## Handling Large-Scale Unit Level Data Using STATA Professor Pratap C. Mohanty Department of Humanities and Social Sciences, Indian Institute of Technology, Roorkee Lecture 16 Questionnaire Design

Welcome once again friends to this NPTEL MOOC module on Handling Large-Scale data Using Stata. We have been so far understanding the very basics of Stata operations in last couple of lectures. just Stata operations are not complete unless we are equipped with understanding data. Though we have already have had sections or sessions on data, unit level data, large-scale unit level data, but we will be discussing on certain prerequisites of unit level data in Stata.

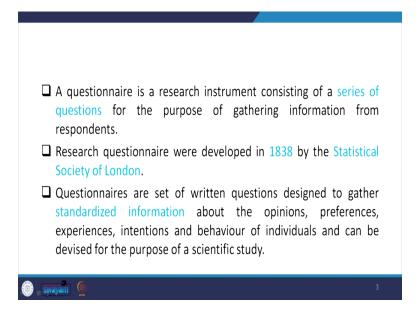
why prerequisites? Because unless we prepare the data according to the Stata format if you do not read the data as per the Stata requirement, it is not viable to operate in Stata and the results might be erroneous. Often the case researchers are highly tensed in opening the data and the end result is also disastrous, because if your data itself is problematic so you cannot able to operate Stata correctly. This week we will be discussing on prerequisites of unit level data with Stata. the first prerequisite is Questionnaire Design.

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Questionnaire design we mean that how questions are framed and survey takes place and how different types of questions are set in order to have a better structure of our information.

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For your clarity, let me go through. Questionnaire is a research instrument consisting of a series of questions for the purpose of gathering information from respondents. Research questionnaire were developed initially in 1838 by the Statistical Society of London. You can imagine how many years of evolution we have relating to the questionnaire design.

There must have a number of changes. So questionnaire is a set of written questions, designed to gather information, are standardized about their opinion, preferences, experiences, intentions and behavior of individuals and those can be deviced for the purpose of a scientific inquiry.

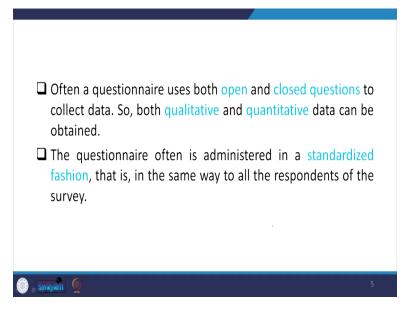
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☐ Questionnaires are used in various fields of research like survey research and experimental design.
Questionnaire is one such tool used to collect information which can cover almost all practical issues.
☐ It is used to query a population/sample in order to obtain information for analysis.
<ul> <li>Questionnaire can be thought of as a kind of written interview- a formal contact, in which the conversation is governed by the wording and order of the questions in the instrument.</li> <li>It can be carried out face to face, by telephone or online.</li> </ul>
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Questionnaires are used in various fields of research like survey research and experimental design. And this is one such tool which is used to collect information which can cover almost all practical issues in our day to day research. Therefore, it is useful to have a query on the detailed understanding of questionnaire and it is used to query a population or sample in order to obtain information for analysis.

Questionnaire can be thought of a kind of written interview, a formal contact, in which the conversation is governed by the wording and order of the questions in the instrument. It can be carried out face to face or telephone or online. There are different approaches we are going to discuss in a short while.

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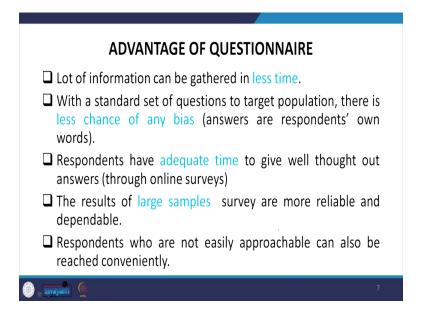
Often questionnaire uses both open and close ended questions and accordingly we define those as open ended questionnaire and close ended questionnaires in order to collect the data. So both qualitative and quantitative data can be collected through these two broad type of questionnaires. The questionnaire often is administered in a standardized fashion, that is in the same way to all the respondents of the particular survey. What do we mean by standardization and how to do that standardization and how Stata interpretation is going to be better with the standardization we are going to guide you.

