5 of 32 respondents requested information from USA staff in the previous month.

2) 28 of 32 respondents had positive feelings regarding the local staff's rapid responses to their requests. Three were negative. One was neutral.

3) 6 of 7 respondents had positive feelings regarding the USA staff's rapid responses to their requests. One was neutral.

**Table 14: # of Users Who Had Requested Information from Local Staff or USA Staff in any Mode in the Previous one Month**

	Local Staff	USA Staff
# out of 32 respondents (%)	29 (91%)	5 (16%)

4) Of 33 respondents, the average overall satisfaction with the Kathmandu staff was 6.00, on a 1 to 7 scale.

5) Of 7 respondents, the average overall satisfaction with the USA staffs was 6.57, on a 1 to 7 scale.

#### **8.3.1.4 Willingness to Participate in HealthNet**

1) To the question of whether or not users were willing to register for a Nepalese email list that would be for a general information exchange purpose, 30 of 34 respondents said yes. 3 of 34 respondents said that they had already had a list. One was said no.

2) 32 of 34 respondents were willing to add their name and specialty, or their organization's, to a directory search service that the HealthNet headquarters is planning to make available.

3) 31 of 33 respondents said that they were willing to provide other users with information derived from personal sources or from their organizations.

#### **8.3.1.5 Knowledge of HealthNet Services and Demand for Training**

1) 20 of 34 respondents said that they did not have any hard copy materials explaining HealthNet services (Table 15).

2) 16 of 33 respondents said that they did not have a manual of the HealthNet computer application (Table 16).

3) As for training, more than half of the respondents liked taking formal class sessions better than visiting staff offices individually. (Table 17)

**Table 15: Proportion of Users Who Said That They Had Hard Copy Materials Explaining HealthNet Services**

	Yes	No	Total
# of users (%)	14 (41%)	20 (59%)	34 (100%)

**Table 16: Proportion of Users Who Said That They Had a Manual of the HealthNet Application**

	Yes	No	Total
# of users (%)	17 (52%)	16 (48%)	33 (100%)

**Table 17: Users' Preference for Style of Training Session**

	Visiting staff offices individually	Taking formal class sessions	N/A	Total
# of Respondents (%)	13 (41%)	17 (53%)	2 (6%)	32 (100%)

### 8.3.1.6 System Stability

Table 18 shows that 9 of 33 respondents had negative feelings on the stability<sup>11</sup> of the HealthNet node in Kathmandu. Many of the users added comments saying that there were too many busy signals when they tried to access the node. Some users said that email was not delivered sometimes.

**Table 18: Users' Feelings on the Stability of the HealthNet Node in Kathmandu**

	Positive	Negative	Neutral	Total
# of Respondents (%)	22 (67%)	9 (27%)	2 (6%)	33 (100%)

Note: The meaning of system stability here is accessibility to a node and dependability of email delivering.

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<sup>11</sup> The meaning of system stability here is accessibility to a node and dependability of email delivering.

### 8.3.1.7 Demand for New Services

- 1) 26 of 30 respondents had journals that they wanted to read on HealthNet (Table 19).
- 2) Popular journals they mentioned were general journals, such as *New England Journal of Medicine*, *British Medical Journal* and *Lancet*.
- 3) 29 of 34 respondents said HealthNet should provide non-text data, such as graphs, tables, pictures, etc., as well as text data (Table 20).

However, please note that these numbers could imply nothing about to what extent users needed them.

**Table 19: Demand for New Journals**

(Do users have any journals that they want to read periodically, which are not currently provided by HealthNet?)

	Yes	No	Total
# of users (%)	26 (87%)	4 (13%)	30 (100%)

**Table 20: Should HealthNet Provide Non-text Data?**

	Yes	No	Total
# of users (%)	29 (85%)	5 (15%)	34 (100%)

### 8.3.1.8 Users' Types of Professions and Satisfaction

Because of the small sample size, professions were grouped into two types. One is non-specialist users; the other is specialist users. The non-specialist users include managers, secretaries and librarians. The

specialist users include physicians, their assistants, researchers, pharmacists and community health workers. If users had two or more professions, the primary one was counted. The number of non-specialist respondents was 16; that of specialist respondents was also 16.

1) The average overall UIS score over the 16 non-specialist users was 0.46; that of the 16 specialist users was 1.39 on a -3 to +3 scale (Table 21) Using a T-test, significant difference was found between these two types of users at  $p = 0.0006$  (one tail).

2) In the case of the overall non-UIS satisfaction score, the average was 0.81 for non-specialist users, and 1.67 for specialist users in a -3 to +3 scale (Table 21). Using a T-test, significant difference was found between these two types of users at  $p = 0.04$  (one tail).

3) Table 22 shows that non-specialist users were less satisfied than specialists with respect to all the 3 UIS categories. Using T-tests, significant difference was found between these two types of users at  $p = 0.002$  (one tail) for Info Category;  $p = 0.003$  (one tail) for Staff Category; and,  $p = 0.009$  (one tail) for Knowledge Category.

4) Table 23 shows that non-specialist users were less satisfied than specialist users over all the 11 UIS items.

**Table 21: Users' Types of Professions and Overall Satisfaction**

Non-specialist users		Specialist users	
Average score of Overall UIS	Average score of overall non-UIS satisfaction	Average score of Overall UIS	Average score of overall non-UIS satisfaction
0.46 (-3 to +3)	0.81 (-3 to +3)	1.39 (-3 to +3)	1.67 (-3 to +3)

Result of T-test: UIS:  $p = 0.0006$  (one tail); non-UIS: 0.04 (one tail).  
 Note: non-specialist users include managers, secretaries and librarians. Specialist users include physicians, physician assistants, researchers, pharmacists, and community health workers. If users had two or more professions, the primary one was selected. The number of non-specialist user respondents was 16; that of specialist user respondents was also 16.

**Table 22: Users' Types of Professions and Satisfaction with Respect to Each Category of UIS**

Non-specialist users			Specialist users		
Info Category	Staff Category	Knowledge Category	Info Category	Staff Category	Knowledge Category
0.45	1.08	-0.16	1.35	2.04	0.68

Result of T-test: Info Category:  $p = 0.002$  (one tail); Staff Category:  $p = 0.003$  (one tail); Knowledge Category:  $p = 0.009$  (one tail).  
 Note: As for the definitions of non-specialist users and specialist users, please see the note of Table 21.

**Table 23: Users' Types of Professions and Satisfaction with Respect to Each Item of UIS**

	1	2	3	4	5	6	7	8	9	10	11
Non-specialist	1.31	-0.38	0.08	-0.28	0.78	0.18	1.09	0.57	0.83	-0.07	0.87
Specialist users	2.16	1.06	1.30	0.44	1.37	0.54	2.00	1.25	1.97	1.22	1.63

Note: As for the definitions of non-specialist users and specialist users, please see the note of Table 21. The definitions of the numbers of 1 to 11 are as follows:

- |                                      |                                 |
|--------------------------------------|---------------------------------|
| 1. Relationship with staff           | 7. Attitude of staff            |
| 2. Degree of training                | 8. Accuracy of information      |
| 3. Reliability of information        | 9. Communication with staff     |
| 4. Understanding of systems/services | 10. Completeness of information |
| 5. Relevancy of information          | 11. Clarity of info Overall UIS |
| 6. Feelings of participation         |                                 |

### 8.3.1.9 Communication among Users

To the question of whether or not users had ever had provided other users with information about their specialties or resources of their organizations, 6 (21%) of 29 respondents said yes; 23 (79%) said no.

The fifth and sixth results in Section 8.3.1.2, which are about message-posting on conferences, are also related to communication among users.

