

USING VIGNETTES IN COGNITIVE RESEARCH ON ESTABLISHMENT SURVEYS

Rebecca L. Morrison, Kristin Stettler, and Amy E. Anderson
U.S. Census Bureau, ESMPD Room 3110/4, Washington, DC 20233-6200

1. Introduction

There are many different questionnaire development techniques available to the survey researcher. These can vary in scope and size from the expert review, to the cognitive interview, to the pilot test. Cognitive interviews employ a wide variety of methods, including retrospective and concurrent questions, follow-up probes, and vignettes.

While vignettes have become a generally accepted cognitive technique for household surveys, their use in establishment surveys is still relatively rare. Their utility and unique way of presenting situations to respondents make them a valuable addition to the establishment survey designer's toolbox.

Vignettes are used in establishment surveys for the same reasons that they are used in household surveys; they attempt to make the decision-making process seem more real, they lend insight into the response, judgment, and communication processes, and they allow for analysis of respondents' judgments by varying the situations. However, vignettes used in establishment surveys sometimes take a different form than those used in household surveys.

2. Literature Review

Vignettes are brief descriptions of hypothetical situations that are presented to respondents, who often then answer a series of questions based on the information given (Gerber, *et al*, 1996). In essence, they attempt to "create a reality" for respondents. Most times, vignettes are constructed to cover the "gray area" (Alexander and Becker, 1978; Gerber *et al*, 1996). These are situations usually not common in the population of interest or in the population from which cognitive interviews are recruited.

Vignettes are used for five primary reasons. First, they attempt to make the decision-making process more real for respondents (Alexander and Becker, 1978). No longer are respondents thinking in the abstract; the vignette provides a context from which to base their decisions. Second, they lend insight into the response process, especially with respect to the judgment and communication steps (Alexander and Becker, 1978; Gower and Nargundkar, 1991; Martin and Polivka, 1995). Respondents are asked to make decisions based on the information in the vignette, and then report their answer, either on a self-administered form or to an interviewer. In addition, they can point out problems with wording and comprehension (Martin and Polivka, 1995). Third, they can allow for analysis of respondents' judgments through the systematic variation of

situation (Alexander and Becker, 1978). When the details of a vignette are altered, it becomes easier for researchers to determine what bits of information are critical for respondents' decisions. Fourth, they can gauge potential measurement error sources, since researchers know the right and wrong answers for each vignette (Gower and Nargundkar, 1991). Finally, they aid in the determination of what information is being used by respondents when they are answering questions (Gerber, 1994; Gerber *et al*, 1996).

However, vignettes are only as good as the associated assumptions made. Researchers must make two major assumptions when they use vignettes as part of their cognitive research. Vignettes assume that respondents will give the same answers for the vignette as if the situation actually applied to them (Martin and Polivka, 1995). Furthermore, vignette usage assumes that respondents will understand circumstances that may be outside their experience or knowledge. Indeed, Goldenberg (1996) found that "...respondents do not need a clear understanding of [the topic of interest] in order to answer questions about it."

Most of the vignettes described in the literature have been used in household survey development. However, establishment surveys differ in substantive ways from household or population surveys. Establishment surveys usually request factual data – financial numbers, employment information, etc – rather than opinion or attitudinal or behavioral data. Furthermore, they involve technical concepts with complicated definitions, which increase the complexity of the data requested. Many times, this data must be retrieved from records or databases. Sometimes, it must be gathered from multiple sources and then combined in order to answer a single question. In order to encourage the use of records for survey response, many establishment surveys are self-administered. However, as a result of the distributed nature of information found in organizations, it may be necessary to pass the questionnaire around to different people to fulfill the data request. Finally, some information is considered to be proprietary and confidential, so it may be necessary to get authority to release the information outside the establishment.

Vignettes are used in establishment survey questionnaire development for three main reasons. First, researchers often cannot observe the retrieval step of the cognitive process. Frequently, respondents are not willing to check their records during the course of a cognitive interview, especially if they expect it to take a significant amount of time. Second, asking respondents to answer survey questions based on the information in a vignette gives the researcher the chance to observe the judgment and communication steps of the response process. Lastly, respondents at establishments hesitate to report answers because of their concern for accuracy – if a number isn't reasonably accurate, they may not write it on the survey form. Vignettes give researchers a better opportunity to observe problems with the format or layout of the questionnaire that they could not see unless respondents entered data onto the form.

