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REPORT ON
~~TARIFF STUDY FOR~~
TAIZ WATER AND SEWERAGE AUTHORITY,
YEMEN ARAB REPUBLIC
VOLUME 2

FOR

UNITED STATES AGENCY
FOR INTERNATIONAL DEVELOPMENT

NOVEMBER 1977

HASKINS & SELLS

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SOCIO ECONOMIC SURVEY OF TAIZ,
YEMEN ARAB REPUBLIC,
JULY/AUGUST 1976

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SOCIO-ECONOMIC SURVEY OF TAIZ,
YEMEN ARAB REPUBLIC,
JULY TO AUGUST 1976

REPORT ON SURVEY METHODOLOGY

FOR

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APRIL 1977

REPORT ON SURVEY METHODOLOGY

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SOCIO-ECONOMIC SURVEY OF TAIZ, YEMEN ARAB REPUBLIC,
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REPORT ON METHODOLOGY

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SECTION I - INTRODUCTION

Terms of Reference

1. The socio-economic survey of Taiz was specified in the terms of reference for the Taiz Water and Sewerage Tariff Study, which we were commissioned to undertake by USAID, under contract AID/NE-C-1234, effective 14th May 1976. The full terms of reference are reproduced as Appendix 1 to the main report of the tariff study.
2. Although the terms of reference gave an outline specification of the type of information which the survey should establish as a basis for the tariff study, the methods by which the data should be collected and the size of the survey were left unspecified. A pilot study for the survey was excluded by USAID officials during discussions prior to signature of the contract, partly because of the short period available for fieldwork.
3. At the time that the terms of reference were drafted, little information on the socio-economic characteristics of Taiz was available to determine the optimum size of

sample which should be drawn. It was agreed with Ms. Silver of USAID that the survey should collect information from about 1,000 households. Other important aspects of the survey methodology, such as the sampling method to be used, were discussed prior to the start of fieldwork with Dr. Hunter of the Bureau of the Census, but it was not possible to take final decisions on these matters until fieldwork had started. Many matters of detail, such as the final form of the questionnaire, also had to be deferred until local conditions were more fully understood.

Acknowledgements

4. We wish to take this opportunity to express our thanks to Ms. Silver and Dr. Hunter for their assistance during the preliminary visit and at meetings in London. We are also grateful to the staff of the USAID Mission in Sana'a, and to officials of the Yemen Central Planning Organisation and the National Institute of Public Administration for their help during the fieldwork stages of the study.

Purpose and Structure of this Report

5. The purpose of this report is to provide a detailed record of the survey methodology, including design, fieldwork, data validation and analysis. The survey information relating to households and small businesses in Taiz is presented in two separate reports, which have been written for presentation purposes to include the minimum technical background. The detail in this report may help in the interpretation of the results, and to induce confidence in their reliability. It may also be useful to have a detailed record of the way in which the survey was carried out if USAID should wish to commission similar work in the future.

6. The report covers the following main headings:-

- (a) fieldwork planning;
- (b) choice of sampling method;
- (c) business and construction site surveys;
- (d) questionnaire design and testing;
- (e) field staff selection and training;
- (f) survey control;
- (g) analysis.

SECTION II - FIELDWORK PLANNING

7. This section describes the way in which the fieldwork was planned and staffed. In our view these factors are the major determinants of the success of large-scale surveys of this kind.

Timescale

8. At the time of signing the contract, engineers' cost estimates were expected to be available during or immediately after the fieldwork period. The target date for submission of the preliminary report on the tariff study was 1st February 1977. It was clear that this would only be achieved if the fieldwork was complete before the start of Ramadhan (26th August 1976).
9. The contract was signed on 14th May 1976. A preliminary visit to the Yemen Arab Republic was undertaken between 28th May and 12th June 1976 by Dr. Leon Hunter of B.U.CEN and Mr. Peter Ginnings who was survey manager in the Haskins & Sells team. This visit was intended to:-
 - (a) establish logistic and host country support and contacts for the team;
 - (b) review alternative sampling methods;
 - (c) review a preliminary draft of the questionnaire for the household survey.

Dr. Hunter held meetings in London with consulting team members both before and after the preliminary visit.

10. The main fieldwork programme started in the week beginning 19th June 1976. The fieldwork period was thus limited to just over three months, and fieldwork plans and decisions had to be made within this relatively tight time constraint.

Planning

11. A simple form of critical path analysis was used to plan and control the fieldwork period (see Appendix 1). There was little prospect of completing the fieldwork on time unless priority was given at an early stage to those component activities (such as questionnaire design) which had to be completed before others (such as interviewer training) could be commenced.
12. It was inevitable, in a city where socio-economic data and other facilities were limited, that unforeseen delays would occur. Slack time was therefore built into the fieldwork plan prior to the start of interviewing. Fortunately this provision was not all required, and the interview programme started ahead of schedule on Monday, 26th July.
13. Opportunities to reduce the length of the fieldwork programme were taken whenever they arose. For example, there were sufficient applicants from local people for the job of interviewer to allow us to employ a larger field team than originally planned, thus reducing the length of the interview programme. These types of decision were particularly important at the time, since it was not then certain how many interviews could be undertaken by an interviewer in a day.

14. As a result of this strategy, the interviewing programme was completed on 18th August 1976, a few days ahead of schedule; there were also very few interviewers working during the previous three days.
15. Another factor critical to the success of the survey was the accuracy of the information collected. Substantial effort was therefore devoted to:-
- (a) questionnaire design;
 - (b) questionnaire translation and testing;
 - (c) interviewer training;
 - (d) supervision of interviewers;
 - (e) achieving a high response rate;
 - (f) checking key information on completed questionnaires during the interview programme.
16. During the design stages of the survey it was difficult to be certain what the response rate of sampled households would be. A low response rate would have posed major problems in the interpretation of the survey data and jeopardised the success of the entire project. We therefore devised systems which would:-
- (a) help us to quantify the proportion and type of non-responding households;
 - (b) ensure that at least three call-backs were made to these households, if necessary by the field supervisor.
17. In addition, jointly with the Kennedy Water Authority, we advertised extensively in the local newspaper and on the radio to provide information about the purpose of the survey and to encourage householders to participate in the survey if they were approached. We also received

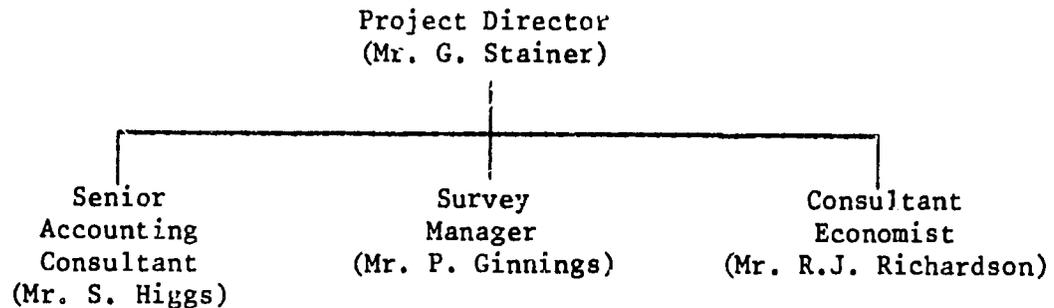
approval for the survey from the Civil Governor of Taiz and from the police. During the interview programme we found a very high level of awareness of our survey.

18. In the event, the response rate for households was 94%. We are not aware of any non-mandatory survey (in developed or less-developed countries) in which a better response rate has been achieved. The survey procedures no doubt helped to reduce the number of non-responding households; the main factor however will have been the great significance of water supply to the surveyed population.
19. As a result of the high response rate, we have been able to ignore the possibility of significant bias due to non-response in the reports of the survey results.
20. Another factor of great importance to the interpretation of the survey results was the extent to which the sample could be regarded as representative of the city of Taiz as a whole.
21. In the design stages, considerable thought and effort was devoted to the selection of the best available sampling method (reported in more detail in Section III). We also spent several days in Taiz at the end of the fieldwork period checking certain key results which could be computed quickly by hand (such as mean household size, or the sex ratio) with the 1975 Census results. During the analysis stages it has been possible to make further, more detailed comparisons.

22. As a result of these checks we feel confident that the sampled households represent the key characteristics of the population of the city as a whole much more closely than we could infer from standard statistical theory alone (see Section VIII).

Staffing

23. The structure of the Haskins & Sells team was as shown below:-



24. The survey manager was resident in the Yemen throughout the fieldwork period. The project director spent the first three and last two weeks of the fieldwork programme in the Yemen. Both the other members of the consulting team assisted with the survey during the fieldwork period to the extent of about three man-weeks in total.
25. Mr. Taher Saif, Director of Statistics for the Central Planning Organisation was released to work as counterpart survey manager for a period of approximately two months. He played an important role in the design, translation and testing of the survey questionnaires and in the training and supervision of field staff.

26. The following survey staff were recruited locally by advertisement (see also Section VI):-

- (a) four supervisors;
- (b) 28 interviewers;
- (c) two checking clerks.

The interviewers were organised in four teams, each with a supervisor. The clerks undertook a specified programme of checks on completed questionnaires, mainly to establish that they had been fully coded. A more extensive series of checks of consistency was carried out by the survey manager or the other consultants.

27. A major part of the work of the survey manager and his counterpart was concerned with the accurate definition of the sampled areas within which households were to be interviewed. In addition, the survey manager had to explain each day's programme to the team supervisors, make administrative arrangements and undertake checks of completed questionnaires. This proved to be a very heavy workload; a second survey consultant would probably have been justified, at least for the period of the interview programme, particularly in view of the risk of illness, and the time constraint.

SECTION III - SAMPLING METHODAlternative Methods Available

28. The household sampling methods available were:-
- (a) to select a random sample of households in Taiz from the records of the census of February 1975;
 - (b) to devise procedures which would result in the random selection of households by interviewers;
 - (c) to select a random sample of areas and interview all households found within the selected areas.
29. Field tests were carried out to establish the feasibility of each method. The tests showed that although it would probably be possible to find individual households selected from the census records, this could well take an average of 20 minutes per interview. To use this method therefore implied the commitment of around 400 interview hours in excess of the time required to complete 1,000 household interviews.
30. A somewhat smaller commitment of interview time would probably also have been required to locate a random sample of individual households chosen by some other random procedure. We considered nevertheless whether suitable rules or procedures could be adopted which, when followed by interviewers, would result in the choice of a random sample of households. We concluded that because of the irregular layout of Taiz it would in practice prove impossible to devise selection criteria which eliminated the exercise of judgement

by interviewers. Such a method would therefore introduce potential bias in the selection of the sample, the significance of which it would be difficult to assess.

31. As part of the field tests, we attempted to identify five hectare squares chosen at random using the maps in the Montgomery report and copies of the aerial photographs on which they were based. The tests showed that it would prove possible to identify the limits of such squares on the aerial photographs, although it might take up to an hour per square to identify accurately which buildings should be included.
32. The other arguments in favour of using the area sampling method were:-
 - (a) that it would include development in Taiz since February 1975 (the date of the census);
 - (b) that the scope of the sample survey could be extended to include the collection of systematic information on non-domestic demand for water, which could be used as the basis of estimates for Taiz as a whole;
 - (c) that a team of interviewers could be more closely supervised, and fieldwork control would be enhanced, if all members of the team were working within a hectare block;
 - (d) that provided the limits of the hectare squares were carefully defined, the selection of households for interview was unlikely to be biased;

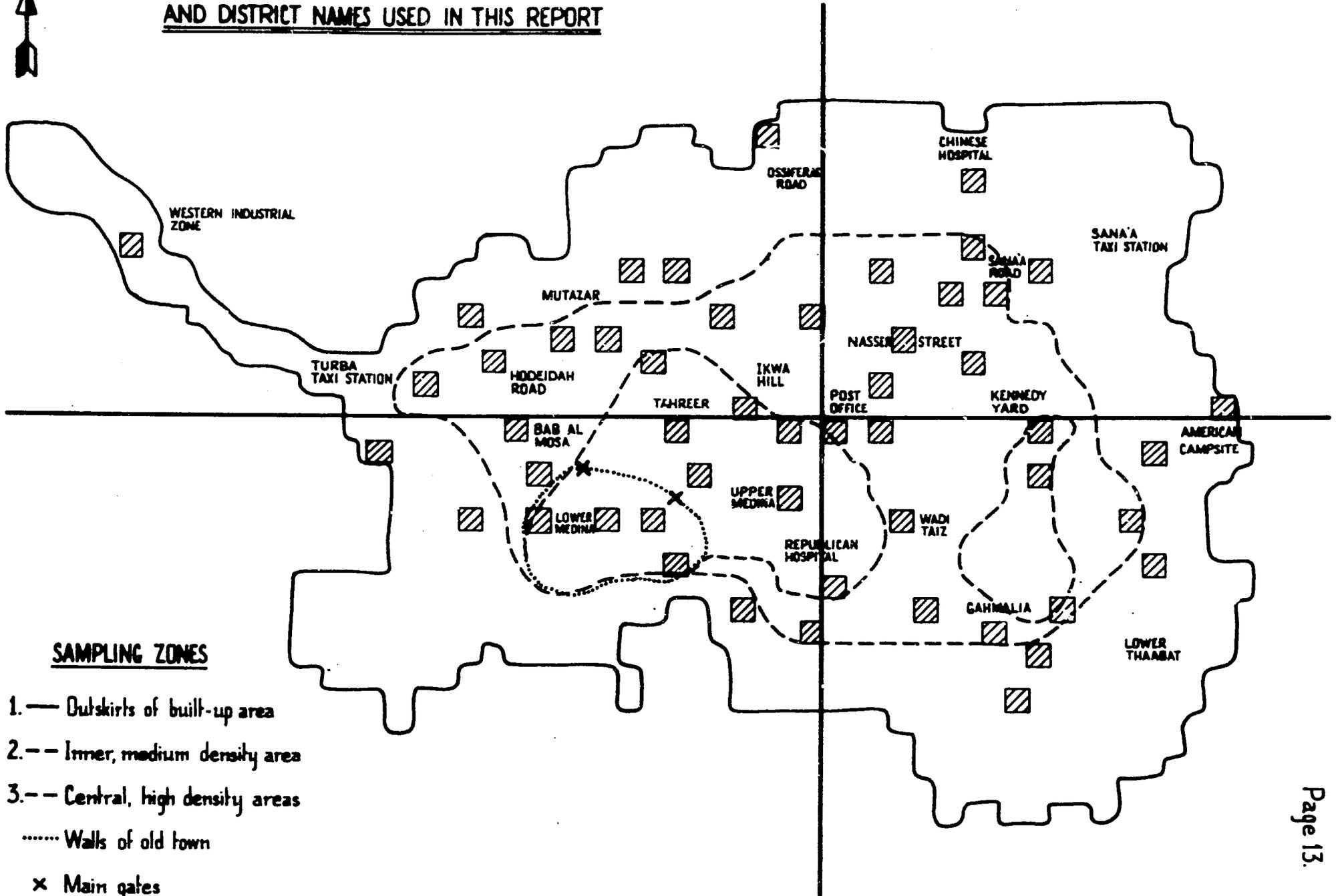
- (e) that the method would give an independent estimate of the population of Taiz, which could be checked against the Census figures;
- (f) that the time required to select the sample would be much less than that required for the selection of individual households from the Census records.

Area Sampling Method Selected

33. It was therefore decided to use the area sampling method for the household survey.
34. In order to reduce the variance of estimates, based on the sample, of the characteristics of the population of Taiz as a whole, and to facilitate the analysis of sub-samples, it was decided to adopt a stratified sampling procedure. The area of Taiz served by Phase I of the new water system proposed by Montgomery was divided into four quadrants of approximately equal area. Within each quadrant the following criteria were used to define strata in more detail:-
- (a) the area at present supplied by the Kennedy Memorial Water System;
 - (b) an area within that supplied by the Kennedy system, which was judged by eye (using maps contained in the Montgomery report) to be of relatively high population density.



SCHEMATIC MAP OF TAIZ SHOWING SAMPLING AREAS
AND DISTRICT NAMES USED IN THIS REPORT



35. Within three of the four quadrants this procedure yielded three separate strata. In the fourth quadrant it was judged that there was no area of very high population density. The system of stratification is shown diagrammatically in Diagram 1.
36. The number of hectare squares in each of the 11 strata was counted. A sample of squares was selected, using random numbers, for each stratum.
37. A selection rule was established which excluded from the sample any square directly adjacent to one already chosen; technically therefore the selection was a random sample of all non-adjacent hectare squares in Taiz. This rule was intended mainly to improve the geographical coverage of the sample; geographical analysis of socio-economic information was required by the terms of reference.

Sampling Fraction

38. The sampling fraction was the same, to the nearest whole hectare square, for each stratum. The sample therefore includes zones of different densities in the same proportions in which they are present in Taiz as a whole. The overall average was 8.6% (84 squares out of the total of 977). This fraction was intended to yield a minimum sample of 1,000 households, based on the 1975 Census population of Taiz. In the event we undertook 1,173 household interviews; we subsequently estimated that Taiz had grown by about 15% since the Census date.

39. Of the 84 blocks sampled, 33 were vacant. All but one of the vacant blocks lay outside the area now served by the Kennedy Memorial Water System. We estimate that the total built-up area of Taiz in August 1976 was 595 hectares.

Identification of Sampled Areas

40. The sampled hectare squares were drawn carefully onto large-scale aerial photographs of Taiz, which were then used to help identify the boundaries of the square on the ground. Greater difficulty was found in identifying vacant squares than those which were built up, and compasses proved to be essential equipment. Where a dwelling was intersected by the boundary of a sample hectare, the household concerned was interviewed only if the main door lay within the boundary.

Accuracy of Results

41. In developing this sampling method we considered that it should produce an unbiased estimate of the means of population variables, and subsequent comparisons with the 1975 Census results tend to confirm that it did so.
42. For theoretical reasons, a cluster sample does not produce such accurate estimates of population characteristics as a simple random sample. Statistical estimates of population means based on a cluster sample will therefore be subject to greater uncertainty than if based on a simple random sample.
43. The sampling method described here involved 51 occupied clusters yielding 1,173 household interviews. The mean cluster was therefore a relatively large number of

households, but subject to variation from one or two households to about 80. Estimates of population means based on a cluster sample of this kind will normally be subject to wide margins of error.

44. We now consider, therefore that it would have been preferable to choose a cluster size one half or one quarter of the size actually selected, although it would have been necessary to assess this carefully for administrative feasibility. The accuracy of the survey would also have been improved if we had had time to modify the stratification by reviewing conditions on the ground. (As already stated, the close agreement with the Census results seems to indicate that the sample actually chosen was more representative of the total population than statistical theory would allow us to infer, but one could not rely on a similar outturn in another such survey).

45. A pilot study is normally intended:-

- (a) to check the feasibility of a sampling method;
- (b) to make a preliminary estimate of population variances, as the basis of a decision on stratification and the size of sample required;
- (c) to check the sense and completeness, and the possible redundancy, of survey questions.

46. We would normally recommend, for a survey of this importance and cost, that a pilot study should be undertaken, since it is likely to lead to both improved accuracy and reduced cost. We accept that in this case the time constraint made this approach impossible, and consider that the results are nevertheless sufficiently precise for the purposes of the tariff study.

SECTION IV - SURVEY OF BUSINESS ACTIVITY

47. During the initial fieldwork stages it became clear to us that in addition to a few relatively large commercial or industrial concerns, there was an extensive informal sector of business activity.
48. Businesses in this sector were typically small, employing only a few people, and operating either from domestic premises or from small shops or offices.
49. These businesses nevertheless represented a considerable part of the present and future employment available in Taiz. They would therefore also represent a significant demand for water and sewerage services, the size and potential of which it would be difficult to estimate unless we used survey methods.
50. The terms of reference for the tariff study did not specifically cover business activity of this informal kind, but they specified that the socio-economic data should include, for industry and commercial establishments:-
- (a) source of water;
 - (b) sewerage service;
 - (c) water consumption.
51. The terms of reference also specified that the socio-economic data should cover the attitudes of households and non-domestic establishments:-
- (a) towards water service, sewerage service (present and future);
 - (b) towards hypothetical bills.

52. However, the discussions which we had held with Joan Silver and Leon Hunter, and USAID's comments on the preliminary draft of the household questionnaire, did not appear to envisage a major survey of informal economic activity, perhaps because at the time we did not fully appreciate that it existed.
53. The decision to use an area sampling method for the household survey offered the opportunity to include small businesses operating in the sampled areas with very little additional fieldwork effort (some development of the household questionnaire to cover businesses and one or two days added to the interview programme).
54. In view of this, and the implications of the terms of reference, it was decided to collect information on small businesses through the survey. We did not fully appreciate at the time this decision was made the extent to which we would later incur costs in respect of the information collected in data validation, analysis and report writing. In retrospect, there can be little doubt that accurate information on this type of dispersed but extensive economic activity would have been impossible to collect other than by a survey.
55. The business survey covered:-
- (a) 44 businesses in the sampled areas operating from household premises;
 - (b) 283 businesses operating from other premises.
56. We estimated from the sample that in Taiz as a whole this sector of economic activity includes 3,800 businesses, that is, one for every three and a half households.

57. We also undertook a very short and simple survey of the water consumption characteristics of construction activities. The main purpose of this was to provide supporting information on the growth rate of Taiz. The results are discussed in the main tariff study report.

SECTION V - QUESTIONNAIRE DESIGN

Preliminary Drafts of Household Questionnaire

58. An early, uncoded, draft of the household questionnaire was produced prior to the preliminary visit to the YAR by Dr. Hunter and Mr. Ginnings. As a result of comments on this draft by USAID staff in Washington, discussions during the preliminary visit and some data processing input, the early draft was revised. This revised draft was taken to Washington by Dr. Hunter at the end of June.
59. Following an initial test for length, the questionnaire was developed further in Sana'a and translated. Arabic staff of the USAID Mission in Sana'a prepared and helped to revise an initial translation. The final draft of the questionnaire, prepared by Mr. Taher Saif, was tested in Taiz. The final English version of the household questionnaire is given in the appendix to the household survey report.

Field Testing of Arabic Version

60. Before finalising discussion on the draft household questionnaire we undertook a series of about a dozen interviews to establish:-
- (a) whether the questions could be understood by prospective respondents and were meaningful;
 - (b) whether the order of questions could be followed both by interviewers and respondents;
 - (c) whether the precoded responses were adequate for the types of replies we were likely to receive.

61. The interviews were conducted by Mr. Mourad, a surveyor from the Kennedy Water Authority, with half a dozen members of the public visiting the Kennedy main yard and with a further half dozen respondents in housing areas nearby. The latter were chosen to give a reasonable spread of housing types and sizes. Each of the interviews was observed by Mr. Peter Ginnings, the Haskins & Sells survey manager.
62. Whilst this series of interviews could not be expected to give conclusive results, nevertheless it confirmed that respondents were willing to participate in an interview of this length, and that the organisation and general content of the questionnaire was appropriate.
63. It also suggested specific alterations to the questionnaire as listed below:-
- (a) the concept of "clean" water was not meaningful or not important; the prime distinction was between "sweet" water and "salty" water (see for example question 25);
 - (b) the concept of varying consumption with price was not easily understood because of the existing supply constraint; however, with careful explanation meaningful responses could be obtained (see question 71);
 - (c) it was necessary to simplify the choice of time periods and units specified for recording consumption from different water sources to conform more closely to actual behaviour;

- (d) it was necessary to change the order of questions on sewerage to simplify the routing for the interviewer; we also changed the descriptions of the alternative types of toilet facility to fit in with local conditions;
- (e) some minor changes were made to the translation to clarify the meaning of and to simplify some questions;
- (f) some minor changes were made to the layout of the questionnaire;
- (g) substantial insights were gained into the areas which would have to be covered in the training programme.

Business and Construction Site Questionnaires

64. Separate questionnaires were prepared in order to collect information on:-

- (a) commercial activities not undertaken from the premises of the proprietor's household (see appendix to business survey report);

- (b) construction sites (see Appendix 5).

Information on family business operating from household accommodation was collected in the household questionnaire.

65. Time did not permit separate field testing of the non-household questionnaires. However most of these questions were of identical or similar form to those in the household questionnaire. Various amendments were made to the draft business questionnaire as a result of the field tests to the household questionnaire.

66. Results from the 1975 Census, which we were not able to review until after the initial drafting of the business questionnaire, indicated that a significant proportion of the population lived in "improper" accommodation - mainly business premises. The questionnaire was slightly modified to cover this point.

Experience in Use

67. The household questionnaire normally took 35 to 40 minutes to administer. The time required for particular questionnaires could vary from 20 to 60 minutes, depending on the characteristics of the household being interviewed. The business questionnaire normally took 30 minutes to administer.
68. We could hardly have expected to eliminate all ambiguities or omissions from questionnaires written in a foreign language and designed to collect information about an unfamiliar culture, without a full pilot study. Nevertheless, the final versions were reasonably satisfactory in use. There were one or two questions for which the precoded answers appeared not to be fully comprehensive, but no major analytical problems have been revealed. It is however probable that the household questionnaire could have been somewhat shorter if a pilot study had been undertaken. This would also have simplified analysis of the results.

SECTION VI - FIELD STAFF SELECTION AND TRAINING

69. As already mentioned Mr. Taher Saif, Director of Statistics at the CPO, was engaged as counterpart survey manager (see paragraph 25 above).

Selection of Supervisors and Interviewers

70. Recruitment advertising was carried out by KMWS in the week beginning 26th June 1976. Over 160 applications were received, and as already stated, four supervisors and 28 interviewers were recruited.

71. For supervisors the selection criteria were:-

- (a) previous experience of interviewing or social survey work, normally in the 1975 Census;
- (b) some university education.

We also took into account applicants' ability to speak English. Supervisors were generally older than interviewers.

72. For interviewers, the selection criteria were:-

- (a) experience as an enumerator in the 1975 Census;
- (b) secondary education completed or nearly complete;
- (c) the ability to write English (i.e. Arabic) numbers clearly.

Remuneration of Survey Staff

73. We agreed with Messrs. Shafer and Wagner of the USAID Mission in Sana'a that the counterpart survey manager would receive remuneration in respect of overtime worked on survey business, together with a standard per diem whilst he was in Taiz.

74. Rates of payment for supervisors and interviewers were discussed in Sana'a with Mission officials and with the Director of the 1975 Census (Nadr Hallak), and in Taiz with Ali Abdul Aziz, acting director of KMWS. It became clear that rapid inflation had occurred in the Yemen since our previous fieldwork for the Sana'a water tariff study, and that local costs would be higher than those provided for by our contract.
75. It was decided to pay supervisors 40 rials and interviewers 30 rials for a standard seven hour working day.
76. Supervisors started work at 08.00 am. They spent the first two hours helping to mark out the boundaries of the hectare blocks which were to be interviewed by their team later in the day. Interviewers started work at 10.00 am and the teams normally worked until dusk fell (around 18.30 pm), with a break for lunch from 12.00 to 14.00 pm.
77. Supervisors therefore normally worked at least two hours overtime. Interviewers only worked overtime when this was necessary to complete the day's interviewing programme.
78. We calculate that the total cost of each completed interview was 33 rials (a little over US\$7).

Training

79. It became clear during the early stages of the assignment that the main training material was the final Arabic version of the household questionnaire. The prime objective of training, for both supervisors and interviewers, was to ensure that they fully understood -

- (a) each of the questions they might have to ask;
- (b) the relatively complex sequence of questions, which depended on answers already received;
- (c) how to resolve problems of definition and possible ambiguities.

80. It was apparent therefore that training could not be properly planned until the household questionnaire was almost in its final form, and that the programme could not actually start until copies of the questionnaire were available. Problems with the reproduction of the household questionnaire resulted in the training programme starting later than had originally been intended.

81. The time devoted to training was as follows:-

(days)	<u>Household Questionnaire</u>	<u>Business Questionnaire</u>
Supervisors	9	2
Interviewers	5	2

82. Supervisors were given four days' training prior to the interviewer training programme. This was to ensure familiarity with the purpose and content of the survey so that they could assist in the training programme. It also covered the block sampling technique that we used and practice in survey control methods and documentation.

83. A brief summary of the interviewer training programme is given at Appendix 2. The programme was designed to give interviewers as much experience of using the questionnaire as possible prior to the start of the

interview programme. It was also intended to provide feedback to supervisors and the survey manager on the performance of the trainees. A total of 160 "live" interviews were completed as part of the training programme in addition to classroom exercises.

84. Interviewer training did not finish with the end of the formal training programme. Questionnaires completed during the first few days of interviewing were carefully checked by the field supervisors and by consultant staff, and the performance of individual interviewers monitored and corrected as a result.

SECTION VII - SURVEY CONTROL

85. In the planning of the survey we gave great emphasis to measures designed to increase the accuracy or reliability of the results. This section describes in rather more detail the methods by which this purpose was achieved.

Supervision

86. Our normal consultancy work is organised on the basis of a rather high proportion of supervisory time, because we believe that this results in high quality work. We translated this principle into the organisation of the field survey by employing supervisors (themselves supervised by a survey manager and his counterpart) as well as enumerators, and by choosing a sampling method which permitted close supervision of enumerators as they worked.
87. The role of the supervisor was:-
- (a) to understand clearly, for each sample hectare allocated to him, which buildings were included;
 - (b) to ensure that all the households living in those buildings were identified;
 - (c) to ensure that as many as possible of the households were interviewed, and to call back at least three times to achieve this;

- (d) to allocate interviews to each member of his team and to issue questionnaires;
- (e) to visit each team member periodically during the day to check on his progress, to confirm that the questionnaire was being used correctly, and to resolve any problems;
- (f) to make a brief check of completed questionnaires returned to him by interviewers, and to correct any obvious errors before leaving the interview area;
- (g) to keep a record for each sample hectare (the supervisor's control sheet) which would record certain information about the hectare not contained on individual questionnaires, and which would provide a check on the number of completed questionnaires.

Control Sheets

88. The layout of the supervisors' and interviewers' control sheets is shown at Appendix 3. The information which they were intended to collect which was not included on the questionnaires related to:-

- (a) the number of buildings in the sample hectare (or block);
- (b) the number of households and businesses which were not interviewed;
- (c) the number of buildings under construction.

89. It can be seen that the control sheets provided a reasonable basis by which to judge whether non-interviewed households or businesses were similar to those interviewed, and hence to assess the significance of non-response bias if response rates were low.
90. In addition the control sheets summarised certain information included on the questionnaires. The intention of this was:-
- (a) to relate questionnaires and control sheets for the hectare;
 - (b) to provide the basis for checking the performance of interview teams and individual interviewers;
 - (c) to provide the basis for rapid manual computation of certain key statistics at the end of the interview program, which could then be reviewed against census results.
91. The control sheets were precoded for computer analysis, although with only 51 occupied hectares in the sample all analysis was in practice carried out manually. No analysis of control sheet information has been reported in the survey results, but they formed an important part of the checking of input documents prior to data validation by computer.

Field Checking of Questionnaires

92. Supervisors' checks of completed questionnaires were necessarily brief and superficial, since their teams could be expected to complete approximately 30 to 40 interviews in a day.

93. Two female clerks were employed to undertake a further series of checks. These were primarily concerned to ensure that all (English) numbers entered in the pre-coded boxes of the questionnaire were legible and correctly spaced, and that blanks did not occur where there should have been entire.
94. Consultant staff undertook a more complicated series of checks to establish:-
- (a) that routing instructions contained in the questionnaire had been correctly followed;
 - (b) that there was consistency between certain pairs of responses which should logically have been consistent;
 - (c) that multiple answers had not been coded where only one was permissible.
95. Questionnaires had therefore passed a series of three checking procedures in Taiz before the interview program was completed. The final data validation by computer took place in London after the field work program had ended (see Section VIII).
96. A test of the accuracy with which household questionnaires were being completed was conducted early in the interview program. The results were as follows:-

<u>Number of Errors</u>	<u>% of Interviews</u>
Less than 5	45%
6 - 9	33%
10 - 15	22%
16+	NIL

97. The majority of problems arose with the complicated questions contained on the last two pages of the questionnaire concerning personal information and household income and expenditure. In view of the length and complexity of the questionnaire the error rate was small, and improved as the survey progressed.
98. As a result of the checks on individual performance, several interviewers and one supervisor resigned during the interview program.

Interviewer Debriefing

99. A formal debriefing session was held with supervisors and interviewers at the end of the field work period. The purpose of this was:-
- (a) to review survey organisation and the training program in the light of experience;
 - (b) to check the interpretation of certain interview questions where an ambiguity had been revealed during use;
 - (c) to gather additional information which might prove helpful during analysis.

Extensive feedback was of course received through supervisors during the interview program.

100. Typical questions covered in the debriefing session were:-

- (a) the problems arising from inaccurate Kennedy water meters;
- (b) whether there might have been any tendency for information on recent deaths or emigration to have been suppressed (the answer in these cases was no);
- (c) the probable reliability of income and expenditure information.