### 8.3.2 Relationships among variables

#### 8.3.2.1 Sufficiency of the Initial Training and the Understanding of Systems/Services

Table 24 shows the relationship between two variables: 1) whether or not users thought they had enough initial training when they registered for HealthNet, and 2) whether or not users thought that they had enough understanding of how to use

**Table 24:**  
**Relationship between Satisfaction in Initial Training and Understanding of Systems/Services**

Opinion about initial training	Understanding of systems/services		Total
	+	-	
+	8	2	10
-	2	9	11
<b>Total</b>	10	11	21

Result of Fishier's Exact Test:  $p=0.007$  (one tail)  
 "+" = Yes or Positive Feeling/Opinion  
 "-" = No or Negative Feeling/Opinion

HealthNet services. The relationship was tested using a statistical method called Fisher's exact test. A significant positive relationship was observed for the two variables (one tail  $p$ -value = 0.007).

Both variables were converted from seven rank ordinal scales to two category nominal data. As for the conversion principles, I already discussed them in Chapter 4. One of the scales (understanding of systems/services) was one of the UIS items.

**Table 25: Relationship between Knowledge of Services and Whether Professional Needs Were Met**

Knowledge of services	Professional needs were met.		Total
	+	-	
+	11	0	11
-	8	8	16
<b>Total</b>	19	8	27

Result of Fishier's Exact Test:  $p=0.006$  (one tail)  
 "+" = Yes or Positive Feeling/Opinion  
 "-" = No or Negative Feeling/Opinion

#### 8.3.2.2 Degree of knowledge of HealthNet services and meeting in professional needs

Table 25 presents the relationship between two variables: 1) whether or not users thought that they had enough knowledge of what kinds of



services were available in HealthNet; and 2) whether or not HealthNet met users' professional needs. The relationship was tested using Fisher's exact test. A significant positive relationship was observed (one tail p-value = 0.006).

Again, both variables were converted from seven rank ordinal scales to two category nominal data.

### 8.3.2.3 Degree of Knowledge of HealthNet Services and Subscription for Electronic Conferences

Table 26 presents the relationship between two variables: 1) whether or not users thought that they had enough knowledge of what kinds of services were available on HealthNet; and 2) whether or not users subscribed to any electronic conferences on HealthNet. Fisher's exact test was conducted. There was a significant positive relationship between them (one tail p-value = 0.04).

**Table 26: Relationship between Knowledge of Services and Subscription for Conferences**

Knowledge of services	Subscription for conferences		Total
	one or more	none	
+	12	0	12
-	10	7	17
<b>Total</b>	<b>22</b>	<b>7</b>	<b>29</b>

Result of Fisher's Exact Test: p=0.01 (one tail)  
 "+" = Yes or Positive Feeling/Opinion  
 "-" = No or Negative Feeling/Opinion

### 8.3.2.4 Degree of Knowledge of Healthnet Services And Opinion on Sufficiency of Information Provided

Table 27 presents that relationship between two variables: 1) whether or not users thought that they had enough knowledge

**Table 27: Relationship between Knowledge of Services and Opinion on Information Sufficiency**

Knowledge of services	Sufficiency of info		Total
	+	-	
+	10	1	11
-	8	9	17
<b>Total</b>	<b>18</b>	<b>10</b>	<b>28</b>

Result of Fisher's Exact Test: p=0.006 (one tail)  
 "+" = Yes or Positive Feeling/Opinion  
 "-" = No or Negative Feeling/Opinion

of what kinds of services were available on HealthNet; and 2) whether or not users thought that HealthNet provided sufficient information. The relationship was tested by Fisher's exact test. A significant positive relationship was observed (one tail p-value = 0.02).

Again, both variables were converted from seven rank ordinal scales to two category nominal data.

### 8.3.2.5 System Stability and Experience in Posting Messages

Table 28 presents the relationship between two variables: 1) whether or not users thought that HealthNet node in Kathmandu was stable<sup>12</sup>; and 2) whether or not users had ever posted messages on any electronic

**Table 28: Relationship between Node Stability and Message Posting in Previous 3 Months**

Stability of node	Message posting		Total
	one or more	none	
+	8	14	22
-	0	9	9
Total	8	23	31

Result of Fisher's Exact Test: p=0.04 (one tail)

"+" = Yes or Positive Feeling/Opinion

"-" = No or Negative Feeling/Opinion

conferences in HealthNet in the previous three months. The relationship was tested by Fisher's exact test. A significant positive relationship was observed (one tail p-value = 0.04). All who had negative opinions on stability of the node had never posted a message to any electronic conference.

The independent variable was converted from a seven rank ordinal scale; the dependant variable was converted from a six category ordinal nominal scale measuring the number of times of posting.

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<sup>12</sup> As for the definition of stability, see the note in Section 8.3.1.6

### 8.3.2.6 Information Reception and Provision by Users

Table 29 shows the relationship between two variables: 1) whether or not users used any database through HealthNet in the previous three months; and 2) whether or not users had ever posted messages on any electronic conferences on HealthNet in the previous three months.

**Table 29: Relationship between Database Usage and Message Posting in Previous 3 Months**

Database usage	Message posting		Total
	one or more	none	
+	9	6	15
-	1	17	18
<b>Total</b>	10	23	33

Result of Fisher's Exact Test:  $p=0.001$  (one tail)  
 "+" = Yes or Positive Feeling/Opinion  
 "-" = No or Negative Feeling/Opinion

A significant positive relationship was observed through Fisher's exact test (one tail  $p$ -value = 0.001).

Both variables were converted from a six category ordinal nominal scale measuring the number of times of usage or posting.

### 8.3.2.7 Users' Types of Professions and Feeling on Completeness of Information

Table 30 shows the relationship between two variables: 1) whether or not a user's profession is a specialist, and 2) users' satisfaction with the completeness of information provided. The relationship was tested using a statistical method called Fisher's exact test. A significant negative relationship was observed for the two variables (one tail  $p$ -value = 0.04).

**Table 30: Relationship between Users' Types of Jobs and Feelings on Completeness of Information**

Specialist or not	Completeness (comprehensiveness) of info		Total
	+	-	
+	12	2	14
-	5	6	11
<b>Total</b>	17	8	25

Result of Fisher's Exact Test:  $p=0.04$  (one tail)  
 "+" = Yes or Positive Feeling/Opinion  
 "-" = No or Negative Feeling/Opinion

As for definitions of specialists and non-specialists, please

refer to Section 8.3.1.8. The variable "Completeness of Information" was converted from seven rank ordinal scales to two category nominal data. This variable was one of the UIS items.

#### ***8.4 Findings from Communication with System Operator***

I had several informal conversations with the system operator and observed his job by chance.

He said that his first priority was to make the HealthNet server in Kathmandu stable. Actually, many users pointed out that the HealthNet system in Nepal has progressed in the last six months. In addition, during my stay in Kathmandu, the system operator obtained a brand new IBM compatible computer with a pentium CPU and Motorola 36600 modems from the USA headquarters. He installed that computer as a system server, and when I left Kathmandu, he was testing it. He also said that, in two weeks, he was going to install 3 more telephone lines to the HealthNet access node, which had had only one line. He had already obtained permission for the expansion from the government authority concerned.

These findings mean that the stability and accessibility of the HealthNet Nepal system is likely to significantly increase in the very near future.

#### ***8.5 Other Findings***

##### ***8.5.1 Inefficiency of Indirect Search***

One user said that indirect database search could lead to loss of time because what he wanted and what he got through a system operator were sometimes different. 'Indirect search' means here that users who need information do not search for it by themselves, but instead request the search from the HealthNet staff.

### *8.5.2 System Stability Could be Crucial to Non-Kathmandu Valley Users*

One non-Kathmandu Valley user said that, to users who are outside Kathmandu, system stability was crucial because they had to pay long distance call fees when calling Kathmandu staff to resolve problems with the system.