There are a few variations on vignettes: traditional, mock records, and other. The first type – traditional – presents respondents with a “little story” that is ambiguous relative to what is being measured. Gerber *et al* (1996) used this type of vignette in their study of household rosters. Their vignettes frequently took the form of one- to two-sentence descriptions of situations, such as:

- Sandy’s husband, Peter, left on a business trip on March 15 and won’t return until April 30th. Should Sandy list Peter on her Census form?
- Craig and his wife have a house in Pennsylvania. Craig’s job is in Washington, D.C. so he stays with his mom in D.C., Monday through Thursday of the week. Where should Craig be listed on a census form?

The second type – mock records – work in a similar fashion. Here, respondents are given a document that looks like a fictitious report for an establishment, organization, firm, or other entity. These mock documents are usually some sort of financial records that would be analogous to the respondent’s own records. Respondents are then asked to answer the survey questions for that entity, based on those reports. Interestingly, mock records have also been used in household surveys. Schober and Conrad (1997) presented respondents with what they called “fictional scenarios” in the forms of apartment floor plans and purchase receipts.

Several establishment survey research studies have been conducted using mock records that contain simulated data. For instance, at one stage of the redesign of the Occupational Safety and Health Survey (Kydoniefs, 1993), respondents were given mock forms with detailed information that should be reported on the survey. Researchers chose this route so that record keeping across respondents could be standardized. In this manner, problems that were encountered could be attributed to the questionnaire, rather than variations in business records.

In another study (Moy and Stinson, 1999; Schechter *et al*, 1999), participants were given one of two sets of fictitious job applications containing information about Hispanic and Latino origin – they referred to these as “dummy records.” Respondents were asked to aggregate information from the applications and report it on the test questionnaires, and then answered a series of questions concerning their comprehension and interpretation of various sections of the survey instrument.

The vignettes used in the studies named above share five underlying characteristics:

- 1) brevity,
- 2) use of respondents’ words and language,
- 3) ambiguity,
- 4) utility in shedding light on the judgment and communication steps of the response process, and

5) efficient utilization of limited resources.

In order to take advantage of the limited time in a cognitive interview, vignettes must be brief. Respondents must grasp the situation in a few words or sentences. Using the same words that respondents would use to describe a given situation is imperative. Otherwise, the researcher risks respondent confusion, and the focus shifts from answering questions about the situation to understanding the situation. Vignettes must, to some degree, be slightly unclear to the respondent in order to find out how ambiguous situations are likely to be interpreted; there is little reason to make them straightforward. Vignettes are used to find out how respondents make decisions, what they base their answers on, and how they communicate their answers on the survey form. Finally, the use of vignettes enables researchers to take better advantage of the cognitive interviews with respondents they already have. Rather than searching for respondents with special characteristics, researchers can gain information about these special characteristics through respondents who may be familiar with or have knowledge of them, though perhaps not personal experience.

3. Examples of Vignettes Used in Establishment Survey Testing at the U.S. Census Bureau

This section describes some of the vignettes that have been used by the authors in questionnaire development and testing of establishment surveys at the U.S. Census Bureau. Examples of both traditional and mock records types of vignettes are given, along with an example of another variation on vignettes – a mock questionnaire.

3.1 Traditional vignette testing survey concepts

Co-employment (also known as “employee leasing”) is an employment arrangement where an employee leasing firm contractually assumes responsibility for managing key human resource and employer services for a client firm. Functions handled by the leasing firm include payroll, employee benefits, unemployment, and workers’ compensation. For employees, the transfer to an employee leasing firm is almost transparent because their original employer retains the supervisory role, even though their paychecks are issued under the (tax) Employer Identification Number of the leasing firm.

In order to maintain consistency in employment figures, the Census Bureau decided to request information about co-employees on the 2002 Economic Census form. This way, co-employees will be summarized in the industry and county where they actually work, rather than as employees of the leasing company.

There are several complications regarding co-employment. First, these types of arrangements are rare. Second, while “co-employment” is the terminology

advocated by the employee leasing industry, it was unclear how pervasive this terminology was and whether co-employers would recognize themselves in the questions. Third, there are a variety of alternative employment arrangements by which people can work at businesses, including temporary employees, contract employees, and consultants. Finally, many firms use payroll services that do many of the same functions as leasing firms, but without reporting the client company's employees under their Employer Identification Number. Both co-employers and non-co-employers could confuse these alternative arrangements with co-employment, resulting in measurement error in employee and co-employee counts.