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FUNCTIONS OF QUESTIONNAIRE	
<ul> <li>□ Enables data collection from respondents.</li> <li>□ A structure to interview</li> <li>□ Provides a standard means for writing down answers</li> <li>□ Helps in processing collected data.</li> </ul>	
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These are the functions of the questionnaire. It enables data collection from respondents. It gives a structure to the interview, the respondents. It provides a standard means for writing down answers, also helps in processing collected data.

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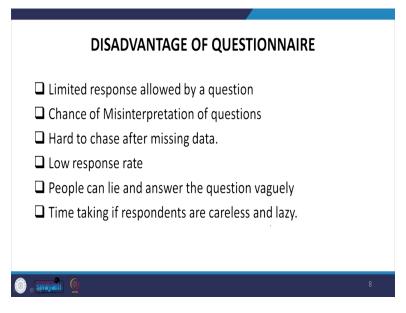
So what are the advantages we generally have of the questionnaire, there are lots of information those can be gathered within less time if you have a standardized questionnaire. This is, another advantage is that with a standard set of questions to target population, there is less chance of any bias. Bias means generally respondents having their own words and some questions are attached

to some form of biasness, we will also discuss, and which may not face the correct information from the respondent.

Respondents have adequate time to give well thought out answers through online surveys. If we have any possible online based measures, nowadays I think we are discussing online format because of COVID-19, where most of the surveys in the international level are taking the help of online platform. Somewhere you may take the help of Google documents for survey or there are SurveyMonkey there are various approaches to have online surveys.

The results of large sample survey are more reliable and dependable also if you have a large sample survey. But why am I emphasizing this point, because of the fact that, our focus of this particular module is on understanding large sample survey. And how to define large sample, small sample, I think we have discussed from the beginning of our lectures understanding samples. Respondents who are not easily approachable can also be reached conveniently. These are the advantages of questionnaire.

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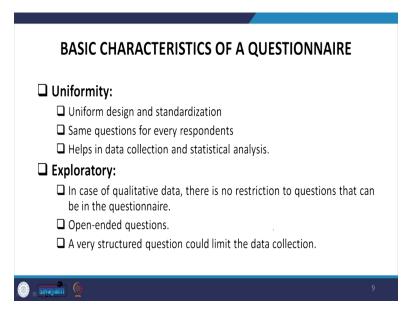
What are the disadvantages? Disadvantages of questionnaires are as follows. It has limited response and limited response allowed by a particular question. Once a question is set with a limited information and so response will be automatically confined by those limits. And chance of misinterpretation of questions. There are chances of misinterpretation because of the way the

researcher wanted to set the questions in the questionnaire may not be convinced to the respondent. So, they may go by some forms of misinterpretation.

And it is hard to chase after missing data. If your questionnaire is faulty and your fault questionnaire may not result into any response, that may lead to missing information. So when you are analyzing with our data you might be stuck with missing information from the data that time it is too difficult to track.

So that is one of the disadvantage of the questionnaire as against the direct observation from the respondent. It has low response rate and people can also lie and answer the question vaguely. It is the independence of the respondents and it is the duty of the surveyor to crosscheck carefully. And it is generally time taking if respondents are careless and lazy and also depending upon, if the questionnaire's design is faulty, usually it is also time taking if it does not follow a proper structure.

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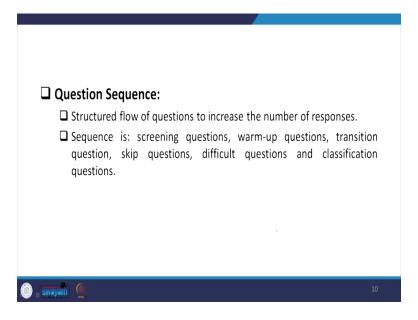
So then what are the basic characteristics of a questionnaire? Which we are looking for our module and for our answer with the help of Stata. Broadly there are different, there are uniformity, in fact, is one of the basic characteristic of a questionnaire. Broadly it is of uniformity and exploratory. And we will also be discussing its sequencing, we will also discuss what is called a good questionnaire.