### *8.5.3 PC vs. Mac*

According to the system operator, three users were using a Macintosh computer. One of the interviewees used a Macintosh computer. He said that HealthNet provided a Macintosh application to access HealthNet; however, it was very complicated to use.

## **9 Answers to the Operational Questions Presented in Chapter 6**

### ***9.1 Answer to the first question in Chapter 6: Did the low level of understanding of systems/services prevent users from using HealthNet to its fullest potential?***

The answer is that a low level of understanding of systems/services might prevent users from using HealthNet to its fullest potential.

Explanation is as follows:

First of all, most users did not make good use of the HealthNet resources, as reflected in the data describing the current pattern of service usage, especially in under-usage of electronic conferences and database services. (See Section 8.3.1.2.)

Second, this low level of usage was caused by the low level of understanding of systems/services. This is based on the following four results, also discussed in Chapter 8:

Those who had positive feelings about their knowledge and understanding of systems/services were more likely:

1) to be satisfied with the relevancy of information provided by HealthNet. (See Section 8.2.4.2.)

2) to think that the net satisfied their professional needs. (See Section 8.3.2.2.)

3) to use at least one electronic conference. (See Section 8.3.2.3.)

4) to think that the net provided sufficient information. (See Section 8.3.2.4.)

Neither correlation coefficients nor Fisher's exact test imply anything about causation between the two variables concerned. However, these results suggest that lack of knowledge discouraged users from using the HealthNet resources actively.

### ***9.2 Answer to the Second question in Chapter 6: Is the high satisfaction which the users reported in the staff category based on local staff in Kathmandu, USA staff, or both?***

The answer is that users' high satisfaction in the staff category might be based mainly on the performance of Kathmandu staffs.

Findings about users' communication status with Kathmandu staff and USA staff clearly showed that users were communicating with local staff much more than USA staffs. Their communication with USA staff was very limited. (See Section 8.3.1.3) Thus it is reasonable that users' satisfaction was based on Kathmandu staff. Actually, their satisfaction with the Kathmandu staff was very high as I discussed in Section 8.3.1.3.

As for USA staff, users' communication with them was very limited. Thus, I can make no conclusions. However, it is noteworthy that those who had communicated with them showed high satisfaction as I discussed in Section 8.3.1.3.

### ***9.3 Answer to the Third Question in Chapter 6: Why was the degree of users' satisfaction with the completeness of information low?***

My research offered no clear answer to this question. As I discussed in Chapter 8, I tried to answer this question by exploring the relationship between a UIS score of completeness of information and

users' demand for full text articles as well as non-text data. However, it was impossible to determine the relationship between them because the number of users who said 'no' to the questions about demand for full text articles and non-text data was too small to do any analysis (Table 19 and 20).

Possible alternative explanation is as follows:

As I discussed in Section 8.3.2.7, non-specialist users were significantly less satisfied with completeness (comprehensiveness) of information than specialist users. On the other hand, HealthNet is targeted basically at the health specialists, not for non-specialists. Thus, non-specialist might become less satisfied with the net, especially with the information aspect of the net. However, this does not necessarily explain why the completeness of information was the extreme case, compared with other information-related aspects, such as relevancy of information, precision/clarity of information, etc.

#### ***9.4 Answer to the Fourth Question in Chapter 6: Have users experienced system instability?***

The findings about system stability suggest that significant numbers of users experienced system instability of HealthNet. (See Section 8.3.1.6.) However, since the system operator was expanding the number of telephone lines as well as installing a new server and modems, this problem may be solved in the very near future.

#### ***9.5 Answer to the Fifth Question in Chapter 6: Were users who experienced system instability different from other users in terms of their usage of HealthNet?***

The observed strong negative relationship between node stability and experience in posting messages suggests that system stability might discourage users from participating in HealthNet more actively. (See Section 8.3.2.5.)

Fisher's exact test itself implies nothing about the causal relationship between the two variables concerned. However, it is

reasonable to think that the increase in system stability will facilitate users' participation in the system.

## **10 Conclusion and Recommendations**

### ***10.1 Summary of Limitations***

At the beginning of this conclusion and recommendation chapter, it is noteworthy to pay attention to major limitations in this survey because what I will address in this chapter should take into account these limitations. The major limitations are as follows:

- 1) Sample size was relatively small. (See Section 3.2.3.1.2.1 and 8.1.1. for more detail.)
- 2) Convenience sampling was employed, instead of stratified random sampling. (See Section 3.2.3.1.2.2 for more detail.)
- 3) The standardized UIS calculation was modified so that it might be adapted better to this particular survey. However, the modified calculation has not been tested to prove its validity and reliability. (See Section 4.1 for more detail.)
- 4) The UIS measuring instruments have been developed in industrialized countries, not in developing countries. (See Section 2.1.1 for more detail.)
- 5) In the case of organizational subscribers, the interviews were conducted with only a primary user in each organization. The interviews did not cover other users in each organization. (See Section 3.2.3.1.2.2 for more detail.)
- 6) Users who had any difficulty in connecting HealthNet Nepal were more unlikely to respond to the online questionnaires. (See Section 3.2.2.1.3.)
- 7) 7 rank ordinal data (or 6 rank ordinal data) were often dichotomized to two category nominal data in this research. This dichotomization had not been tested. (See Section 4.2 for more detail.)



## ***10.2 Users' Current Satisfaction Status***

Overall, users of HealthNet Nepal are generally satisfied with HealthNet in terms of the information it provides and the medium of telecommunication. However, users' satisfaction differs according not only to different aspects of the net, such as information product, staff performance and users' knowledge of the net, but also to users' different professional characteristics.

### ***10.2.1 Difference in Satisfaction according to Different Aspects of HealthNet***

Users are satisfied with the HealthNet staff in terms of their responsibility, accountability and cordiality to users (Section 8.2.2). In addition, this high level of satisfaction seems to have strong influence on the overall satisfaction (Section 8.2.4.1)<sup>13</sup>. This satisfaction may be essentially limited to the Kathmandu local staff since users seldom communicate with the USA staff. Those who do communicate with the USA staff, however, are satisfied with them (Section 8.3.1.3).

As for their knowledge of systems and services of HealthNet, the majority of users have the feeling that their knowledge is insufficient. They are not satisfied with the training provided to them, and frequently report that training is insufficient (Section 8.2.3.1). In addition, the majority of users do not have access to essential documents, such as an information guide or an application manual (Section 8.3.1.5).

Users are generally satisfied with the information product that HealthNet provides (Section 8.2.2). However, they are not satisfied with completeness of information, one of the aspects of the information product (Section 8.2.3.3). This low level of satisfaction was reported mainly by non-specialist users, who are slightly unsatisfied with the

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<sup>13</sup> A correlation coefficient does not confirm any causal relationship between two factors by itself. However, in this case, there seems to be causal relationship between users' satisfaction with staff performance and overall satisfaction.

completeness of information (8.3.1.8). I will discuss this issue more in the following section.

### ***10.2.2 Difference in Satisfaction according to Different Professions***

Because of the small sample size, users were grouped into two types. One is non-specialist users, such as managers and secretaries, including librarians. The other is specialist users, such as physicians, their assistants, researcher, pharmacists, and community health workers.

Non-specialist users are less satisfied with HealthNet Nepal than specialist users. This result is observed with all UIS items as well as in overall non-UIS satisfaction. This difference in satisfaction was most extreme in reaction to the completeness of information aspect of the net. (See Section 8.3.1.8 and 8.3.2.7.) The reason for this difference may be that the net is designed for the health-related specialists providing information and ways of communication in their specific areas.