101. No significant criticisms were made of the training program or of survey organisation, and the information relating to particular survey questions tended to confirm what the survey manager already knew.

Field Review of Results

102. The following key survey statistics were computed manually as soon as the interview program finished:-

- (a) total number of households in sample hectares (including those not interviewed);
- (b) population in sampled hectares;
- (c) sample sex ratio;
- (d) the number of buildings in the sampled area.

103. We were quickly able to establish that estimates for Taiz as a whole, based on the sample, were consistent with the 1975 Census results, with the exception of the number of buildings.
104. We therefore revisited about 20 sample hectares and checked that the number of buildings had been correctly recorded. It became clear that although the definition of a building adopted for the survey was difficult to apply consistently, the numbers recorded were approximately correct.
105. We subsequently discussed the definition of buildings used in the 1975 Census with its Director, Nadr Hallak. It became apparent that the definition used in the Census was not directly comparable with our own. We noted also that the sample survey conducted by Montgomery had used a third definition which had given results not strictly comparable either with those of the Census or of our survey.
106. The problem stems from the type of construction found in the Yemen which is often continuous from one building to the next. Estimates of the numbers of buildings in these circumstances are extremely difficult to make, and minor changes in definition can substantially alter the resulting estimate.

Report to Mission and CPO

107. We organised our own debriefing meeting in Sana'a at the end of the field work period. This was attended by a number of USAID Mission Officials (including the Director, Mr. Ruiz) and by Dr. El-Ariki, Deputy Chairman of the Central Planning Organisation. At this meeting we reviewed the progress of the field work program, and gave some indication of the population of Taiz in August, 1976, based on the sample results.

SECTION VIII - ANALYSIS

Quantity of Information

108. The punching documents consisted of 1173 household questionnaires and 283 business questionnaires. The household questionnaire comprised just over 100 questions, many of which could involve multiple answers, the business questionnaire is slightly shorter. The information occupied approximately 10,000 punched cards.

Validation

109. Data validation of the household questionnaire involved the specification of 620 computer statements. They provided an exhaustive check that:-
- (a) the punched cards contained only those codings which were permissible for each question;
 - (b) the codings for each questionnaire were mutually consistent.
110. The error rate revealed by these routines was less than 5%; however, this resulted in at least one error in approximately 60% of questionnaires, on account of the amount of data contained in them.
111. In most cases, it was necessary to consult the original questionnaire before correcting the punched card; the

only problem posed by this was that it took time. Errors were reduced to insignificant proportions after three validation runs.

Extent of Analysis

112. The survey questionnaires were designed in order to collect the information specified in the terms of reference. Two questions (on education), included at the request of CPO or Census Officials, were of limited relevance to a water and sewerage tariff study; all of the rest could have proved to be significant, and all of these, to a greater or lesser extent, have undergone analysis.
113. It is clear however, that the inter-relationship of many of the variables (such as the relationship of household income to the education of the head of the household, or of immigration to income or housing) are potentially of considerable political and social value, although not directly relevant to present or future water consumption.
114. Following Mr. Stainer's letter to Ms. Silver dated September 30, 1976, it was decided by USAID that at this stage the analysis should cover only those relationships directly relevant to the present and future consumption of water.
115. It was further agreed that a copy of the master computer files of survey data would be made available to USAID for any further analysis that might be required. (This was sent in April 1977).

Tabulation Plan

116. A comprehensive tabulation plan was sent to Ms. Silver on August 11, 1976. It had proved impossible to submit the plan until the form and extent of the questionnaire had been finalised. The covering letter from Mr. Stainer pointed out the cost implications of undertaking such a comprehensive analysis.
117. It was subsequently agreed during telephone discussions with Ms. Silver and Dr. Hunter that we would adopt a step-by-step approach to the analysis. The first step would be to inspect frequency distributions of the variables, followed by cross-tabulation of those expected to reveal relevant inter-relationships. Further cross-tabulations would be specified as required for interpretation of these findings.
118. Following this procedure, we inspected the following numbers of frequency distributions and cross-tabulations, many of which have been included in the reports of the household and business surveys:-

	<u>Household Questionnaire</u>	<u>Business Questionnaire</u>
Frequency distributions	90	45
Cross- tabulations	120	45

These include an examination of 28 additional variables which were derived from analysis of the survey data (see Table overleaf).

Multi-Variate Analysis

119. During the planning stages of the survey, we considered using the statistical technique of cluster analysis to explore the relationships between survey variables.
120. As we gained familiarity with the survey results, it became clear that:-
- (a) it would be a difficult and lengthy process to specify the survey variables in such a way that they could be handled by the technique;
 - (b) the socio-economic data which was specified by the terms of reference could be sufficiently analysed by cross-tabulation.
121. We therefore abandoned the idea of using multi-variate methods of analysis.

Statistical Significance of Results

122. As already stated, comparisons of population estimates based on the household sample with the 1975 census results indicate that in relation to key demographic characteristics the sample is reasonably representative of the city of Taiz.

Table of New Variables Created from Survey Data

(a) Household Survey

Number of males in household
 Number of females in household
 Total household size
 Total income from employment
 Total money income
 Total real income
 Per capita real income
 Total expenditure
 Ratio real income/expenditure
 Number of persons per room
 Total employed in business
 Source of water supply
 Connection status
 Actual water consumption per month
 Per capita water consumption
 Monthly expenditure on water
 Ratio of change in consumption with supply increase
 Ratio of change in consumption with price increase (1)
 Ratio of change in consumption with price increase (2)
 Ratio of change in consumption with price decrease
 Price elasticity group

(b) Business Survey

Total employed in business
 Source of water supply
 Actual water consumption per month
 Monthly expenditure on water
 Ratio of change in consumption with supply increase
 Ratio of change in consumption with price increase
 Ratio of change in consumption with price decrease

123. It is of course, not possible to be certain how far the sample is also representative in respect of secondary characteristics. However, it is reasonable to expect that a sample which is reasonably representative in terms of geographical distribution, household size, sex ratio and age structure will also be representative for many other characteristics.
124. The relevance of inferences about the representativeness of sample means, based on the variances of sample estimates, is less in these circumstances than if no direct comparison with population characteristics were possible. This is particularly the case for a sample for which we can deduce (see paragraphs 41 and 42) that population estimates will be subject to wide margins of uncertainty, as a consequence of the sampling method.
125. In view of these considerations, we have not attempted to undertake statistical significance tests for the full range of variables cross-tabulated in the survey reports. To do so would have been costly and we consider that it would have revealed little of immediate relevance to the tariff study. We should not have been able to accept automatically that statistical confidence intervals should form the basis of sensitivity tests for tariff purposes.
126. We have however, derived theoretical expressions (in Appendix 4) for the variances of:-

- (a) our estimate of the population total;
- (b) our estimate of the number of households.

127. We have also computed the means and the standard errors of our estimates of the following key variables:-

- (a) present and future water consumption
 - per connection and per capita;
- (b) real incomes per household and per capita;
- (c) household expenditure on water;
- (d) the elasticity of demand to increases in the price of water;
- (e) the proportion of households with a connection to:-
 - (i) the Kennedy system;
 - (ii) the municipal sewer ;
- (f) the proportion of households willing to connect to:-
 - (i) the Kennedy System
 - (ii) the municipal sewer.

128. The results for each of these variables are given in full in Appendix 4.

FIELDWORK ACTIVITY PLAN

WEEK 1 W/B 19TH JUNE	WEEK 2 W/B 26TH JUNE	WEEK 3 W/B 3RD JULY	WEEK 4 W/B 10TH JULY	WEEK 5 W/B 17TH JULY	WEEK 6 W/B 24TH JULY	WEEK 7 W/B 31ST JULY	WEEK 8 W/B 7TH AUGUST	WEEK 9 W/B 14TH AUGUST	WEEK 10 W/B 21ST AUGUST	WEEK 11 W/B 28TH AUGUST
<u>Questionnaire</u> - Check computing feasibility - Test draft questionnaire - Draft training manual	Finalise questionnaire Finalise training manual	Translation and Production								
<u>Sampling Procedure</u> - Test method of drawing sample	Draw sample (Devise alternative method) Collect preliminary	Draw sample census data								
<u>Select Interviewers</u> - Check applications - Establish rates of pay, etc.	Select supervisor	Select interviewers								
<u>Train Interviewers</u>		Train supervisors	Train interviewers							
<u>Fieldwork Controls</u> - Manual validation	procedures									
Set up account with British Bank of ME in Taiz		Interviewer record cards								
<u>Non-Household Survey</u>	Collect population growth projections CPO/AID on 5-year plan Establish number of non-domestic institutions and project growth Collect manpower study information See selected industrialists/officials etc. (as per list attached)									
<u>Supply Analysis</u>		Establish contacts in Sana'a/Taiz Collect revenue data, production and consumption data from MISA/ONS, and interpret in the light of present and future pricing policies Discuss accounting policies Determine rates of increase in costs (with assistance from economists) Establish other running costs of existing systems Establish expected running costs of new system (manpower, running, rates costs) Establish availability of supply from new system Establish capital costs of new system and phasing Review existing billing system and capability for change				Probable return to U.K.	Communication with engineers in Boston, probably through AID			
									Review interview data etc. Return to U.K.	
										Return to U.K.

OUTLINE OF TRAINING PROGRAMME

1. The training programme consisted of three separate parts:-

supervisor training
household questionnaire
business questionnaire

Supervisor Training

2. The supervisors were given a brief four day training programme in advance of general field staff training.

The purpose was:-

- (a) to give familiarity with the aims and content of the survey so that they could assist in the main training programme;
- (b) to try out the training approach that would be used in the main programme and identify areas which would require different coverage than had been anticipated;
- (c) to train specifically in supervisory tasks and documentation, that is:-
 - laying out sample blocks;
 - interview allocation procedures;
 - call-backs;
 - building count;
 - completing control sheets.

3. The timetable was a condensed version of the timetable for the main programme reproduced below, and is not included separately. In addition, there were additional field exercises and discussions to give familiarity with items listed in para. 2(c).

Household Questionnaire

4. The main field staff training programme was based on the household questionnaire and lasted for five days. It comprised classroom teaching by Messrs. Ginnings and Saif and class and team exercises led by the survey managers and supervisors. (For the main field training a classroom in the Russian school on Nasser Street was used). The programme is set out below.

Day 1

5. (a) Introduction

- Introduce supervisors and managers;
- Describe existing sources of water (especially Kennedy), and existing sewerage system, and problems arising;
- Describe proposal to extend existing systems, stage reached, probable costs etc.;
- Establish how socio - economic survey fits in its general objectives;
- Questions and discussion.

(b) Structure of Survey

- Explain how sample was drawn, area basis, expected range of differences between blocks, role of supervisors in establishing which households and buildings included, need for absolute accuracy and complete enumeration within blocks;
- Explain what we expect to find in blocks, households, family business, business etc., and how these are handled within survey (i.e. several questionnaires);
- Questions and discussion.

- (c) Introduction to household questionnaire
 - Main groups of questions and sequence;
 - Definition of household;
 - Importance of interviewing head of household;
 - Characteristics of different types of information, e.g. population data, income and expenditure, etc., and how these fit into survey objectives;
 - Mock interview between two supervisors with class following progress in distributed copies of questionnaire.

Day 2

- 6. (a) Detailed discussion of questions relating to housing and water use. (Questions 1 - 67). Full explanation of meaning of each question, meaning of each answer, coding and routing instructions; rules for interviewers (see attached summary);
- (b) simple mock interviews covering above parts of questionnaire, between interviewers - Class following progress;
- (c) more difficult mock interviews similar procedure - Supervisor instructed to offer ambiguous or difficult responses - as aid to discussion on probing;
- (d) detailed discussion of questions relating to sewerage, population, income and expenditure (Questions 68 - 103);
- (e)(f) mock interviews as before, class following progress;

- (g) questions and discussion on coding problems, meaning of questions, etc.;
- (h) team exercise: interviewers in pairs go through mock interviews alternately acting as interviewer/respondent; interviewers change questionnaires, work through codings one by one, establish whether correct;
- (i) supervisors check coding of each questionnaire and conduct review session in interview teams.

Day 3

- 7. (a) Introduction to age events lists and job/industry classifications as aid to establishing responses to questions 86 and 93/94 (the job/industry lists are attached to the household survey report; the age lists are as used in the YAR census);
- (b) test of familiarity with these lists; examples of problem responses;
- (c) questions and discussion;
- (d) team exercise: continue exercise of previous afternoon, pairing interviewers from different teams; each interviewer completes three interviews (each questionnaire marked by survey managers and summary of findings prepared).

Day 4

8. (a) Return questionnaires from test exercise;
summarise main areas of of error;
reinforce main training points;
- (b) discussion of errors in teams;
survey managers discuss queries;
- (c) class questions and discussion;
- (d) field exercise: interview
teams go to pre-selected blocks;
all interviewers conduct three
interviews, questionnaires checked by
supervisor;
managers check codings (also acts as
practice in block allocation and
supervision tasks).

Day 5 (followed first day's full fieldwork)

9. (a) Review field test errors; emphasise
importance of accuracy through question
and answer session in which interviewers
identify and resolve their own (and their
groups) errors;
- (b) questions and discussion on general
fieldwork procedures, involving supervisors
and interviewers' experience in previous
day's fieldwork;
- (c) introduce control documents, discuss
purpose and procedures for completion
(attached);
- (d) issue notes to supervisors on corrections
to questionnaire identified in training and
field tests (misprints, ommitted route
instructions).

10. In the fieldwork review session held at the end of the interview programme, interviewers indicated that the length and content of the training had been adequate, although they had experienced problems with identifying and correcting errors and misprints in the questionnaire once in the field.

Business Questionnaire

11. Training on the Business questionnaire was delayed by printing difficulties. After household interviewing had been underway for several days we held a further two day training session prior to the commencement of the business survey. That programme was much shorter and was as follows:

Day 1

12. (a) Detailed review of questions; coding; routing;
- (b) classroom mock interviews to establish coding problems, approach to probing;
- (c) questions and discussion;
- (d) team practice exercise - interviewers working in pairs as before; team supervision and discussion.

Day 2

13. (a) Field exercise, as before; interviewers conduct three interviews with businesses in pre-selected areas;
- (b) training questionnaires checked by survey managers; summary of findings and discussion of errors at start of next survey session; corrected questionnaires returned to interviewer.

RULES FOR INTERVIEWERS

Rule 1

Visit every family and business in the area assigned to you by your supervisor. Try to interview the head of the household or business; if he is absent you may interview another responsible adult (for example, eldest son). If no suitable person is available, arrange an appointment to call back.

Rule 2

Ask each question exactly as it is written on the questionnaire, without any further explanation. You may repeat the question if it is not understood; if any explanation is necessary, keep to the explanations given in the training sessions.

Rule 3

Do not read aloud the answers printed on the questionnaire unless there is an instruction to do so.

Rule 4

Ask each question in the order it is written on the questionnaire, or according to the instructions written on the questionnaire for "skipping". These instructions are an important part of the interview.

Rule 5

Once you have recorded an answer you may only change it if the informant changes his mind or remembers something he forgot earlier. You must not make any changes of your own - although if you think he has made a mistake you may discuss the answer with him.

Rule 6

You must try to get accurate answers to all the questions; if the informant does not know the exact answer, ask him for his best estimate. Only if he cannot give an estimate you may code for "don't know". However, if the interview is not with the head of household or business you should go back when he is available to fill in any incomplete answers for example on water consumption, incomes, expenditure.

Rule 7

During the day you are responsible for interviewing all households and businesses in the area assigned to you by your supervisor, and for using the appropriate questionnaire in each case. At the end of each day you must check that all your questionnaires are complete, that you have completed your parts of the control sheet accurately, and that the household and business numbers are recorded accurately on the questionnaire from your part of the control sheet.

SUPERVISORS' CONTROL SHEET

JOB NUMBER

1	2	3	4
S	0	1	8

BLOCK
REFERENCE
NUMBER

5	6	7	8

SUPERVISOR
NUMBER

9	10

NUMBER OF
BUILDINGS
IN BLOCK

11	12

DENSITY
CODE

13

QUADRANT

14

TOTAL NUMBER
OF HOUSEHOLDS
IN BLOCK

15	16

NUMBER OF
INTERVIEWED
HOUSEHOLDS

17	18

TOTAL POPULATION IN
INTERVIEWED HOUSEHOLDS

MALE

19	20	21

FEMALE

22	23	24

NUMBER OF
HOUSEHOLDS
NOT
INTERVIEWED

25	26

ESTIMATED POPULATION IN
HOUSEHOLDS NOT INTERVIEWED

MALE

27	28	29

FEMALE

30	31	32

NUMBER OF
FAMILY
BUSINESSES

33	34

NUMBER
EMPLOYED
IN FAMILY
BUSINESSES

35	36	37

TOTAL OF
OTHER
BUSINESSES
IN BLOCK

38	39

NUMBER OF
OTHER
BUSINESSES
INTERVIEWED

40	41

TOTAL EMPLOYED
IN INTERVIEWED
BUSINESSES

42	43	44

NUMBER OF
OTHER
BUSINESSES
NOT
INTERVIEWED

45	46

ESTIMATED
NUMBER IN
BUSINESSES
NOT INTERVIEWED

47	48	49

NUMBER OF
CONSTRUCTION
SITES

50	51

INTERVIEWERS' CONTROL SHEET

BLOC:
REFERENCE NUMBER

--	--	--	--

INTERVIEWER NUMBER

--	--

INTERVIEWER SIGNATURE _____

DATE _____

INTERVIEWED HOUSEHOLDS

NUMBER EMPLOYED	TOTAL POPULATION IN HOUSEHOLD		QUESTIONNAIRE NUMBER	NAME OF HEAD OF HOUSEHOLD
	MALE	FEMALE		
TOTAL			TOTAL	

HOUSEHOLDS NOT INTERVIEWED

NUMBER EMPLOYED	ESTIMATED POPULATION IN HOUSEHOLD		TIME INTERVIEWER CALLED BACK	NAME OF HEAD OF HOUSEHOLD
	MALE	FEMALE		
TOTAL			TOTAL	

STATISTICAL TESTS OF SIGNIFICANCE

Introduction

1. The object of this note is to discuss the methods by which population characteristics can be estimated from survey data.
2. The estimates required are of two types:-
 - (a) population totals (e.g. total water consumption);
 - (b) population means (e.g. water consumption per head).These are discussed in sections 3 and 4; the nomenclature used is defined in Annex 1.
3. Subsequent to the discussion of the statistical theory we present the results of significance tests for certain key variables which are critical to forecasts of future demand.

Sampling

4. The sampling method was stratified cluster sampling. The city was divided into quadrants by points of the compass. The quadrants were further divided into 3 density layers which corresponded to areas with different water supply characteristics and population densities. By this method a total of 11 strata were obtained (only three quadrants contained the highest density layer). The strata consisted of a number of blocks, each 1 hectare in area. Each block contained a number of households and businesses, the numbers of which varied between blocks.
5. The survey sampled blocks within each stratum. The blocks were chosen randomly, with a restriction that adjacent blocks were not sampled. A constant sampling fraction was used,

- so that (within integer constraints on the number of blocks sampled) the sample was representative of different geographic areas and different density and water supply characteristics (see table 1).
6. Within each block, all households and businesses were approached with questionnaires. The response rate was, in general, high and checks on non-respondants suggest that it is reasonable to assume that the replies constitute a random sample of the households and businesses within each block (see table 2).
 7. Clustering reduces precision, but no other sampling method was satisfactory in the circumstances. Stratification was therefore used to improve the precision of estimates from the sample. Because no pilot survey was done and no reliable estimates of population variances were available from other sources, it was not possible to estimate the optimum sample size for any required degree of precision. It was agreed separately with AID/Washington to undertake between 1,000 and 1,200 household interviews.
 8. Since many of the variables we are interested in were not Normally distributed but had long tails at the upper end (e.g. income, water consumption), we should strictly apply non-parametric tests of significance. However, it would have been more time-consuming to devise tests appropriate to our sampling method, and we felt this would not have been justified by any improvement in results.
 9. Throughout we have presented the statistical theory as it applies to stratified cluster sampling. It is not possible to modify the formulae to take account of the restriction on sampling adjacent blocks. However, the effect of this rule will have been to increase the between block variances for the blocks that were sampled.

10. Our estimates of the variance of population and stratum means calculated from this sample will therefore be larger than we would expect if some adjacent blocks had been included.

Table 1 - Sample Fraction

<u>Stratum</u>	<u>Blocks sampled</u>	<u>Total blocks in stratum</u>	<u>Sample fraction (%)</u> (n_k / N_k)
1	16	191	8.377
2	22	271	8.118
3	13	133	9.774
	—	—	—
	51	595	8.571
	—	—	—

Table 2 Household Response rates

	<u>HH in sampled blocks</u>	<u>Number of responses</u>	<u>Response rate (m_{ki} / M_{ki})</u>	<u>Total HH in stratum</u>
1	200	182	0.910	2388
2	621	582	0.937	7650
3	438	408	0.932	4481
	—	—	—	—
	1,259	1,172	0.931	14,519
	—	—	—	—

Population total statistics

11. For population totals, two figures are calculated from the survey data:-

- (1) the estimate of the population total;
- (2) the variance of the estimate of the population total.

These figures are used to estimate the population total and to give a measure of the accuracy of that estimate.

12. The arguments set out in this appendix rest on the assumption that we have accurate values for N_k , the total number of blocks in each stratum and M_{ki} , the total number of households in each block. In the present case we believe this to be true.

13. The estimate of the true population total Y , is given by y , where:-

$$y = \sum_{k=1}^K \frac{N_k}{n_k} \sum_{i=1}^{n_k} \frac{M_{ki}}{m_{ki}} \sum_{j=1}^{m_{ki}} y_{kij} \quad (1)$$

that is y is the sum of the individual household characteristics weighted by the block response rate; summed across all the sampled blocks in the stratum, weighted by the stratum sampling fraction; and summed across all the strata.

14. The estimate of the variance of Y is given by $\text{var}(y)$, where:-

$$\begin{aligned} \text{var}(y) &= \sum_{k=1}^K N_k (N_k - n_k) \frac{s_k^2}{n_k} + \\ &\quad \sum_{k=1}^K \frac{N_k}{n_k} \sum_{i=1}^{n_k} (M_{ki} - m_{ki}) \frac{s_{ki}^2}{m_{ki}} \end{aligned} \quad (2)$$

This states that the population variance is the sum of the between block variances (s_k^2), where:-

$$s^2_k = \sum_{i=1}^{n_k} \frac{(y_{ki} - \bar{y}_k)^2}{(n_k - 1)} \quad \begin{array}{l} (y_{ki} \text{ is estimated block total;} \\ \bar{y}_k \text{ is mean of estimated} \\ \text{block totals)} \end{array} \quad (3)$$

and the within block variances (s^2_{ki}) where:-

$$s^2_{ki} = \sum_{j=1}^{m_{ki}} \frac{(y_{kij} - \bar{y}_{ki})^2}{(m_{ki} - 1)} \quad (4)$$

15. If the proportion of blocks sampled is small and if there is a high within block response rate, then

$$\text{var}(y) \doteq \sum_{k=1}^K N_k^2 \cdot \frac{s^2_k}{n_k} \quad (5)$$

In the present case the mean value of $(n_k/N_k) \doteq 0.086$ and the mean value of $(m_{ki}/M_{ki}) \doteq 0.93$, which means equation (5) may be considered as an approximation for equation (2). However, response rates vary for each question and between blocks; we have kept the longer form to maintain accuracy.

16. As a special case, consider the problem of estimating the total number of households within the city. In this case the value of all y_{kij} are 1; that is, the household is present. Equation (1) then gives, with M the total number of households:

$$M = \sum_{k=1}^K \frac{N_k}{n_k} \sum_{i=1}^{n_k} M_{ki} \quad (6)$$

On substituting into equations (2), (3) and (4), it is seen that:

$$y_{kij} = \bar{y}_{ki} = 1, \text{ so that all } s^2_{ki} \text{ are zero.}$$

17. In equation (3) $y_{ki} = M_{ki}$

$$\text{and } \bar{y}_k = \bar{M}_k = \sum_{i=1}^{n_k} \frac{M_{ki}}{n_k}$$

$$\text{so that var (M) = } \sum_{k=1}^K \frac{N_k}{n_k} \frac{(N_k - n_k)}{(n_k - 1)} \sum_{i=1}^{n_k} (M_{ki} - \bar{M}_k)^2 \quad (7)$$

Since the number of blocks sampled in each stratum is large, this simplifies to:-

$$\text{var (M) } \doteq \sum_{k=1}^K \left\{ \frac{N_k}{n_k} \right\}^2 \sum_{i=1}^{n_k} (M_{ki} - \bar{M}_k)^2 \quad (8)$$

Population means

18. For population means two figures are calculated from the survey data:

- (1) the estimate of the population mean;
- (2) the variance of the estimate of the population mean.

These given values for the population mean and the accuracy of the estimate. Means may be expressed as per head or per household values of a variable.

19. The value \bar{y} is used as an estimate of the true population mean \bar{Y} where:-

$$\bar{y} = \frac{\sum_{k=1}^K \frac{N_k}{n_k} \cdot M_k}{\sum_{k=1}^K \frac{N_k}{n_k} \sum_{i=1}^{n_k} M_{ki}} \cdot \sum_{i=1}^{n_k} \frac{M_{ki}}{M_k} \cdot \bar{y}_{ki} \quad (9)$$

that is, the population mean is the sum of the block means, weighted by the number of households in the block; summed across all the sampled blocks in the stratum, weighted by the number of households in the stratum; and summed across all strata.

20. The block means are derived from observations from all households responding to the question, or (in the case of a characteristic of a subset of the population) from all households possessing that characteristic, so that

$$\bar{y}_{ki} = \sum_{j=1}^{m_{ki}} \frac{y_{kij}}{m_{ki}} \quad (10)$$

21. For binary variables, that is yes/no responses to a question, equation 11 can be simplified. If m'_{ki} is the number of positive responses, then

$$\bar{y}_{ki} = \sum_{j=1}^{m_{ki}} \frac{m'_{ki}}{m_{ki}} \quad (11)$$

22. The variance of the estimate of the population mean \bar{Y} is given by $\text{var}(\bar{y})$ where:-

$$\text{var}(\bar{y}) = \frac{\sum_{k=1}^K \left(\frac{N_k}{n_k} \cdot M_k \right)^2}{\left\{ \sum_{k=1}^K \frac{N_k}{n_k} \cdot \sum_{i=1}^{n_k} M_{ki} \right\}^2} \cdot \text{var}(\bar{y}_k) \quad (12)$$

where $\text{var}(\bar{y}_k)$ is the estimated variance of the stratum mean in the k^{th} stratum.

23. The stratum variance is the sum of two parts:-

$$\begin{aligned} \text{var}(\bar{y}_k) &= \frac{1}{M_k^2} \left(N_k(N_k - n_k) \frac{s_k^2}{n_k} + \right. \\ &\quad \left. \frac{N_k}{n_k} \sum_{i=1}^{n_k} M_{ki} (M_{ki} - m_{ki}) \frac{s_{ki}^2}{m_{ki}} \right) \end{aligned} \quad (13)$$

where the between block variance is given by

$$s_k^2 = \frac{1}{(n_k - 1)} \sum_{i=1}^{n_k} (y_{ki} - \bar{y}_k)^2 \quad (14)$$

$$y_{ki} = M_{ki} \cdot \bar{y}_{ki}$$

and the within block variance is

$$s_{ki}^2 = \frac{1}{(m_{ki} - 1)} \sum_{j=1}^{m_{ki}} (y_{kij} - \bar{y}_{ki})^2 \quad (15)$$

(y_{ki} is the total for the i^{th} block, \bar{y}_k the mean block total for the k^{th} stratum).

24. If there is enumeration at block level (i.e. $M_{ki} = m_{ki}$), then the effect of s_{ki}^2 is eliminated in (13).

25. For a binary variable, the estimate of the variance can be simplified further. If m'_{ki} is the number of positive responses, then equation 16 becomes:-

$$s^2_{ki} = \frac{(m_{ki} - m'_{ki})}{(m_{ki} - 1)} \cdot \frac{m'_{ki}}{m_{ki}} \quad (16)$$

Analysis of Key Variables

26. The results of the calculations described above are set out in the table below, compared with results which were calculated as if the survey had been a simple random sample.
27. The table shows the sample estimates of the population means of a number of key variables, and the standard errors of those estimates (that is, $SE = \sqrt{\frac{\text{variance}}{\text{number of observations}}}$). This assists calculation of the statistical confidence interval, that is the measure of accuracy, of our estimates of the means.
28. In general there is close agreement between the two sets of results; there does not appear to be any consistent bias in the estimates due to the sampling method used, and only a slight reduction in accuracy. The uncorrected sample means have therefore been used in the survey reports as a reasonably accurate summary of the population characteristics.

Table 3 - Means and Standard Error of Estimates for Key Variables

VARIABLE	CLUSTER SAMPLE			SIMPLE RANDOM SAMPLE		
	Mean	Standard Error	D.F.	Mean	Standard Error	D.F.
Total household population	84,752	1,233	47	84,115	N/C	1171
Present water consumption (cu.m./mo.)	8.5	0.19	40	8.5	0.20	807
Present expenditure on water (R/mo.)	23.8	1.70	43	18.0	1.09	1143
Present per capita consumption - no Kennedy connection(1/c/d)	30.5	1.73	30	25.2	1.54	328
- bath only (1/c/d)	48.5	3.18	36	49.6	2.24	292
- bath and flush (1/c/d)	69.4	5.51	37	56.5	2.58	511
Real income per household (R/mo.)	1120	60.5	46	1130	46.8	1125
Real income per capita (R/mo.)	255	16.72	46	252	10.85	1125
Percent of households with Kennedy connection	71.2	2.01	42	71.1	N/C	1171
Percent of households with or willing to connect	76.0	1.97	43	75.9	N/C	1171
Percent of households with sewerage connection	25.0	1.38	27	26.1	N/C	1171
Percent of households with or willing to connect	89.6	2.24	45	89.8	N/C	1171
Future water consumption from unrestricted supply (cu.m./mo.)	8.94	0.24	43	9.3	0.24	859
Percent change in consumption with price increase	80.2	2.95	40	85.0	0.84	552
Percent change in consumption with supply increase	114.6	3.55	40	119.1	1.84	741
N/C = not calculated						

Note the 99% and 99.9% confidence intervals for estimates from samples of this size are approximately $\pm 2.6SE$ and $\pm 3.5SE$ from the mean respectively.

29. In retrospect, however, the differences in means and standard errors for expenditure on water and per capita water consumption suggest that the sample stratification adopted for availability of Kennedy water was not very efficient. This might have been improved if we had had time to review conditions on the ground.

30. In addition, since the within block variances were generally insignificant, it would have been possible to increase the precision of the survey results by sampling a larger number of smaller blocks. However this would not necessarily have been practicable with the physical method of identification which was used, and would have increased the total survey cost.

Nomenclature

N = number of blocks in city

N_k = number of blocks in stratum k : $\sum_{k=1}^K N_k = N$

n_k = number of blocks sampled in stratum k

M = number of households in city

M_k = number of households in stratum k : $\sum_{k=1}^K M_k = M$

M_{ki} = number of households in sampled blocks in stratum k , block i

$$\text{where } \frac{N_k}{n_k} \sum_{k=1}^K M_{ki} = M_k$$

m_{ki} = number of households sampled in stratum k , block i and responding to the question being analysed

y = sum of all observations in the city weighted by sample fraction and response rate

y_k = sum of all observations in stratum k , weighted by sample fraction and response rate

y_{ki} = sum of all observations in block i , stratum k , weighted by response rate

y_{kij} = either the sum of all observations in household j , in block i , in stratum k or the individual observation in household j , in block i , in stratum k

\bar{y} = sample mean over strata in city

\bar{y}_k = sample mean over blocks in stratum k

\bar{y}_{ki} = sample mean over households in block i of stratum k

(Note: Capital letters (Y) refer to population; small letters (y) to the observed values.)

References

Hansen, Hurwitz and Madow: Sample Survey Methods and Theory,

vol. 1, especially chapters 5 and 7.

Cochran: Sampling Techniques, especially chapter 10.