So uniformity means across the questions, the design has a proper uniformity and it must be standardized. Same questions for every respondent, should not be biased to some as against others that may create some kind of problems in the response and that too in the analysis. And helps in data and statistical analysis, uniformity if it is maintained then that also helps in data collection and better analysis as I already mentioned.

And another characteristics of a questionnaire is exploratory. In case of qualitative data, there is no restriction to questions that can be in questionnaire, because since it is qualitative and it is expected to be exploratory, there should be no restriction for the questions because there are open end questions possible, it depends upon the context of the survey being conducted. And generally exploratory are of open ended questions and these are very structured. A very structured questionnaire could limit the data collection.

Basically what I wanted to say here, though exploratory questionnaire is not of purely structured one, but a surveyor must make it a structure otherwise it is very difficult to limit the data collection. So even if it is qualitative and exploratory in nature, we must structure it and limit its boundary that is always suggested for a questionnaire design.

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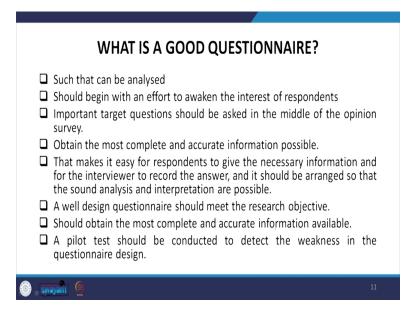
So question sequencing is important. Structured flow of questions to increase the number of responses is required and sequence is basically it follows screening of the questions and warm up

questions, some warm up questions must be given that will create interest of the respondent. Then transition questions from one to another one. There must be a proper transition, otherwise the respondent will be in trouble.

Then skip questions, like there are some questions which are not relevant. If the question is targeted, for example, if the question is targeted for gender, for female, and successive questions are on female related issues, but you are still asking to the male person, so it is creating trouble to the respondents. So, skip questions must have been clearly identified. If male is responding, please keep question number this to that should have been identified clearly. We will show you a standard questionnaire that we have already shown you in our earlier lecture.

Similarly, there are difficult questions, must be avoided. Some questions, it has to be simplified. And also classification of questions, how you are classifying the questions and decoding the questions is important.

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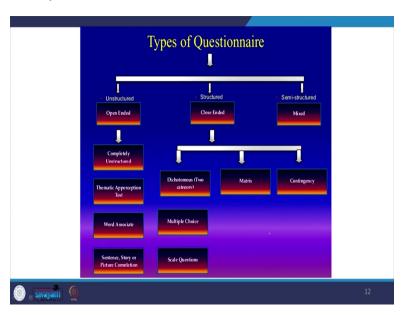


Then what is a good questionnaire must be understood now. It is such that that can be analyzed correctly and it should begin with an effort to awaken the interest of the respondent as I mentioned from the beginning. It is important to have target questions that should be asked in the middle of the opinion survey. So target questions, target of our objective in the survey must have been clearly dealt in the questionnaire, otherwise our questionnaire is meaningless.

Often, it obtains the most complete and accurate information possible that makes it easy for respondents to give the necessary information and for the interviewer to record the answer. It should be arranged so that the sound analysis and the interpretations are possible. The good questionnaire is a well designed questionnaire, should meet the research objective, we have already discussed.

It should obtain the most complete and accurate information available and a pilot test must have been conducted to detect the weakness in the questionnaire design. And also depends upon the context you are surveying. If it is related to some seasonal factor, then those seasonal content must have been included. So depending upon the context, questionnaire is defined to be good or bad.

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Now what I wanted to explain you is the following. That questionnaire must have been structured very clearly, what are the different types of questionnaire in order to understand the better structure? There are broadly three types of questionnaire, we are going to discuss also. One is called open ended, another is called close ended and the third one is called mixed. Open ended questions are also called unstructured questionnaire, whereas close ended are called structured and the mix is both structured and unstructured, basically that is also called semi-structured questionnaire.

One such example is close ended, if you referred to structured questionnaire that is close ended

questionnaire, your answer is limited with the choice, like respondent gives answer in yes and no

or only categorical variable like you are asking the customer feedback in five rating scale, those

are close ended questions.