## ***10.3 What Problems Does HealthNet Nepal Have?***

### ***10.3.1 Problem concerning Inefficient Use of Existing Resources***

The main problem with HealthNet Nepal has become quite clear as a result of this survey. The problem is that users cannot make good use of existing resources and communication capability in HealthNet Nepal because of their insufficient knowledge of systems and services of the net. In other words, very little of the potential of the net is realized right now. For example, the frequency of usage of services is low, especially participation in electronic conferences, as demonstrated in Section 8.3.1.2. Solving this problem should be a first priority over introducing new services.

### ***10.3.2 Problem concerning Secondary Users in Each Organization***

Another problem is about secondary users in each organization. Most of subscribers to HealthNet Nepal are organizational ones (Section

8.3.1.1). Those organizations may have specialists within them. However, as I discussed in Section 8.3.1.1, the majority of the primary users in each organization are non-specialist users. In addition, non-specialist users are less satisfied with HealthNet than specialist users (Section 8.3.1.8 and 8.3.2.7). These phenomena may have been causing under-usage of HealthNet because HealthNet is targeted to specialist users, not to non-specialist ones. Thus, it is important to encourage specialist-secondary-users in each organization to utilize HealthNet more actively.

### ***10.3.3 Problem about Disadvantages of non-Kathmandu Valley users***

There is also another problem. It is about a disadvantage of non-Kathmandu-Valley users vis-a-vis Kathmandu Valley users. This survey may be insufficient to examine how geographic diversity affects reported levels of satisfaction because almost all of the interviews took place in the Kathmandu Valley area. This notwithstanding, it is clear that Non-Kathmandu users are at a disadvantage vis-a-vis users in Kathmandu Valley. They have much more difficulty in contacting system operators for help than do Kathmandu-valley users. In addition, they have to pay long-distance telephone call fees to access the one node of HealthNet that is located in Kathmandu. Actually, one of the interviewees in a non-Kathmandu area pointed out this disadvantage concerning long distance calls. (See Section 8.5.2.)

## ***10.4 What Should be Done to Solve the Problems? (Recommendations)***

### ***10.4.1 Recommendations concerning Inefficient Use of Existing Resources***

As I discussed in Section 9.1, a cause of the inefficient use of existing resources is users' insufficient knowledge of systems/services. Thus, the problem boils down to how we can improve users' knowledge of systems/services.

Based on the results of this research, I recommend providing users with training sessions.

The system operator has been providing some free training sessions at his office and at users' sites upon request. However, the survey results suggest that this style of provision of training has not been enough. (See Section 8.2.3.1 and Section 8.3.1.5.) Furthermore, there has been only one system operator. It seemed impossible for him to cover all the users, especially the ones outside Kathmandu.

Thus, formal hands-on sessions should be provided. They will be more efficient in that only one system operator will be able to instruct many users. In addition, the majority of users preferred formal class sessions to individual visiting. (Section 8.3.1.5.)

Then, how should we provide training sessions? This question needs further investigation. I will discuss this issue later in Section 10.5.1.1.

#### *10.4.2 Recommendations concerning Secondary Users Problem*

Another priority objective is to facilitate communication among all users in Nepal. Under the current circumstances, there is little information provided to users about who else is in the net and about what their specialties are, much less about secondary users in each organization. Actually, the results show that there is little communication among users of HealthNet Nepal. (See Section 8.3.1.9.)

It is very important to facilitate inter-user communication because it is likely that users experience common problems in terms of system utilization. In addition, there are many health-related professionals and organizations in the net. Increasing information flow in the net will improve not only users' knowledge of the HealthNet systems/services but also quality and quantity of information that users can access through HealthNet.

The system operator in Nepal has recently organized a Nepal mailing list. In addition, the SatelLife headquarters in Boston is going to introduce a user directory search service. Fortunately, users in Nepal have been very willing to add in their name and information about their specialties and organizations' activities. (See Section 8.3.1.4.) Thus, facilitating communication among users in Nepal meets users' needs. In

this sense, we should keep improving the Nepal mailing list and introducing the user directory search service.

In addition to these on-going projects, I also recommend two things. One is to create a more comprehensive Nepalese user directory that includes not only primary users in each organization, but also secondary users. The directory should have at least users' names, email address, and users' specialties/professions (as well as activities of organizations if users are organizational subscribers). The other is to introduce into HealthNet Nepal much more specified Nepalese mailing lists that are targeted to particular specialties.

To realize these two recommendations, further surveying of users will be required to find out which organization has what kinds of users.

#### *10.4.3 Note on Disadvantages of Non-Kathmandu-Valley Users*

The problem of the disadvantage of non-Kathmandu Valley users vis-a-vis Kathmandu Valley users is beyond the scope of this particular research. The problem involves aspects both of finance and institutional relationship. However, this issue will become more important because HealthNet Nepal is now expanding to non-Kathmandu Valley areas, including rural areas.

### *10.5 Issues That Need Further Investigation and Discussion*

#### *10.5.1 Short Term*

##### **10.5.1.1 For the Purpose of Introducing Training sessions**

In order to introduce training sessions, the following questions must be pursued:

- 1) Who should have responsibility for the sessions, the local steering committee in Kathmandu or the SatelLife headquarter in the USA?
- 2) Who should pay for the training sessions? More specifically, should the cost required for the training sessions be covered by users' regular monthly fees? If not, who should pay for the sessions, users,

Satellife or both? How about transportation costs, especially for those who come long distances?

3) Where should the sessions be held? There are many options such as the Kathmandu Valley area, other urban areas besides the Kathmandu Valley and rural areas.

4) Whom should the sessions target? More specifically, should they target i) computer novices, in terms of basic skills in computer usage; ii) those who have basic skills in computer usage, but who are not familiar with computer based telecommunication; and/or iii) those who are familiar with computer and computer based telecommunication, but who are not familiar with what kinds of services are available through HealthNet?

5) Should the sessions be held on a regular basis? If so, how often should they be held?

6) For those who cannot attend the sessions because of cost and/or transportation limitations, what would be adequate substitutes for the formal training sessions?

#### **10.5.1.2 For the Purpose of Introducing Mailing Lists and Users' Directory**

For the purpose of introducing mailing lists and users' directory, the following should be addressed:

1) What kinds of specialties do users have? This is especially important when users are secondary users in each organization?

2) What kinds of mailing lists should be introduced? More specifically, what specialties should the mailing lists target? How many members should each mailing list have? Who should manage each mailing list?

#### **10.5.1.3 For the Purpose of Dealing with Disadvantages of Non-Kathmandu Users**

Finally, for the purpose of dealing with disadvantages of non-Kathmandu users, especially in rural areas, what should be considered?

1) Should additional access nodes be introduced in other areas? If so, which areas have priority? What is the required institutional

arrangement? Who should take care of the nodes? Who should pay the cost?

2) Should other HealthNet staff members be employed in non-Kathmandu areas? If so, which areas have priority? Who should pay the cost?

### *10.5.2 Middle and/or Long Term*

HealthNet Nepal, which this particular research concentrated on, is only one part of HealthNet. It would be useful to conduct other user satisfaction surveys in other countries that have HealthNet. Through these surveys, not only can we make a comparison between the countries, but we may also establish a standardized survey instrument for examining users' satisfaction. This should enhance HealthNet's ability to better serve its increasing numbers, and diverse kinds, of users.

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## Appendices

### *Appendix A: Cover letter of online survey*

Dear HealthNet user:

I am writing to request your assistance in completing a user information satisfaction survey on HealthNet Nepal. Your answers to the attached survey will be vital to evaluating current users satisfaction with HealthNet Nepal and providing the SatelLife, which administers the HealthNet and has approved this survey, with direction for the future.