Yamane: Elementary Sampling Theory

PUNCH 5018 IN COLUMNS 1 TO 4

<p>7 WILL THESE BUILDINGS BE USED AS RESIDENTIAL ACCOMMODATION?</p> <p style="text-align: right;">7</p> <p>Yes 1</p> <p>No 2</p> <p>(IF NO, SKIP TO QUESTION 9)</p>	<p>6 HOW LONG FROM START TO FINISH WILL IT TAKE TO CONSTRUCT THESE BUILDINGS?</p> <p>(months)</p> <p>(WRITE IN)</p> <table border="1" style="float: right;"> <tr><td>8</td><td>9</td></tr> <tr><td> </td><td> </td></tr> </table>	8	9			<p>5 HOW MANY OF THESE MEN ARE SKILLED MASONS?</p> <p>(WRITE IN)</p> <table border="1" style="float: right;"> <tr><td>10</td><td>11</td></tr> <tr><td> </td><td> </td></tr> </table>	10	11		
8	9									
10	11									

<p>13. WHERE DO YOU GET IT FROM?</p> <p style="text-align: right;">20</p> <p>Own Kennedy connection 1</p> <p>Neighbours' Kennedy connection 2</p> <p>Own sweet water connection 3</p> <p>Neighbours' sweet water connection 4</p> <p>Own well 5</p> <p>Public tap or well 6</p> <p>Vendor 7</p> <p>Water truck 8</p>	<p>12 HOW MUCH DOES THIS WATER COST?</p> <p>(WRITE IN RIALS)</p> <table border="1" style="float: right;"> <tr><td>21</td><td>22</td><td>23</td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>	21	22	23				<p>11 HOW MUCH WATER WEEK?</p> <p>(WRITE IN CUBIC METRES)</p>
21	22	23						

CONSTRUCTION SITE QUESTIONNAIRE

1. HOW MANY MEN ARE WORKING ON THIS BUILDING SITE?

(WRITE IN)

12	13	14

3. WHAT IS THE MAIN MATERIAL USED TO CONSTRUCT THESE BUILDINGS?

1. CEMENT BLOCKS
2. STONE BLOCKS
3. MUD BLOCKS
4. OTHER
5. DON'T KNOW

15

2. WHAT WILL BE THE TOTAL AREA OF THESE BUILDINGS?

(WRITE IN SQUARE METRES)

16	17

4. HOW MANY BUILDINGS WILL BE BUILT ON THIS SITE?

(WRITE IN)

18	19

5. DO YOU USE EACH

24	25	26

10. HOW MANY BUSINESS UNITS WILL THERE BE WHEN THESE BUILDINGS ARE FINISHED?

27	28

9. WILL THESE BUILDINGS BE USED AS BUSINESS ACCOMMODATION?

Yes
No

29

1
2

8. HOW MANY FAMILIES WILL LIVE HERE WHEN THESE BUILDINGS ARE FINISHED?

(WRITE IN)

30	31

(IF NO, SKIP TO QUESTION 11)

Socio-Economic Survey of Taiz,
Yemen Arab Republic,
July to August 1976

Results of the
Household Survey

For

United States Agency
for International Development

March 1977

RESULTS OF HOUSEHOLD SURVEY

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

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RESULTS OF THE HOUSEHOLD SURVEY

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

SECTION I - INTRODUCTION

Terms of Reference

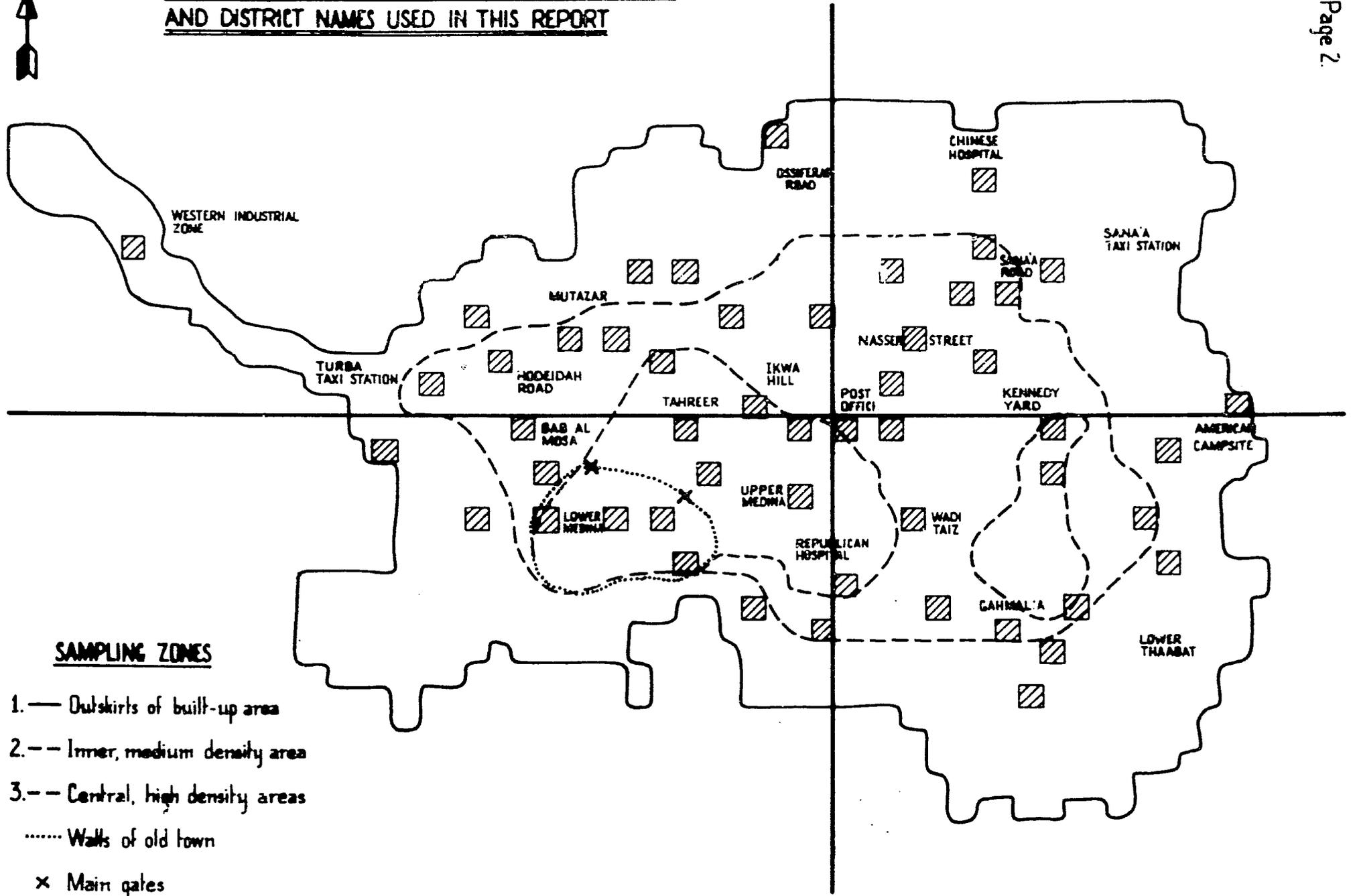
1. This report, and the companion report "Business Survey in Taiz", is intended to discharge the obligation in Section IV of the Scope of Services to tabulate the major relationships between the demand for water and key socio-economic variables, and to indicate the ability of consumers to pay for the present or improved water and sewerage services. Translated copies of the questionnaires as used are attached to each report, together with other key survey materials.

Structure of This Report

2. The report first discusses the principal demographic, economic and physical characteristics of the survey population. This provides the background for the later discussion of water consumption and the characteristics of the present water and sewerage services.



SCHEMATIC MAP OF TAIZ SHOWING SAMPLING AREAS
AND DISTRICT NAMES USED IN THIS REPORT



3. The report includes the following main sections:-
- (a) survey population - demographic characteristics,
- economic characteristics;
 - (b) household incomes and expenditure;
 - (c) housing characteristics;
 - (d) total water consumption and expenditure;
 - (e) a more detailed discussion of each of the
water sources used;
 - (f) attitudes to and consumption from the proposed
new Kennedy system;
 - (g) present sewerage services;
 - (h) attitudes to the present and proposed improved
sewerage service.

A summary of the key findings follows this introduction.

Geographic Analysis

4. The scope of work required us to present our results, where appropriate, by geographic area. The frontpiece to this report is a schematic map of Taiz showing the sampling zones used in the survey and the names of a number of districts or places to identify parts of the city. Where we feel it assists the analysis, or where the findings are in themselves important, we refer in the text, or in subsequent tables or figures, to these sampling zones or districts to indicate geographic similarities or differences.

Comparison with Census

5. References made in this report to results of the YAR Census of February 1975 are to the preliminary results (published as a booklet by the Central Planning Organisation), or to the results of an analysis of 12% of the census records in Taiz by CPO, made available to us prior to publication. In general the two sets of results are in close agreement with the results of our survey.

SECTION II - SUMMARY AND CONCLUSIONS

6. This section summarises our main findings and conclusions which will influence our approach to alternative tariff policies.

Characteristics Of The Survey Population

7. We estimate the total population in Taiz was about 95,000 in July, 1976, representing a 10% p.a. growth since the national census. The ratio of males : females was 1.4 (paragraphs 44, 47).
8. The population was young - 66% aged 22 years or less - which led to a low death rate (10 per 1,000), and a high birth rate (30-35 per 1,000). Although the latter was not as high as in other developing countries, it may be expected to increase as the proportion of women of child-bearing ages increases (paragraphs 48, 51, 52).
9. The key factor affecting the growth of Taiz has been immigration, particularly of males seeking work and girls of marriageable age. This has been several times the rate of emigration and the rate of net natural increase. The average net inflow over the past two years was 69 per 1,000. The future growth of Taiz is likely to depend on political factors abroad, and on the relative rates of economic growth in Taiz, other towns in Yemen and in agriculture (paragraphs 61, 64).
10. 33% of males were employed or seeking work, whilst 31% of females were housekeepers. The majority of the remainder of the population were too young to work (paragraphs 66, 67 and table 7).

11. Few of those interviewed worked in manufacturing, agriculture or the extractive industries. 52% worked in service industries of various kinds and 22% worked for the government sector. This emphasises the role of Taiz as a market town and administrative and service centre (paragraphs 68, 69).
12. Wages varied significantly between industries for the same skills. On average the water and electricity utilities paid technical and professional staff well below the level of other industries, although tradesmen were paid in the middle of the market range (paragraph 73).

Household Incomes And Expenditure

13. 49% of households depended solely on incomes from employment, and 19% depended solely on incomes from other sources - mainly the government, relatives outside Taiz and some other source (paragraph 76).
14. Mean real income was 1130 Rials per month per household and 255 Rials per month per head (\$250 and \$57 respectively), compared with mean household consumption of 915 Rials per month (\$200) (paragraphs 76, 81 and table 12).
15. The largest item of expenditure was food and drink, whereas water was one of the smallest - falling from 4% of expenditure for households with the smallest budgets to 2% of expenditure for those with the largest (paragraph 82 and table 13).
16. However, poor households were more likely to over-spend their income than rich households; this would affect their ability to pay for water if the price were to be increased (paragraph 84).

Housing Characteristics

17. The majority of the poorer households were housed in small single storey dwellings or in temporary dwellings or rented rooms. The majority of rich households lived in apartments, villas (small houses with gardens) and larger houses (paragraphs 89, 90).
18. 53% of the dwellings were owned by the head of the household or another relative, while 46% were rented (paragraphs 91, 92).
19. The average size of household was 5.8 persons, compared with an average 3.4 rooms/dwelling. A considerable proportion of households lived in significantly overcrowded conditions (paragraphs 93, 95).
20. We have investigated housing and living conditions in some detail to identify the feasibility of developing progressive tariff policies based on housing variables. Whilst we have no doubt that relationships between incomes and these variables exist, we have concluded that they do not discriminate sufficiently unambiguously between different income groups to enable them to be used as the basis of administrative decisions on differential pricing policy.

Water Consumption and Expenditure

21. The main water sources are:-
 - (a) the Kennedy Memorial System, which served 78% of households or more;
 - (b) free sources (wells, taps, mosques) which served 20% of households;
 - (c) another unidentified source which served 12% of households;

(d) the Jabel Sabir piped system and water carriers which were subsidiary sources.

All of these were frequently used to supplement a household's Kennedy connection (paragraphs 98, 102).

22. A relatively high proportion of households expressed dissatisfaction with the service offered, whichever source was used. The main reasons were the same: the water supply was limited, and many households had inadequate storage (table 22).
23. Mean consumption from all sources was $7\frac{1}{4}$ cu.m. per household per month and varied significantly with household income (paragraph 112).
24. Consumption per head varied from 25 litres per capita per day for households without a connection to Kennedy to 50 l/c/d for households with a basic connection and 57 l/c/d for households which also had a flush toilet. These figures reflect the inadequacy of the present supply, particularly for households with more than the basic connection. The proportion of these household is likely to increase in the future (table 25).
25. Water was one of the smallest items of household expenditure - the average cost was 18 Rials/month. However, poor households spent a higher proportion of their income on water than rich households. The data collected suggests an income elasticity of demand of about 0.5 (paragraphs 116, 117)

Adequacy of Supply

26. Adequacy of supply is a relative concept, relating both to expected consumption from each individual source and

8.

whether a household's total needs are met. We cannot identify precisely what proportion of households wished to consume more than they could obtain from all the sources they used (paragraph 110).

27. Future tariff policy must consider:-

- (a) whether in the long-run Kennedy is likely to be the sole source of supply;
- (b) what levels of consumption it is desirable to satisfy at the standard domestic price level;
- (c) the feasible rate of new connections.

A balance may need to be achieved between the consumption per connection and the number of connections, particularly if supply remains limited (paragraph 111).

Kennedy Memorial Water System

28. 71% of households were already connected to the Kennedy System. The benefits were a substantially improved level of consumption at the same or lower cost than households that were not connected, even although there was a significant supply constraint on consumption (paragraphs 121, 125).

29. Significant variations in level of service between different parts of the city were probably the result of rationing policy or the effects of the gradient on water pressure - although whether a customer had a storage tank was likely to have been just as important (paragraphs 127, 129).

Connection To An Improved Kennedy System

30. Only 17% of the households not already connected stated their willingness to connect to an improved Kennedy System. Two significant groups, those in rented accommodation and poorer households, were not willing to connect (paragraphs 151 -153).
31. Future connection policy should therefore take into account the extent to which connection is the responsibility of landlords rather than tenants. It should also consider methods of reducing or spreading the costs of connection (including the costs of providing adequate storage); both for poor households and because these costs could become a more significant deterrent to connection if they were more widely known (paragraph 159).
32. However, there may still be a small proportion of households not interested in improved water service, possibly because their consumption was so low (paragraphs 156, 160)

Consumption From An Improved Kennedy System

33. Responses to hypothetical questions about future consumption from an unrestricted water supply at a range of different prices give an indication of future demand, although we cannot know whether households would behave in practice as they indicated (paragraph 163).
34. Basic consumption levels might increase by 31% with relaxation of the supply constraint. The anticipated increase was greater for households which did not receive sufficient water at present than for those that did. Household demand was more sensitive to price reductions than to price increases, although price

elasticities were low (0.76 and 0.15 respectively).
(paragraph 165).

35. We identified four different patterns of behaviour, which we describe as:-

- (a) maintaining a minimum or satisfactory consumption level;
- (b) minimising expenditure;
- (c) maximising consumption;
- (d) unconstrained by either supply or price (paragraph 176).

36. There were variations in present consumption between these groups, but differences in their anticipated reactions to changes in the price or supply of water might tend to reduce them in the future (paragraph 178).

Present Sewerage Services

37. 86% of households had their own toilet, although the type of toilet varied depending on whether the main sewerage service was available. Only 26% had a connection to the municipal sewer. (paragraph 181).

38. The proportion of households with their own toilet increased with household income and size. The type of toilet facility used was also related to the type of housing (paragraphs 183, 184).

39. The majority of households without their own toilet defecated upon the ground; the proportion of such households was highest in poor areas on the outskirts of town. This could cause a significant health hazard (paragraph 182).

39A. The majority of households paid nothing for sewerage disposal, whatever type of facility they used (paragraph 186).

Connection To An Improved Sewerage Service.

40. Half of the households not already connected would be willing to connect to an extended sewerage system. These were more likely to be large, rich households which owned their own home, whilst small, poor households and those in rented accommodation were less willing to connect (paragraphs 195, 196).
41. Future connection policy should identify the respective responsibilities of landlords and tenants for making connection decisions. It should also consider methods of reducing or spreading connection costs to enable more households to connect (paragraphs 199, 201).
42. Finally, a significant group of households indicated disinterest in improved sewerage services. An educational or legislative programme may be necessary if universal connection to the sewer is to be achieved (paragraph 202).

Table 1 - Age/Sex Structure of Survey Population

	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Ratio Male:</u> <u>Female</u>
Total in interviewed households (1)	6843	3681	3162	1.16
<u>% Aged</u>				
less than 3 years	8.2	7.7	8.8	1.01
3- 7	20.7	20.3	21.2	1.11
8-12	16.8	17.0	16.6	1.19
13-17	12.3	13.6	10.9	1.45
18-22	8.4	9.0	7.8	1.35
23-27	5.9	4.7	7.3	0.75 (2)
28-32	6.8	5.8	8.1	0.84 (2)
33-37	5.1	5.1	5.2	1.15
38-42	5.4	5.2	5.7	1.06
43-47	3.1	3.8	2.4	1.85
48-52	3.1	3.4	2.7	1.46
53-90	4.0	4.5	3.4	1.54
	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	

Based on 1173 responses

Notes:

1. this does not include persons in business accommodation or institutions;
2. this reflects the number of males working abroad or elsewhere in Yemen; the ratio would be more balanced if population from note 1 was included;
3. sex ratio recorded in census preliminary results was 1.32; from the 12% sample analysis it was 1.40.

In this and subsequent tables, percentages may not sum to 100 due to rounding.

SECTION III - CHARACTERISTICS OF THE SURVEY POPULATION

43. This section first discusses the age and sex structure of the sampled population and birth, death and migration rates. Subsequently it identifies working status and the structure of employment in Taiz.

DEMOGRAPHIC CHARACTERISTICS

Age/Sex Structure

44. Table 1 shows the ages and sex of population in interviewed households. We estimate that the total population in Taiz in mid 1976 was about 95,000; this includes 84,000 in 14,600 households, 6,000 living in 2,500 business premises and an estimated 5,000 living in institutions.
45. If we allow for the effect of seasonal migration on the Census total, this represents a mean growth of population of between 7½% and 12½% per annum since the YAR Census in February 1975, compared with a 5% growth rate expected by CPO. We estimate that the mean growth of the number of households was 20% per annum.
46. Some of the apparent growth will have been caused by differences in the definition of residence:-
- (a) the Census counted persons resident on Census night;
 - (b) our survey covered "usual residence".
47. We believe the persons living in business accommodation and institutions were mostly males. Including these, the overall ratio of males: females was 1.40 - close to the Census result.

Table 2 - Birth Rates (1965 - 1976)

<u>Child Age</u> <u>at survey date</u>	<u>Birth Rate ϕ</u> <u>per 1,000 females</u> <u>aged 18 - 42</u> (age specific rate)	<u>Birth Rate ϕ</u> <u>per 1,000 in</u> <u>Total Population</u> (crude rate)
< 6 months*	190	30.0
1 year	233	35.5
2 years	266	39.2
3-7 years*	313	41.4
8-12 years*	303	33.6

* annual equivalent rate.

ϕ rates based on estimate of number in appropriate group in previous years.

Based on table 1.

Note:

the apparent fall in the birth rate in recent months could be the result of women bearing their children outside the city and immigrating with their children within 18 months of the birth.

48. The age structure of the population reinforces the view that Taiz was rapidly expanding. We estimate that:-

- (a) 66% were aged 22 years or under;
- (b) 29% were aged 7 years or under.

This compares with the sample Census results:-

- (a) 65% were 24 years or less;
- (b) 33% were 9 years old or less.

(The age bands we used reflect a peaking in responses every 5 and 10 years. This is not a characteristic of the Census age/events lists which were used to assist respondents in answering, and must reflect an element of estimation in the replies given).

49. The ratio of males : females was fairly constant in all age groups, with the exception of ages 23-32. This may be partly explained by the number of males who were working abroad or elsewhere in Yemen.

Birth Rate

50. From this information we have estimated the birth rates in Taiz over the 12 years prior to the survey. Although births and deaths might have been regarded as sensitive social issues, we are not aware that any significant problems were encountered with these questions. The estimates derived from them are consistent and seem reasonable for this population, although low by comparison with other developing countries.

51. Table 2 shows that these estimates of the crude birth rate may be a reasonably reliable basis on which to forecast future population. Nevertheless, with an increase in the proportion of women of child-bearing age, from 16% at present to possibly 18% in 10 years and 20% in 25 years, the crude birth rates must increase from the present level even if the age specific rates were to remain constant.

Table 3 - Crude Death Rates Per 1,000 Population

	<u>Total</u>	<u>Male</u>	<u>Female</u>
Total deaths in previous year	66	41	25
Mean rate per 1,000	9.6	11.1	7.9
<u>Rates for age groups:</u>			
< 3 years	64.0	81.3	46.6
3 - 7 years	4.9	4.0	6.0
8 - 12 years	0.9	0.0	1.9
13 - 17 years	4.7	8.0	0.0
18 - 22 years	6.9	3.0	12.2
23 - 27 years	4.9	5.7	4.3
28 - 32 years	4.3	4.7	3.9
33 - 37 years	0.0	0.0	0.0
38 - 42 years	5.4	10.5	0.0
43 - 47 years	4.7	7.2	0.0
48 - 52 years	4.9	8.1	0.0
53 - 90 years	21.9	24.1	18.5

Based on 1,173 responses.

- Notes: 1. A special study of burials in Taiz by CPO indicated a crude death rate of 12.7 per 1,000 population;
2. records kept by the Swedish Save the Children Fund hospital indicated a rate of 200 per 1,000 children aged under one year.

Death Rate

52. We also asked about deaths in the previous year. Table 3 presents the overall results and the rates for each age group. The crude death rate of 10 per 1,000 seems reasonable for a population with this age structure, and agreed with the results of a survey carried out in 1976 by the Yemen Central Planning Organisation (unpublished).
53. Over half the deaths recorded were for children aged less than three years; this represented a very high rate per 1,000 for this age group, and was even higher for children aged less than six months.
54. There was also a noticeable increase in female mortality at ages 18 - 22, possibly related to the birth of the first child.
55. For both men and women the rates increased significantly for ages 53 and above, although the female rate was well below the male. This may indicate that more elderly females move away from the city than males.
56. A rising birth rate would normally be accompanied by a fall in the crude death rate. However, unless the high rate of infant mortality is reduced we do not expect any changes to be significant within the next 10 years or so.

Table 4 - Immigration Rates

	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Rate per 1,000</u> <u>per annum ϕ</u>
Number of immigrants in last 2 years	1045	630	415	
% of population	15.3	17.1	13.1	
<u>% arrived in</u>				
< 3 months	35	33	38	> 212
3-12 months	35	37	32	77
1- 2 years	<u>30</u>	<u>30</u>	<u>30</u>	52
	100	100	100	

ϕ based on estimates of population in the appropriate period.

Based on 1173 responses.

Note: may be high because of poor harvests in last few years.

Net Natural Increase

57. Our resulting estimate of net natural increase of between 2.1% and 2.6% p.a. for the year prior to the survey agreed fairly well with estimated rates for the YAR as a whole quoted in the 1973-1976 Development Programme (published by CPO).

Immigration

58. The key factor affecting the growth of Taiz, however, has been immigration. Table 4 shows that some 15% of the population in surveyed households were immigrants in the last 2 years. The rates of immigration appeared to have increased substantially over the 3 months prior to the survey - although this may have been the effect of more accurate recollection. (It may also have been the effect of Yemeni workers returning from Saudi Arabia as a result of changes in Saudi government policy towards immigrant workers in June 1976. At the same time the YAR government stopped further emigration to Saudi).
59. Although immigrants were of all ages, there were significantly more male immigrants of working ages (13-37) than in the population as a whole, and more female children (3-7 years) or girls of marriageable age (18-27). The majority of immigrants were from the Taiz governorate and elsewhere in Yemen; a small proportion were from Aden, very many fewer than in the peak years of 1969 and 1972.

Emigration

60. Conversely emigration rates were very small. Table 5

Table 5 - Emigration Rates

	<u>Total</u>	<u>Males</u>	<u>Females</u>	<u>Rate per 1,000 per annum</u>
Number of emigrants in surveyed households	120	101	19	
% of population	1.8	2.7	0.6	
<u>% left</u>				
< 3 months	28	23	42	> 18
3-12 months	30	30	32	7
1- 2 years	24	25	21	5
> 2 years	<u>18</u>	<u>21</u>	<u>5</u>	-
	100	100	100	

Based on 1173 responses.

Note:

CPO suggested emigration may have been higher in the last two years because of the buoyant economic situation in Saudi Arabia.

shows that less than 2% of the population had moved away in the two years prior to the survey, although the rate also appeared to have increased in the most recent 3 months. We believe that this may be the effect of better recollection, since some 6-9% of households regularly received income from relatives abroad or elsewhere in Yemen.

61. Those changing their residence permanently were mainly males aged 13-47 moving to other Arab countries or elsewhere abroad, presumably to work or study, and females of marriageable ages (13-22) to other parts of Yemen or other Arab countries. (There were a few elderly women moving into Taiz governorate or elsewhere in Yemen which may affect female death rates (see paragraph 55).)
62. Although we did not ask about seasonal migration, other enquiries established that there were three main movements out of Taiz:-
- (a) in January 1976 for about one month on the annual pilgrimage to Mecca (CPO estimates 3-4% of the male population of Taiz); and
 - (b) in March/April and October/November to assist in sowing and harvesting.

Net Migration

63. At the time of the survey the population of Taiz was rapidly changing. Only 42% of the population surveyed had lived in Taiz from birth; 31% were from Taiz governorate, 14% were from other parts of Yemen, 8% from Aden, and 4% from elsewhere abroad.

Table 6 - Net Migration Rates per 1,000 Per Annum

	<u>In-migration</u>	<u>Out-migration</u>	<u>Net Change</u>
Last 3 months	> 212	> 18	+ > 194
3 - 12 months	77	7	+ 70
1 - 2 years	52	5	+ 47
	—	—	—
Mean annual change over 2 years	76	7	+ 69

Based on 1173 responses

(no reliable census results yet available for comparison)

Table 7 - Working Status

	<u>Total</u>	<u>Males</u>	<u>Females</u>
Total survey population	6843	3681	3162
% full time employment	16	30	1
% part time employment	1	2	*
% unemployed seeking work	1	1	*
% housekeeper	14	*	31
% other (elderly, children, sick)	66	66	67
	—	—	—
	100	100	100
	—	—	—

* less than ½%.

Based on 1,173 responses.

64. The average net inflow of population over the previous two years was 69 per 1,000 (see table 6). This was several times more important in influencing population growth than net natural increase. Future growth will depend on political and economic factors in countries outside Yemen which received or produced migrants (principally Saudi Arabia and Aden), and on the relative rates of growth of employment in Taiz, in other towns in Yemen and in the rural agricultural sector.
65. Population forecasts used as the basis for estimating future demand for water will therefore be subject to wide margins of error.

ECONOMIC CHARACTERISTICS

Working Status of the Population

66. Table 7 shows the working status of the population in interviewed households. The low participation rates (33% of males, 1% of females working or seeking work) reflected the population age structure and social conventions about the role of women. On average each household had slightly more than 1 employed member. Unemployment rates were low (male 4.5% female 2.7%).
67. Generally persons aged 18 years or less (58% of the population) were not in the labour force (although many children may have had casual or vacation jobs). At 18 males began work, and continued working until after 58 years, although an increasing proportion took part time jobs from 53 years of age; from 23 females were mainly occupied as housekeepers. Over 58 years a significant proportion of males and females were completely retired.

TABLE 8 - STRUCTURE OF EMPLOYMENT BY INDUSTRY AND SKILL LEVELS

	<u>Total</u>	<u>Tech./ Prof.</u>	<u>Managers/ Supervisors</u>	<u>Clerical/ Sales</u>	<u>Trades- men</u>	<u>Semi- Skilled</u>	<u>Un- Skilled</u>	<u>Not Class.</u>
Total in interviewed households	1,182	73	114	252	289	146	177	131
<u>% working in:</u>								
Agriculture/mining/quarrying	2	3	2	1	4	0	0	1
Manufacturing	8	9	10	6	17	5	3	1
Construction	12	3	2	3	23	4	30	1
Electricity/water	2	9	0	*	5	0	1	0
Wholesale/retail	12	1	10	49	1	1	0	1
Hotels/restaurants	2	0	0	4	5	1	0	2
Transport and communications	13	16	8	2	20	30	16	1
Banking, etc.	3	11	5	8	0	0	0	0
Other services	7	14	16	7	6	2	5	5
Government service	22	25	42	12	16	47	22	8
Not classified	16	8	2	7	3	10	22	81
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

*less than 1/2%.

Note:

The table understates by 25% employment in manufacturing as estimated from our direct interviews; it may also underestimate employment in retailing, since a number of shop workers sleep in business premises.

Structure of Employment

68. Table 8 indicates the structure of employment in Taiz for an employee's main job (only 6% of employees also had second jobs):-
- (a) only 10% of employees in interviewed households worked in manufacturing, agriculture or the extractive industries;
 - (b) 52% worked in service industries of various kinds; and
 - (c) 22% worked in government civil or armed services.
69. This shows the role of Taiz as a market town and administrative and service centre, rather than as an industrial or manufacturing centre (see also table 1 of the Business Survey report).
70. The significant proportion of the workforce in construction emphasises the very rapid growth of the city.
71. The skills required varied considerably between industries:-
- (a) government employed high proportions of managers and semi-skilled workers;
 - (b) manufacturing employed a significant proportion of all tradesmen;
 - (c) construction employed tradesmen and unskilled workers;
 - (d) public utilities and other services employed a significant proportion of professional and managerial workers;

TABLE 9 - EARNINGS PER MONTH BY SKILL LEVEL

	<u>Total</u>	<u>Tech./ Prof.</u>	<u>Managers/ Supervisors</u>	<u>Clerical/ Sales</u>	<u>Trades- men</u>	<u>Semi- Skilled</u>	<u>Un- Skilled</u>	<u>Not Class.</u>
<u>\$ earning:</u>								
< 300 Riials	30	8	13	24	26	41	41	45
300 - 500	21	21	19	15	18	20	30	23
500 - 700	17	18	26	18	16	12	20	12
700 - 1,000	16	25	17	18	22	16	4	8
1,000 - 1,500	7	5	8	6	12	6	2	3
> 1,500	8	17	16	14	5	3	2	5
Don't know	3	7	2	6	2	1	1	4
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
Mean earnings per month (Riials)	795	1,005	1,375	1,005	720	555	500	530

Based on 1,182 responses.

TABLE 10 - MEAN EARNINGS PER MONTH BY INDUSTRY AND SKILL LEVEL (Riials)

	<u>Total</u>	<u>Tech./ Prof.</u>	<u>Managers/ Supervisors</u>	<u>Clerical/ Sales</u>	<u>Trades- men</u>	<u>Semi- Skilled</u>	<u>Un- Skilled</u>	<u>Not Class.</u>
Agriculture/mining/ quarrying	1,218	*	*	*	621			*
Manufacturing	848	1,000	1,612	792	794	455	*	*
Construction	823	*	*	1,087	943	*	622	*
Electricity/water	536	521		*	615		*	
Wholesale/retail	1,479	*	4,308	1,256	*	*		*
Hotels/restaurants	761			1,045	589	*		*
Transport and communications	777	826	978	*	829	878	463	*
Banking, etc.	849	*	*	696				
Other services	636	771	632	598	427	*	309	454
Government service	641	1,553	851	766	425	337	628	645
Not classified	515	*	*	658	638	671	316	526

Based on 1,182 responses.

* only three responses or fewer; blank indicates no responses.

Note: These figures are broad indications only; the number of observations for each entry can be derived from Table 8.

(e) wholesaling and retailing employed half of all clerical and shop workers;

(f) transport and communications employed significant groups of tradesmen and semi-skilled workers.

(The definitions of industries and skill levels used are set out in Appendix 2).

Income from Employment

72. Table 9 shows the distribution of earnings by skill level and mean monthly earnings. Semi-skilled and unskilled workers earned significantly less than the average, whereas professionals, managers and clerical workers earned significantly more.
73. However, wages varied significantly between industries for the same skills. Table 10 shows on average the electricity and water utilities paid technical and professional staff well below the level of other industries, although tradesmen were paid in the middle of the market range. Government and other service workers were consistently low paid at all skill levels.