And unstructured question basically you are giving the option to the respondent to respond like

for example you are asking what is your opinion about the value of education in India if that is

the content of your questionnaire, then you did not define the limit rather you have given a blank

space to write. So that is simply called open ended questionnaire.

Usually qualitative surveys are based on open ended questionnaire. And for researchers like us,

we are dependent on large-scale data and we have to include qualitative as well as quantitative

questions in the questionnaire. So it requires a semi-structured design. It should have open ended

as well as close ended questions.

In the open ended questionnaire we have complete unstructured responses and thematic

apperception test, I am going to talk about, usually psychological aspects, perceptions mapping

usually studied for youth and kids and it attaches with world associate and sentence, story or

picture completion etc. are part of open ended question I just mentioned.

Looking at the understanding of close ended questionnaire, we have again the three types of open

ended questionnaire. One is called dichotomous category, like two categories are there, yes, no

type of answers, then other in matrix format or in continuous format. We have that table. I am

going to show you. Generally, it has multiple choice answers, scale questions also. Either it will

be of dichotomous, multiple choice, we have all those design.

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☐ Structured questionnaire:
☐ The questions are definite, concrete and pre-determined.
☐ The form of the question may be either closed or open but should be stated in advance.
☐ For a highly structured questionnaires, the respondent's own words are held to the minimum.
☐ Unstructured questionnaire:
Questions are not pre-determined but based on some general guideline or pattern.
☐ Exact question formulation is largely Interviewer's own responsibility.
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So, structured questionnaire is the one which are definite, concrete and pre-determined. So form of the question maybe either close or open, but should be stated in advance and it is for a highly structured questionnaire, the respondent's own words are held to the minimum. So like since we are explaining Stata, handling Stata, while you develop your questionnaire, I will suggest that you please mix both quantitative as well as qualitative questions or the questionnaires that helps the researcher in having better interpretations through the Stata software.

Let us come to the unstructured questionnaire, structured we have already clarified, unstructured are the questionnaire where questions are not pre-determined, but based on some general guidelines or the patterns. And it has exact question formulation is largely interviewer's own responsibility based on the context they do follow.

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## PRELIMINARY DECISION IN QUESTIONNAIRE DESIGN

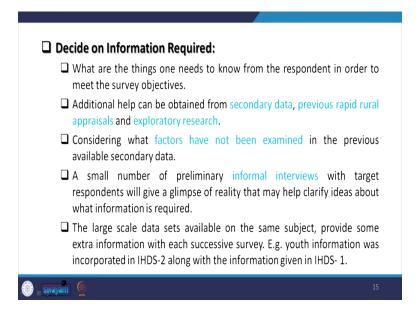
A well-designed questionnaires are highly structured to allow the same type of information to be collected from a large number of respondents in the same way and for data to be analyzed quantitatively.

There are nine steps involved in the development of a questionnaire:

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What is the preliminary decision in questionnaire design? A well designed questionnaire is highly structured to allow the same type of information to be collected for a large number of respondents in the same way and for data to be analyzed quantitatively. There are nine steps involved in the development of a questionnaire. We are going to discuss those nine steps right now.

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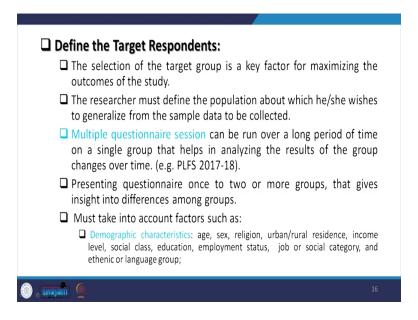


First one is decide on what information we required for the questionnaire design. So, what are the things one needs to know from the respondent in order to meet the survey objectives. Then, additional help can be obtained from secondary data or from previous rapid rural appraisals and exploratory research. Any additional secondary information is there must have been obtained a priority to the questionnaire design.

And by considering what factors have not been examined in the previous available secondary data. If there are datasets already available in this particular area of study, you please check what is missing and if you are including your survey questionnaires are going to give you better results with the help of Stata. A small number of preliminary informal interviews with target respondents will give a glimpse of reality that may help clarify ideas about what information is required.