Because of the concern about the method and wording used to ask about co-employees, cognitive interviewing was conducted to test the new questions (Stettler *et al*, 2001). The goal for the cognitive interviewing was two-fold: 1) to understand how respondents understand and interpret a very difficult technical concept and 2) to make any necessary changes in order to ease reporting for respondents with and without co-employees.

Over a period of three months in 2001, forty cognitive interviews were conducted with establishments in seven industries. Respondents represented co-employers, non-co-employers, and Professional Employer Organizations (PEOs, or leasing firms).

Respondents were asked to complete the newly-drafted employment and payroll questions with data for their firm. Respondents were then asked to complete the same questions for hypothetical companies described in five vignettes, which outlined various employment arrangements.

Each vignette was only a few sentences long, and used language familiar to respondents who were knowledgeable about payroll and employment arrangements within their company. The vignettes were intentionally vague, to allow respondents wide latitude in their interpretations, and to allow the researchers to find out what sort of information is crucial to the decision-making process. Two examples are below:

- JKL is a large telecommunications company with 300 workers. JKL has outsourced its data processing department to MNO Computing Inc., which provides all 40 computer specialists in JKL's data processing department. Where should the 40 computer specialists and 260 other employees be reported on the economic census form?
- Widgets.com manufactures custom widgets, and sells them online. Widgets.com has 20 part-time employees, who are leased from Leasing Services International. Where should the 20 employees be reported on the economic census form?

Probing questions about the respondents' definitions and distinctions among co-employees, "leased employees," temporary employees, contract employees, and consultants were asked after each vignette.

The use of vignettes to supplement the think-aloud and debriefing process allowed for more natural respondent interpretations of the various types of employment arrangements. Although the researchers tried to probe on these topics during the early part of the interview, respondents were much more willing to discuss their knowledge of these employment arrangements after being presented with the vignette. Sometimes the various arrangements were not used by the respondent's business, yet respondents had knowledge or opinions about what each was. Often, the respondents reinterpreted the information provided in the vignettes in the context of their own company or industry.

The primary conclusions from the cognitive testing were: 1) it was necessary to ask about employment and co-employment in two separate questions, 2) the terms "leased employees" and "leasing company" be used, instead of the cognitively more difficult "co-employment" and "PEO" terms, and 3) leasing needed to be explained in terms of what it was not (not temporary employees, not contractors/consultants), rather than what it was.

In this case, vignettes were used to test the survey concept of co-employment. The situation descriptions were only a few sentences long, and in the language respondents knew and understood. They were somewhat ambiguous because it was not entirely clear where employees should be reported on the form. The vignettes allowed for insight into the judgment and communication steps of the response process, since respondents were required to make decisions and report their answers on the questionnaire. Also, because the different scenarios were presented to all sample units during the testing phase, it was possible to get interpretations of alternative employment arrangements from all participants.

3.2 Mock records vignette testing survey concepts

Goldenberg *et al* (2002) used mock records when they compared similar data items from two surveys coming from two different government agencies. The two surveys were the Bureau of Labor Statistics' Current Employment Statistics (CES) Survey, and the Census Bureau's Annual Survey of Manufactures (ASM). Although both surveys collect data about wages, production worker employment, and hours worked, they collect it in different ways. Researchers wanted to assess how the different presentations of these similar items and their instructions influenced respondents' strategies for response. Using cognitive interviews, researchers were able to evaluate respondents' behavior when they were answering both the CES and ASM questionnaires.

At the time of the testing, both statistical agencies were legally prohibited from sharing information from their business registers; cognitive interviews with

business respondents were impossible. As a result, cognitive testing was held in a laboratory; participants were internal agency payroll or human resource staff members. Mock records vignettes were used so researchers could assess how different presentations of similar items and instructions influenced response strategies. Also, since the researchers knew the correct answers for each mock record, researchers could easily identify response errors.