Table 11 - Mean Household Real Income

	<u>Income Ranges (Rials/Month)</u>						
	<u>< 250</u>	<u>251-500</u>	<u>501-700</u>	<u>751 - 1,000</u>	<u>1,001 - 1,500</u>	<u>1,501 - 2,000</u>	<u>> 2,000</u>
Number of households	124	268	185	185	147	75	125
Mean real income (Rials/Month)	<u>176</u>	<u>390</u>	<u>629</u>	<u>886</u>	<u>1,287</u>	<u>1,859</u>	<u>4,294</u>
<u>% of real income from:</u>							
Employment	60	75	78	81	74	82	75
Government grants	6	4	3	3	4	2	1
Net rents	2	3	3	2	3	3	7
Relatives in YAR	10	4	1	*	3	1	*
Relatives abroad	3	6	3	6	4	3	5
Other	14	5	6	6	8	6	9
All other sources	<u>35</u>	<u>21</u>	<u>16</u>	<u>16</u>	<u>22</u>	<u>15</u>	<u>22</u>
Total money income	95	96	95	98	95	97	97
Free food	3	4	4	2	5	3	3
Other free items	3	1	1	1	*	*	*
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Based on 1,109 responses.

*less than ½%.

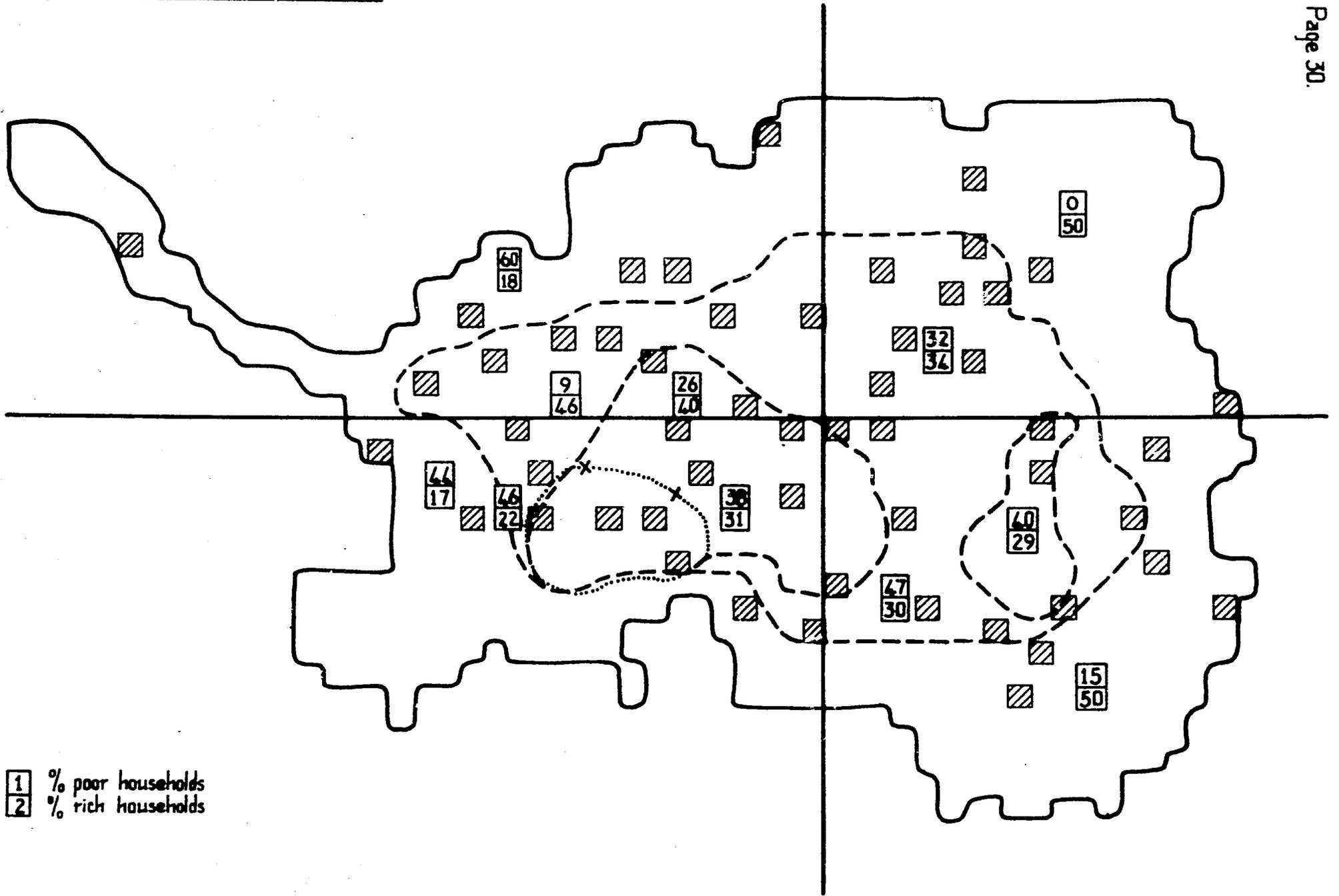
SECTION IV - HOUSEHOLD INCOMES AND EXPENDITURE

74. This section discusses the sources and distribution of household incomes, patterns of household expenditure, and the relationship between real income and expenditure.

Household Real Income

75. The previous section discussed incomes from individual employment. Table 11 shows the sources of household incomes for households with different real incomes. Incomes from work provided only 60-82% of total real income; incomes from sources other than work were important in all groups - the main ones were money from relatives outside Taiz and other unspecified incomes. Government grants and free food and other items were also important for the poorest households, as were net rents for those in the highest income group.
76. In total 49% of interviewed households existed solely on income from the head of the household's main job; 19% of households depended entirely on income from some other source, and 32% received other income to supplement wages. Mean real income was 1130 Rials (\$250).
77. In subsequent discussions we refer to the 35% of households with monthly incomes of less than 500 Rials (\$110) as "poor", and the top 31% of households with incomes over 1000 Rials per month (\$220) as "rich". (These terms are only relative; less than 5% of households have incomes exceeding 3000R (\$665) per month). We also apply this definition in some instances to household money incomes, when we are interested in the ability of households to pay.

Diagram 1. HOUSEHOLD REAL INCOME



1	% poor households
2	% rich households

78. Diagram 1 shows the percentage of households in the poor and rich groups in different parts of Taiz. Generally the western outskirts and parts of the inner south-east quadrant - Gahmalia and Wadi Taiz were poorer than average. Conversely the eastern outskirts (Upper Thaabat and around the old American campsite), and the inner and central north-west quadrant (Ikwa hill and the area below Mutazar) were richer.

Per Capita Real Income

79.. Table 12 and diagram 2 show the distribution of per capita real incomes:-

(a) Mean incomes for the top 12% of households were over 10 times the mean incomes of the poorest 11%; and

(b) mean incomes for the richest 34% were nearly 5 times those of the poorest 37%.

80 We also use the terms "poor" and "rich" for households with per capita incomes of less than 100 Rials (the bottom 37%) or more than 200 Rials (the top 34%). These were not necessarily the same households as those in paragraph 77 , as per capita income is significantly affected by household size. Nevertheless, it may be a better indicator of a household's real living standard.

Table 12 - Per Capita Real Income

<u>Rials</u> <u>Per Capita</u> <u>per Month</u>	<u>Number of</u> <u>Households</u>	<u>Per Cent</u>
< 50	119	11
51 - 100	291	26
101 - 150	182	16
151 - 200	140	13
201 - 300	143	13
301 - 500	100	9
> 500	134	12
	<u>1,109</u>	<u>100</u>

Mean per capita income 250 Rials/month

Modal per capita income 75 to 95 Rials/month

Diagram 2. CUMULATIVE DISTRIBUTION OF PER CAPITA INCOMES (RIALS PER MONTH)

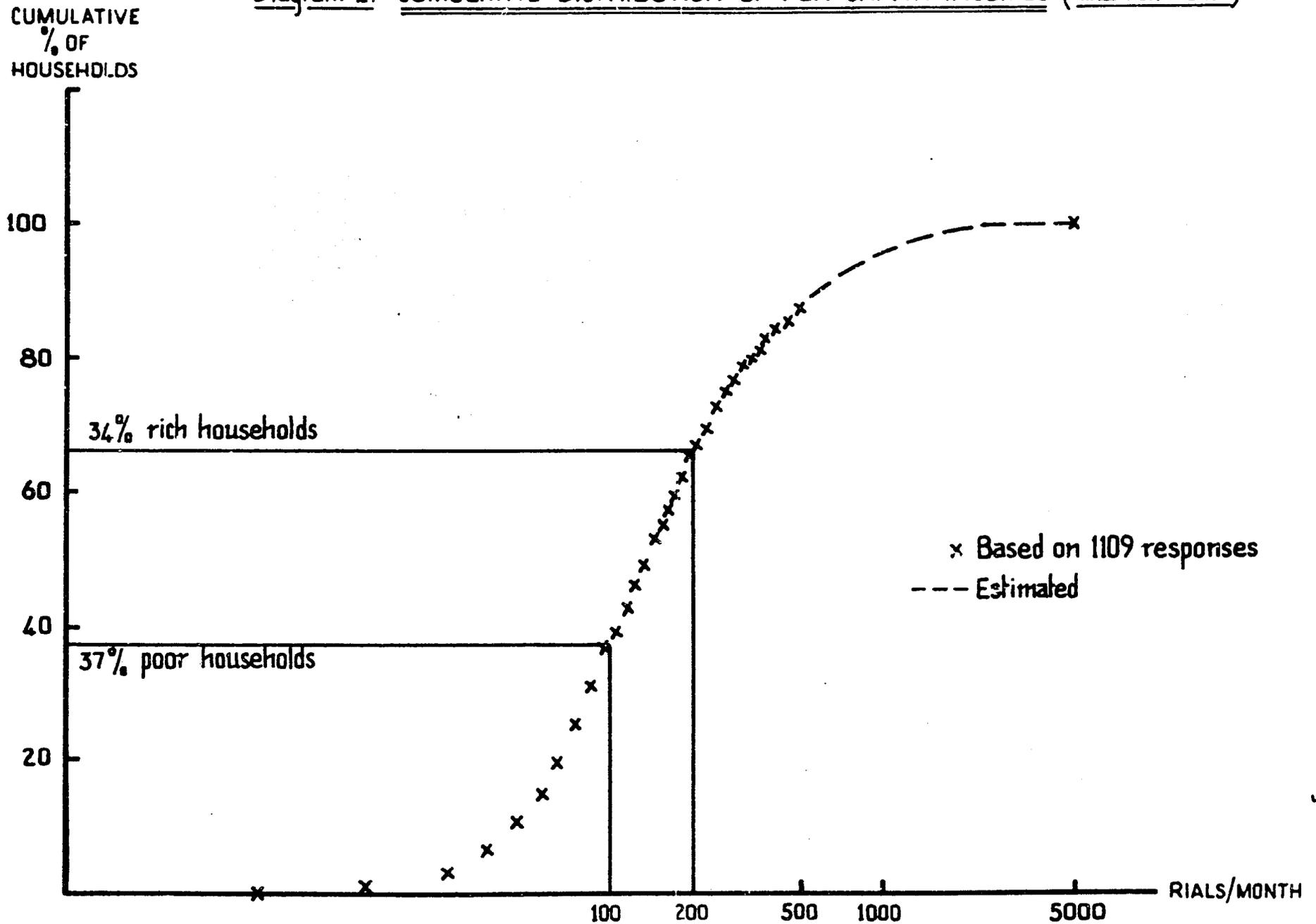


Table 13 - Monthly Household Expenditure

	<u>Total Expenditure Ranges (Rials)</u>					
	<u>< 300</u>	<u>301-500</u>	<u>501-700</u>	<u>701 - 1,000</u>	<u>1,001 - 1,500</u>	<u>> 1,500</u>
Number of households	186	213	217	211	179	141
<u>% expenditure on:</u>						
food and drink	63	58	57	53	53	47
kat and tobacco	10	13	11	13	13	14
fuels	7	6	5	5	4	5
water	4	3	2	2	2	2
housing	6	6	8	10	9	11
clothing	6	8	7	8	9	9
transport	1	2	7	3	5	6
other	3	5	5	6	6	6
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
Mean expenditure	205	410	610	850	1,220	2,450

Based on 1,147 interviews.

Table 14 - Ratio of Monthly Income/Expenditure
by Per Capita Real Income

<u>% with per capita real income:</u>	<u>Ratio</u>					
	<u>< 0.5</u>	<u>0.5-0.9</u>	<u>0.9-1.1</u>	<u>1.1-1.5</u>	<u>1.5-2.0</u>	<u>> 2.0</u>
< 50	48	13	6	6	0	1
50 - 100	30	34	28	18	10	8
100 - 150	9	24	25	24	15	10
150 - 200	7	9	15	16	17	9
200 - 300	3	12	12	11	21	17
300 - 500	1	4	10	9	19	17
> 500	1	4	4	15	19	39
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Based on 1,126 responses.

Household Expenditure

81. Table 13 shows the pattern of household expenditure for households with different budget limits. Average household expenditure was 875 Rials per month, plus an average 40 Rials per month for free food and other items.
82. Food and drink was typically the largest item of household expenditure, whereas water was one of the smallest. Expenditure on food, fuels and water fell as a proportion of total expenditure as the household budget increased - that is the income elasticity of demand for these items was less than one (using total expenditure as a proxy for income).
83. On the other hand, expenditure on kat, housing, clothing, transport and other items increased as a proportion of the total - income elasticities were greater than one (significantly greater for the latter two items).

Relationship of Income and Expenditure

84. Although expenditure on water was a relatively small amount, households were not necessarily able to absorb an increase in price. Table 14 shows that poor households were more likely to spend above their incomes than rich households - the ratio of income to expenditure (I/E) was less than one. (For all households the ratio I/E was normally distributed with a mean of one).

Table 15 - Ratio of Monthly Income/Expenditure
and Accuracy of Estimates

	<u>Ratio</u>					
	<u>< 0.5</u>	<u>0.5-0.9</u>	<u>0.9-1.1</u>	<u>1.1-1.5</u>	<u>1.5-2.0</u>	<u>> 2.0</u>
Number in group	89	307	209	251	124	129
<u>% answering:</u>						
income more accurate	11	24	23	34	44	50
expenditure more accurate	62	48	38	23	20	21
both accurate	6	13	24	24	14	13
don't know	21	14	14	19	22	16
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Based on 1,102 responses

85 This situation could not be sustained permanently. When asked about the accuracy of the estimates, table 15 shows that:-

- (a) when income was less than or equal to expenditure, expenditure was more likely to be accurate;
- (b) when income was greater than expenditure, the estimate of income was more likely to be accurate.

86. It is possible therefore that poor households underestimated their incomes. For example, if funds from sources other than work varied in amount or frequency this would affect estimates of mean incomes more significantly for poor households than rich ones.

87. However, we have continued to use the income data we have to express differences in behaviour between income groups. We have assumed that households with uncertain increments to low incomes are likely to behave in a similar way in the short-run to households with fixed low incomes. Such behaviour may occur in the long-run as well.

TABLE 16 - TYPE OF HOUSING BY HOUSEHOLD REAL INCOME

	<u>VILLA ON ONE FLOOR</u>	<u>SMALL HOUSE</u>	<u>HOUSE ON TWO FLOORS</u>	<u>APARTMENT</u>	<u>TEMPORARY</u>	<u>ROOM</u>	<u>OTHER</u>
Number of households	177	524	220	138	16	37	60
<u>% real income:</u>							
< 250	10	13	4	4	25	41	32
251 - 500	20	28	18	9	38	30	32
501 - 750	13	20	14	13	19	8	5
751 - 1,000	16	15	16	20	19	11	12
1,001 - 1,500	15	10	16	20	0	3	8
1,501 - 2,000	6	4	10	12	0	0	7
> 2,000	15	6	17	20	0	3	5
Don't know	6	4	4	4	0	5	0
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Based on 1,172 responses.

Note: Excludes 163 households living in business premises; these are likely to be relatively poor households.

TABLE 17 - TENURE BY TYPE OF DWELLING

	<u>VILLA ON ONE FLOOR</u>	<u>SMALL HOUSE</u>	<u>HOUSE ON TWO FLOORS</u>	<u>APARTMENT</u>	<u>TEMPORARY</u>	<u>ROOM</u>	<u>OTHER</u>
<u>% Owned by:</u>							
Head of household	48	53	57	33	75	3	7
Other relative	7	7	5	7	6	5	3
Landlord - not related	41	39	36	61	0	89	82
Government department	5	1	1	0	0	0	2
Other	0	1	1	0	19	3	7
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Based on 1,172 responses.

SECTION V - HOUSING CHARACTERISTICS

88. This section discusses the types of housing, tenure, household size and density of occupation found in the surveyed population.

Type of Housing

89. Table 16 shows that the majority of the population were housed in small single storey dwellings, with most of the remainder in apartments, villas (mainly small houses with gardens), and larger houses. Even in the old town these were generally of a straightforward western-type design, rather than in the highly decorated traditional Arab style which was prevalent in Sana'a.
90. The relatively poor households were more likely to live in temporary dwellings, rented rooms or other accommodation (one or two rooms only), or in a small house built of stone, mud and wood (two to four rooms). The relatively rich were more likely to live in villas, apartments or larger houses built of stone, concrete and wood (three to five rooms). However, housing did not discriminate unambiguously between income groups.

Tenure

91. Table 17 shows housing tenure; 53% of the total dwellings were owned by the head of household or another relative, whilst 46% were rented from a landlord (not related) or from a government department. (The Census figures were 47% and 48% respectively, with 5% unspecified).

Table 18 - Household Size

<u>Number of Persons</u>	<u>Number of Households</u>	<u>Per Cent</u>
1	111	10
2	117	10
3	94	8
4	126	11
5	136	12
6	122	10
7	127	11
8 or more	339	29
	<u>1,172</u>	<u>100</u>

Mean household size 5.8 (persons usually resident)

Notes:

1. This excludes persons living in business accommodation.
2. The Census figure was higher than in other governerate capitals and may have been inflated by immigration from Aden; we would expect average size to fall since the estimated increase in households was greater than population (see paragraph 45).

92. The majority of apartments, rooms and other dwellings were rented, whereas the majority of villas, houses and temporary dwellings were owned by the occupants. There was no significant relationship between tenure and incomes.

Household Size

93. The average size of interviewed households was 5.8 persons (3.1 males and 2.7 females), compared with 6.2 in the YAR Census. This was made up of:-
- 1.0 male working or seeking work;
 - 0.8 female housekeeper
 - 3.5 children under 18 years;
 - 0.5 retired or too sick to work.
- Only 2% of households included no male, whereas 13% were without females - presumably immigrant workers or students. (These figures exclude persons living in business accommodation, where the average size of household was 2.8 males).
94. Table 18 shows the distribution of household size. The high proportion of households with eight or more members could indicate a number of "extended" families - that is, households which included relatives from outside an immediate family circle. These would have been included in the survey as a single household if they shared housekeeping or if they ate together. (Some 12% of households shared their accommodation with another household with whom they did not also share their housekeeping).

Density of Occupation

95. The average size of dwelling was 3.4 rooms: paragraph 90 broadly identifies the variation in the number of rooms

Table 19 - Number of Persons per Room

<u>Density</u>	<u>Number of Households</u>	<u>Per Cent</u>
0.5 or less	72	6
0.6 - 1.0	254	22
1.1 - 1.5	201	17
1.6 - 2.0	285	24
2.1 - 2.5	130	11
2.6 - 3.0	111	9
above 3.0	119	10
	<u>1,172</u>	<u>100</u>

Mean density 1.9 persons/room

1. Rooms include kitchen but exclude separate bathroom.
2. Census average density 1.4 persons/room; this relates to living quarters rather than dwellings and definition of rooms included differed from our survey.

by type of dwelling and the relationship with household income.

96. Table 19 indicates the variation in the number of persons per room. Only 28% of households lived at a density of one person per room or less, whilst 30% exceeded a density of two persons per room - which represents significant overcrowding. The average density was not related to income.

Table 20 - Sources of Water Supply

<u>Source</u>	<u>Number of Households</u>	<u>Per Cent</u>
Own Kennedy connection	833	71
Neighbour's Kennedy connection	81	7
Jabel Sabir	111	9
Water carrier	50	4
Tap/Mosque	174	15
Well	53	5
Other*	137	12

Based on 1,172 responses.

On average each household used 1.2 sources

*includes truck vendors employed by Kennedy when piped supply interrupted.

Note:

The Census results gave 89% of living quarters connected to a public piped water supply (Kennedy and Jabel Sabir) and 8% getting water from wells. The only source not listed above was 1% getting water from streams and pools.

SECTION VI - WATER CONSUMPTION AND EXPENDITURE

97. This section identifies:-

- (a) the main sources of water supply;
- (b) the alternative levels of service offered;
- (c) water consumption by households and per head;
- (d) household expenditure on water; and
- (e) ownership of water using facilities.

Each source is discussed in more detail in the following section.

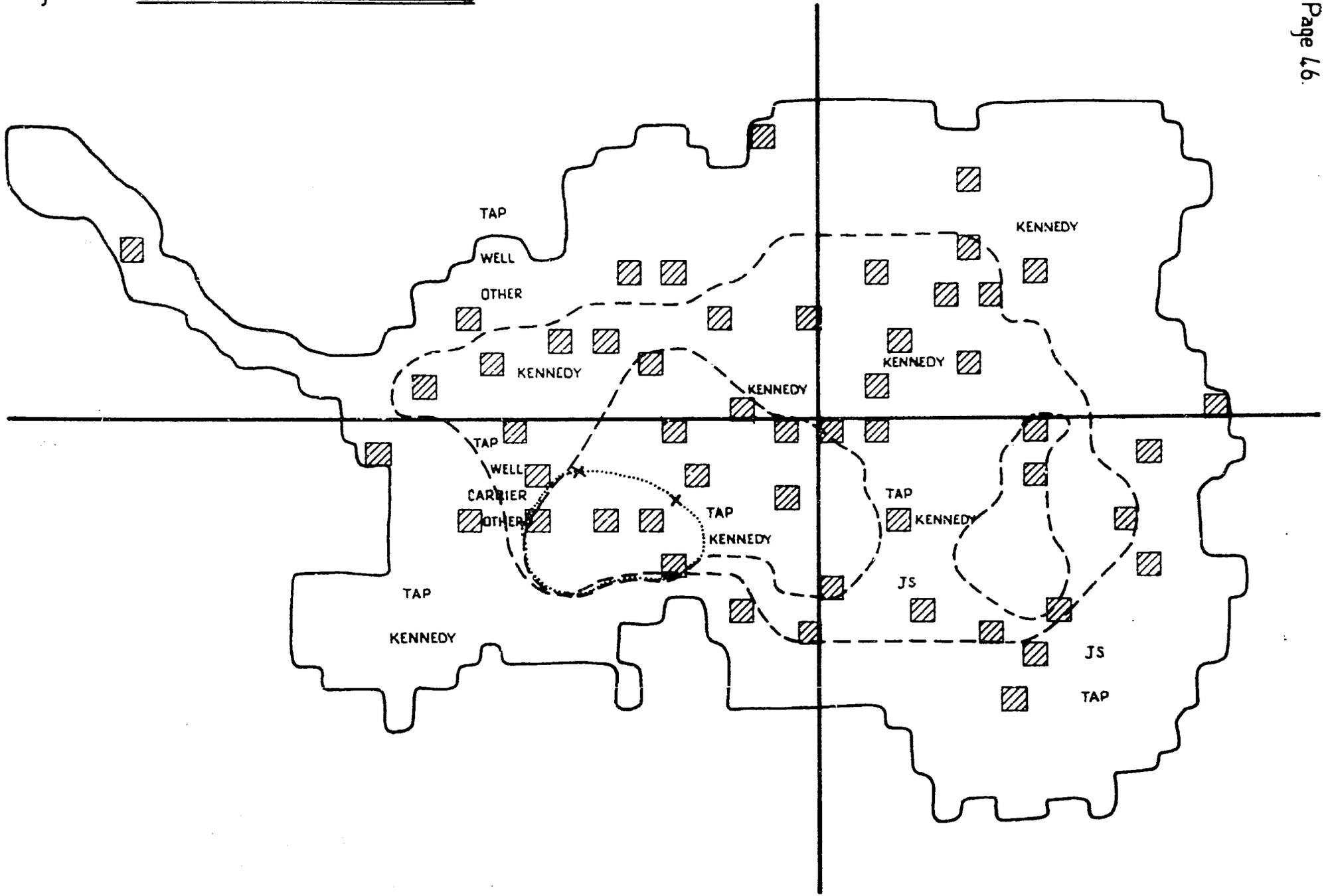
Sources of Water Supply

98. The main sources of water supply were:-

- (a) the Kennedy Memorial Water System;
- (b) the Jabel Sabir piped mountain water system;
- (c) traditional water carriers;
- (d) public taps or water from Mosques; and
- (e) wells.

Table 20 shows the proportions of households served by each.

Diagram 3. DISTRIBUTION OF WATER SOURCES



99. The most important water sources in different parts of Taiz are noted in figure 3. From this it can be seen that the Kennedy system is not significant in the extreme north-west (a relatively poor area) and south-east fringes of the town (a steeply rising area with severe water pressure problems). It can also be seen that the Jabel Sabir system serves mainly the southern parts of Taiz.
100. The Kennedy System was used by at least 78% of households; in addition, some of the water from public taps and mosques will have been supplied by Kennedy.
101. On average each household used 1.2 water sources, regardless of its actual consumption. Most households using the Jabel Sabir System, taps, water carriers and other unspecified sources also used a second source, whereas only 38% of households using wells and 25% of households using Kennedy supplemented their supply from another source.
102. For Kennedy users who used a second source, the Secondary sources were:-
- | | |
|-------------------|------|
| public tap/mosque | 33% |
| water carrier | 15% |
| Jabel Sabir | 13% |
| well | 4% |
| other source | 31%. |
103. In each case the quantities involved were small. Some households, for example, appeared to prefer water from these sources when making tea or coffee in order to avoid the "salty" taste from the Kennedy water (as compared with "sweet" water from the mountain supply).

Table 21 - Comparison of Levels of Service
From Main Sources

	<u>Average Price per cu.m.</u>	<u>Volume Supplied (cu.m./ month)</u>	<u>Mean⁺</u>	<u>% Satisfied With Service</u>
Kennedy	2R	2 - 15	7.9	63
Jabel Sabir	1.7R*	½ - 5	2.4	50
Water carrier	40R ^b	½ - 5	2.8	60
Tap/Mosque	Free	> 3	1.9	74
Well	Free	½ - 4	2.2	94

* operates a fixed rate tariff related to income and household size.

^b the average price to households was lower than that charged to businesses (60 rials/cu.m.); even so carriers were a relatively less important water source for households.

⁺ mean volume supplied to households using the source.

Table 22 - Comparison of Reasons for Dissatisfaction With
Service From Main Sources

<u>% of dissatisfied users answering:</u>	<u>Limited Supply</u>	<u>Limited Storage</u>	<u>Other Reasons</u>
Kennedy	92	21	-
Jabel Sabir	96	19	-
Water carrier	65	35	35(1)
Tap/Mosque	67	42	29(2)
Well	*	*	*

(1) Water too expensive.

(2) Tap too far away.

* too few responses to analyse.

104. Although wells were no longer a major source of supply in their own right they were often considered as a stand-by source in case of interruption of the Kennedy supply.
105. We were not able to identify the other source used by 12% of households. At some times the Kennedy water authority have employed truck vendors to distribute water from tanker trucks when the main supply is cut-off, for example, during road construction and maintenance, or whilst the new telephone lines were being laid. However, we would not expect this to account for such a large proportion of households.

Alternative Levels of Service

106. Table 21 describes the services offered by the main water sources. Although the two public piped supplies operated at the same effective price levels, Kennedy was the only significant bulk source, supplying on average some three to four times the volume of the others. As the only supply for households without Kennedy water (22%) the other sources were unlikely to have been adequate.
107. It should be noted that, for those who had access to them, water from public wells, standpipes or from mosques was available free as a social service. However, availability was largely restricted to the southern and western fringes of Taiz (including the old Medina).
108. A relative high proportion of those using all sources except wells expressed dissatisfaction with the service offered. The main reasons (see table 22) were the same in each case, although the differences between the piped supplies and the others reflected important differences in the type of service offered.

Table 23 - Monthly Water Consumption From All Sources

<u>Quantity</u> <u>(cu.m./month)</u>	<u>Number of Households</u>	<u>Per Cent</u>
Nil	65	6
1 - 5	524	45
6 - 10	345	29
11 - 15	133	11
16 - 20	34	3
> 20	52	4
Don't know	32	3
	<u>1,170</u>	<u>100</u>

Mean consumption 7.24 cu.m./month.

Table 24 - Per Capita Water Consumption by Per Capita Real Income

	<u>Total</u>	<u>Real Income (Rials/Month)</u>		
		<u>< 100</u>	<u>100-200</u>	<u>> 200</u>
Number of households	1,126	378	371	377
<u>% consuming:</u>				
Nil	6	1	3	14
1 - 10 l/c/d	5	10	4	1
11 - 20 l/c/d	16	27	14	6
21 - 30 l/c/d	14	21	14	8
31 - 50 l/c/d	28	24	33	28
51 - 70 l/c/d	12	10	17	15
71 - 100 l/c/d	10	3	7	11
> 100 l/c/d	7	2	5	13
Don't know	3	2	2	4
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Mean consumption 56 litres per capita per day(1/c/d).

Adequacy of Supply

109. Consumption levels varied considerably between different sources. Nevertheless users of all sources expressed dissatisfaction with the volume of water available.
110. Adequacy of supply is a relative concept, relating both to expected consumption from each individual source and whether a household's total needs are met. We cannot identify precisely what proportion of households wished to consume more than they could obtain from all the sources they used. Only 18% of households stating that they received insufficient Kennedy water used a supplementary source (compared with 5% of those stating that they received sufficient).
111. Future tariff policy must consider whether in the long-run Kennedy is likely to be the sole source of supply, and what levels of consumption it is desirable to satisfy at the standard domestic price level, so as to get the right balance between consumption per connection and the number of connections.

Water Consumption

112. The average consumption per household was $7\frac{1}{2}$ cu.m. This is less than the average consumption from Kennedy since it includes households using other sources (see table 23). Consumption is closely related to the size of household, with smaller households (up to three members) generally consuming no more than 5 cu.m., and larger households (four or more) consuming 5 cu.m. or more.
113. Table 24 indicates per capita water consumption. Mean consumption was 56 litres per capita per day. However, this figure is significantly influenced by a few households with extremely high consumption. If the top 3 $\frac{1}{2}$ % of responses were excluded, the mean would be 40 l/c/d.

Table 25 - Per Capita Water Consumption
By Connection Status

	<u>Not Connected</u>	<u>Bath Only*</u>	<u>Bath and Flush</u>
Number of households	339	297	533
<u>% consuming:</u>			
Nil	17	0	1
1 - 10 l/c/d	14	2	2
11 - 20	24	11	13
21 - 30	14	15	13
31 - 50	18	35	31
51 - 100	9	28	27
> 100	2	6	10
Don't know	3	1	4
	<u>100</u>	<u>100</u>	<u>100</u>
Mean l/c/d	25	50	57

Based on 1,169 responses

* 5% of these had connection but neither appliance; 2% had connection and flush; the remainder had connection and bath.

Table 26 - Monthly Expenditure on Water (Rials)

	<u>Total</u>	<u>Total Money Income</u>		
		<u><500</u>	<u>500-1,000</u>	<u>>1,000</u>
Number of households	1,133	442	363	328
<u>% spending:</u>				
Nil	19	30	13	10
1 - 5	7	8	8	6
6 - 10	25	29	26	20
11 - 15	12	11	12	11
16 - 20	16	10	20	19
21 - 30	10	5	9	17
> 30	9	4	10	15
Don't know	2	2	2	2
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Mean expenditure 18 Rials

Based on 1,133 responses.

114. It is clear that poor households consumed less than the average and rich households consumed substantially more. These differences are also reflected in the connection status of the household (see table 25). Households which had only a basic connection to the piped water supply consumed more than twice as much as households with no connection; and those with a flush toilet consumed 14% more on average than households with a basic connection.
115. By comparison with consumption levels for connected urban populations in other Arab countries these figures are low - reflecting the inadequacy of the present supply particularly for households with more than a basic connection.

Expenditure on Water

116. Table 26 summarises data on expenditure on water from all sources. This data was collected independently of, and is consistent with, our earlier analysis of patterns of household expenditure. In general poor households spent less on water, but a higher proportion of their money income, than rich households.

Table 27 - Ownership of Water Using Facilities

	<u>Number</u>	<u>% of Households Owning</u>
Water storage tank	406	35*
Water heater	78	7
Sink/basin	367	31
Bath/shower	1,015	87*
Flush toilet	523	45
Washing machine	47	4
Motor vehicle	110	9
Garden	105	9

Based on 1,173 responses

*compares with 833 households with a Kennedy connection (71% of total); clearly not all baths were plumbed and many households could have eased the supply constraint by purchasing a storage tank.

117. The data from these two sources suggest an income elasticity of demand for water of about 0.5 - that is for every 1% increase in incomes, households increased their expenditure on water by 0.5% on average. This appears reasonable given the importance of water and the very low incomes of households at present.