The large scale datasets available on the same subject provide some extra information with each successive survey, like we have IHDS 1 and 2, where youth information was incorporated in IHDS 2, along with the information given in IHDS 1. So that is important some information you must collect before designing a questionnaire.

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And also define a target respondent. The selection of the target group is a key factor for maximizing the outcomes of the study. What do you mean by that? Like you are designing a questionnaire and you have a intension to interpret with the help of Stata and you are going to feed the data after the questionnaire's responses were collected then you are going to feed into the Stata data window. And once it is loaded, you wanted to answer it, explain it or analyze it. So how would you do it? So you have to first of all think of target respondents in the questionnaire.

The researcher must define the population about which he or she wishes to generalize from the sample data to be collected. Multiple questionnaire session can be run over a long period of time on a single group that helps in analyzing the research of the group changes overtime, like we have already discussed.

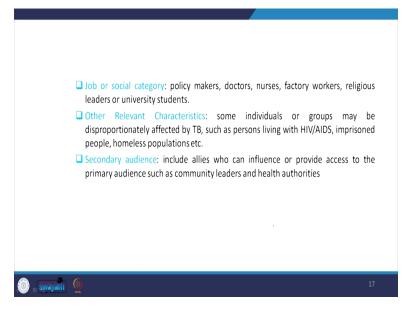
Multiple questionnaire session, this is very important for all of us to know because not necessarily you are just going to collect some cross-sectional information from the field, it might be valid that particular time, what happens over a period of time, like an individual nutritional pattern or the food intake and its impact on nutritional choice. If the person has taken food at point, at time T, what is the implication of that food consumption after T plus 1 time, maybe after one year. If you wanted to map for the same person, you need to have multiple questionnaire session, different in different time period. Those are sometimes called in fact, the way I cited the example, those are called longitudinal survey. And we explain through panel models.

One of the latest dataset on this which captures this kind of multiple questionnaire session that we have already discussed is called PLFS, Periodic Labor Force Survey 2017-18, where the ministry have changed the name of the labor survey to periodic labor force survey, not labor survey, that was called employment round of the Government of India, then they have changed to Periodic Labor Force Survey of 2017-18.

This time in the latest PLFS that is 2017-18, they have included urban area. There are two areas basically covered, rural and urban. In the urban areas there are repeated sampling of the same set of observation. So over different quarters they studied the urban samples for understanding their changes over time.

So the target respondents where the presenting questionnaire ones or two or more groups give insights into differences among groups. It must take into account factors such as, demographic characteristics like age, sex, religion, income, residence of the person, social status, class, then cast, education, employment status, job and ethnic or language group etc.

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job and social category like policymakers, it is important for policymaker, doctors, nurses, factory workers, religious leaders or university students for analysis. Other relevant characteristics like some individuals or groups maybe disproportionately affected by tuberculosis, TB, such as persons living with HIV AIDS, imprisoned people, homeless

population etc. We also taken into account of secondary audience like it include allies who can influence or provide access to the primary audience, where the target is made. So the secondary audience is important, they can influence. They are such as community leaders or health authorities for surveys targeted accordingly.

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What are the methods of reaching target respondents? So there are broadly four types. We considered one is personal interview, face to face personal interview. Then second one is focused group discussion, FGDs. Then telephonic interviews or mail questionnaires through email survey.

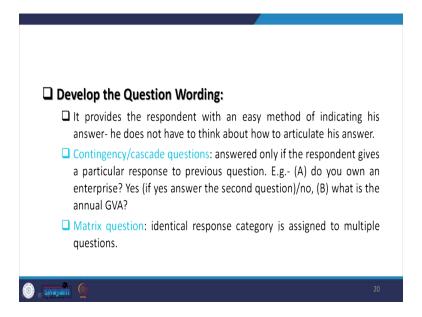
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☐ Decide on Question Content:	
Decide on Question Content:	
☐ While developing the questionnaire, a researcher should pose certain questions:	1
☐ Is this question sufficient to generate the required information?	
☐ Can the respondent answer the question correctly?	
lacksquare Are there any external events that might bias response to the question	
☐ Do the words have same meaning to all the respondents?	
$\square$ Is there ambiguity in the question?	
lacksquare Are any question too personal or of a potentially embarrassing nature?	
lacktriangle Are any of the word or phrase loaded or leading anyway?	
lacksquare Will the question be understood by the type of individual to be interviewed.	
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What to decide on question content, what should be the content in the questions as part of the features of the questionnaire. Nine important features we are discussing. While developing the questionnaire, a researcher should pose certain questions, like, is this question sufficient to generate the required information which we have targeted.