Prior to the interview, subjects were given mock payroll records (see Figure 1 for an example) for a fictitious manufacturing establishment and asked to complete either the CES or ASM. During the cognitive interview, participants were asked retrospective probing questions about the form. The participant was then asked to complete the other form using the mock records and “think aloud” as they went through it. While the records contained all the necessary information, participants still needed to locate the correct pieces of information and make some calculations.

Researchers discovered that participants made many unnecessary calculations – many questions on the form could have been calculated using fewer numbers from the records. Though this approach did not cause wrong answers, it did add burden for the participants. In addition, the researchers found that the different layouts between the CES and ASM did not affect the response strategies used by the laboratory participants. The data provided by participants generally adhered to the survey definitions. Finally, the researchers discovered that participants consulted the instructions frequently and used them as a reference tool.

The mock records used in this testing of a survey concept displayed the five underlying characteristics discussed previously. They were concise and used payroll and accounting terminology that the respondents were familiar with, so the study participants quickly absorbed information. Since respondents had to know what calculations were needed, and when they were needed, the mock records required respondents to make judgments relative to the form and its instructions. In other words, the mock records were subject to interpretation. Using mock records allowed researchers to find out how potential respondents would use instructions and respond to different questions measuring similar concepts. Lastly, it was not necessary for researchers from both agencies to meet with business respondents, which is a more costly alternative.

3.3 Mock records vignette testing form layout

Research was conducted using mock records to test alternative formatting for the 2002 Economic Census (Stettler *et al*, 2000). The census of manufacturing industries, part of the economic census, provides periodic statistics about manufacturing establishments, activities, and production. Forms for manufacturing industries have traditionally used a tabular format, internally referred to as a “spanner,” to display up to five ordered levels of detail for

collecting data. Other industries typically indent this information, in the style of a topic outline, on their forms.

In an effort to increase consistency among all economic census forms, it was proposed that the manufacturing forms use the indented layout. However, subject experts were concerned that respondents would aggregate their data onto the first available line, regardless of the detail requested, thus resulting in “first-line bias”. The primary objective for the testing was to learn about the potential for this type of bias under indentation.

Cognitive interviews were conducted with respondents from 17 single- and multi-unit establishments in three different industries with past reporting problems. Two different methods were used to evaluate both the “spanner” and indented layouts: think-aloud with debriefing and vignettes. Prior to the interview, respondents were sent one of the two forms to complete using their company’s data. Though some respondents completed a subset of the items, none had responded fully before the interview. Because of the length and complexity of the questionnaire, it was unreasonable to expect respondents to complete it in the presence of the researchers. Therefore, the use of mock records was critical to the success of the cognitive interviews for this project.

Mock records were used for the form layout the respondent had not received prior to the interview. To ensure that the mock records were comprehensible to the respondents, separate records were developed for each of the three industries being studied. The records looked like internal documents from a fictitious company. (See Figure 2 for a sample mock record).

The mock records were constructed so that respondents would be encouraged to make difficult choices that could possibly result in first-line bias. That is, the data provided in the mock records did not exactly correspond to the categories requested on the form, a common phenomenon in establishment surveys. In some cases, an aggregation of multiple items was provided in the vignette, without appropriate detail breakdowns. Because the researchers were studying the effect of the question format, respondents were required to write numbers on the form, as if they were completing it with their own data. This allowed for an evaluation of whether the “spanner” or indented versions were related to the likelihood of a respondent entering data incorrectly.

The use of mock records showed how respondents reacted to a form’s layout even though the data provided did not fit perfectly into the available answer categories. Although respondents used different methods for determining how to report the data given, differences in a respondent’s reporting behavior due to the change in formatting were not seen. A few reported aggregated data on the first detailed line, but they did so equally on the “spanner” and indented versions.

Generally, respondents were reluctant to take the time to access their records to complete the form. Using mock records allowed the researchers to observe the respondents using the different layouts to determine how to enter their data.

The mock records used in this research also fit the definition for vignettes. Despite the appearance of length, respondents quickly absorbed their information and filled in the form. Furthermore, the mock records were more concise than respondents' own records. The mock records used language appropriate to the respondent company's industry. They were deliberately ambiguous, as demonstrated by the fact there was not always an exact match between the product descriptions in the mock records and the categories on the questionnaire. Respondents had to make choices about where to report product data then write numbers on the form, clearly allowing for insight into the judgment and communication steps of the response process. Finally, since time was too limited for respondents to complete the questionnaire using company records, the mock records efficiently used the limited amount of time in a cognitive interview.