Water Using Facilities

118. We collected information on water using facilities since this indicates the wealth of households, as represented by investments which would improve their standard of living, as well as the possible uses of water other than in direct personal consumption (see table 27).
119. The main facilities available to households were baths and flush toilets. This information has been used in assessing levels of water consumption (see table 25 above). As more baths are connected to the main water supply, and as more households acquire storage tanks, flush toilets or washing machines and other appliances, the average levels of consumption can be expected to rise. (Conversely if more water is available, households will be more likely to acquire these facilities as their real incomes rise).

Table 28 - Quantity of Water Consumed Each Month
From Kennedy System

<u>Quantity</u> (cu.m./month)	<u>Number</u> <u>Receiving</u>	<u>Per Cent</u>
< 1	30	3
1 - 2	42	5
2 - 3	62	7
3 - 4	77	8
4 - 5	167	18
6 - 10	338	37
11 - 15	110	12
16 - 20	27	3
> 20	32	4
Don't know	23	3
	<hr style="width: 100%; border: 0.5px solid black; margin: 0;"/> 908	<hr style="width: 100%; border: 0.5px solid black; margin: 0;"/> 100

Mean consumption 7.9 cu.m.

Note:

1. Interviewers reported that 5% to 10% of households complained that their meters were recording a significant volume of air passing through the pipes, not water. To avoid disconnection these households had to pay for water which they did not receive. (No estimate was possible of the quantities involved.)

2. Comparison with a sample of 250 Kennedy account cards shows that this data reasonably reflects the pattern of consumption over the 3 months prior to the survey.

SECTION VII - CHARACTERISTICS OF MAIN WATER SOURCES

120. This section discusses consumption from and attitudes towards each of the main water sources listed in table 20.

KENNEDY MEMORIAL WATER SYSTEMPresent Connections and Consumption

121. 71% of households had a connection to the Kennedy System, and 85% of these had their own meter. From the household and business surveys we estimate that there were approximately 9,000 domestic and 1,300 business accounts, although the total number of households or businesses with a connection was nearly 11,800. KMWS estimated the total number of accounts at June 1976 was 9,700, although they acknowledged that some 2-5% of meters could not be located (that is in addition to the number of current accounts).
122. Only 3% of households gave water from their connection to another household, although 7% of households received Kennedy water from a neighbour. The majority of the latter group lived in rented accommodation.
123. Table 28 shows the quantity of Kennedy water consumed by Kennedy users. Mean consumption varied between 7.8 cu.m./month for those households getting enough water and 8.5cu.m./month for those not getting enough (these households consumed 0.3 cu.m. from supplementary sources in addition). Households which needed to consume larger volumes of water were more seriously affected by the supply constraint than households generally. Water service

Table 29 - Expenditure on Kennedy Water Related
to Household Money Income

	<u>Income Group (Rials/Month)</u>					
	<u>Less Than 300</u>	<u>301 - 500</u>	<u>501 - 700</u>	<u>701 - 1,000</u>	<u>1,001 - 1,500</u>	<u>More Than 1,500</u>
Number of households	134	144	136	169	118	171
<u>% spending:</u>						
Nil	1	2	4	2	5	2
1 - 10	64	42	43	37	28	28
11 - 20	28	41	40	39	42	32
21 - 30	5	10	6	12	17	21
31 - 40	0	2	2	4	6	6
Over 40	1	1	5	5	1	9
Don't know	0	1	1	2	2	2
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Mean expenditure 16.4 Rials/month

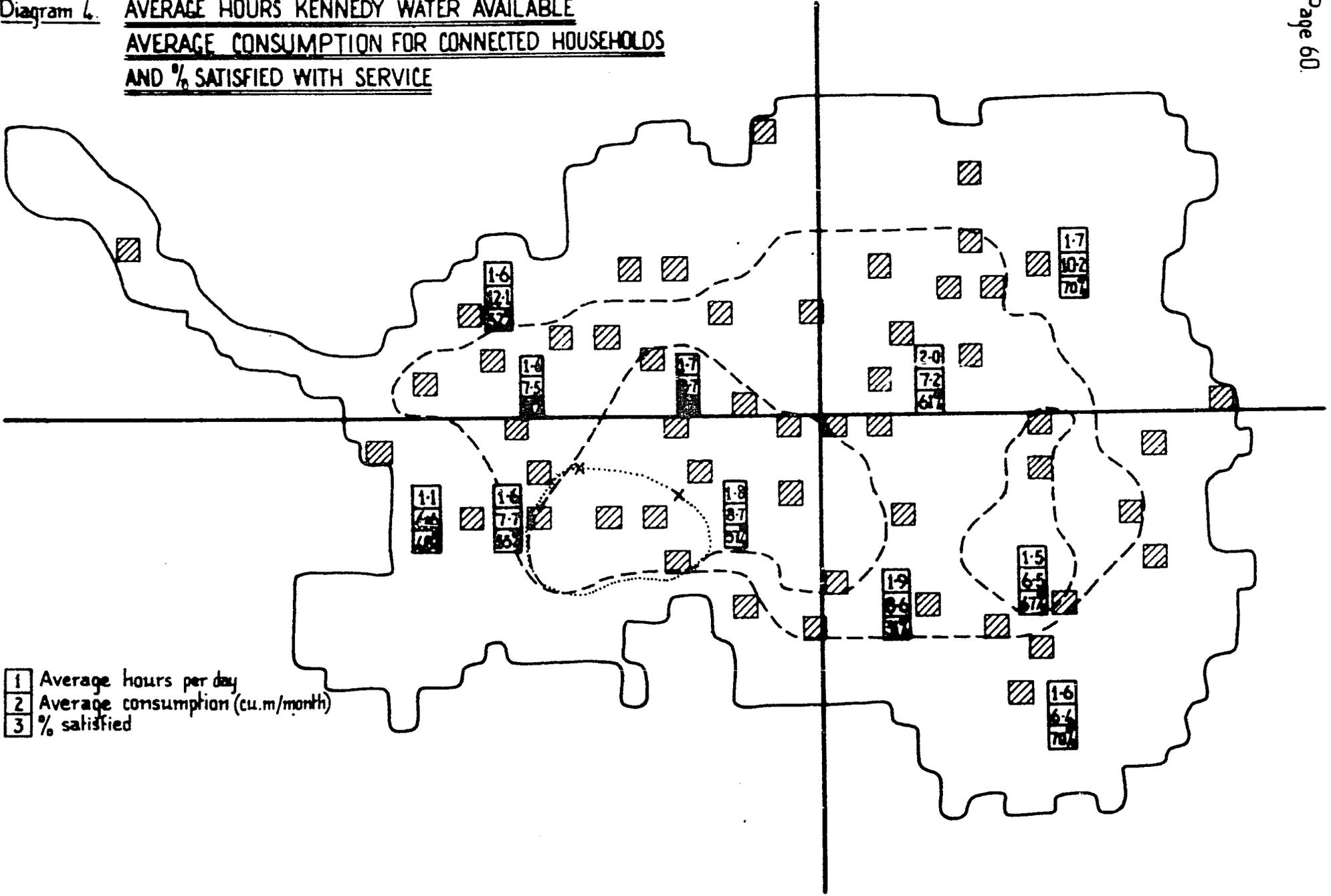
Based on 872 responses.

was available for between 1½ and 2 hours a day. (No analysis of consumption was carried out by size of meter installed, since it was not felt that this would significantly affect consumption levels and this would have been difficult information to collect).

Expenditure on Water

124. Domestic water was supplied at the standard rate of 2 Rials per cubic metre. (A small volume was supplied free from well sites to rural vendors). Table 29 indicates the cost of water in relation to money income.
125. Poor households connected to Kennedy spent broadly the same amount as poor households using other sources - although they would have received more water (see table 26). On average medium income and rich households spent less than similar households which were not connected to Kennedy (although the saving was not likely to be significant in their overall expenditure). Again the main benefit of connection was increased consumption.
126. The implied income elasticity of demand for Kennedy water fell from 0.5 for the poorest households to about 0.2 for medium income and rich households (although this may have been affected by the supply constraint - see paragraph 123).

Diagram 4. AVERAGE HOURS KENNEDY WATER AVAILABLE
AVERAGE CONSUMPTION FOR CONNECTED HOUSEHOLDS
AND % SATISFIED WITH SERVICE

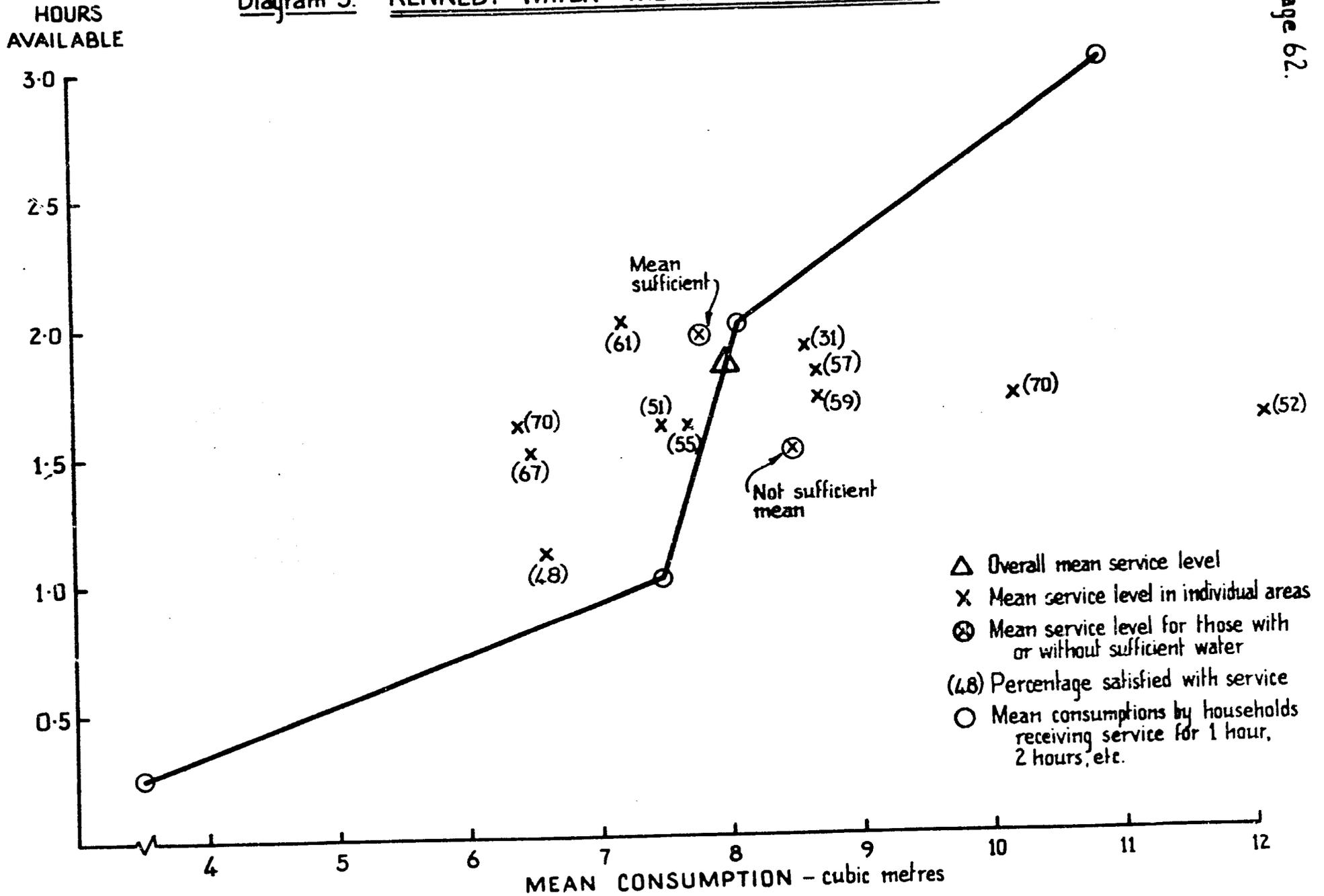


1 Average hours per day
 2 Average consumption (cu.m/month)
 3 % satisfied

Present Level of Service

127. Figure 4 shows the variations in service, average consumption and customer satisfaction in different parts of Taiz. The area outside Bab al Mosa received water for a significantly shorter time than average. Households in Gahmalia, Upper Thaabat, the areas above the Kennedy yard and on Nasser Street also consumed less than average, whereas households in the old American campsite and the areas below the Sana'a road or around Mutazar consumed more. These variations are likely to have been either the result of the rationing policy adopted by KMWS or the effects of the gradient on water pressure.

Diagram 5. KENNEDY WATER: MEAN LEVEL OF SERVICE



128. Figure 5 shows:-

- (a) the mean consumption of households which received water for different periods of time;
- (b) the mean levels of service in different parts of the town in relation to this overall measure; and
- (c) the relationship with customer satisfaction.

129 Consumption was clearly related to hours of service; however, differences in this variable did not explain all of the differences in consumption. Other factors (mains capacity and pressure; whether a customer had a storage tank) were likely to have been just as important.

130. Overall, 57% of customers stated that they received sufficient water - although the proportion was generally lower on the eastern side of Taiz. Those that did not receive sufficient consumed more than the average, but received service for a shorter time. Their dissatisfaction may have been related to the period of service (which was intermittent in some areas - every 2 or 3 days - and not always reliable) or to the actual quantity received - for example, if their needs were greater than average (see paragraph 123), or if the meter was not functioning properly (see note to table 28).

Table 30 - Reason for not Receiving Sufficient
Water from Kennedy System

	<u>Number</u>	<u>% of Those Answering</u>
Limited water supply	355	92
Water too expensive	9	2
Water tastes salty	2	1
Limited storage	80	21
Other/don't know	24	6

Based on 387 responses

(On average each respondent gave 1.2 reasons)

Table 31 - Reason Given for not Having a Connection
to the Kennedy System

	<u>Number of Households</u>	<u>% of Those Asked</u>
Connection too expensive	9	3
Connection not available	71	27
Kennedy refused connection*	34	13
Limited water supply	104	39
Water too expensive	22	8
Water too salty	9	3
Other	97	37
Don't know	27	10

Based on 265 responses

(On average each household gave 1.4 reasons)

*Since June 1976 Kennedy has curtailed the number of new connections because of an acute water shortage; this has led to a long waiting list for connections.

Reason for Not Receiving Sufficient Water

131. The main reasons given were limited water supply and limited storage (table 30). We have already noted the relatively large proportion of connected households which did not have storage tanks (table 27). It is significant that very few households gave the cost or the quality of water as reasons.

Reason for Not Having a Connection to Kennedy

132. The main reasons are shown in table 31. In the Medina and the inner south-east quadrant (relatively poor areas) those households with above average consumption were more likely to give the reasons "connection not available" or "Kennedy refused connection". In the same areas, households with below average or zero consumption were more likely to answer "don't know" or to give a reason not coded on the questionnaire. On the outskirts of Taiz, respondents were more likely to give the limited water supply as the reason for not connecting. The cost of connection was not seen as a major problem (but see paragraph 159).

JABEL SABIR WATER SYSTEM

Connections

133. There is a secondary piped water system in Taiz which supplied water from the Jabel Sabir mountain range to the southern parts of Taiz (Gahmalia, Wadi Taiz) and to the Medina and the area outside Bab al Mosa. This system is administered by the Ministry of Awkaf. Only 7% of households had a connection to this service, and a further 3% of households shared a neighbour's connection. In total the survey estimate of just over 1,000 connections

Table 32 - Quantity of Water Consumed and
Expenditure on Jabel Sabir Water

<u>Quantity (cu.m./Month)</u>	<u>%</u>	<u>Expenditure (Rials/Month)</u>	<u>%</u>
< ½	10	Nil	43
½ - 1	10	1	3
1 - 1½	17	2	4
1½ - 2	14	3	6
2 - 2½	13	4	15
2½ - 3	8	5	8
3 - 4	7	6	4
4 - 5	14	7	3
> 5	7	>7	13
	<u>100</u>		<u>100</u>
Mean	2.4cu.m.		4.1 Rials

Based on 111 responses.

Table 33 - Reason for not Receiving Sufficient
Water from Jabel Sabir System

	<u>Number</u>	<u>% of Those Asked</u>
Limited water supply	54	96
Water too expensive	0	0
Water not clean enough	2	4
Limited storage	10	18
Other/Don't know	6	11

Based on 56 responses.

On average each respondent gave 1.3 reasons.

compares well with the Ministry's estimate of 774 authorised connections and an unknown number of unauthorised ones.

Consumption and Expenditure

134. On average water service was available for only 1.3 hours a day - less than Kennedy. Estimated consumption was much lower than from Kennedy (see table 32) - this service was not metered.
135. The effective average price of water was slightly lower than Kennedy (1.7 Rials/cu.m.). We were told by Ministry officials that this system operated a flat rate charge related to income; interviewers reported, for example, that water was charged for in Gahmalia, and distributed free in the Medina. This was not apparent from the responses we received.

Attitudes to Present Level of Service

136. 50% of users stated that they did not get enough water from this source. The major reason given was the limited water supply (see table 33).

Table 34 - Quantity of Water Consumed
and Expenditure on Water from Water Carriers

<u>Quantity (cu.m./Month)</u>	<u>%</u>	<u>Expenditure (Rials/Month)</u>	<u>%</u>
< ½	12	< 30	26
½ - 1	22	30 - 60	32
1 - 1½	6	60 - 120	16
1½ - 2	22	120 - 180	6
2 - 2½	8	180 - 240	8
2½ - 3	4	240 - 300	4
3 - 4	6	Over 300	6
4 - 5	10		
> 5	6		
Don't know	4	Don't know	2
	<u>100</u>		<u>100</u>
Mean consumption	2.8 cu.m.	Mean expenditure	114 Rials

Based on 50 responses

Table 35 - Reason for not Receiving Sufficient
Water from Water Carriers

	<u>Number</u>	<u>% of Those Asked</u>
Limited water supply	13	65
Water too expensive	7	35
Water not clean enough	1	5
Limited storage	7	35
Other/Don't know	1	5

Based on 20 responses.

On average each respondent gave 1.5 reasons.

WATER CARRIERS

137. 4% of households bought water from water carriers. Table 34 indicates the quantities bought and the cost of this water. On average 1 can of water (about 17 litres) cost about 1 Rial - some twenty times the cost of Kennedy water.
138. Consumption from this source was higher than from wells or public taps, although these were important sources in areas where water carriers operated. It would appear therefore, that cost was not a major factor for the volume of water which households bought from carriers, or else the supply constraint forced householders to pay the high marginal cost.
139. 60% of households bought sufficient water from this source. For those not receiving enough the cost of water and the problem of storage assumed greater importance than for other sources (table 35).

Table 36 - Quantity of Water Consumed each Month
from Public Taps and Mosques

<u>Quantity (cu.m./month)</u>	<u>Number Receiving</u>	<u>Per Cent</u>
< ½	56	33
½ - 1	32	18
1 - 1½	26	15
1½ - 2	16	9
2 - 2½	18	10
2½ - 3	6	3
3 - 4	10	6
4 - 5	4	2
> 5	5	3
Don't know	1	1
	<u>174</u>	<u>100</u>

Mean consumption 1.9 cu.m.

Note:

Consumption from these sources is low compared with water from carriers and from wells. This may reflect the use of these sources to supplement consumption from elsewhere.

Table 37 - Reason for not Receiving Sufficient
Water from Taps/Mosques

	<u>Number</u>	<u>% of Those Asked</u>
Limited water supply	30	67
Water too expensive	2	4
Water not clean enough	4	9
Limited storage	19	42
Tap/Mosque too far away	13	29
Other/Don't know	6	13

Based on 45 responses.

On average each respondent gave 1.6 reasons.

PUBLIC TAPS AND MOSQUES

140. 15% of households collected water from public taps or from Mosques. These two sources were combined because they both provided free water as a social service; they were important sources in the relatively poorer parts of Taiz. Average consumption was 1.9 cu.m. per month per household (table 36).
- 141 Two thirds of households using these sources lived within 40 metres of the tap or Mosque they used, and no household was further than 100 metres away.
- 142 Consumption was related significantly to the size of household and distance from the water source. Average consumption fell from 1½ cans (25 litres) per capita per day for small households close to the source, to ½ can (8 litres) per capita per day for large households some distance away.
- 143 74% of households got sufficient water from these sources. The main reasons given by those which did not are summarised in table 37. Distance from the source was an additional problem not faced by households receiving water from other sources.

Table 38 - Quantity of Water Consumed each Month From Wells

<u>Quantity</u> <u>(cu.m./month)</u>	<u>Number</u> <u>Receiving</u>	<u>Per Cent</u>
< ½	1	2
½ - 1	11	21
1 - 1½	9	17
1½ - 2	11	21
2 - 2½	7	13
2½ - 3	5	9
3 - 4	5	9
4 - 5	3	6
Don't know	1	2
	<u>53</u>	<u>100</u>

Mean consumption 2.2 cu.m.

WELLS

144. 4½% of households drew water from wells - 83% of these were public wells from which water was collected free of charge. The average quantity consumed was higher than from taps or mosques (see table 38).
145. 94% of these households received sufficient water. This is higher than the proportion of households which received sufficient water from taps, possibly because supply to the latter was restricted. There were too few responses to analyse the reasons why some households did not receive enough well water.
146. Two thirds of households were less than 50 metres from the well they used, and no household was further than 100 metres. Both taps and wells clearly served a very local community.
147. There were too few responses to analyse the relationship between consumption and distance from the water source.

Table 39 - Willingness to Connect to Improved
Kennedy System by Total Household Money Income

	<u>Already Connected</u>	<u>Willing to Connect</u>	<u>Not Willing to Connect</u>	<u>Landlord's Responsibility</u>
Number of households	756	134	118	164
<u>% of households with money incomes</u> (Rials/Month)				
< 300	15	24	41	26
300 - 500	17	20	25	15
500 - 700	14	16	15	15
700 - 1,000	18	11	11	16
1,000 - 1,500	13	14	3	12
> 1,500	20	12	3	12
Don't know	4	2	1	5
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Based on 1,172 responses.

Note:

There was some ambiguity in answers to this question; data in this table therefore differs from data in table 20. In interpreting this table we have assumed the earlier data is correct.

SECTION VIII - CONNECTION TO AN IMPROVED KENNEDY SYSTEM

148. This section describes the willingness of households to connect to an improved water supply system and the reasons given by those households not willing to connect.

Willingness To Connect

149. Respondents were asked whether they would be willing to connect to an improved Kennedy system, which was described as being:-

- (a) a sweet water supply - to offset complaints about saltiness/bad taste of the existing water;
- (b) in the respondents' area - so that the opportunity to connect was explicitly offered; and
- (c) at high pressure for 24 hours a day - to offset complaints about inadequate supply.

150. By the time interviewing took place there had been advertising coverage in the local newspaper and on the radio (by the Kennedy authority and Haskins & Sells jointly). Respondents were therefore aware that improvements were a real possibility, although how far they believed the description given to them is not known.

151. 17% of households not already connected to Kennedy stated they were willing to connect. Over half of the remainder stated that connection was the responsibility of the landlord (see table 39).

152. There was a clear relationship with income. More of the households already connected were in the rich income groups; more of those willing to connect or

Table 40 - Willingness to Connect to Improved
Kennedy System by Housing Tenure

	<u>Already Connected</u>	<u>Willing to Connect</u>	<u>Not Willing to Connect</u>	<u>Landlord's Responsibility</u>
Number of households	756	134	118	164
<u>% of dwellings owned by:</u>				
Head of household	55	69	36	0
Other relative	6	5	5	7
Landlord	37	25	50	88
Government	1	0	3	4
Other	1	2	6	0
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Based on 1,172 responses

Table 41 - Main Reason for not connecting
to Improved Kennedy System

	<u>Number</u>	<u>% of those asked</u>
Connection too expensive	49	17
Water too expensive	6	2
Water tastes salty	2	1
Landlord's responsibility	156	57
Don't know	70	25
		<u>100</u>

Based on 284 responses.

or referring a decision to their landlord were in the medium income groups, and more of those not willing to connect were poor.

153. There was also a relationship with size of household. Larger households were more likely to be connected already or willing to connect, whereas smaller households were more likely either to defer a decision to their landlord or to be unwilling to connect.
154. Finally, a significantly higher proportion of dwellings owned by the head of household or another relative were already connected, or were willing to connect, than those which were rented (table 40).
155. Note that over 40% of households in rented accommodation which were not already connected did not defer a decision on connection to their landlord, but were willing to decide themselves (whether or not it was their responsibility to do so). It may be that some of the households which were apparently not willing to decide were expressing disinterest (or they may not have wanted to pay for improvements to their landlord's property).
156. Finally, households which were not willing to connect had very much below average per capita consumption.

Reasons for Not Wishing to Connect

157. The main reason given by households not wishing to connect to Kennedy was "landlord's responsibility"(table 41).

78.

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158. Other subordinate reasons were:-

- (a) "don't know", particularly medium income and rich households and those in the centre of Taiz; and
- (b) "connection too expensive", particularly poor households and those in the middle and outer zones.

We note that the cost of water was not a deterrent (taste had of course been excluded by the question asked).

159. 55% of households without Kennedy water did not know the cost of connection, and the majority of those answering understated the probable cost (as estimated for us by the Kennedy authority). More households might be deterred by the costs if they were better known.

160. Comparison of the reasons for not wishing to connect to an improved water supply with the reasons given for not having a connection at present showed a consistent predominance of "other" and "don't know" answers. This may indicate a significant group of households not interested in water service whatever the costs or quality of service offered.

161. On the other hand, those households stating that they would be willing to connect to an improved system were presently deterred by the non-availability of the service or by the limited water supply. These responses may therefore represent the potential number of new connections at the present time, although the number that could be realised would depend on the cost of connection (see paragraph 159) above).

Table 42 - Changes in Water Consumption With
Changes in Availability and Price

	<u>Mean Consumption (cu.m/month)</u>	<u>Mean % Change</u>	<u>Implied Price Elasticity</u>	<u>% households not altering Consumption</u>
At present price (1)	9.5	+ 31	--	50%
At half price (2)	12.3	+ 38	0.8	9%
At one and half times price (2)	7.2 ⁽³⁾	- 14	0.3	37%
At twice price (2)	8.3 ⁽³⁾	- 15	0.2	39%

Based on 890 responses.

Notes:

- (1) compared with present restricted supply at present price;
- (2) compared with unrestricted supply at present price;
- (3) it was intended that half the households should be asked one or other of these questions at random; it now appears the selection was biased as to present consumption.

SECTION IX - CONSUMPTION FROM AN IMPROVED KENNEDY SYSTEM

162. Households which were already connected to Kennedy, or which were willing to connect, were asked a series of hypothetical questions about future consumption from the improved system, assuming unrestricted supply and a range of different prices.
- 163 This was not an easy area to probe (as reflected in the proportion of don't know responses - although this was significantly lower than for businesses). The answers we received give an indication of future demand. Nevertheless, there remains a basic ambiguity about whether households would behave in practice as they indicated.
164. This section first considers the effect on demand of an increase in the supply of water and the effect of price changes. It then analyses differences in patterns of anticipated consumer behaviour.

Relaxation of the Supply Restriction

165. With water available for 24 hours a day, respondents suggested that they would increase consumption on average by 31%, although 50% of households stated that they would not alter their consumption (see table 42). (This is significantly higher than the suggested increase in consumption by businesses).

Table 43 - Percentage Change in Consumption
with Relaxation of Supply Constraint

	<u>Receiving Sufficient Water at Present</u>	<u>Not Receiving Sufficient Water</u>	<u>Willing to Connect</u>
Number of households	439	338	117
Per cent of potential connections	49	38	13
<u>% of Households Increasing (%)</u>			
Nil	67	34	28
1 - 10	1	4	3
11 - 20	7	17	4
21 - 30	4	9	3
31 - 40	4	9	1
41 - 50	4	8	9
> 50	9	10	44
don't know	4	9	9
	<hr/>	<hr/>	<hr/>
	100	100	100
	<hr/>	<hr/>	<hr/>
Mean % change	+ 20	+ 25	+118

Based on 894 responses.

Note: there were only slight differences between connected households by present connection status and whether they received enough water at present or not; this may indicate the relative adequacy of supply to connected households and emphasises the difficulty of interpreting customer attitudes with any precision.

166. The increase varied between 20-25% for households which were already connected, to almost 120% for households willing to connect to Kenned (see table 43). The larger anticipated increase for households willing to connect would raise their mean consumption to the same level as households which were already connected.

Table 44 - Percentage Change in Consumption with
Relaxation of Supply Constraint.

	Present consumption (cu.m.)			
	<u><6</u>	<u>6-10</u>	<u>11-15</u>	<u><15</u>
Number of households	340	317	129	68
<u>% of households</u>				
<u>increasing consumption</u>				
NIL	47	52	49	59
1-10 %	0	1	9	4
11-20 %	6	15	12	7
21-30 %	4	7	9	6
31-40 %	6	5	5	3
41-50 %	7	9	1	3
< 50 %	26	6	7	4
don't know	4	5	9	13
	100	100	100	100

Based on 855 responses

167. Respondents anticipated larger increases in demand at lower levels of present consumption (see table 44). As a result, anticipated consumption may not be any more widely distributed about the mean than present consumption, although the mean is likely to increase.
168. There did not appear to be any relationship between the anticipated change in consumption and household size or income.

Change In Price Of Unrestricted Water Supply

169. We asked respondents how consumption from this unrestricted supply would vary if the price were halved or doubled in order to identify the possible demand constraints on future tariff policy. It was felt that these alternative prices bounded the likely range of any possible changes.
170. We also asked some households their reaction to a price one and a half times the present price. The anticipated percentage change in consumption was not significantly different from households which were asked about a doubled price. The results discussed here can therefore only be taken as a broad indication of the effects of price increases on demand.
171. Table 42 shows that households were more sensitive to price reductions than to price increases. The mean price elasticities (the % change in consumption for a 1% change in price) were 0.76 and 0.15 respectively. This is consistent with a market in which present consumption is supply constrained. Households were more sensitive to price reductions and less sensitive to price increases than businesses.

Table 45 - Percentage change in Consumption with
Reduction in Price

	Present Consumption				Implied price <u>elasticity</u>
	<u><6</u>	<u>6-10</u>	<u>11-15</u>	<u>>15</u>	
Number of households	357	320	128	68	
<u>% of households</u>					
<u>increasing consumption</u>					
NIL					
< 10%	13	13	24	26	0.1
10-19%	4	19	17	21	0.3
20-29%	18	28	24	18	0.5
30-39%	7	12	16	16	0.7
40-49%	17	13	10	13	0.9
50-75%	11	7	3	1	1.25
76-100%	19	7	4	4	1.75
> 100%	5	1	1	0	
don't know	6	2	2	0	
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	

Mean increase 38%

Implied mean elasticity 0.76

Based on 890 responses.

172. Tables 45 and 46 show that small consumers were more price sensitive than larger consumers. There was no difference in mean change in consumption, whether or not households received enough water at present and whether or not they were willing to connect. Nor was demand sensitivity significantly related to income or household size.

Consistency Of Estimates

173. The reliability of the results reported above for forecasting purposes is uncertain. In particular, estimates of demand for water from an unrestricted supply and of anticipated reductions in demand with increases in price are subject to some qualification. For future demand:-

- (a) households stating their willingness to connect to Kennedy made broadly similar estimates of future demand from the unrestricted supply as those already connected to Kennedy;
- (b) on the other hand, estimates of future demand made by those households which received sufficient water were very similar to those of households which did not - this could be taken to indicate that the estimates lack realism.

For price elasticity:-

- (a) our estimates of the sensitivity of demand to price increases were broadly the same at all levels of consumption - the low elasticity reasonably reflects the importance of water and the use of water carriers at high cost as a supplementary source of supply for some households is consistent with this result;

Table 46 - Percentage change in Consumption
with Increase in Price

	Present Consumption				Implied price elasticity
	<u><6</u>	<u>6-10</u>	<u>11-15</u>	<u>>15</u>	
<u>% of households reducing consumption</u>					
NIL	49	41	29	40	
1-10%	0	2	8	10	0.05
11-20%	17	21	21	20	0.15
21-30%	9	15	18	5	0.25
31-40%	11	9	10	8	0.35
41-50%	9	8	6	13	0.45
51-75%	1	2	3	3	0.63
> 75%	1	0	0	0	
don't know	2	1	5	3	
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	

Mean decrease 15%

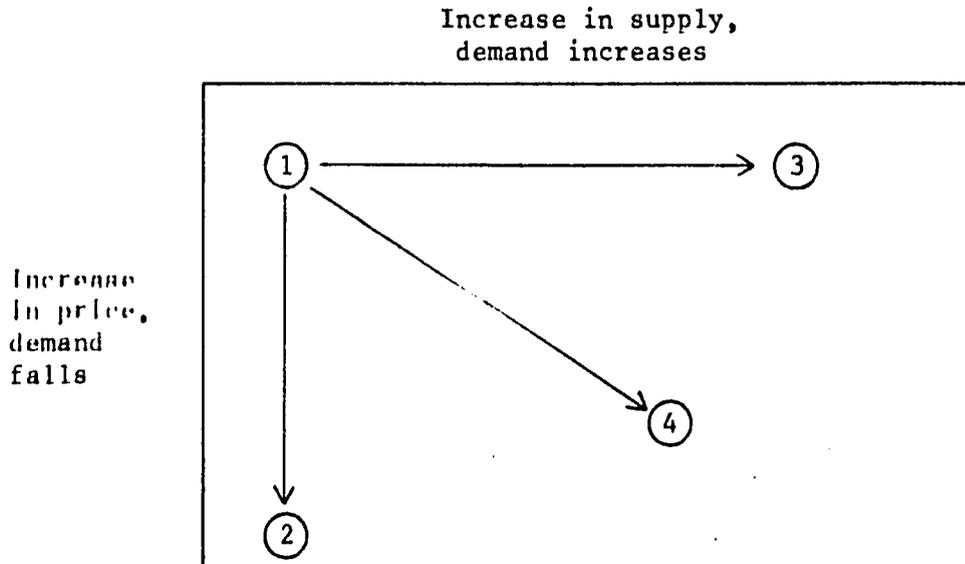
Mean elasticity 0.15

Based on 551 responses.