Can the respondent answer the question correctly? Are there any external events that might bias response to the question? Is there any ambiguity in the question? Do the words have same meaning to the respondents? Are any of the words or phrase loaded or leading anyway? Is any question too personal or of potentially embarrassing in nature? Will the question be understood by the type of individual to be interviewed? Must be thought of while setting the questions in the questionnaire.

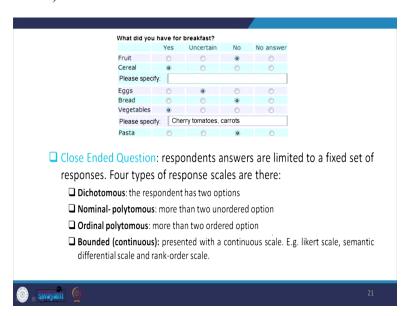
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Another important feature is developing a question wording, wording is very important. It provides the respondent with an easy method of indicating his or her answer. He or she does not have to think much about how to articulate his or her answer.

Similarly, contingency or cascading questions answer, only if the respondent gives a particular response to previous question, that is do you own an enterprise, if the answer is yes. Then the second question follows. What is the annual gross value added of your enterprise? But if it is no, then it should not follow. We must have certain question like skip the question. Another type of questions we discussed is mixed question, where identical response category is assigned to multiple questions like in a matrix form.

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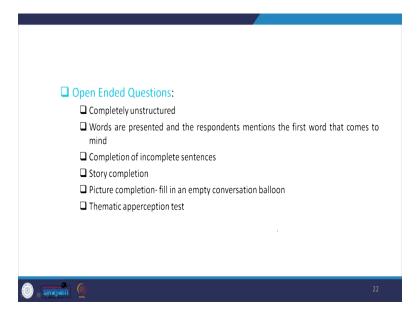


But the same type of responses must have been asked, questions must be asked to the entire set of respondents, yes, uncertain, no, answer like these must have been asked. So in this example, what did you have for breakfast? Food, cereal, please specify which is correct. Similarly, please specify then you have to leave a blank.

Regarding close ended questions, we discussed earlier that respondent's answers are very limited to a fix set of responses. Four types of response scales are there to understand the close ended questions. One is dichotomous, which is of two varieties answers possible at maximum. It has basically two options. Another one is called nominal or ordinal. So nominal, polychotomous, dichotomous we have already discussed. Nominal, ordinal, nominal polychotomous or ordinal polychotomous. So nominal polychotomous means more than two responses, but those are unordered. Similarly, ordinal where the more than two responses must have been ordered.

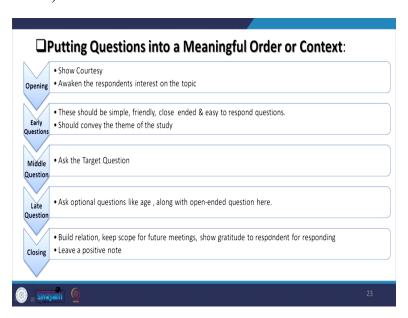
Another one close ended question is called bounded or continuous question. Usually observed in case of likert scale, like customer feedback are in: like very much, you like, average, then do not like or do not like at all or in semantic different scales. If you wanted to understand, you have to go through the scale data. You have ordered scale, there are different scales of data you need to go through.

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So, open ended questions. What is the meaning of it? we already clarified. Those are completely unstructured, usually words are presented and the respondents mentions the first word that comes to his or her mind, and completion of incomplete sentences, if there is part of the open ended questions, story completion is also part of it, picture completion, the thematic apperception test, it also in short called TAT and it is very important for understanding the perception mapping of the respondent.