3.4 Mock questionnaire vignette testing electronic instrument design

Testing of edits within electronic instruments was conducted as part of the Census Bureau's 2002 Economic Census Style Guide development (Anderson *et al*, 2001). The style guide was a list of rules for developers to use when designing electronic forms for the economic census. One section of the style guide focused on edit messages, which usually consist of a couple of sentences telling the respondent that data he or she entered has failed an edit. Issues included how many edit messages to present, how they should be phrased, and when they should be shown.

Due to time and budget constraints, the proposed edit messages were tested with eight internal Census Bureau employees. The testing focused primarily on how edit messages should be phrased. The researchers were concerned about participants' high level of familiarity with economic census forms, so they developed a partially completed mock on-line mortgage application (a mock questionnaire) that could easily incorporate the proposed edits from the style guide.

Cognitive testing was done in the Census Bureau's Cognitive Laboratory. All participants were asked to "think-aloud." Subjects were initially presented with the vignette (paper screen shots of the mock questionnaire) and asked to read them in order to familiarize themselves with the form, its pre-printed data, and the language used on mortgage applications. (See Figure 3 for a portion of the mock questionnaire presented to participants.) Three edits were presented to the subjects as they read through the vignette; fifteen edits were presented to participants at the end of the vignette. Edit messages were no longer than two sentences. They varied by the inclusion and placement of the question number,

the question topic, and the respondent's entry of data. Due to this variation, not all of the edit messages were presented clearly.

For each edit, participants were asked a series of questions about what they thought the edit message meant, what they would need to do in order to fix the error, and where on the mock questionnaire they needed to go in order to make their corrections. Participants were encouraged to explain any confusion they experienced with the edit messages. Researchers watched and listened as participants used the messages to fix the data problems. This allowed researchers to pinpoint current edit message limitations and outright problems.

The findings from this research had several implications for the style of edit messages presented to respondents on economic census electronic forms. Respondents frequently cited a need for the question number, a description of the problem, and an action to take. As a result, researchers recommended that these three elements will be incorporated into each edit message, where feasible.

This use of a mock questionnaire fits the definition of a vignette. It was shorter and more generic than an economic census form. By allowing time for the study participants to familiarize themselves with the topic of the questionnaire, they became familiar with the words and language. The vignette was ambiguous since the clarity of the edit messages was interpreted in the context of the vignette itself. Participants were required to make changes to the mock questionnaire based on the edit messages, thus shedding light on the judgment and communication steps of the response process. Finally, since researchers were able to test edit messages before the electronic instrument had been programmed, the mock questionnaire was an efficient utilization of limited resources.

4. Conclusions

Vignettes, commonly used by household survey developers, are useful to the survey researcher who wants to study the decision-making process of business respondents. Moreover, the underlying characteristics of vignettes – brevity, ambiguity, familiar language, the ability to provide insight into the judgment and communication steps of the response process, and their efficient use of limited resources – can be applied to and expanded within the establishment survey setting.

Establishment surveys have a dimension that is uncommon to the household survey: the record look-up. Though some population surveys ask respondents to look back through their calendars or expenses, the records consulted in an establishment survey may require respondents to access information from multiple sources. Since respondents are frequently unable or unwilling to do so

in the context of a cognitive interview, and because it generally takes a great deal of time, vignettes can be used instead.

Traditional vignettes are similar to those found in the household setting: a couple of sentences that describe a hypothetical situation. The testing of the co-employment questions on the Census Bureau's 2002 Economic Census forms used this type of vignette. Mock records share the same characteristics of the traditional vignette, but take a different form, in order to accommodate the restrictions associated with record look-up during the course of an establishment survey cognitive interview. These mock records can be tailored for different types of respondents, or the same records can be given to all respondents, depending on the researcher's needs.

In establishment surveys, traditional vignette methodology has been broadened to include the application of mock records. The goals are the same – to observe the judgment and communication steps for situations where this might otherwise be difficult to observe. Because of the nature of records and their importance in the establishment survey response process, using vignettes in the form of mock records can help researchers gain a better understanding of potential measurement errors during questionnaire development and testing.