(b) on the other hand households anticipated the same average reduction in demand in response to prices one and a half times and twice the present price - the price elasticity derived from these responses can therefore only be approximate.

174. We therefore intend to forecast future demand subject to a wide range of sensitivities.

Diagram 6 - Patterns of Consumer Behaviour with
Increases in the Supply and Price of Water



- ① consumption unchanged;
- ② consumption changes with price but not supply;
- ③ consumption changes with supply but not price;
- ④ consumption changes with both supply and price.

Patterns Of Consumer Behaviour

175. We compared the suggested changes in consumption following possible increases in the supply and price of water from the improved system. Figure 6 illustrates the four different patterns of anticipated behaviour that were found.

176. We describe these four distinct motivations as follows:-

- (1) maintaining a minimum or satisfactory consumption level (20% of households);
- (2) minimising expenditure, subject to satisfying minimum consumption needs (21% of households);
- (3) maximising consumption, within an overall expenditure limit (15% of households);
- (4) unconstrained by either supply or price (21% of households).

(The remaining 22% of households were those not willing to connect and those deferring to their landlord).

Table 47 - Consumer Behaviour Related to
Per Capita Real Income

	<u>Total</u>	<u>Not</u> <u>Willing to</u> <u>connect</u>	<u>Maintain</u> <u>consumption</u>	<u>Maximise</u> <u>Consumption</u>	<u>Minimise</u> <u>Expenditure</u>	<u>Un-</u> <u>Constrained</u>
Number of Households	1,111*	240	225	170	232	235
<u>% per capita incomes</u>						
<50	10	10	9	9	10	12
50-100	23	15	22	26	25	26
101-150	19	20	16	19	23	18
151-200	12	12	12	11	13	13
201-300	12	11	13	18	10	11
301-500	8	8	10	7	9	9
>500	11	20	12	7	8	9
don't know	4	5	4	4	2	4
	100	100	100	100	100	100

* 5% of households were unable to estimate future consumption.

177. Table 47 shows there were no significant differences in per capita incomes between these groups of households; those not willing to connect appeared to be better off because the average size of these households was smaller.

Table 48 - Consumer Behaviour Related To Per Capita
Water Consumption (l/c/d)

	<u>Total</u>	<u>Not Willing to Connect</u>	<u>Maintain Consumption</u>	<u>Maximise Consumption</u>	<u>Minimise Expenditure</u>	<u>Un- Constrained</u>
	1111 ^Ø	249	225	170	232	235
<u>% Consuming</u>						
< 10 l/c/d	11	36	4	14	1	3
11-20	16	18	15	19	13	17
21-30	14	10	14	16	12	19
31-50	28	14	33	25	36	33
51-70	14	8	16	11	17	14
71-100	7	2	11	6	9	8
>100	6	*	7	7	12	6
don't know	3	12	0	*	*	*
	100	100	100	100	100	100

Ø 5% of households were unable to estimate future consumption

* Less than ½%.

178 Table 48 shows that there were slight differences in per capita consumption. Those households which anticipated they would maximise consumption at present consumed less than those households which anticipated they would minimise expenditure. However, these differences in anticipated behaviour are small and would tend to reduce present differences in consumption.

179 We do not intend to identify these groups separately in forecasting, although we will explore the implications of these different objectives.

Table 49 - Type of Toilet Facility Used.

	<u>Total</u>	<u>Zone 1</u>	<u>Zone 2</u>	<u>Zone 3</u>
Households with own Toilet	1012	121	532	359
% Flush connected to sewer	26	7	17	47
% Flush connected to septic tank	24	21	34	12
% non-Flush connected to cess-pit	30	32	35	23
% other	6	8	5	7
Households without own toilet	153	56	50	47
% share neighbour's toilet	1	1	1	1
% public toilet	2	0	2	4
% other	<u>10</u>	<u>31</u>	<u>6</u>	<u>6</u>
	100	100	100	100

Based on 1165 responses.

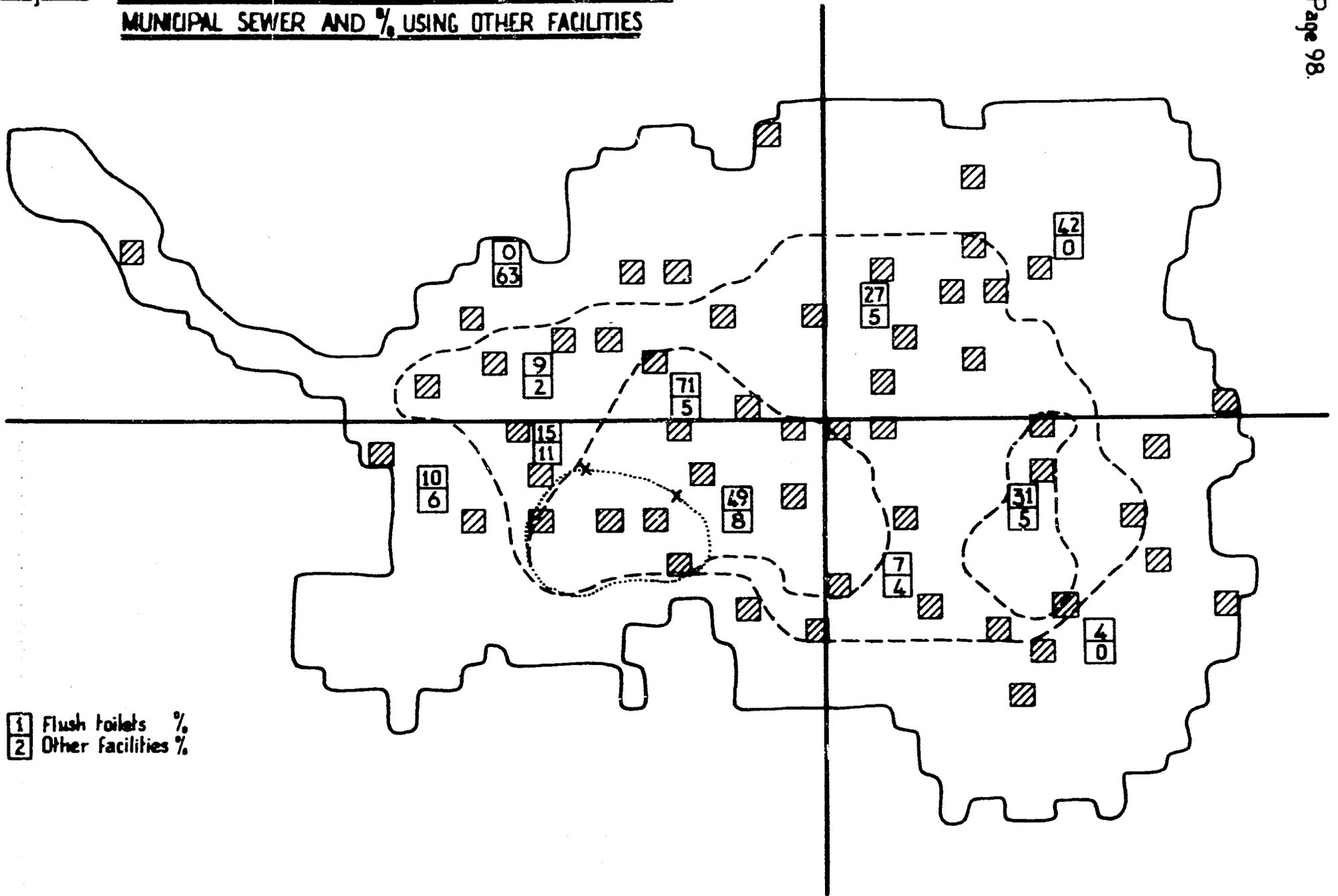
SECTION X - EXISTING SEWERAGE SERVICES

180. This section describes the types of toilet facility used in Taiz, and the reasons given for not having a flush toilet connected to the municipal sewer.

Type of Toilet Facility

181. 86% of households had their own toilet, varying from 60% on the outskirts of Taiz to 90% in the inner and central zones (see Table 49). Because of the limited extent of the sewer system there were more septic tanks and cess-pits in parts of zones 1 and 2 to compensate. (There is a city ordinance against discharging sewage into the street). In total we estimate there were some 3,800 connections to the municipal sewerage system.

Diagram 7. % OF HOUSEHOLDS WITH FLUSH TOILETS CONNECTED TO MUNICIPAL SEWER AND % USING OTHER FACILITIES



1 Flush toilets %
2 Other facilities %

182. A few of the households without their own toilet used public toilets - particularly in the Medina. (These are provided in some Mosques and by the municipality.) However, the majority defecated upon the ground, especially households in poor areas on the edge of town. This could cause a significant public health hazard in some areas (see Figure 7), for example, above Mutazar.

Table 50 - Type Of Toilet Facility by
Household Money Income

	<u>< 300</u>	<u>301- 500</u>	<u>501- 700</u>	<u>701- 1000</u>	<u>1001- 1500</u>	<u>>1500</u>	<u>don't know</u>
Number of Households	<u>233</u>	<u>209</u>	<u>170</u>	<u>193</u>	<u>140</u>	<u>188</u>	<u>39</u>
% With Own Toilet	<u>72</u>	<u>80</u>	<u>91</u>	<u>93</u>	<u>96</u>	<u>96</u>	<u>92</u>
Flush connected to sewer	13	19	24	35	31	38	38
Flush connected to Septic Tank	10	17	31	28	27	37	31
Non-Flush to Cess-Pit	36	38	30	25	35	18	21
Other	<u>13</u>	<u>6</u>	<u>6</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>3</u>
% With No Toilet	<u>28</u>	<u>20</u>	<u>9</u>	<u>7</u>	<u>4</u>	<u>4</u>	<u>8</u>
Share Neighbour's	1	1	1	1	1	1	3
Public Toilet	6	2	1	3	1	1	0
Other	<u>21</u>	<u>17</u>	<u>8</u>	<u>3</u>	<u>2</u>	<u>3</u>	<u>5</u>
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Based on 1172 responses.

183. Tables 50 and 51 show that the proportion of households with their own toilet increased with household income and size. Most of the rich households and those of above average size had their own toilet, whereas a significant proportion of the poorest and smallest households did not.
184. The type of toilet facility used was also related to the type of housing. Most households living in permanent dwellings had their own toilet, compared with relatively few of those living in rooms, temporary structures or other accommodation (see Table 52).
185. The average distance to a toilet for those households without their own was 33 metres; 75% of households were within 50 metres of the toilet they used. A very high proportion of those using any "other" facility were unable to state how far away it was.
186. The majority of households paid nothing for sewerage disposal, whatever type of facility they used.

Table 51 - Type Of Toilet Facility
By Size of Household

	Number in Household					
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6+</u>
Total number of households	111	117	94	126	136	588
% with Own Toilet	<u>59</u>	<u>74</u>	<u>82</u>	<u>83</u>	<u>88</u>	<u>96</u>
Flush Connected to Sewer	15	21	24	19	26	31
Flush Connected to septic tank	24	15	16	19	20	30
Non-flush to cess-pit	17	31	36	36	40	28
Other	<u>2</u>	<u>9</u>	<u>5</u>	<u>10</u>	<u>2</u>	<u>7</u>
% with no toilet	<u>41</u>	<u>26</u>	<u>18</u>	<u>17</u>	<u>12</u>	<u>4</u>
Share Neighbour's	5	1	1	1	1	*
Public toilet	14	3	3	2	1	*
Other	<u>23</u>	<u>21</u>	<u>14</u>	<u>14</u>	<u>10</u>	<u>4</u>
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

* = less than ½%

Based on 1172 responses.

Table 52 - Type of Toilet Facility by Type
of House.

	<u>Villa</u>	<u>Small House</u>	<u>House</u>	<u>Apart- ment</u>	<u>Temporary Structure</u>	<u>Room</u>	<u>Other</u>
Number of households	117	524	220	138	16	37	60
% with own toilet	97	88	100	97	12	35	28
Flush connected to sewer	40	18	37	36	0	5	12
Flush connected to septic tank	32	19	30	46	0	5	0
Non-flush to Cess-pit	19	43	26	13	6	24	17
Other	7	8	6	2	6	0	0
% with no toilet	3	12	*	3	88	65	72
Share Neighbour's	1	1	0	1	0	11	2
Public toilet	1	2	0	1	0	0	23
Other	2	9	*	1	88	54	47
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Based on 1172 responses

* = less than ½%

Table 53 - Reason for not Having a Flush Toilet
Connected to the Sewer by Type of Toilet Used

	<u>Total</u>	<u>Septic Tank</u>	<u>Cess- pit</u>	<u>Other Type</u>	<u>Share Neighbour</u>	<u>Public</u>	<u>Other</u>
Number of households	866	286	353	74	11	27	115
Average number of reasons given	1.3	1.2	1.3	1.2	1.5	0.7*	1.1
<u>% Answering</u>							
Service not available	55	69	58	68	27	19	10
Connection too expensive	18	8	26	18	27	7	22
Water supply limited	19	20	22	27	18	11	6
Water too expensive	4	4	5	4	9	4	5
Don't need	5	3	5	0	18	4	16
Other/don't know	24	21	19	8	46	22	55

*We do not understand this low response average.

Reason For Not Having Flush Toilet

187. We asked those households without a flush toilet connected to the sewer why they did not have such a facility (see Table 53.)
188. Those households with their own septic tank or another kind of toilet were more likely to answer "service not available" or "limited water supply". (Relatively more households gave these two reasons than businesses). Those with a cess-pit were more likely to answer "connection expensive".
189. Those households which defacated on the ground were more likely to answer "don't need" or "other/don't know".

Table 54 - Comparison of Water and Sewerage Services Used

	<u>Water Source</u>					
	<u>Own Kennedy</u>	<u>Neighbour's Kennedy</u>	<u>Jabel Sabir</u>	<u>Tap/ Mosque</u>	<u>Water Carrier</u>	<u>Well</u>
Number of households using this source	833	81	111	174	50	53
<u>% Having:</u>						
Flush connected to sewer	34	25	6	11	24	0
Flush connected to septic tank	31	28	7	8	28	9
Non-flush to cess-pit	27	32	63	33	32	53
Other	6	2	14	9	4	2
Share neighbour's toilet	*	5	1	3	0	0
Public toilet	*	0	0	2	4	8
Other	1	7	8	34	8	28
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Based on 1172 responses

On average each respondent used 1.2 water sources.

Comparison of Water And Sewerage Services

190. Nearly all the households which had a Kennedy connection also had their own toilet, although only 34% had a flush toilet connected to the sewer (see Table 54).
191. Significant proportions of households receiving water from other sources had cess-pits, which required little or no water to operate. (The groups of households with flush toilets which received water from water carriers or from taps/Mosques probably used these as supplementary water sources).
192. Another significant group received water from free sources (taps and wells) and used "other" toilet facilities. This emphasises the relationship between the type of service used and household incomes.

Table 55 - Willingness to Connect to Extended Sewerage System

	<u>Total</u>	<u>Households With own Toilet not Already Connected</u>	<u>Households With no Toilet</u>
Number of households	845	713	132
% willing to connect	54	62	12
% not willing to connect	19	12	56
% deferring decision to landlord	<u>27</u>	<u>26</u>	<u>32</u>
	<u>100</u>	<u>100</u>	<u>100</u>

Table 56 - Willingness to Connect to Extended Sewerage System by Household Money Income

	<u>Already Connected</u>	<u>Willing to Connect</u>	<u>Not Willing to Connect</u>	<u>Landlord's Responsibility</u>
Number of households	324	459	157	229
<u>% with incomes:</u>				
< 300	12	20	41	16
300 - 500	14	20	27	14
500 - 700	12	15	13	17
700 - 1,000	21	14	9	20
1,000 - 1,500	14	12	3	15
> 1,500	23	16	4	15
don't know	5	3	2	4
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Based on 1,169 responses.

SECTION XI - CONNECTION TO AN IMPROVED
SEWERAGE SERVICE

193. This section discusses the willingness of households to connect to an extended sewer and the main reason given by households not willing to connect.

Willingness to Connect

194. Households were asked if they would be willing to connect to the municipal sewerage system if it were extended to their area.

195. 62% of those households which already had a toilet stated they were willing to connect, whereas 56% of those without a toilet were not. The proportion of households referring a decision to their landlords was about the same in both groups (see Table 55).

196. As with connection to an improved Kennedy system, willingness to connect to the sewer was significantly related to incomes. Those already connected were rich households, whereas those not willing to connect were poor (see Table 56). There was also a relationship with household size; larger households were more likely to be connected already or willing to connect, whilst smaller households were more likely to defer to their landlord or refuse to connect.

Table 57 - Willingness to Connect to Extended
Sewerage System by Tenure

	<u>Already Connected</u>	<u>Willing to Connect</u>	<u>Not Willing to Connect</u>	<u>Landlord's Responsibility</u>
Number of households	327	459	157	229
<u>% owned by:</u>				
Head of household	42	72	49	3
Other relative	6	5	6	9
Landlord	49	22	40	86
Government	3	1	1	1
Other	*	1	5	1
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Based on 1,172 responses.

Table 58 - Main Reason Given for Not Connecting
to Extended Sewerage System

	<u>Number</u>	<u>% of Those Asked</u>
Connection too expensive	70	18
Landlord's responsibility	233	60
Other	32	8
Don't need/want	31	8
Don't know	24	6
	<u>390</u>	<u>100</u>

197. Table 57 enlarges on the relationship with tenure. 25% of dwellings owned by the head of the household or another relative were already connected, and a further 57% were willing to connect. On the other hand, 31% of rented dwellings were already connected, but only 20% more were willing to connect.
198. 47% of those in rented accommodation not already connected to the sewer indicated whether or not they were willing to connect, rather than refer the question to their landlord, although they may not have been responsible for doing so.

Main Reason Given for Not Wishing to Consent

199. The most important reason given was that connection was the "landlord's responsibility" - this was a more important reason than for businesses (see Table 58). However, these households were generally as well off as those which were willing to connect. It may be that this reason was used by some households which were not interested in connection, or not sufficiently interested to pay for an improvement to their landlord's property. Future connection policy should identify the respective responsibilities of landlords and tenants.
200. We compared reasons given for not wishing to connect with the reasons given for not having a connection to the present sewerage system. The majority of reasons given were unaltered; extension of the system alone would not persuade these households to connect.

201. A significant proportion of households gave the reason "connection expensive". All households without a flush toilet were asked the cost of connection. 78% did not know, and only 10% to 15% of households suggested costs that we believe to be of the right order. If costs were better known, this might become a more significant deterrent. Future connection policy should consider methods of reducing or spreading connection costs to enable more households to connect.
202. Table 58 also identifies "other", "don't need", "don't know" as subsidiary reasons for not wishing to connect, although relatively fewer households gave these reasons than businesses. For this group an educational or legislative programme may be necessary if universal connection to the sewer is to be achieved.
-

COLUMN:

1	2	3	4
---	---	---	---

 JOB NUMBER:

5	0	1	0
---	---	---	---

NATIONAL WATER AND SEWERAGE AUTHORITY
OF THE YEMEN ARAB REPUBLIC
UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

HOUSEHOLD QUESTIONNAIRE

BLOCK
REFERENCE
NUMBER

5	6	7	8

HOUSEHOLD
REFERENCE
NUMBER

9	10

CARD
NUMBER

11

SUPERVISOR
NUMBER

12	13

INTERVIEWER
NUMBER

14	15

_____ TIME FINISHED

_____ TIME STARTED

_____ DATE

_____ CHECKED BY
SURVEY
MANAGER

_____ CHECKED BY
SUPERVISOR

_____ CHECKED BY
INTERVIEWER

MARK BOX IF NON-FAMILY BUSINESS ON PREMISES

- 16 REASON FOR NON-COMPLETION
- 1 NOT AT HOME AFTER THIRD CALL-BACK
 - 2 REFUSED TO BE INTERVIEWED
 - 3 INTERVIEW INCOMPLETE
 - 4 OTHER REASON

3. DO YOU RECEIVE RENT FROM OR PAY RENT TO ANOTHER FAMILY USING YOUR ACCOMMODATION? <input type="checkbox"/> 17 Do not share accommodation 1 No rent received or paid to another family sharing accommodation 2 Rent paid to another family sharing accommodation 3 Rent received from another family sharing accommodation 4 Share with another family but pay rent direct to landlord 5 Other 6	2. IN WHAT TYPE OF HOUSE DO YOU LIVE? <input type="checkbox"/> 18 Villa on one floor 1 Small house on one floor 2 House on two or more floors 3 Apartment/flat 4 Temporary structure 5 Furnished room or lodging with family 6 Hotel/lodging house 7 Other 8	1. WHAT MATERIAL IS USED IN CONSTRUCTION OF THIS HOUSE? <input type="checkbox"/> 19 Stone with concrete ceiling 1 Stone with wood ceiling 2 Stones and mud with wood ceiling 3 Mud with wood ceiling 4 Other 5
5. HOW MANY LIVING ROOMS DO YOU HAVE? (Include kitchens but exclude bathroom) (WRITE IN) <input type="checkbox"/> 20 <input type="checkbox"/> 21	4. WHO OWNS YOUR ACCOMMODATION? <input type="checkbox"/> 22 Head of household 1 Other relative 2 Landlord (not relative) 3 Government department 4 Other 5	

10. HOW MANY PEOPLE WORK IN THE BUSINESS WITHOUT RECEIVING WAGES? (WRITE IN) <input type="checkbox"/> 23 <input type="checkbox"/> 24	9. HOW MANY PEOPLE RECEIVE WAGES OR PROFITS FROM THE BUSINESS? (WRITE IN) <input type="checkbox"/> 25 <input type="checkbox"/> 26	8. WHAT TYPE OF BUSINESS IS CARRIED ON HERE? <input type="checkbox"/> 27 Shop 1 Restaurant 2 Wholesaler 3 Workshop 4 Office 5 Coffee Shop 6 Other 7	7. IS THE OWNER OF THIS BUSINESS A MEMBER OF YOUR HOUSEHOLD? <input type="checkbox"/> 28 Yes 1 No 2 (IF NO: GO TO QUESTION 11 AND TICK BOX ON FACING SHEET)	6. IS A BUSINESS CARRIED ON FROM PART OF YOUR PREMISES? <input type="checkbox"/> 29 Yes 1 No 2 (IF NO: GO TO QUESTION 11)
15. HOW MUCH DO THEY PAY PER MONTH? (RIALS) <input type="checkbox"/> 30 <input type="checkbox"/> 31 <input type="checkbox"/> 32	14. DO THEY PAY FOR THE WATER THEY USE? <input type="checkbox"/> 33 Yes 1 No 2 (IF NO: GO TO QUESTION 15)	13. HOW MANY PEOPLE IN ADDITION TO YOUR HOUSEHOLD USUALLY SHARE YOUR KENNEDY CONNECTION? (WRITE IN) <input type="checkbox"/> 34 <input type="checkbox"/> 35	12. DO YOU GIVE OR SELL WATER TO ANOTHER FAMILY OR A BUSINESS? <input type="checkbox"/> 36 Yes 1 No 2 (IF NO: GO TO QUESTION 17)	11. IS THERE A CONNECTION TO YOUR HOUSE FROM THE KENNEDY WATER SYSTEM? <input type="checkbox"/> 37 Yes 1 No 2 (IF NO: GO TO QUESTION 19)

<p>42. HOW MANY PEOPLE IN ADDITION TO YOUR HOUSEHOLD USUALLY SHARE THIS WELL?</p> <p>(WRITE IN) <input type="text" value="35"/> <input type="text" value="36"/></p>	<p>41. DO YOU SHARE THIS WELL WITH ANOTHER FAMILY OR A BUSINESS?</p> <p>Yes <input type="text" value="37"/> 1 No 2</p> <p>(IF NO, GO TO QUESTION 44)</p>	<p>40. DO YOU GET WATER DIRECTLY FROM A WELL?</p> <p>Yes <input type="text" value="38"/> 1 No 2</p> <p>(IF NO, GO TO QUESTION 51)</p>	<p>39. WHY DON'T YOU GET MORE? (Do not read out. Code each answer)</p> <p>Limited supply <input type="text" value="39"/> 1 <input type="text" value="40"/> 2 Water too expensive <input type="text" value="41"/> 3 Water not clean enough <input type="text" value="42"/> 4 Limited storage <input type="text" value="43"/> 5 Other <input type="text" value="44"/> 6 Don't know <input type="text" value="44"/> 7</p>	<p>38. DO YOU USUALLY GET SUFFICIENT WATER FROM THIS SOURCE?</p> <p>Yes <input type="text" value="45"/> 1 No 2</p> <p>(IF YES, GO TO QUESTION 40)</p>
<p>47. IF A BUSINESS IS CARRIED ON BY A MEMBER OF YOUR FAMILY, HOW MANY EXTRA GEE CANS DOES IT USE EACH DAY?</p> <p>(WRITE IN) <input type="text" value="46"/> <input type="text" value="47"/></p>	<p>46. ABOUT HOW MANY GEE CANS DOES YOUR HOUSEHOLD USUALLY USE EACH DAY?</p> <p>(WRITE IN) <input type="text" value="48"/> <input type="text" value="49"/></p>	<p>45. ABOUT HOW FAR AWAY IS IT IN METRES?</p> <p>(WRITE IN) <input type="text" value="50"/> <input type="text" value="51"/></p>	<p>44. IS THIS WELL INSIDE YOUR PREMISES?</p> <p>Yes <input type="text" value="52"/> 1 No 2</p> <p>(IF YES, GO TO QUESTION 45)</p>	<p>43. DO THE PEOPLE SHARING THIS WELL PAY YOU FOR THE WATER THEY USE?</p> <p>Yes <input type="text" value="53"/> 1 No 2 Some but not all 3</p>

<p>52. HOW FAR AWAY IS THIS IN METRES?</p> <p>(WRITE IN) <input type="text" value="54"/> <input type="text" value="55"/></p>	<p>51. DO YOU GET WATER FROM A PUBLIC TAP IN STREET OR FROM A KIOSQUE?</p> <p>Yes <input type="text" value="56"/> 1 No 2</p> <p>(IF NO, GO TO QUESTION 57)</p>	<p>50. WHY DON'T YOU GET MORE? (Do not prompt. Code each answer)</p> <p>Limited storage <input type="text" value="57"/> 1 Well too far away <input type="text" value="58"/> 2 Other/don't know <input type="text" value="59"/> 3</p> <p>Limited supply <input type="text" value="50"/> 1 Too expensive <input type="text" value="61"/> 2 Tastes salty <input type="text" value="62"/> 3</p>	<p>49. DO YOU USUALLY GET SUFFICIENT WATER FROM THIS WELL?</p> <p>Yes <input type="text" value="63"/> 1 No 2</p> <p>(IF YES, GO TO QUESTION 51)</p>	<p>48. WHAT IS THE COST PER MONTH OF THE WELL WATER USED BY YOUR HOUSEHOLD OR BUSINESS?</p> <p>(WRITE IN RIALS) <input type="text" value="64"/> <input type="text" value="65"/> <input type="text" value="66"/></p>
<p>56. WHY DON'T YOU GET MORE? (Do not read out. Code each answer)</p> <p>Limited storage <input type="text" value="67"/> 1 Too far away <input type="text" value="68"/> 2 Other/don't know <input type="text" value="69"/> 3</p> <p>Limited supply <input type="text" value="70"/> 1 Too expensive <input type="text" value="71"/> 2 Tastes salty <input type="text" value="72"/> 3</p>		<p>55. DO YOU USUALLY GET SUFFICIENT WATER FROM THIS SOURCE?</p> <p>Yes <input type="text" value="73"/> 1 No 2</p> <p>(IF YES, GO TO QUESTION 57)</p>	<p>54. ABOUT HOW MUCH DOES THIS WATER USUALLY COST YOUR HOUSEHOLD EACH DAY?</p> <p>(WRITE IN RIALS) <input type="text" value="74"/> <input type="text" value="75"/></p>	<p>53. ABOUT HOW MANY GEE CANS DOES YOUR HOUSEHOLD USUALLY USE EACH DAY?</p> <p>(WRITE IN) <input type="text" value="76"/> <input type="text" value="77"/></p>

DUPLICATE COLUMNS 1 TO 10 FROM CARD (1) PUNCH (3) IN COLUMN 11			
60. HOW MUCH DOES THIS WATER USUALLY COST YOU EACH DAY? (WRITE IN DIALS)	12 13 <input type="text"/> <input type="text"/>	59. IF A BUSINESS IS CARRIED ON BY A MEMBER OF YOUR FAMILY, HOW MANY EXTRA GREE CANS DOES IT USE EACH DAY? 14 15 <input type="text"/> <input type="text"/>	58. ABOUT HOW MANY GREE CANS DO YOU USUALLY BUY EACH DAY? (WRITE IN)
63. DO YOU GET WATER FROM ANY OTHER SOURCE? Yes 1 No 2	19 <input type="text"/>	62. WHY DON'T YOU GET MORE? (Do not prompt. Code each answer) Limited storage 20 Limited supply 22 1 1 2 2 Other/don't know 21 Too expensive 23 1 1 2 2 Tastes salty 24 1 1 2 2	57. DO YOU BUY WATER FROM A VENDOR? Yes 1 No 2 (IF NO, GO TO QUESTION 63)
61. DO YOU USUALLY GET SUFFICIENT WATER FROM THE VENDOR? Yes 1 No 2 (IF YES, GO TO QUESTION 63)	25 <input type="text"/>		

66. ABOUT HOW MUCH WATER DOES YOUR HOUSEHOLD USUALLY USE FROM ALL SOURCES EACH MONTH? (WRITE IN CUBIC METRES)	26 27 28 <input type="text"/> <input type="text"/> <input type="text"/>	65. IF A BUSINESS IS CARRIED ON FROM YOUR PREMISES BY A MEMBER OF YOUR HOUSEHOLD, DOES IT SEPARATELY HAVE ANY OF THE FOLLOWING? (READ OUT: Code each answer) Water heater 32 Bath 35 1 1 2 2 Water storage tank 33 Sink/basin 36 1 1 2 2 Motor vehicle 34 Flush toilet 37 1 1 2 2 Washing machine 38 1 1 2 2	64. DOES YOUR HOUSEHOLD HAVE ANY OF THE FOLLOWING? (READ OUT: Code each answer) Water storage tank 39 Sink/basin 43 1 1 2 2 Garden 40 Flush toilet 44 1 1 2 2 Motor vehicle 41 Washing machine 45 1 1 2 2 Bath 42 Water heater 46 1 1 2 2
67. IF A BUSINESS IS CARRIED ON FROM YOUR PREMISES BY A MEMBER OF YOUR HOUSEHOLD, HOW MUCH WATER DOES IT USUALLY USE FROM ALL SOURCES EACH MONTH? (WRITE IN CUBIC METRES)	29 30 31 <input type="text"/> <input type="text"/> <input type="text"/>		

<p>70. WHAT IS THE MAIN REASON WHY YOU DO NOT CONNECT? (Do not read. Code each answer)</p> <p style="text-align: right;">47</p> <p>Connection too expensive 1 Water too expensive 2 Water too salty 3 Other 4 Don't know 5</p> <p>(GO TO QUESTION 72)</p>	<p>69. HOW MUCH WOULD IT COST YOU TO MAKE THE CONNECTION AND PIPE WATER INTO YOUR HOME FROM THE KENNEDY SYSTEM?</p> <p style="text-align: right;">48 49 50</p> <p>(GO TO QUESTION 71) (RIALS)</p>	<p>68. IF TREAT WATER WERE AVAILABLE FROM AN APPROVED PLANNED SYSTEM IN THIS AREA AT HIGH PRESSURE 24 HOURS A DAY WOULD YOU CONNECT TO THIS SYSTEM?</p> <p style="text-align: right;">51</p> <p>Yes 1 No 2 Already connected 3 Landlord's responsibility 4</p> <p>(IF CODE 2 OR 4, GO TO QUESTION 70; IF CODE 3, GO TO QUESTION 71).</p>
---	---	--