I would like to introduce myself and the purpose of my survey briefly. I am a graduate student at the Massachusetts Institute of Technology (MIT), which is a US university located in the Boston metropolitan area near the SatelLife headquarters. This survey is a part of my thesis, which is one of the requirements for the Master's degree in the field of international development. Following this survey, I will visit Neapl and have more detailed personal interviews with some of the users. Through my thesis, I will make a recommendation to the SatelLife to achieve further improvement of services of the HealthNet, especially HealthNet Nepal.

You will find that the questionnaire below is easy to answer. Would you please complete your survey carefully, and return it through email to me at:

htamada@mit.edu

before:

February 28 (Friday), 1997.

Please do not return it to the SatelLife/HealthNet. You may receive this questionnaire twice or more. If it is the case, please reply to one of them.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission.

I appreciate your cooperation and thank you for taking the time to share your opinion with me. If you have any questions, please do not hesitate to contact me.

Sincerely,

**Appendix B: Online questionnaire**

\*\*\*\*\*  
USER INFORMATION SATISFACTION SURVEY ON HEALTHNET NEPAL  
\*\*\*\*\*

-----  
I. Which is your subscription status?  
-----

(Please check one by using 'x' like   x  .)

- Organizational subscriber
- Individual subscriber

If the status is an organizational subscriber, please answer the following question.

How many people in your organization other than you make a direct access to the HealthNet? (Please check one only.)

- zero
- 1-5
- 6-10
- 11 or more

-----  
II. Is email your primary tool to access the HealthNet?  
-----

(Please check by using 'x': e.g., '  x  Yes   No' to say 'Yes'.)

- Yes         No

If YES, please answer the question 1; if NO, please answer the question 2.

1. Did you use any other tool (e.g., telephone, facsimile, regular letter, etc.) besides email in the last three months? If yes, how many times? (Please specify.)

- Yes (   times)         No

2. What is your primary tool to access the HealthNet?  
(Please specify: e.g., telephone, facsimile, etc.)

-----  
III. To which electronic conference do you subscribe?  
-----

(Please check all that apply.)

- ProMED: Program for Monitoring Emerging Diseases
- ProCAARE: Program for Collaboration Against AIDS and Related Epidemics
- E-Drug: Essential Drugs

-----  
IV. How many times did you post a message to each conference  
in the last three months?  
-----

(Please check one for each.)

1. ProMED: Program for Monitoring Emerging Diseases

- zero
- 1-5
- 6-10
- 11-15
- 16-20
- 21 or more

2. ProCAARE: Program for Collaboration Against AIDS and Related  
Epidemics

- zero
- 1-5
- 6-10
- 11-15
- 16-20
- 21 or more

3. E-Drug: Essential Drugs

- zero
- 1-5
- 6-10
- 11-15
- 16-20
- 21 or more

-----  
V. Which electronic conference is most important to you?  
-----

(Please check one only.)

- ProMED: Program for Monitoring Emerging Diseases
- ProCAARE: Program for Collaboration Against AIDS and  
Related Epidemics
- E-Drug: Essential Drugs

-----  
VI. How many times did you use each database through  
the HealthNet in the last three months?  
-----

(Please check one for each.)

1. Medline

- zero
- 1-5
- 6-10
- 11-15
- 16-20
- 21 or more

2. Toxnet

- zero
- 1-5
- 6-10
- 11-15

- 16-20
- 21 or more

3. Cancerlit

- zero
- 1-5
- 6-10
- 11-15
- 16-20
- 21 or more

4. Other(s) (If there are any others that you used through the HealthNet in the last three months, please specify their names and the number of times in using of each.)

-----  
 VII. Which database is most important to you?  
 -----

(Please check one only.)

- Medline
- Toxnet
- Cancerlit
- Other (Please specify.): \_\_\_\_\_

-----  
 VIII. Which electronic publications did you use through the HealthNet in the last three months?  
 -----

(Please check all that apply.)

- HealthNet News
- African Medical Librarians Bulletin
- WHO Library Digest for Africa
- WHO/AFRO Infodigest
- AIDS Bulletin
- Population Issues
- Practical Pointers on Primary Care
- Child Health Dialogue
- AIDS Action
- CBR News
- Health Action
- HDDFlash
- Emerging Infectious Diseases
- Morbidity and Mortality Weekly Report
- Other(s) (Please specify.): \_\_\_\_\_

-----  
 IX. Which electronic publication is most important to you?  
 -----

(Please check one only.)

- HealthNet News
- African Medical Librarians Bulletin
- WHO Library Digest for Africa
- WHO/AFRO Infodigest





-----  
XII. How do you feel about each of the following factors?  
-----

(Please rely on your first impressions and check one of the segments of each scale by using 'x'. Do not omit any scales. As for a definition of each segment, refer to Question XI.

e.g.: complete :\_\_ : x :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : incomplete  
low :\_\_ :\_\_ :\_\_ :\_\_ : x :\_\_ :\_\_ : high )

\* PLEASE NOTE \*

Each scale has two items and each of them has a positive word and a negative one at each end. Some of the items are ordered by positive-negative; the others are in negative-positive.

1. Relationship with the SatelLife/HealthNet staff (The manner and methods of interaction, conduct and association between the user and the staff.)

cooperative :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : uncooperative  
candid :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : deceitful

2. Degree of training provided to users in how to use HealthNet services

inferior :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : superior  
complete :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : incomplete

3. Reliability of information (The consistency and dependability of the information.)

inconsistent :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : consistent  
high :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : low

4. Understanding of how to use HealthNet services

complete :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : incomplete  
insufficient :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : sufficient

5. Relevancy of information (The degree of fitness between what the user wants and what is provided.)

useful :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : useless  
relevant :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : irrelevant

6. Feeling about whether your opinion is reflected in improvement of services and systems of the HealthNet

negative :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : positive  
insufficient :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : sufficient

7. Attitude of the SatelLife/HealthNet staff (The willingness and commitment of the staff to achieve the mission of the HealthNet.)

positive :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : negative  
user-oriented :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : self-centered

8. Accuracy of information (The correctness of the information.)

inaccurate :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : accurate  
insufficient :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ :\_\_ : sufficient

9. Communication with the SatelLife/HealthNet staff (The manner and methods of information exchange between the user and the staff.)

harmonious : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : dissonant  
meaningless : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : meaningful

10. Completeness of information (The comprehensiveness of the information content.)

inadequate : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : adequate  
sufficient : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : insufficient

11. Clearness of information (The degree of easiness to understand what the information is intended to mean.)

definite : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : uncertain  
sufficient : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : insufficient

-----  
XIII. In summary, how satisfied are you overall with HealthNet services?  
-----

(Please check one of the segments by using 'x'. As for a definition of each segment, refer to Question XI.)

satisfied : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : \_\_\_ : not satisfied

-----  
XIV. Please feel free to write in any additional comments or suggestions on the HealthNet information service.  
-----

- THANK YOU VERY MUCH FOR YOUR COOPERATION -

***Appendix C: The First Reminder***

Dear HealthNet user:

This is a reminder that I sent a questionnaire for a user satisfaction survey on the HealthNet about one week ago. As February 24, I have not received your response. Would you please respond to it before this

Friday (Feb. 28)? It will be highly appreciated. If you have not received the questionnaire yet, please let me know at htamada@mit.edu.

If you have responded to the questionnaire already, I appreciate your cooperation. And, I beg your pardon for bothering you by this message.

Because of some difficulty in handling e-mail addresses of the HealthNet users, you may receive this message twice or more. If it is the case, I appreciate your patience with the multiple messages.

Sincerely,

### ***Appendix D: The Second Reminder***

Dear HealthNet users:

This is the last reminder that I sent an e-mail questionnaire of a user satisfaction survey on the HealthNet about two weeks ago. Its deadline is on today (February 28).