NOTE: This paper reports the results of research and analysis undertaken by the U.S. Census Bureau staff. It has undergone a Census Bureau review more limited in scope than that given to official Census Bureau publications. This report is released to inform interested parties of ongoing research and to encourage discussion of work in progress.

6. References

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Figure 1. Sample Mock Record Used in the Cognitive Testing of the Current Employment Statistics (CES) Survey and the Annual Survey of Manufactures (ASM)

**Brass Band Hardware Company
Biweekly Payroll Summary Report**

Pay period number	1
Pay period beginning:	31-Dec-00
Pay period ending:	13-Jan-01
Pay date:	20-Jan-01

Current Pay Period	A	B	C	D	E	F	G	H	I
		Regular hours worked	Overtime hours worked	Hours worked, Total	Hours paid leave, paid holidays	Hours paid, Total	Commissions paid	Total Gross Pay	Total Net Pay
Department	Total staff								
Executive	4	216	0	216	104	320	\$0.00	\$17,017.42	\$11,742.02
Sales	5	248	0	248	152	400	\$0.00	\$10,379.81	\$7,162.07
Admin	4	288	0	288	32	320	\$0.00	\$5,119.23	\$3,532.27
Operations	44	3,032	0	3,032	488	3,520	\$0.00	\$68,008.80	\$46,926.07
Shipping	10	644	0	644	156	800	\$0.00	\$11,234.40	\$7,751.74
Total YTD	67	4,428	0	4,428	932	5,360	\$0.00	\$111,759.66	\$77,114.17

Staff Gender	Number	Percent
Male	42	62.7
Female	25	37.3

Year to date	J	K	L	M	N	O	P	Q
	Regular hours worked	Overtime hours worked	Hours worked, Total	Hours paid leave, paid holidays	Hours paid, Total	Commissions paid	Total Gross Pay	Total Net Pay
Department								
Executive	216	0	216	104	320	\$0.00	\$17,017.42	\$11,742.02
Sales	248	0	248	152	400	\$0.00	\$10,379.81	\$7,162.07
Admin	288	0	288	32	320	\$0.00	\$5,119.23	\$3,532.27
Operations	3,032	0	3,032	488	3,520	\$0.00	\$68,008.80	\$46,926.07
Shipping	644	0	644	156	800	\$0.00	\$11,234.40	\$7,751.74
Total	4,428	0	4,428	932	5,360	\$0.00	\$111,759.66	\$77,114.17

Figure 2. Sample Mock Record Used in the Cognitive Testing of the 2002 Economic Census Manufacturing Forms

ABC Widgets, Inc. 123 Street Washington, D.C. 12345 Phone: (202) 123-4567			PRODUCT SHIPMENT REPORT	
<i>Instructions: Please take the information below and put it into the correct place(s) on form MC-3621 or form MC-33421(X).</i>				
Date	Description	Quantity	Value of Shipments	TOTALS
1/97-12/97	Etch	NA	\$ 3,145,000	\$ 3,145,000
1/97-12/97	Strip	NA	\$ 2,451,000	\$ 2,451,000
1/97-12/97	Aligners	NA	\$ 987,000	\$ 987,000
1/97-12/97	Vapor deposition	NA	\$ 1,541,000	\$ 1,541,000
1/97-12/97	Voltage ion implanters	NA	\$ 2,598,000	\$ 2,598,000
1/97-12/97	Polishing machines for semiconductor wafers	NA	\$ 751,000	\$ 751,000
1/97-12/97	Focused ion beam milling machines	NA	\$ 541,500	\$ 541,500
1/97-12/97	Machines that cut blank semiconductor wafers	NA	\$ 4,212,000	\$ 4,212,000
1/97-12/97	Die and wire bonders	NA	\$ 3,457,000	\$ 3,457,000
	TOTALS		\$ 19,883,500	\$ 19,883,500

Figure 3. Portion of the Mock Questionnaire Used in the Testing of Electronic Instruments for the U.S. Economic Census

Tell us about your finances

30. What is your total monthly salary?
\$.00

31. Please completely fill in the amount for each category related to your monthly salary:

1 Federal income tax deduction

2 State income tax deduction

3 Health Insurance deduction

4 Social Security deduction

5 Medicare tax deduction

6 Retirement deduction

7 Other deductions

8 Net monthly income

32. What is your total monthly other income?
\$.00

33. What is your current monthly housing payment?
\$.00