<p>71. HOW MUCH WATER IN TOTAL WOULD YOU USE EACH MONTH AT THE FOLLOWING PRICES IF THESE IMPROVEMENTS CAME ABOUT? (WRITE IN CUBIC METRES)</p> <p>- The same price that you pay for your water now</p> <p style="text-align: right;">52 53 54</p> <p>- Half the price you pay now</p> <p style="text-align: right;">55 56 57</p> <p>- One and a half times the price you pay now</p> <p style="text-align: right;">58 59 60</p> <p>(PUNCH (Y) IN COLS. 51, 62, 63)</p>	<p>71. HOW MUCH WATER IN TOTAL WOULD YOU USE EACH MONTH AT THE FOLLOWING PRICES IF THESE IMPROVEMENTS CAME ABOUT? (WRITE IN CUBIC METRES)</p> <p>- The same price that you pay for your water now</p> <p style="text-align: right;">52 53 54</p> <p>- Half the price you pay now</p> <p style="text-align: right;">55 56 57</p> <p>PUNCH (Y) IN COLS. 53, 59, 60</p> <p>- Double the price you pay now</p> <p style="text-align: right;">61 62 63</p>
---	---

(UP. COLS. 1 TO 10 FROM Q-10 (1)
PUNCH (4) IN COL. 11)

<p>77. HOW FAR AWAY IS THE TOILET WHICH YOUR HOUSEHOLD USUALLY USES?</p> <p style="text-align: right;">12 13</p> <p>(WRITE IN METRES)</p>	<p>76. WHAT TOILET FACILITIES DO YOU USE?</p> <p style="text-align: right;">14</p> <p>Share neighbour's toilet 1 Public toilet 2 Other 3</p>	<p>75. HOW MUCH DO YOU PAY FOR SEWERAGE DISPOSAL EACH YEAR?</p> <p style="text-align: right;">15 16 17</p> <p>(GO TO QUESTION 79)</p>	<p>74. HOW MANY PEOPLE IN ADDITION TO YOUR FAMILY SHARE THIS TOILET?</p> <p style="text-align: right;">18 19</p>	<p>73. IS THE TOILET FOR YOUR OWN FAMILY OR IS IT SHARED BY A NEIGHBOUR?</p> <p style="text-align: right;">20</p> <p>Own 1 Share 2</p> <p>(IF CODE 1, GO TO QUESTION 75)</p>	<p>72. DO YOU HAVE TOILET FACILITIES IN THIS HOUSE?</p> <p style="text-align: right;">21</p> <p>Yes 1 No 2</p> <p>(IF NO, GO TO QUESTION 76)</p>
---	--	---	--	--	--

<p>83. ABOUT HOW MUCH WOULD IT COST TO BECOME CONNECTED?</p> <p style="text-align: right;">22 23 24</p> <p>(WRITE IN RIALS)</p>	<p>81. IF THE SEWER WERE EXTENDED TO THIS AREA, WOULD YOU PAY TO CONNECT TO THE SYSTEM?</p> <p style="text-align: right;">25</p> <p>Yes 1 No 2</p> <p>Landlord's responsibility 3 (IF YES, GO TO QUESTION 82)</p> <p>82. WHAT IS THE MAIN REASON WHY NOT?</p> <p style="text-align: right;">26</p> <p>Connection too expensive 1 Don't need/want 2 Other 3 Don't know 4</p>	<p>80. WHY DO YOU NOT HAVE FLUSH TOILET CONNECTED TO THE MUNICIPAL SEWER? (Do not read. Code each answer)</p> <table border="0"> <tr> <td>Service not available</td> <td style="text-align: right;">27</td> <td>Limited water supply</td> <td style="text-align: right;">30</td> </tr> <tr> <td>Connection too expensive</td> <td style="text-align: right;">28</td> <td>Water too expensive</td> <td style="text-align: right;">31</td> </tr> <tr> <td>Don't need/want</td> <td style="text-align: right;">29</td> <td>Don't read/want</td> <td style="text-align: right;">32</td> </tr> <tr> <td></td> <td style="text-align: right;">1</td> <td></td> <td style="text-align: right;">1</td> </tr> <tr> <td></td> <td style="text-align: right;">2</td> <td></td> <td style="text-align: right;">2</td> </tr> </table>	Service not available	27	Limited water supply	30	Connection too expensive	28	Water too expensive	31	Don't need/want	29	Don't read/want	32		1		1		2		2	<p>79. WHAT KIND OF TOILET IS THIS?</p> <p style="text-align: right;">33</p> <p>Flush connected to municipal sewer 1 Flush connected to septic tank 2 Non-flush connected to cesspit 3 Other 4</p> <p>(IF CODE 1, GO TO QUESTION 84)</p>	<p>78. HOW MUCH DOES THIS USUALLY COST EACH WEEK?</p> <p style="text-align: right;">34 35</p> <p>(GO TO 80)</p>
Service not available	27	Limited water supply	30																					
Connection too expensive	28	Water too expensive	31																					
Don't need/want	29	Don't read/want	32																					
	1		1																					
	2		2																					

SUP. COLS. 1 - 10 FROM CARD (1)
PUNCH (Y) IN COL. 11

100. HOW MUCH DOES YOUR HOUSEHOLD USUALLY SPEND EACH MONTH ON: (Tens of Riials)

Food and drink	12 13 14	Housing	28 29 30
Kat and tobacco	15 16 17	Clothing	31 32 33
Electricity/kerosene/gas/ firewood	18 19 20	Car and taxi	34 35 36
Water	21 22 23	Other	37 38 39
TOTAL	24 25 26 27		

99. HOW MUCH DOES YOUR HOUSEHOLD RECEIVE PER MONTH FROM EACH OF THE FOLLOWING SOURCES? (Tens of Riials)

Government grants	40 41 42
Net rent	43 44 45
From relatives in YAR	46 47 48
From relatives abroad	49 50 51
Other	52 53 54
TOTAL	55 56 57 58

SUP. COLS 1 - 10 FROM CARD (1)
PUNCH (X) IN COL. 11

98. DETAILS OF HOUSEHOLD MEMBERS WHO HAVE LEFT TAIZ RECENTLY TO TAKE UP PERMANENT RESIDENCE ELSEWHERE.

WHERE TO	WHEN LEFT	AGE (Years)	SEX	AGE	SEX				
1. Taiz gov'te	1 - Within last 3 months		1 - M	(Age at death - years)	1 - M				
2. Other YAR	2 - Between 3 and 12 months ago		2 - F		2 - F				
3. Aden									
4. Other Arab									
5. Other	3 - Between 1 and 2 years ago								
	4 - More than 2 years ago								
START AT COL.				END AT COL.	START AT COL.				END AT COL.
12				16	44				46
17				21	47				49
22				27	50				52
28				32	53				55
33				37	56				58
38				43	59				61

FOR OFFICE USE ONLY

Density

52
1
2
3

FOR OFFICE USE ONLY

Quadrant

63
1
2
3
4

103. WHICH ESTIMATES DO YOU THINK ARE MORE ACCURATE - INCOMES OR EXPENDITURE?

64	
INCOME	1
EXPENDITURE	2
DON'T KNOW	3
BOTH ACCURATE	4

102. PLEASE ESTIMATE THE VALUE PER MONTH OF ANY OTHER ITEMS THAT YOUR HOUSEHOLD RECEIVES FREE EACH MONTH

65	66	67
----	----	----

101. PLEASE ESTIMATE THE VALUE OF ANY YUGG OR OTHER THAT YOUR HOUSEHOLD RECEIVES PER MONTH FREE FROM YOUR OWN LAND, YOUR WORK PLACE OR FROM THE GOVERNMENT

68	69	70
----	----	----

INDUSTRY AND JOB CLASSIFICATIONS USED
IN THE TAIZ SOCIO-ECONOMIC
SURVEYS, 1976

These lists were prepared by Haskins & Sells survey staff from:-

- (a) the 1975 YAR Census job classification list;
- (b) a table of the main industrial establishments in Taiz from the YAR Central Planning Organisation's Statistical Year Book, 1973.

The lists were expanded to cover all activities and sectors in Taiz, and to conform to our understanding of current status and salary differentials (see vol. 1, tables 4-1 and 4-2 of the Montgomery Feasibility Study of Water and Sewerage Facilities for Taiz, YAR, dated April, 1975).

Job Classification

1. Technical or professional:

example doctor, engineer, lawyer, accountant
teacher, minister of religion,
pharmacist, surveyor;

2. Managers, administrative, executive or sales supervisors
in private business or government; owners of business
employing more than 5 people; officer in police/armed
forces; production supervisor; journalist.

3. Clerical and Sales workers:

example secretary, typist, accounts clerk,
draughtsman, small shop-keeper,
wholesale or retail salesman, owner
of small business employing less than
5 people;

4. Craftsmen, skilled tradesmen:

example mason, plumber, electrician, black
smith, fitter, well driller, farmer,
carpenter, tanner, tailer, tool maker,
cook, shoe maker, welder, glazier,
printer, painter, plasterer,
photographer, nurse/midwife, long
distance lorry driver, NCO in police/
armed forces; motor mechanic.

5. Semi-skilled:

example

taxi driver, laundry worker, barber
agricultural worker, machine operator,
policeman, soldier; and operatives
assisting tradesmen defined above.

6. Unskilled:

example

household staff, labourer, messenger,
cleaner, loader;

7. Not classified: insufficient information.

Industry/Sector

1. Mining, quarrying,
2. Agriculture, forestry, hunting, fishing.
3. Manufacturing: food/drink
 paper/printing/publishing
 wood/wood products
 metal/metal products
 paint
 cement/bricks/tiles
 textiles.
4. Construction.
5. Electricity, Water and Sewerage.
6. Wholesale & Retail trade.
7. Hotels, restaurants, coffee shops.
8. Transport and communications. (including motor vehicle servicing & repair; taxis, road haulage; telephone/post/radio and T.V.).
9. Banking/finance Insurance and Real Estate.
- 0 Other services (for example, schools, hospitals)
- Y Government civil service, police and armed forces.
- X Not Classified.

Socio-Economic Survey of Taiz,
Yemen Arab Republic,
July to August 1976

Results of the
Business Survey

For

UNITED STATES AGENCY
FOR INTERNATIONAL DEVELOPMENT

February 1977

RESULTS OF BUSINESS SURVEY

UNITED STATES AGENCY
FOR INTERNATIONAL DEVELOPMENT

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RESULTS OF BUSINESS SURVEY

UNITED STATES AGENCY
FOR INTERNATIONAL DEVELOPMENT

SECTION I - INTRODUCTION

1. The majority of businesses in Taiz are small shops; these vary in size from small booths, sometimes of a temporary construction, to single or multiple units in a purpose-built block, sometimes with housing units or small offices over. There are very few large commercial buildings, even in the downtown area; these are mainly banks, gas stations, hotels, municipal offices and a few trading companies.
2. The business area is very closely defined. Grouped originally around the souk inside the gates of the Medina (old town), it has since spread outside the gates into the Tahreer and Upper Medina areas and now shows signs of extending further, along the axis of the main Sana'a and Hodeida roads. It is notable, however, that very few shops or small businesses are located elsewhere within the city, notwithstanding the fact that transport services between residential areas and downtown are relatively undeveloped and congested.
3. The main industrial employment is located in zones on the eastern and western edges of Taiz on the roads to Sana'a and Hodeida respectively. None of these establishments was sampled in the business survey. However, since they are relatively few in number many were visited, and information was obtained about present water and sewerage services, as part of the interview process designed to establish the future growth plans of major industries.

4. In total 327 businesses were interviewed, 283 answering the business questionnaire and 44 interviewed in households. The majority of tables presented are for the 283 businesses for which we have most data. However, the household businesses were not significantly different in type, size (number employed) or water consumption, and we do not expect any significant bias in the main analysis.

5. The following sections present the main results of the survey. After a brief discussion of the characteristics of the businesses which were interviewed, we discuss in more detail their water consumption, their use of and attitudes to the alternative water sources and sewerage services, and their attitudes to the proposed new water and sewerage systems.

SECTION II - SUMMARY AND CONCLUSIONS

Characteristics of Businesses

6. The survey covered some 8½% of all commercial activity in Taiz; we estimate the total number of businesses in July 1976 was approximately 3,800, employing approximately 12,500 persons.
7. These were small, predominantly young, businesses. The majority were shops, small restaurants and workshops. Average turnover was 2,100R (\$500) per month, and few businesses were very profitable.

Water Consumption and Expenditure

8. 40% of businesses used no water; the remainder used on average 7½ cu.m. per month from all sources. Average expenditure on water was less than 1% of turnover, equivalent to less than 4% of profits.

Characteristics of Existing Water Sources

9. Over half the businesses used KMWS, 45% having their own connection and 11% sharing a neighbour's. The only other significant sources were water carriers (12%) and some other unidentified source (12%).

10. Only 61% of Kennedy users were satisfied with the present level of service; water shortage was the main reason for dissatisfaction, although this was aggravated by a significant number of businesses with insufficient storage. More than 25% of Kennedy users supplemented their consumption from water carriers or another source.
11. Water carriers provided a mainly supplementary service to businesses, satisfying excess demands which could not be met by other sources, particularly restaurants, lodging houses and other large consumers.
12. Those not having a Kennedy connection at present were deterred by the cost of connection and the nonavailability of water service. It follows that future policy must consider methods of reducing connection costs rather than the cost of water.

Connection to an Improved Kennedy System

13. Half of those businesses not at present connected to Kennedy stated they would be willing to connect to an improved system. However, knowledge of connection cost was poor, so this proportion might fall as information about cost improved.
14. Some of those not wishing to connect were tenants; connection policy must take into account the responsibility of owners/landlords rather than consumers. But the majority not wishing to connect stated they did not need a connection; they may be some of those businesses which use no water at all. Unless their needs or attitudes change they are unlikely to connect whatever the cost and level of service offered.

Water Consumption From
an Improved Kennedy System

15. Consistent responses were made to hypothetical questions about expected consumption from an unrestricted supply at a range of different prices. These are a good indication of future demand, although we cannot know if businesses would behave in practice as was indicated.
16. Responses suggested that relaxation of the supply restriction might increase consumption by an average of 15% to 20% at present prices; this increase could be more for those businesses not receiving sufficient water at present.
17. If the price were halved, consumption might increase by a further 25% to 35%. On the other hand, if the price were doubled, the benefits of providing an unrestricted supply would be wiped out for over half the businesses connected to the new system. These changes imply an elasticity of demand to price reductions of between 0.5 and 0.6, and an elasticity to price increases of between 0.1 and 0.2.
18. However, there were four very different patterns of behaviour which we describe as:-
 - (a) maintaining a minimum or satisfactory consumption level;
 - (b) minimising expenditure;
 - (c) maximising consumption;
 - (d) unconstrained by either supply or price.

Existing Sewerage Services

19. Only 38% of businesses had their own toilet on the premises; 60% of these were flush toilets connected to the municipal sewer. Septic tanks and cess-pits were largely confined to medium-density areas. Of the 62% of businesses without

their own toilet, 60% used a public toilet or a toilet in neighbouring premises, and the remainder defecated upon the ground - more on the outskirts of Taiz but still a significant proportion in downtown areas.

20. The majority of businesses stated that they paid nothing for sewerage services. A few of those businesses without a toilet paid a small charge for the toilet they used.
21. The main reason for not having a flush toilet was the nonavailability of service, although limited water supply and cost of connection were significant secondary factors. Many of those using public toilets or none at all all gave reasons other than those coded in the questionnaire. We believe that this is a group which is not interested in improved sewerage services.

Connection to an Improved Sewerage Service

22. Half of those at present without a sewer connection stated that they would be willing to connect to the extended system; this includes half of the businesses at present having no toilet.
23. The main reasons given by businesses not wishing to connect were "landlord's responsibility" and "don't need/want". As with connection to Kennedy, future policy should concentrate on owners and landlords rather than on consumers. The proportion who stated that they did not want a sewer connection may include some businesses with their own septic tanks or cess-pits, as well as those not interested in improved service. An educational or legislative programme may be necessary to achieve universal connection.
24. The cost of connection was not recognised as a major problem. However, 74% of businesses did not know the cost, and with better information more might be deterred by it.

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TABLE 1 - TYPES OF BUSINESS INTERVIEWED

	BUSINESS QUESTIONNAIRE	HOUSEHOLD QUESTIONNAIRE	% OF TOTAL
Shop	164	18	58
Restaurant/Coffee Shop	29	4	10
Workshop	39	8	14
Office	10	2	4
Lodging House	9	NA	3
Other	32	12	11
TOTAL	283	44	100

NA = not asked.

Note

We estimate that in mid-1976 there were 4,000 small businesses in the categories covered by this survey.

SECTION III - CHARACTERISTICS OF BUSINESSES

25. This section discusses the types of business which were interviewed, their size and profitability, their use as living accommodation and the ownership of water-using facilities.

Types of Business

26. Table 1 shows the number of businesses which were interviewed. Over half were shops. Since these businesses are a random sample, we can use the sample total to estimate independently the total number of such businesses in Taiz. We estimate this total to be approximately 3,800.

TABLE 2 - AGE OF BUSINESS

	TOTAL	SHOP	RESTAURANT CAFE	WORKSHOP	OFFICE	LODGING HOUSE	OTHER
Total interviewed	283	164	29	39	10	9	32
Average age (years)	4.6	4.7	5.3	4.5	3.5	5.3	3.4
<u>% Operating For:</u>							
4 years or less	63	64	59	59	70	33	74
5 years or more	37	36	41	41	30	67	26
	100	100	100	100	100	100	100
<u>Number Started</u>							
During 6 months to July 1976	6	3	0	0	1	0	2
In two previous years (annual average)	48	29	3	8	2	1	5

TABLE 3 - NUMBER OF EMPLOYEES BY TYPE OF BUSINESS

	TOTAL	SHOP	RESTAURANT CAFE	WORKSHOP	OFFICE	LODGING HOUSE	OTHER
Total interviewed	327	182	33	47	12	9	44
Average number employed	2.8	2.3	4.1	4.2	3.3	3.4	2.4
<u>% Employing:</u>							
One	26	26	6	23	50	11	36
Two	35	43	24	19	17	22	32
Three	20	22	21	13	0	33	23
Four or more	19	8	48	45	25	34	7
	100	100	100	100	100*	100	100

NOTE: In 28% of businesses, one employed person does not receive wages, in a further 12½% of businesses two employees work for free. These may be members of the respondents family.

* Includes 8% don't know.

In this and subsequent tables, percentages may not sum to 100, due to rounding.

27. Table 2 shows the age distribution of surviving businesses. The average age of all businesses was four and a half years, and over 60% had been established for four years or less. This reflects the massive growth of Taiz in recent years with the end of the civil war in Yemen and with the influx of immigrants from Aden. Indeed, only five per cent of businesses date back to the Imam's regime. The oldest types of business were those providing personal services - restaurants and lodging houses.

Size of Businesses

28. The majority of businesses were very small - on average employing only three persons. Table 3 shows the numbers of persons employed by type of business. Only five businesses employed more than ten people, and 80% employed three persons or less. Shops and other businesses were slightly smaller than average, and restaurants and workshops rather larger. In total we estimate that approximately 12,500 persons were employed in these activities in the whole of Taiz.

TABLE 4 - SALES TURNOVER BY NUMBER OF EMPLOYEES (RIALS PER MONTH)

	< 1,000	1,000 - 2,000	2,000 - 4,000	4,000 - 6,000	> 6,000	DON'T KNOW
Total interviewed	57	19	29	19	7	152
<u>% of Total Employing:</u>						
One	48	32	10	5	10	24
Two	30	42	38	21	25	39
Three	14	26	28	42	25	18
Four or more	9	0	24	32	40	18
	100	100	100	100	100	100

Based on 283 interviews.

TABLE 5 - SALES TURNOVER BY TYPE OF BUSINESS

	TOTAL	SHOP	RESTAURANT CAFE	WORKSHOP	OFFICE	LODGING HOUSE	OTHER
Average Sales (Rials/month)	2,100	2,200	3,400	1,600	NIL	2,300	1,400
<u>% Sales:</u>							
< 1,000	20	19	10	21	20	22	34
1,000 - 2,000	7	7	3	13	10	0	3
2,000 - 4,000	10	10	24	8	0	11	6
4,000 - 6,000	7	7	7	5	0	11	6
> 6,000	2	2	10	0	0	0	0
Don't Know	54	55	45	54	70	56	50
	100	100	100	100	100	100	100

Based on 283 interviews.

29. Table 4 indicates monthly sales by number of employees. Information on sales turnover was provided by 47% of businesses interviewed; 85% of these had sales of 6,000R or less each month (approximately \$1,300). We do not know whether the remainder did not know or would not disclose their turnover.
30. Table 5 shows turnover by type of business. On average, monthly turnover was 2,100R (\$465); it was highest for restaurants, which had been operating slightly longer and employed more people than average.

TABLE 6 - PROFIT AND SALES TURNOVER (RIALS PER MONTH)

	< 100	100 - 200	200 - 300	300 - 400	400 - 500	500 - 1,000	> 1,000
Total interviewed	26	16	17	5	11	21	7
<u>% of Businesses with Turnover</u>							
Less than 500	36	19	6	0	0	5	0
500 - 1,000	15	6	24	20	27	5	0
1,000 - 2,000	15	19	29	0	0	10	0
2,000 - 4,000	23	25	12	0	36	14	14
4,000 - 6,000	0	6	6	60	9	33	0
Over 6,000	0	6	6	0	9	10	71
Don't Know	8	19	18	20	18	24	14
	100	100	100	100	100	100	100

Based on 103 responses from businesses knowing their monthly profit.

Profitability

31. Table 6 shows the relationship between profit and turnover, although only 37% of businesses gave information on profits. Large firms had larger profits than small firms, but their profit margins were smaller. Of those businesses answering, 40% had profit margins of 10% of sales or less, and a further 25% had margins of between 10% and 20%. Average monthly profits were 400R (less than \$100), and only 7% made profits exceeding 1,000 Rials per month (approximately \$220).

Businesses as Living Accommodation

32. The YAR census in 1975 indicated that shops and small businesses were used as living accommodation. 58% of those interviewed were used in this way, in addition to the nine lodging houses or the household businesses in the sample. On average each provided overnight accommodation for two persons. In total we estimate 6,000 people lived in business accommodation; we believe that all of these were males.

TABLE 7 - NUMBER STAYING OVERNIGHT IN BUSINESS ACCOMMODATION

	NUMBER STAYING OVERNIGHT				
	0	1	2	3	MORE THAN 3
Total Interviewed	110	65	52	25	30
<u>% of Businesses</u> <u>Employing:</u>					
One	25	48	8	12	10
Two	35	29	71	8	10
Three	24	11	10	56	23
More than three	15	9	11	24	57
	100	100	100	100	100

Based on 283 interviews.

TABLE 8 - OWNERSHIP OF WATER USING FACILITIES

	NUMBER	% OF BUSINESSES OWNING
Water Storage Tank	74	23
Water Heater	10	3
Sink/Basin	39	12
Bath/Shower	123	38
Flush Toilet	116	35
Motor Vehicle	23	7

Based on 327 interviews.

33. The diagonal of Table 7 indicates a close relationship between the number of persons sleeping in business premises overnight and the number employed. This accommodation may represent a payment in lieu of or as a supplement to wages.

Water Using Facilities

34. The facilities available on business premises for residents or employees were generally limited. Table 8 shows the number of businesses investing in water-using facilities. It is an interesting indication of the possible uses of water other than in personal consumption.

TABLE 9 - WATER CONSUMPTION BY TYPE OF BUSINESS
(CUBIC METRES PER MONTH)

	TOTAL	SHOP	RESTAURANT CAFE	WORKSHOP	OFFICE	LOGGING HOUSE	OTHER
Mean Water Consumption (cu.m) *	7.8	5.5	12.3	9.7	9.1	10.4	6.7
<u>% Consuming:</u>							
None	43	51	3	40	25	0	52
1 to 5 cu.m.	29	33	18	28	33	0	30
6 to 10	14	11	24	17	8	78	5
11 to 20	8	4	36	4	33	11	2
More than 20	4	1	18	9	0	11	5
Don't know	2	1	0	2	0	0	7
	100	100	100	100	100	100	100

*for those businesses consuming water.

Based on 327 interviews.

TABLE 10 - SOURCE OF WATER SUPPLY

	TOTAL	SHOP	RESTAURANT CAFE	WORKSHOP	OFFICE	LOGGING HOUSE	OTHER
Average number of sources for those using water	1.2	1.1	1.7	1.1	1.4	1.4	1.0
<u>% of Businesses Using:</u>							
KMWS - own tap	45	37	79	41	90	89	31
KMWS - shared tap	11	13	7	8	0	11	9
Jabel Sabir	2	1	14	3	0	0	0
Public tap/mosque	14	15	3	8	0	0	31
Truck vender	1	0	3	5	0	0	0
Water carrier	14	8	59	13	20	44	0
Other	14	18	0	15	20	0	13
<u>% of Businesses using no water</u>	16	20	0	15	10	0	16
	117	112	165	108	140	144	100

Based on 283 interviews.

SECTION IV - WATER CONSUMPTION AND EXPENDITURE

Water Consumption

35. Table 9 indicates the quantity of water consumed by businesses. On average, those businesses using water consumed $7\frac{1}{2}$ cu.m. per month from all sources combined - about the same as households. However, over 40% used no water at all.
36. Consumption varied with the number of employees in a business, falling from 2.3 cu.m. in businesses with a single employee to about 1.7 cu.m. per employee for businesses with three or more employees.

Expenditure on Water

37. Average expenditure on water was 15 to 16 Rials per month (two Rials per cu.m.). Expenditure varied from 12R for shops to 22R for restaurants.
38. 30% of businesses (those with the smallest sales turnover) spent $1\frac{1}{2}$ % of sales or more on water, whereas 40% (the largest businesses) spent $\frac{1}{2}$ % or less. The average expenditure is equivalent to 4% of profit.

Water Sources

39. Table 10 identifies the water sources which businesses used. Many businesses relied on only one source (shops, wholesalers, others), whilst restaurants relied heavily on more than one. On the other hand, 16% of businesses used no water source at all.

40. The Kennedy system was used in some way by at least 57% of businesses (compared with 78% of households):-

own connection	45%
neighbour's connection	11%
truck vendor	1%

In addition, some of the water from public taps and mosques was supplied by the Kennedy system.

41. The only other significant sources were water carriers (12%), and some other unspecified source which we were not able to identify (12%). The sweet water system from Jabel Sabir was not a significant source for businesses (only 2%); it mainly served the city outside the business areas. Wells were not used at all by businesses. Of the 55 businesses which used more than one source, 45 supplemented their Kennedy supply with water from a water carrier (30) or one of the other sources (15).

Alternative Levels of Service

42. The three principal sources offered widely differing levels of service, both in respect of price and volume available:-

	<u>Average Price</u> (per cu.m.)	<u>Volume Supplied</u> (cu.m./Month)	<u>Mean Consumption</u> cu.m./Month	<u>% Satisfied With Service</u>
Kennedy	2R	Over 1 cu.m.	7.5	61
Water carrier	60R	½ cu.m. to 4 cu.m.	2.0	63
Public tap/ mosque	Free	less than 1 cu.m.	0.6	67

43. These sources are complementary. Taps and mosques provided for the lowest levels of demand which did not justify a Kennedy connection. Water carriers provided a supplementary service to larger consumers which did not receive sufficient water from another source - particularly restaurants and lodging houses.

44. The main reasons for dissatisfaction were the same for all services:

	<u>Limited Supply</u>	<u>Limited Storage</u>
Kennedy	89% (of respondents)	30%
Water carrier	73%	40%
Public tap/ mosque	62%	62%

However, the differences in emphasis reflect significant differences in the nature of the service offered and in the way the alternative sources were used.

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SECTION V - CHARACTERISTICS OF EXISTING WATER SOURCES

45. The following sections discuss the characteristics of each of the existing water sources.

Kennedy Memorial Water System

46. This section first discusses existing connections to and consumption of water from the Kennedy system, then the adequacy of the present level of service, and finally the reasons given by non-users for not connecting to Kennedy.

Existing Connections

47. As table 10 shows, 45% of the businesses interviewed had their own connection to the Kennedy system. A high proportion of restaurants, offices and lodging houses were connected, but only a minority of shops, workshops and other businesses.
48. 83% of the businesses with a Kennedy connection had their own meter, and only 6% shared their connection with other businesses (although 30 businesses got Kennedy water from a neighbour). The Water Authority records should therefore give a reasonably reliable picture of consumption by business users - provided that they are based on meter readings rather than estimation.

Water Consumption

49. On average, water service was provided to business users in density zone 2 for 1.3 hours each day - almost twice as long as it was provided to those in density zone 3 (only 0.7 hours). (Density zone 1 is broadly outside the present and phase 1 service area).

TABLE 11 - QUANTITY OF KENNEDY WATER CONSUMED
(CUBIC METRES PER MONTH)

	BUSINESSES RECEIVING WATER FROM KENNEDY SYSTEM		CUMULATIVE %
	NUMBER	%	
Less than $\frac{1}{2}$	9	6	6
1	11	7	13
2	8	5	18
3	13	8	26
4	17	11	37
5	21	13	50
6 - 10	45	29	79
11 - 15	13	8	87
16 - 20	8	5	92
More than 20	11	7	99
Don't know	1	1	100
	157	100	

Based on 293 interviews.

TABLE 12 - REASONS GIVEN BY BUSINESSES FOR NOT RECEIVING
SUFFICIENT WATER FROM KENNEDY SYSTEM

	NUMBER	% OF THOSE ASKED
Limited storage	18	30
Limited water supply	54	89
Water too expensive	1	2
Water too salty	1	2
Other	6	10
Don't know	0	0
	80	

Based on 61 interviews.
(On average each business gave 1.3 reasons)

50. Each business consumed on average 7.5 cu.m. of Kennedy water in the month before the survey; table 11 shows that 50% of the businesses consumed 5 cu.m. or less, and only 20% consumed more than 10 cu.m. Expenditure was at the standard Kennedy price of 2 Rials per cubic metre.

Adequacy of Present Level of Service

51. 61% of businesses stated that they received sufficient water; the figure for Nasser Street and the area near the Kennedy yard was 85%, compared with only 53% in the Upper and Lower Medina and Tahreer areas.
52. Table 12 explores the reasons given by businesses which did not receive sufficient Kennedy water. Nearly 90% claimed it was because there was limited supply from the Kennedy system (compared with 93% for households). This was a more important source of dissatisfaction than for any other water source. In addition, nearly 30% of respondents stated that it was because they had insufficient storage capacity (compared with 21% of households). (Of the 157 businesses receiving Kennedy water, only 66 owned a water storage tank).

TABLE 13 - REASONS GIVEN BY BUSINESSES FOR NOT
HAVING A CONNECTION TO THE KENNEDY SYSTEM

	NUMBER	% OF THOSE ASKED
Water too expensive	10	8
Connection too expensive	40	32
Water too salty	1	1
Connection not available	17	13
KMWS refused connection	24	19
Limited supply	12	10
Other	63	50
Don't know	17	13
	184	

Based on 126 interviews.

(On average, each business gave 1.5 reasons)

Reasons for Not Having a Kennedy Connection

53. Table 13 analyses the reasons given by 126 businesses explaining why they did not have a Kennedy connection. The two most important, explicit factors were:-

- (a) the availability of the water service (19% refused and 13% not available);
- (b) the cost of connection (32%).

By comparison, the cost and availability of water were not deterrents. (Although the availability of service was an equally important reason for the households, by contrast the cost of connection was not so important (only 3½%) and the limited water supply was much more important (39%)).

54. Two things follow from this:-

- (a) there may be a substantial level of suppressed demand for water service, which could show itself as a significant increase in the number of new connections in the early years of the improved system;
- (b) subsequent connection policy may need to consider methods of reducing connection costs, rather than the cost of water, in order to increase the percentage of the population served by the improved system.

55. However, 50% of businesses gave something other than the reasons listed in the table as their reason for not connecting. These may be tenants who do not want to assume responsibility for capital improvements to their premises, or they may be businesses which do not consume water from any source at present and do not want or need a connection.