As of today, I have not received your response yet. Would you please respond to it as soon as possible? Even if you respond after the deadline, it will still be very helpful to me. So, please don't hesitate to respond the questionnaire after the deadline. Your cooperation will be highly appreciated.

If you have responded to the questionnaire already, I appreciate your cooperation. And, I beg your pardon for bothering you by this message.

Because of some technical difficulty in handling e-mail addresses of the HealthNet users, you may receive this message twice or more. If it is the case, I appreciate your patience with the multiple messages.

In addition to the questionnaire, I'll visit Nepal to have personal interviews with the HealthNet users. I will reach Nepal on March 13 and stay there about two weeks. I'll do my best to have as many interviews as I can. However, there is a strict time limitation. If I don't have enough time to have interviews with some of the users, please understand the limitation.

Thank you very much for your time.

Sincerely,

## ***Appendix E: Acknowledgement of Responses to the Questionnaire***

Dear HealthNet users:

I have received your response to the questionnaire. Thank you very much for your cooperation.

Thanks to your contribution, I have had 28 responses so far. This is about 40% of all the subscribers in Nepal. I'm satisfied with this number.

After reviewing all of your answers, I will visit Nepal to have personal interviews with the HealthNet users. I will reach Nepal on March 13 and stay there about two weeks. I will do my best to have as many interviews as I can. However, there is a strict time limitation. If I cannot have interviews with some of the users, please understand the limitation.

Again, thank you very much for your cooperation.

Sincerely,

## ***Appendix F: Interview Questions (Longer Form)***

*My name is Hiroshi Tamada, and I am from the Massachusetts Institute of Technology, USA. I am conducting a user satisfaction survey on HealthNet Nepal. For this purpose, I would like to ask you a number of questions about the HealthNet. The information that you provide will be very important in evaluating current user satisfaction with HealthNet Nepal and improving its services in the future. Any information that is obtained in this interview and that can be identified with you will remain confidential and will be disclosed only with your permission.*

=====  
*I would like to begin by asking you some general questions. May I continue?*  
=====

01) Which is your subscription status?

- Organizational subscriber --> **CONTINUE TO 02**
- Individual subscriber --> **SKIP TO 03**

02) How many people in your organization other than you make a direct access to the HealthNet? (**OPEN-END**)

- zero
- 1-5
- 6-10
- 11 or more

03) Is your organization governmental or non-governmental?

- Non-governmental
- Governmental

04) Which category in the list describe best your organization?

--> **SHOW LIST**

- Hospital/clinic
- University/Educational Institute
- Research center
- Consulting
- Other (Please specify.)

05) Which in the list describes best your profession? --> **SHOW LIST**

- Physician
- Physician assistant
- Nurse
- Midwife
- Pharmacist
- Technician
- Community health worker
- Researcher
- Manager
- Secretary
- Librarian
- Other (specify):

06) Which in the list describes best your occupational specialty?

--> **SHOW LIST**

- 1. Clinical --> **SKIPT TO 07**
- 2. Public Health --> **SKIPT TO 08**
- 3. Health Management --> **SKIPT TO 09**
- 4. Drugs & Medical Supplies --> **SKIPT TO 10**
- 5. Information Systems --> **SKIPT TO 10**
- 6. Other (Please specify) --> **SKIPT TO 10**

07) More specifically, which in the list best describes your occupational specialty? --> **SHOW LIST**

- Anesthesiology/Intensive Care
- Oncology/Hematology
- Cardiology/Pulmonology
- Dermatology
- Emergency Medicine
- General Practice
- HIV/AIDS/STDs
- Infectious Diseases/Microbiology
- Internal Medicine
- Obstetrics/Gynecology
- Ophthalmology
- Orthopedics
- Pathology
- Pediatrics
- Physiology/Pharmacology
- Physical Medicine & Rehabilitation
- Psychiatry

- Radiology
- Surgery
- Tropical & Parasitic Medicine
- Virology
- Other

08) More specifically, which in the list best describes your occupational specialty? --> **SHOW LIST**

- Epidemiology
- Environmental Health
- Health Policy & Administration
- Maternal & Child Health
- Nutrition
- Nursing
- Primary Health Care
- Reproductive Health
- Other

09) More specifically, which in the list best describes your occupational specialty? --> **SHOW LIST**

- Evaluation
- Finances
- Human Resources
- Information & Communication
- Logistics
- Management Information Systems
- Policy & Planning
- Supervision
- Training

10) When were you born? (**Open-End**)

- 1931-1935
- 1936-1940
- 1941-1945
- 1946-1950
- 1951-1955
- 1956-1960
- 1961-1965
- 1966-1970
- 1971-1975
- After 1976

11) when did you first register for the HealthNet? (**OPEN-END**)

- 1993
- 1994
- 1995
- 1996
- 1997

12) For how long have you used computers? (**OPEN-END**)

- less than 1 year.
- 1 to 2 years
- 2 to 3 years
- 3 to 4 years

- 4 to 5 years
- more than 5 years

=====  
*Next two questions are about your computers.*  
=====

13) How much memory (--> **EXPLAIN**) does your computer have? (**OPEN-END**)

14) What is your modem speed?

=====  
*Now I would like to learn about your satisfaction with the Healthnet*  
=====

15) What did you expect of HealthNet when you first registered?  
(**OPEN-END**)

16) Have your expectations been met by using the HealthNet?

--> **SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

17) What do you do first when you need information that is NOT available in your office?

- access the healthnet
- call/visit your colleague
- call/visit libraries/universities
- other (Please specify.)

=====  
*Now I would like to ask you some more detailed questions about the kind of information you can access through HealthNet.*  
=====

18) To which electronic conference do you subscribe? Please select all that apply in the list. --> **SHOW LIST** --> **IF NONE, SKIP TO 23**

- ProMED: Program for Monitoring Emerging Diseases
- ProCAARE: Program for Collaboration Against AIDS and Related Epidemics
- ProCOR: Emerging Cardiovascular Diseases in Developing

- \_\_\_ Countries
- \_\_\_ E-Drug: Essential Drugs
- \_\_\_ Epidemio-1: Epidemiology
- \_\_\_ Asia-hnet: HealthNet Asia
- \_\_\_ Injury-1: Injury Surveillance Control and Intervention
- \_\_\_ Leprosy
- \_\_\_ Malaria
- \_\_\_ Other: (Please specify.) \_\_\_\_\_

19) Have you ever posted or sent a message to any electronic conferences.

- \_\_\_ Yes --> SKIP TO 21
- \_\_\_ No

20) Why not? --> **SHOW LIST** --> **SKIP TO 22**

- \_\_\_ I'm too busy with my work
- \_\_\_ I have nothing to post.
- \_\_\_ I don't like to post anything.
- \_\_\_ I'm not familiar with how to post a message
- \_\_\_ There are no conferences that are relevant to my specialty
- \_\_\_ Other (Please specify.)