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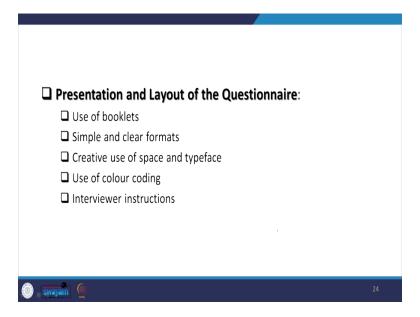
Let us put questions into a meaningful order or context. How questions are put. First one is, starting with a questionnaire design for a better analysis, start with opening questions, then early question, middle question, late question, and closing. This order must have been followed in a questionnaire design.

Opening question must show courtesy of asking questions to the respondent. Respondent must be convinced with the behavior. So awaken the respondent's interest on the particular topic. Then relating to the second part of our questionnaire design is called early questions. These should be simple, very friendly, close ended, easy to respond questions. We have the format. I will show you. I have already shown you questions of IHDS and National Family Health Survey. Under the early questions it should be conveying to the respondents regarding the theme of the study.

And in the middle section ask the target question after convincing. Also make the respondent comfortable about your survey then you ask the target questions. Then late questions ask the optional questions like age, along with open ended question here. Then the respondent might be comfortable in describing his or her thought regarding your survey.

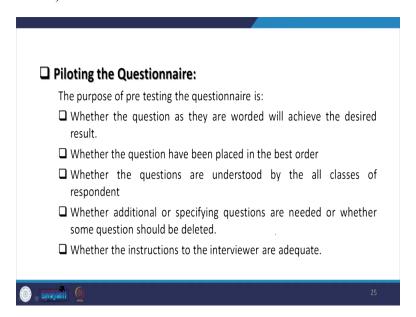
So, at the end there must be closing related question. Try to build relation, keep scope of future meetings, so some gratitude to the respondents for responding in future or even at that because he has already spend time and leave a positive note to the respondent.

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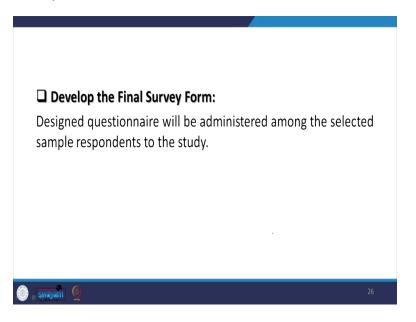
Now come to the presentation and layout of the questionnaire, it has these layouts, booklets, simple and clear formats must have been there, creative use of space and typeface, use of color coding is required nowadays for respondents for better response, interviewer instructions.

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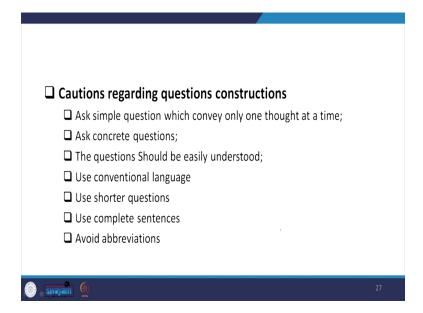
Piloting of the questionnaire is important. I told you already, some pilot testing must have been there. These are also called pretesting of the questionnaire. The purpose of pretesting the questionnaire is whether the question as they are worded will achieve the desired result, whether the questions have been placed in the best order, whether the questions are understood by all classes of respondent, whether additional or specifying questions are needed, whether some questions would be deleted, whether the instructions to the interviewer are adequate or not can be tested from the questionnaire.

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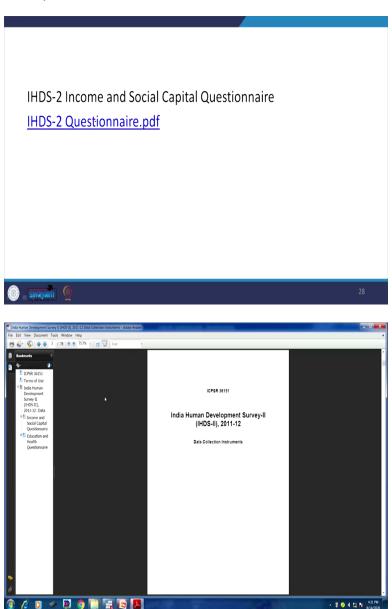
Develop the final survey form. Designed questionnaire will be administered among the selected sample respondent to the study.