21) How many times did you post or send a message to each conference in the last three months? Please select one for each in the list. (**ASK ABOUT ONLY RELEVANT CONFERENCES.**) (**OPEN-END**)

01. ProMED: Program for Monitoring Emerging Diseases

- \_\_\_ zero
- \_\_\_ 1-5
- \_\_\_ 6-10
- \_\_\_ 11-15
- \_\_\_ 16-20
- \_\_\_ 21 or more

02. ProCAARE: Program for Collaboration Against AIDS and Related Epidemics

- \_\_\_ zero
- \_\_\_ 1-5
- \_\_\_ 6-10
- \_\_\_ 11-15
- \_\_\_ 16-20
- \_\_\_ 21 or more

03. ProCOR: Emerging Cardiovascular Diseases in Developing Countries

- \_\_\_ zero
- \_\_\_ 1-5
- \_\_\_ 6-10
- \_\_\_ 11-15
- \_\_\_ 16-20
- \_\_\_ 21 or more

04. E-Drug: Essential Drugs

- \_\_\_ zero
- \_\_\_ 1-5
- \_\_\_ 6-10
- \_\_\_ 11-15
- \_\_\_ 16-20



- \_\_\_ 21 or more
- 05. Epidemio-1: Epidemiology
  - \_\_\_ zero
  - \_\_\_ 1-5
  - \_\_\_ 6-10
  - \_\_\_ 11-15
  - \_\_\_ 16-20
  - \_\_\_ 21 or more
- 06. Asia-hnet: HealthNet Asia
  - \_\_\_ zero
  - \_\_\_ 1-5
  - \_\_\_ 6-10
  - \_\_\_ 11-15
  - \_\_\_ 16-20
  - \_\_\_ 21 or more
- 07. Injury-1: Injury Surveillance Control and Intervention
  - \_\_\_ zero
  - \_\_\_ 1-5
  - \_\_\_ 6-10
  - \_\_\_ 11-15
  - \_\_\_ 16-20
  - \_\_\_ 21 or more
- 08. Leprosy
  - \_\_\_ zero
  - \_\_\_ 1-5
  - \_\_\_ 6-10
  - \_\_\_ 11-15
  - \_\_\_ 16-20
  - \_\_\_ 21 or more
- 09. Malaria
  - \_\_\_ zero
  - \_\_\_ 1-5
  - \_\_\_ 6-10
  - \_\_\_ 11-15
  - \_\_\_ 16-20
  - \_\_\_ 21 or more
- 10. Other
  - \_\_\_ zero
  - \_\_\_ 1-5
  - \_\_\_ 6-10
  - \_\_\_ 11-15
  - \_\_\_ 16-20
  - \_\_\_ 21 or more

22) Which electronic conference is most important to you? Please select one only. --> **SHOW LIST**

- \_\_\_ ProMED: Program for Monitoring Emerging Diseases
- \_\_\_ ProCAARE: Program for Collaboration Against AIDS and Related Epidemics
- \_\_\_ ProCOR: Emerging Cardiovascular Diseases in Developing Countries
- \_\_\_ E-Drug: Essential Drugs
- \_\_\_ Epidemio-1: Epidemiology
- \_\_\_ Asia-hnet: HealthNet Asia

- Injury-1: Injury Surveillance Control and Intervention
- Leprosy
- Malaria
- Other: (Please specify.) \_\_\_\_\_

23) Which databases have you ever used through the HealthNet in the last three months? Please select all that apply in the list. --> **SHOW LIST IF NONE, SKIP TO 25**

- 1.  Medline
- 2.  Toxnet
- 3.  Cancerlit
- 4.  Other (Please specify.)

24) How many times did you use each database through the HealthNet in the last three months? Please select one for each. (**OPEN-END**)

- a. Medline
  - zero
  - 1-5
  - 6-10
  - 11-15
  - 16-20
  - 21 or more

- b. Toxnet
  - zero
  - 1-5
  - 6-10
  - 11-15
  - 16-20
  - 21 or more

- c. Cancerlit
  - zero
  - 1-5
  - 6-10
  - 11-15
  - 16-20
  - 21 or more

d. Other(s) (If there are any others that you used through the HealthNet in the last three months, please specify their names and the number of times in using of each.)

25) Which database is most important to you? Please select one only. --> **SHOW LIST**

- Medline
- Toxnet
- Cancerlit
- Other (Please specify.): \_\_\_\_\_

26) Which electronic publications did you use through the HealthNet in the last three months? Please select all that apply. --> **SHOW LIST IF NONE, SKIP TO 28**

- HealthNet News
- African Medical Librarians Bulletin
- WHO Library Digest for Africa
- WHO/AFRO Infodigest

- AIDS Bulletin
- Population Issues
- Practical Pointers on Primary Care
- Child Health Dialogue
- AIDS Action
- CBR News
- Health Action
- HDDFlash
- Emerging Infectious Diseases
- Morbidity and Mortality Weekly Report
- Other(s) (Please specify.): \_\_\_\_\_

27) Which electronic publication is most important to you? Please select one only. --> **SOW LIST**

- HealthNet News
- African Medical Librarians Bulletin
- WHO Library Digest for Africa
- WHO/AFRO Infodigest
- AIDS Bulletin
- Population Issues
- Practical Pointers on Primary Care
- Child Health Dialogue
- AIDS Action
- CBR News
- Health Action
- HDDFlash
- Emerging Infectious Diseases
- Morbidity and Mortality Weekly Report
- Other (Please specify.): \_\_\_\_\_

28) To what extent is each of the following important to you in reference to the HealthNet? Please select one of the segments of each scale. --> **SHOW LIST, AND EXPLAIN DIFINITION OF EACH OPTION.**

\* PLEASE NOTE \*

Each segment is defined as follows:

adjective A : 1 : 2 : 3 : 4 : 5 : 6 : 7 : adjective B

- (1) extremely A (5) slightly B
- (2) quite A (6) quite B
- (3) slightly A (7) extremely B
- (4) neither A or B; equally A or B; does not apply

1. Electronic conferences  
important : 1 : 2 : 3 : 4 : 5 : 6 : 7 : unimportant
2. Databases  
important : 1 : 2 : 3 : 4 : 5 : 6 : 7 : unimportant
3. Electronic publications  
important : 1 : 2 : 3 : 4 : 5 : 6 : 7 : unimportant
4. Private communication with HealthNet users through email  
important : 1 : 2 : 3 : 4 : 5 : 6 : 7 : unimportant
5. Private communication with NON-HealthNet users through email  
important : 1 : 2 : 3 : 4 : 5 : 6 : 7 : unimportant

- 29) Which is more important to you?  
 specific information in your specialty  
 comprehensiveness covering many areas
- 30) Which is more important to you?  
 quality or reliability of information  
 quantity or sufficiency of information
- 31) Which is more important to you?  
 Detailed information  
 Concise information
- 32) Does the HealthNet provide sufficient information? --> **SHOW LIST**  
 Definitely Yes  
 Yes  
 Probably Yes  
 Uncertain/No Opinion  
 Probably No  
 No  
 Definitely No
- 33) Do you think electronic publications are presented in a useful format? --> **SHOW LIST**  
 Definitely Yes  
 Yes  
 Probably Yes  
 Uncertain/No Opinion  
 Probably No  
 No  
 Definitely No
- 34) Does the HealthNet have any electronic publications or electronic conferences that are directly related to your own specialty?  
 Yes  
 No
- 35) Does the healthnet satisfy your professional specific needs? --> **SHOW LIST**  
 Definitely Yes --> **SKIP TO 37**  
 Yes --> **SKIP TO 37**  
 Probably Yes --> **SKIP TO 37**  
 Uncertain/No Opinion --> **SKIP TO 37**  
 Probably No  
 No  
 Definitely No
- 36) Why not? (**OPEN-END**)
- 37) Are there any journals you want to read periodically? (**OPEN-END**)

38) If there is a mailing list of users in Nepal, do you want to add your address in the list? --> **SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

39) The HealthNet has provided only text data so far because image data need much more time to send. Do you think it should provide image data to those who want them, as well as text data? --> **SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

40) If the HealthNet provided user-directory search service, would you add your name in the directory so that other users may search for your name and your specialty? --> **SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

41) Do you have willingness to provide other users with information that you or your organization has? --> **SHOW LIST**

42) Have you ever informed other users of your specialty or your organization's resources?

- Yes --> **SKIP TO 44**
- No

43) Why not? --> **SHOW LIST**

- I thought that users had been already informed.
- I never noticed this kind of way of communication.
- I did not have time to do so.
- I was never requested by other users.
- Other (Please specify.)

44) Is information provided by the HelathNet distributed to other members in your organization?

- Yes
- No --> **SKIP TO 46**

45) How is the information distributed? (**OPEN-END**)

=====  
*Now I would like to learn more about your feelings and opinions about  
staff from the HealthNet.*  
=====

46) Which is more helpful to you?

- Local staff in Kathmandu
- Staff at the SatelLife headquarters in the USA

47) Have you ever requested information or services from the USA office.

- Yes
- No --> **SKIP TO 51**

48) How many times have you communicated with the staff in the USA by phone, email or any other ways in the last one month? (**OPEN-END**)

49) Was the response from the USA staff quick enough? --> **SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

50) Overall, how satisfied are you with the communication with the staff in the USA. --> **SHOW LIST**

- Very Satisfied
- Moderately Satisfied
- Slightly Satisfied
- Neither Satisfied Nor Dissatisfied; Uncertain; No Opinion
- Slightly Dissatisfied
- Moderately Dissatisfied
- Very Dissatisfied

51) Have you ever requested information or services from a local staff person in Kathmandu?

- Yes
- No --> **SKIP TO 55**

52) How many times have you communicated with the local staff by phone, email any other ways in the last one month? (**OPEN-END**)

53) Were the response from the local staff quick enough? --> **SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

54) Overall, how satisfied are you with the communication with the local staff? --> **SHOW LIST**

- Very Satisfied
- Moderately Satisfied
- Slightly Satisfied
- Neither Satisfied Nor Dissatisfied; Uncertain; No Opinion
- Slightly Dissatisfied
- Moderately Dissatisfied
- Very Dissatisfied

55) Have you ever requested HealthNet staff to introduce a new electronic conference you want?

- Yes
- No --> **SKIPT TO 57**

56) Has HealthNet introduced it?

- Yes
- No

57) Is notification of improvement and new information resources and services speedy? --> **SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

=====  
*Now I would like to ask some questions about your understanding of the HealthNet system and your need of training in how to use the HealthNet.*  
=====

58) Do you have an information services guide that explains what kinds of services are available in the HealthNet?

- Yes --> **SKIP TO 59**
- No --> **SKIP TO 60**

59) Do you think that the guide has enough information to understand the HealthNet systems? --> **SHOW LIST** --> **SKIP TO 61**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

60) Do you think you have enough knowledge of what kinds of services are available in the HealthNet? --> **SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

61) Which application are you using to access the HealthNet?

- Marimba, the brand-new HealthNet application.
- Non-Marimba HealthNet application
- Non-HealthNet application --> **SKIP TO 65**

62) Is your application easy enough to use? --> **SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

63) Do you have a user manual of the HealthNet computer application?

- Yes
- No --> **SKIP TO 65**

64) Is the user manual of the application easy enough to understand?

**-->SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

65) Did you take an initial training in how to use the HealthNet?

- Yes
- No --> **SKIP TO 67**

66) Was that enough? --> **SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

67) Do you know you can visit the Health Learning Materials Centre, Kathmandu, to meet a local staff any weekday morning?

- Yes
- No --> **SKIP TO 69**



68) How many times have you visited the center in the last three months?

69) If there is a training session in Kathmandu, would you attend it?

--> **SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

70) How often would you attend?

- once a month
- once every three months
- once a year
- other (Please specify.)

71) Which do you think is more helpful in learning how to use the HealthNet?

- Visiting local staff individually.
- Taking a formal class session.

72) If there is an on-line discussion group on how to use the HealthNet, would you use it? --> **SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

=====  
*Now I would like to ask two questions about th physical condition of  
your telephone line and access node.*  
=====

73) Is your telephone line dependable enough to access the HealthNet?

--> **SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes
- Uncertain/No Opinion
- Probably No
- No
- Definitely No

74) Is the HealthNet node in Kathmandu dependable enough to access the HealthNet? --> **SHOW LIST**

- Definitely Yes
- Yes
- Probably Yes

- \_\_\_ Uncertain/No Opinion
- \_\_\_ Probably No
- \_\_\_ No
- \_\_\_ Definitely No

=====

*As summary, would you please fill in this form? --> HAND THE FORM AND PULL ATTENTION TO THE NOTE.*

=====

75) How do you feel about each of the following factors? Please rely on your first impressions and select one of the segments of each scale. Do not omit any scales.

\* PLEASE NOTE \*

- a) Each scale has two items and each of them has a positive word and a negative one at each end. Some of the items are ordered by positive-negative; the others are in negative-positive.
- b) Each segment is defined as follows:

adjective A :\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_: adjective B

- (1) extremely A (5) slightly B
- (2) quite A (6) quite B
- (3) slightly A (7) extremely B
- (4) neither A or B; equally A or B; does not apply

1. Relationship with the SatelLife/HealthNet staff (The manner and methods of interaction, conduct and association between the user and the staff.)

cooperative :\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_: uncooperative  
 candid :\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_: deceitful

2. Degree of training provided to users in how to use HealthNet services

inferior :\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_: superior  
 complete :\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_: incomplete

3. Reliability of information (The consistency and dependability of the information.)

inconsistent :\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_: consistent  
 high :\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_: low

4. Understanding of how to use HealthNet services

complete :\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_: incomplete  
 insufficient :\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_: sufficient

5. Relevancy of information (The degree of fitness between what the user wants and what is provided.)

useful :\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_: useless  
 relevant :\_1\_:\_2\_:\_3\_:\_4\_:\_5\_:\_6\_:\_7\_: irrelevant

6. Feeling about whether your opinion is reflected in improvement of services and systems of the HealthNet  
 negative : 1 : 2 : 3 : 4 : 5 : 6 : 7 : positive  
 insufficient : 1 : 2 : 3 : 4 : 5 : 6 : 7 : sufficient
7. Attitude of the SatelLife/HealthNet staff (The willingness and commitment of the staff to achieve the mission of the HealthNet.)  
 positive : 1 : 2 : 3 : 4 : 5 : 6 : 7 : negative  
 user-oriented : 1 : 2 : 3 : 4 : 5 : 6 : 7 : self-centered
8. Accuracy of information (The correctness of the information.)  
 inaccurate : 1 : 2 : 3 : 4 : 5 : 6 : 7 : accurate  
 insufficient : 1 : 2 : 3 : 4 : 5 : 6 : 7 : sufficient
9. Communication with the SatelLife/HealthNet staff (The manner and methods of information exchange between the user and the staff.)  
 harmonious : 1 : 2 : 3 : 4 : 5 : 6 : 7 : dissonant  
 meaningless : 1 : 2 : 3 : 4 : 5 : 6 : 7 : meaningful
10. Completeness of information (The comprehensiveness of the information content.)  
 inadequate : 1 : 2 : 3 : 4 : 5 : 6 : 7 : adequate  
 sufficient : 1 : 2 : 3 : 4 : 5 : 6 : 7 : insufficient
11. Clearness of information (The degree of easiness to understand what the information is intended to mean.)  
 definite : 1 : 2 : 3 : 4 : 5 : 6 : 7 : uncertain  
 sufficient : 1 : 2 : 3 : 4 : 5 : 6 : 7 : insufficient
12. In summary, how satisfied are you overall with the HealthNet services? (This question has only one scale.)  
 satisfied : 1 : 2 : 3 : 4 : 5 : 6 : 7 : not satisfied

=====  
*This is the last question.*  
 =====

76) Do you have any comments you would like to add? (**OPEN-END**)

=====  
*This completes my interview. Thank you for taking the time to answer these questions.*  
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