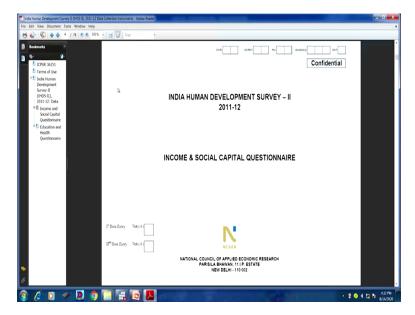
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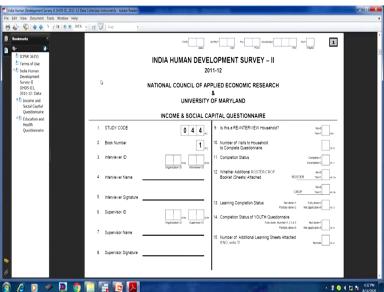


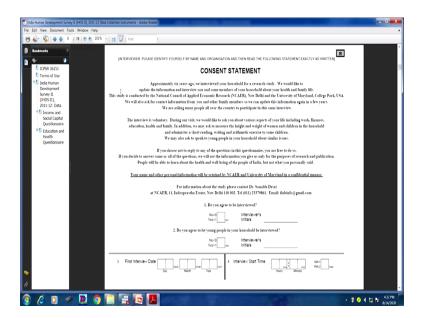
Some of the cautions you must be following regarding questions constructions, ask simple questions as possible which may convey only one third at a time, ask concrete questions, to the point questions, questions should be easily understood, use conventional language, shorter questions, very short form questions, use complete sentences also, and avoid abbreviations. Abbreviation must have been given full clarity.

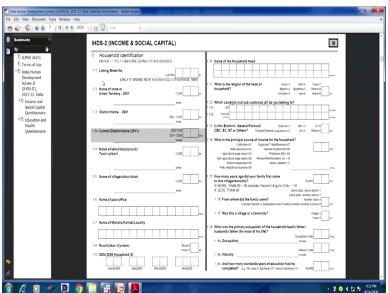
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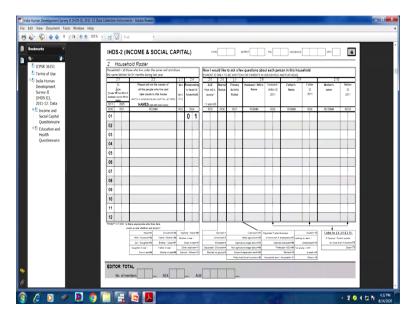


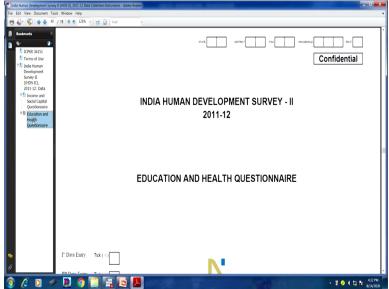












We have this particular questions for your clarity. I am just going to show you. If it gets open, it is fine. Otherwise, I am just going to show you here. We have a sample questions for your clarity. You may follow for it. It is of 78 pages. Just mark it carefully I am just going to show you something in between. Rest we can follow it through our own approach of reading. So this is the India Human Development Survey II that was conducted in 2011-12 by University of Maryland and NCAER, one of the institute in Delhi.

They developed this questionnaire and this is highly appealing and it contains also longitudinal information and they have different component, income and social capital. I am just clicking the

overview of it this is the first page. Like as I told you, warming of questions, questionnaire ID, some consent statement, then they come to the identification, then some important roasters regarding demographic features then the other questions. Another important part of the question is education and health questionnaire as well. So these are very very important to check for better understanding of the different points we discussed I think you must know and this is the education one we are discussing. Similar questions are followed. Please go through and clarify the details.

With this, I think, I should stop here. We will continue in the next class of understanding Stata and its entry of data. Thank you.