TABLE 14 - QUANTITY OF WATER CONSUMED EACH MONTH
FROM PUBLIC TAPS OR MOSQUES

QUANTITY (CUBIC METRES)	NUMBER RECEIVING	PER CENT	CUMULATIVE PER CENT
Less than 0.1	4	10	10
0.1 to 0.24	5	13	23
0.24 to 0.35	7	18	41
0.35 to 0.50	9	23	64
0.50 to 0.65	4	10	74
Above 0.65	10	26	100
	39	100	

Based on 39 interviews

TABLE 15 - REASON FOR RECEIVING INSUFFICIENT
WATER FROM TAPS/MOSQUE

	NUMBER	% OF THOSE ASKED
Limited water supply	8	62
Water expensive	1	8
Water not clean enough	1	8
Limited storage	8	62
Tap/Mosque too far away	5	39
Don't know	2	15
	25	

Based on 13 interviews.

Jabel Sabir Water System

56. There is a very much smaller subsidiary piped water system in Taiz which supplies sweet water from the Jabel Sabir mountain range to a number of fringe areas of the town, notably the Medina and Gahamalia. This system is administered by the Ministry of Awkaf. Only five of the businesses interviewed had a connection to the piped Jabel Sabir system; a further two shared a neighbour's connection. Clearly there are too few responses to analyse, but it appears that water from this source is also very limited.

Public Taps/Mosques

Water Consumption

57. 39 businesses (14%) received water from public taps or from mosques. Table 14 shows the quantity of water consumed each week from these sources. The water is given free; only four businesses paid anything for it. All these businesses consumed very much less water than those connected to the Kennedy system - nearly 65% consumed less than half cubic metre per month.

Adequacy of Present Level of Service

58. Two thirds of the businesses using these sources stated that they received sufficient water (compared with Kennedy 61%) The relative importance of the reasons for inadequate supply are similar to those for other sources (see table 15), although the problem of water storage was more acute than for any other water source.
59. Nearly 70% of businesses were within 30 metres of the water source used, although one respondent had to travel 250 metres.

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Water Vendors

60. There are two kinds of water vendor operating in Taiz: those supplying large scale business consumers from tanker trucks, and traditional water carriers supplying small scale needs.

Truck Vendors

61. The truck vendors purchase water from the Kennedy system at a premium price (three Rials per cubic metre), filling their water tanks at a special bulk supply point. This is metered, and a record of purchases is kept.
62. Sales from the trucks are to construction sites and industries (e.g. the soft drinks bottling plant) whose needs are not met from the pipes supply or wells. Some of the tankers operate solely on behalf of a single customer.
63. Because we did not interview within the industrial zones, we only found three businesses supplied by truck vendors in the business survey. No analysis of these responses is thought to be worthwhile.

TABLE 16 - QUANTITY CONSUMED AND COST OF WATER
FROM WATER CARRIERS EACH MONTH

	QUANTITY (CUBIC METRES)			COST (RIALS)	
	NUMBER	%		NUMBER	%
Less than 0.3	4	10	Less than 16	5	12
0.3 - 0.8	7	17	20 - 48	2	5
0.9 - 1.4	8	20	52 - 80	11	27
1.4 - 1.9	6	15	84 - 112	8	20
2.0 - 3.0	8	20	116 - 176	5	12
3.0 - 4.0	4	10	180 - 240	4	10
Above 4.0	4	10	Above 240	6	15
	41	100		41	100

TABLE 17 - REASONS GIVEN FOR NOT RECEIVING
SUFFICIENT WATER FROM WATER CARRIERS

	NUMBER	% OF THOSE ASKED
Limited supply	11	73
Water expensive	4	27
Water not clean enough	1	7
Limited storage	6	40
Other	3	20
Don't know	0	0

Based on 15 interviews.

Water Carriers

64. On the other hand, 41 businesses (14%) bought water from the traditional water carriers. Table 16 shows the amount of water bought each week and the cost of water from this source. Half of these businesses bought 1.5 cubic metres of water a month or less from vendors, and paid between one and two Rials per ghee can, some 30 times as much as for Kennedy water. As noted earlier, this is mainly a supplementary source of supply and can afford to operate at a high marginal cost.
65. 63% of these businesses received sufficient water from the water carriers. Table 17 shows the reasons given by the remainder for not receiving sufficient water. The price of water is a more important constraint on buying from carriers than it is for other sources of supply.

TABLE 18 - WILLINGNESS TO CONNECT TO IMPROVED KENNEDY SYSTEM

	TOTAL	SHOP	RESTAURANT CAFE	WORKSHOP	OFFICE	LODGING HOUSE	OTHER
<u>Total Number of Businesses</u>	283	164	29	39	10	9	32
% already connected	45	38	76	39	90	89	31
<u>Number Not Connected</u>	157	102	7	24	1	1	22
% of these willing to connect	49	53	71	42	0	100	27

TABLE 19 - WILLINGNESS TO CONNECT TO IMPROVED KENNEDY SYSTEM BY CONSUMPTION

	PRESENT CONSUMPTION (CU.M/MONTH)					
	ZERO	1	2	3 - 4	5 - 10	OVER 11
Total Number of Business	113	22	12	33	62	39
% already connected	4	18	42	70	90	85
Number not connected	108	18	7	10	6	6
% willing to connect	44	50	57	60	75	84

Based on 283 interviews.

SECTION VI - CONNECTION TO AN IMPROVED KENNEDY SYSTEMWillingness to Connect

66. Respondents were asked whether they would be willing to connect to an improved Kennedy system, which was described as being:-
- (a) a sweet water supply - to offset complaints about saltiness/bad taste of the existing water;
 - (b) in the respondents' area - so that the opportunity to connect was explicitly offered; and
 - (c) at high pressure for 24 hours a day - to offset complaints about inadequate supply.
67. By the time interviewing took place there had been advertising coverage in the local newspaper and on the radio (by the Kennedy authority and Haskins & Sells jointly). Respondents were therefore aware that improvements were a real possibility, although how far they believed the description given to them is not known.
68. Approximately half of the 156 businesses not already connected stated that they were willing to connect (compared with only 32% of households). Table 18 shows that the proportion of different types of business willing to connect broadly reflected the proportion of each which was already connected. The present level of consumption of those already connected tended to be lower than that of those willing to connect (table 19). (The same relationship with consumption is apparent in the proportions of businesses willing and not willing to connect).

TABLE 20 - REASON GIVEN FOR NOT CONNECTING TO
IMPROVED KENNEDY SYSTEM

	NUMBER	% OF THOSE ASKED
Connection too expensive	22	29
Water too expensive	3	4
Water too salty	0	0
Landlord's responsibility	27	35
Other	29	38
Don't know	11	14

Based on 77 interviews.

(On average each business gave 1.2 reasons)

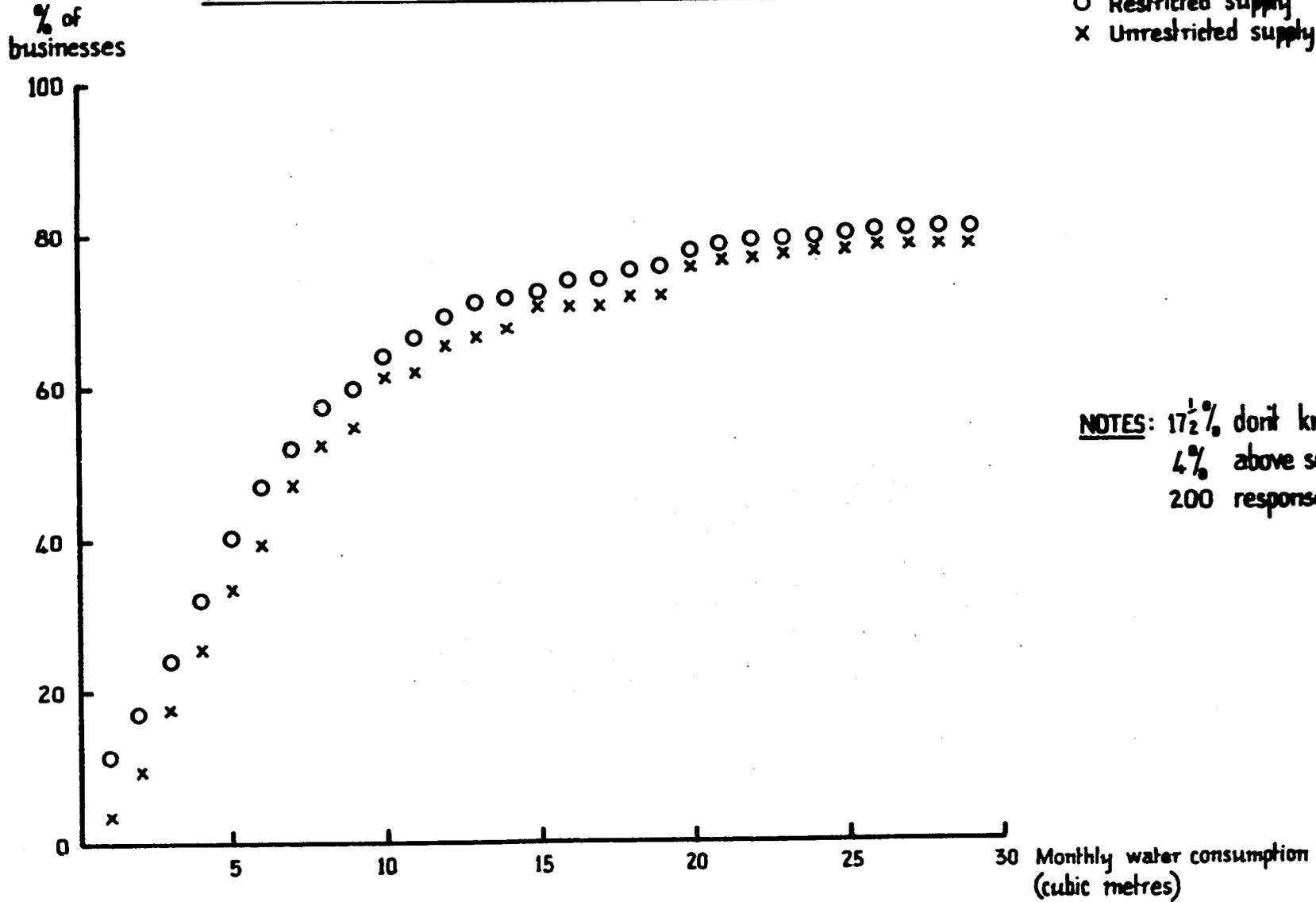
69. We asked these businesses what they thought it would cost to connect. (The average cost calculated by the Kennedy authority was 300 Rials - \$70 approx.) 79% of these did not know, and the estimates made by the remainder tended to be lower than the minimum actual cost. If the costs were correctly known, more of those stating they would connect could be expected no to do so. (See paragraph 53(b)).

Reasons for not Wishing to Connect

70. Table 20 shows the reasons given by those who stated that they were not willing to connect to the improved Kennedy system. As with the present system (see table 13), a large proportion (29%) answered "connection too expensive" and very few (4%) gave the reason "water too expensive".
71. A very large proportion (52%) gave other reasons, or did not know the reason, for not wishing to connect. We discussed this group in relation to the present system in para 55. Unless their needs or attitudes change, these businesses seem unlikely to connect whatever the cost and level of service offered.
72. Finally table 20 identifies a group of tenants (35% of the total) who were unwilling to make a decision on connection. Not all business tenants referred a decision to their landlord; some might connect on their own initiative, although they might not be responsible for doing so. Some of those deferring to a landlord may simply have been expressing disinterest. Future connection policy will need to take into account the extent to which connection is the responsibility of landlords rather than the consumers.

CUMULATIVE FREQUENCY DISTRIBUTION OF WATER CONSUMPTION
WITH AND WITHOUT RESTRICTED SUPPLY FOR BUSINESSES WITH
OR WILLING TO MAKE A CONNECTION TO KENNEDY

○ Restricted supply : present price
x Unrestricted supply: same price



NOTES: 17½% don't know;
4% above scale limits
200 responses

Diagram 1.

SECTION VII - WATER CONSUMPTION FROM AN IMPROVED KENNEDY SYSTEM

73. Businesses already connected to the Kennedy system, or which expressed willingness to connect to the improved system, were asked about their expected consumption from the improved source, assuming unrestricted supply and a range of different prices.
74. These hypothetical questions (answered by 82% of those businesses asked) appear to have been well understood, and the answers are sufficiently consistent to merit careful analysis. The results are probably the best indication of future demand that could have been collected, but there remains a basic ambiguity about whether businesses would behave in practice as they indicated.

Relaxation of the Supply Restriction

75. Respondents suggested they might increase consumption by 15-20% following relaxation of the supply restriction, although those consuming least anticipated larger percentage increases. (See diagram 1 and table 21). This compares with an average 20% increase anticipated by households).
76. Table 22 shows that those businesses which did not receive sufficient water from the Kennedy system at present suggested larger increases (30%) than businesses already receiving sufficient water (13%), or businesses willing to make a connection to Kennedy (9%). (The very small increases suggested by this latter group may indicate the difficulty respondents had in answering these hypothetical questions. The increase suggested is much lower than a comparison of present consumption levels would suggest is likely (see table 19)).
77. Table 23 shows the possible increases in consumption for each type of business. Restaurants suggested smaller possible increases than the average, while offices and lodging houses suggested rather larger increases.

TABLE 21 - PERCENTAGE CHANGE IN WATER CONSUMPTION
WITH CHANGES IN AVAILABILITY AND PRICE

	MEAN CONSUMPTION	MEAN % CHANGE	IMPLIED PRICE ELASTICITY	% BUSINESSES NOT CHANGING CONSUMPTION
At present price (2)	9.4	+ 17	-	37
At half price (3)	11.5	+ 27	0.54	25
At twice price (3)	8.0	- 16	0.16	37

Based on 202 interviews.

- Notes: (1) Only 82½% of those asked were able to answer these questions.
 (2) Compared with consumption from restricted water supply at present price.
 (3) Compared with consumption from unrestricted supply at present price.

TABLE 22 - PERCENTAGE CHANGE IN WATER CONSUMPTION
WITH CHANGES IN AVAILABILITY AND PRICE

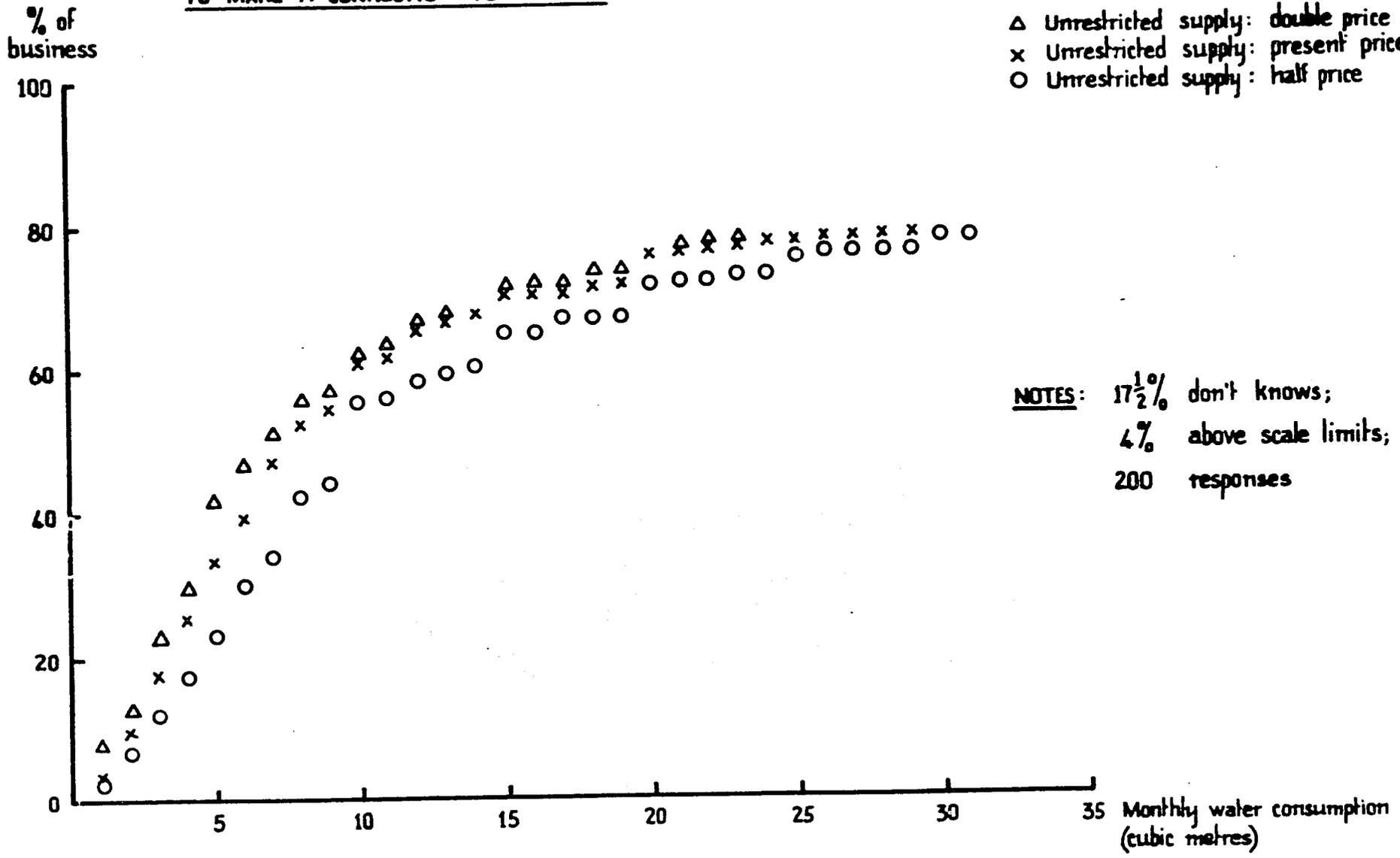
	BUSINESSES WITH KENNEDY CONNECTION		BUSINESSES WILLING TO CONNECT TO IMPROVED KENNEDY SYSTEM
	RECEIVING SUFFICIENT WATER	NOT RECEIVING SUFFICIENT WATER	
Number of businesses	78	48	42
Mean change at present price (1)	+ 13%	+ 30%	+ 9%
Mean change at half price (2)	+ 26%	+ 27%	+ 30%
Mean change at double price (2)	- 18%	- 11%	- 17%

Based on 168 interviews.

- Notes: (1) Compared with consumption from restricted supply at present price.
 (2) Compared with consumption from unrestricted supply at present price.

CUMULATIVE FREQUENCY DISTRIBUTIONS OF WATER CONSUMPTION
AT VARIOUS PRICE LEVELS FOR BUSINESSES WITH OR WILLING
TO MAKE A CONNECTION TO KENNEDY

- △ Unrestricted supply: double price
- x Unrestricted supply: present price
- Unrestricted supply: half price



NOTES: 17½% don't knows;
 4% above scale limits;
 200 responses

Diagram 2.

Change in Price of Unrestricted Water Supply

78. Diagram 2 and table 21 show the suggested changes in consumption with hypothetical changes in the price of water. At half the present price respondents anticipated that consumption might increase by between 25% and 35% above unrestricted consumption at the present price, compared with an average 38% increase for households. (The kinks in the cumulative frequency curves at 10, 15, 20, 25 and 30 cubic metres per month indicate the approximations made by respondents in answering these questions).

TABLE 24 - COMPARISON OF CHANGES IN CONSUMPTION FOLLOWING A HYPOTHETICAL INCREASE OR DECREASE IN THE PRICE OF WATER

		AT HALF PRICE												
		% INCREASE IN CONSUMPTION	NIL	LESS THAN 9	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89	90 - 99	100 - 149
% DECREASE IN CONSUMPTION	IMPLIED PRICE ELASTICITY		0.1	0.3	0.5	0.7	0.9	1.1	1.3	1.5	1.7	1.9	OVER 2.0	
61 - 70	0.65	1												
51 - 60	0.55				1									
46 - 50	0.48		4	1		1		6	1					2
41 - 45	0.43				1				1					1
36 - 40	0.38				2									
31 - 35	0.33		3			3			2					
26 - 30	0.28			1	3		4							
21 - 25	0.23		4	1	5			1						2
16 - 20	0.18		1	5	1	3	2	1						2
11 - 15	0.13		2	7	2		1	1						
6 - 10	0.08		4	1	1									
1 - 5	0.03		1											
NIL			31	7	7	7	2	8	3		1			8

AT
TWICE
PRICE

79. On the other hand, at twice the present price, respondents stated that their demand would fall by:-

- (a) 35% for the 10% of business consuming the least amount of water (up to about 1 cu.m. at present);
- (b) between 10 and 20% for the 40% of businesses at present consuming between 1 cu.m. and about 6½ cu.m.; and
- (c) less than 5% for the 30% of businesses consuming the largest amounts at present (more than about 6½ cu.m.).

Smaller business users are probably less committed to the Kennedy system and may be able to reduce consumption, or to find adequate alternative sources of supply, more easily than larger business users. (The average fall in demand from households was anticipated to be 15%).

80. Existing and potential consumers anticipated very similar reactions to the suggested price changes (table 22). Except for those existing consumers who do not receive enough water at present, respondents suggested that doubling the price of water could wipe out the benefits of the unrestricted supply. Whether this is likely, in view of earlier comments on the relative importance of the cost of water (para. 34), or in view of the proportion of businesses which received additional water from water carriers at high marginal cost, is not possible to say.

Price Elasticity of Demand

81. Table 24 compares the suggested changes in consumption following a decrease or an increase in the price of water. For ease of comparison we have also indicated the implied price elasticities of demand (the price elasticity is the percentage reduction in quantity for a 1% increase in price).

TABLE 25 - COMPARISON OF CHANGES IN CONSUMPTION FOLLOWING A HYPOTHETICAL INCREASE IN THE PRICE OR THE SUPPLY OF WATER

INCREASE IN SUPPLY

INCREASE IN PRICE	% INCREASE IN CONSUMPTION	INCREASE IN SUPPLY										
		LESS THAN 9	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89	90 - 99	> 100
	% DECREASE IN CONSUMPTION											
	More than 50							1				1
	46 - 50	3	1	1								6
	41 - 45	1	1			1						1
	36 - 40			1								2
	31 - 35	1					1					2
	26 - 30	5	1			2						2
	21 - 25	4		1	4			1				2
	16 - 20	8		4		1						2
	11 - 15	3	6		1				1			1
	6 - 10	5										
	1 - 5										1	
	NIL	34	4	5	6	1	3	2				4

82. As we would expect for a commodity as important as water, demand from the majority of businesses is inelastic (that is less than one) for both decreases and increases in price, although demand is more responsive to price reductions (mean between 0.5 and 0.6) than it is to price increases (mean between 0.1 and 0.2). These characteristics are consistent with our assessment of a highly supply-constrained market with extremely low levels of present consumption. (The elasticities are themselves related; businesses which are more responsive to one price change are also more responsive to the other).

Differences in Anticipated Consumer Behaviour

83. We have also compared the reactions of businesses to hypothetical increases in supply or in price (table 25). This table reveals four different patterns of anticipated behaviour which we describe as follows:-

- (a) maintaining a minimum or satisfactory level: 34 businesses in the bottom left corner of the table proposed to maintain their present level of consumption regardless of whether supply or price increased;
- (b) minimising expenditure (subject to satisfying minimum consumption needs): 30 businesses on the vertical edge proposed to reduce consumption as price increased but hold it at present levels if supply increased;
- (c) maximising consumption (subject to a limit on expenditure): 25 businesses on the horizontal edge would maintain their present consumption regardless of price increases, but increase it as supply increased;
- (d) unconstrained by either supply or price: 23 businesses on the diagonal of the table, with 22 other businesses elsewhere between the two edges, would both reduce consumption as price increased and increase consumption as supply increased.

TABLE 26 - TYPE OF TOILET FACILITY

	DENSITY ZONE 1	DENSITY ZONE 2	DENSITY ZONE 3	TOTAL
Total Businesses Interviewed	8	98	175	283
<u>§ With Own Toilet:</u>				
Flush connected to sewer	0	18	25	23
Flush connected to septic tank	0	31	1	11
Non-flush connected to cess-pit	13	8	1	4
Other	0	1	0	-
	13	58	27	38
<u>§ Without Own Toilet:</u>				
Share neighbour's	0	6	8	7
Public toilet	0	12	34	25
Other	87	19	27	26
Own toilet in adjacent premises	0	4	3	3
	87	42	73	62

Based on 283 responses.

- less than 1/2.

SECTION VIII - EXISTING SEWERAGE SERVICESType of Toilet Facility

84. As Table 26 shows, only 38% of the businesses interviewed had a toilet on the premises (compared with 86% of households). In all cases but one, this was not shared with another business or household.
85. The kind of toilet facility used by these businesses and those without their own toilet is described in table 26. Overall, some 22½% of businesses (26% of households) had a flush toilet connected to the municipal sewer.
86. Because of the limited extent of the sewer and the lower density of development, septic tanks and cess-pits occurred more frequently in zone 2 (nearly 40% of businesses). As a result, the proportion of businesses needing to use public toilets or toilets in other premises (22%) was lower than in zone 3 (45%). The differences within this total probably reflected the availability of public toilets in Taiz (these are provided at some mosques and by the municipality).
87. For those businesses without their own toilet, the designation 'other' was used mainly by respondents who defecated upon the ground (for example, on waste ground, or building sites). This proportion was highest (87%) on the edge of the built-up area, but was still very high within the town (between 19 and 27%).

Distance to Outside Toilet

88. We asked those businesses which did not have their own toilet how far the toilet they used was from their premises. Overall 70% of businesses were within 40 metres of the toilet they used and only 15% were further than 100 metres.

TABLE 27 - REASONS GIVEN BY BUSINESSES FOR NOT
HAVING A FLUSH TOILET CONNECTED TO THE SEWER

	BUSINESSES WITH:	
	OWN TOILET	NO TOILET
<u>Total number of reasons given</u>	54	170
<u>% of those asked answering:</u>		
Water too expensive	0	2
Service not available	77	27
Connection too expensive	7	14
Limited water supply	16	6
Don't need/want	7	15
Other/don't know	16	33

Based on 219 interviews.

(On average each business gave 1.0 reasons).

89. Those businesses sharing a neighbour's toilet had less far to go than the average. On the other hand, those claiming to use a public toilet, or one in their own adjacent premises, had much further to go than the average. We believe that in practice some of this group may well use 'other' facilities.
90. A very high proportion of those using an 'other' facility (32%) were unable to state how far away it was.

Cost of Sewerage Service

91. Only 7% of the businesses with their own toilet paid for sewage disposal, whereas 26% of the businesses without their own toilet paid something for the toilet they used. The majority of the latter group paid ten Rials a week or less (just over \$2.00), possibly a gratuity to the mosque attendant or charges for the use of municipal toilets.

Reason for not Having Flush Toilet

92. We asked those businesses without a flush toilet connected to the sewer why they did not have such a facility. Table 27 presents the reasons that were given.
93. Among businesses with their own toilet, the most important reason was "service not available", particularly those businesses which had their own septic tank. The second most important reason was the limited water supply, especially for businesses with a cess-pit or some other type of toilet.

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94. For businesses without their own toilet, availability of service was the most important reason given. In addition, those sharing a neighbour's toilet cited the connection cost as a significant deterrent.
95. Those using public toilets or 'other' facilities gave as a second reason "other/don't know". As with connection to the Kennedy water system, we feel that these are probably businesses without adequate facilities which are not interested in a improved service (para. 53).

TABLE 28 - WILLINGNESS TO CONNECT TO EXTENDED SEWERAGE SYSTEM BY TYPE OF BUSINESS

	TOTAL	SHOP	RESTAURANT CAFE	WORKSHOP	OFFICE	LODGING HOUSE	OTHER
Total number of businesses	283	164	29	39	10	9	32
% already connected	23	26	17	15	40	22	16
Total with own toilet *	44	23	1	5	5	5	5
% willing to connect	68	55	100	80	60	80	60
Total with no toilet	175	99	23	28	1	2	22
% willing to connect	46	57	35	25	0	100	37

*Not already connected to municipal sewer

SECTION IX - CONNECTION TO AN IMPROVED SEWERAGE SERVICEWillingness to Connect

96. As part of the interview, businesses were asked if they would pay to connect to the municipal sewerage system if it were extended to their area (interviewers were instructed to say "to the street outside" if asked for further details or if the respondent did not understand the question).
97. Half of the businesses at present without sewerage service were willing to connect to the extended system, about the same as the proportion of households, varying between 68% of those with their own toilet facility and 46% of those with no toilet. These proportions do not vary significantly with the type of business (table 28). Relatively few restaurants had their own toilet or were willing to connect. This has implications for overall standards of public hygiene.

TABLE 29 - REASONS FOR NOT HAVING A FLUSH TOILET CONNECTED TO THE SEWER

PRESENT SEWERAGE SERVICE

		TOTAL	WATER TOO EXPENSIVE	DON'T NEED/WANT	OTHER/DON'T KNOW	SERVICE NOT AVAILABLE	CONNECTION TOO EXPENSIVE	WATER SUPPLY LIMITED
FUTURE SEWERAGE SERVICE	TOTAL	108	1	25	44	26	11	1
	% of Total	100	1	23	41	24	10	1
	Connection too expensive	10	0	0	0	4	6	0
	Don't need	39	1	19	9	7	2	1
	Other	37	0	5	22	8	2	0
	Don't know	22	0	1	13	7	1	0
Businesses willing to connect		116	2	5	20	56	16	17
% Willing to connect		100	2	4	17	48	14	15

Based on 93 interviews.

(On average each business gave 1.2 reasons).

Reasons for Not Wishing to Connect

98. When asked the reason for not wishing to connect, the answers given were as follows:-

	<u>No.</u>	<u>Percentage</u>
Connection too expensive	7	8
Don't need/want	33	36
Landlord's responsibility	31	33
Other	3	3
Don't know	19	20
	<u>93</u>	<u>100</u>

99. As with connection to the Kennedy system, a significant proportion of businesses claimed that connection was the landlord's responsibility. We will take this into account when recommending future connection policy.
100. The high proportion who gave the reason "don't need/want" may reflect those with their own septic tanks, as well as those not interested in improved service.
101. The cost of connection appeared not to be recognised as a major problem, although 74% of businesses did not know what the cost was when asked. With better information about the actual costs, more businesses might be deterred.
102. Table 29 compares the reasons given by businesses for:-
 (a) not having a connection now; and
 (b) not wishing to connect in the future.
103. Most of the respondents who originally gave the reason that the service was not available, later stated that, if it became available, either:-
 (a) they did not need it; or
 (b) they did not know the reason; or
 (c) they gave a reason not coded on the questionnaire.

104. Over 50% of the businesses gave the same answer to both questions - extension of the system alone would not affect their attitudes. An educational or legislative programme may therefore be necessary if universal connection to the sewer is to be achieved.

COLUMN:

1	2	3	4
5	0	1	8

JOB NUMBER:

1	2	3	4
5	0	1	8

NATIONAL WATER AND SEWERAGE AUTHORITY
OF THE YEMEN ARAB REPUBLIC

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

BUSINESS QUESTIONNAIRE

BLOCK
REFERENCE
NUMBER

5	6	7	8

BUSINESS
REFERENCE
NUMBER

9	10

CARD
NUMBER

11

SUPERVISOR
NUMBER

12	13

INTERVIEWER
NUMBER

14	15

_____ TIME FINISHED _____ TIME STARTED _____ DATE

_____ CHECKED BY SURVEY MANAGER _____ CHECKED BY SUPERVISOR _____ CHECKED BY INTERVIEWER

- 16** REASON FOR NON-COMPLETION
- 1 NOT PRESENT AFTER THIRD CALL-BACK
 - 2 REFUSED TO BE INTERVIEWED
 - 3 INTERVIEW INCOMPLETE
 - 4 OTHER REASON

<p>6. IS THERE A CONNECTION TO YOUR BUSINESS FROM THE KENNEDY WATER SYSTEM?</p> <p>Yes <input type="checkbox"/> 17 No <input type="checkbox"/> 2</p> <p>(IF NO, GO TO QUESTION 14)</p>	<p>9. HOW MANY PEOPLE WORK IN THE BUSINESS WITHOUT RECEIVING WAGES?</p> <p>(WRITE IN) <input type="checkbox"/> 18 <input type="checkbox"/> 19</p>	<p>4. HOW MANY PEOPLE RECEIVE WAGES OR PROFITS FROM THE BUSINESS?</p> <p>(WRITE IN) <input type="checkbox"/> 20 <input type="checkbox"/> 21</p>	<p>3. HOW MANY PEOPLE USUALLY SLEEP IN THESE PREMISES EACH NIGHT?</p> <p>(WRITE IN) <input type="checkbox"/> 22 <input type="checkbox"/> 23</p>	<p>2. WHAT TYPE OF BUSINESS ACTIVITY IS CARRIED ON HERE?</p> <p><input type="checkbox"/> 24 Shop 1 Restaurant 2 Wholesaler 3 Workshop 4 Office 5 Lodging house 6 Cafe 7 Other 8</p>	<p>1. IS THIS BUSINESS RUN BY A PERSON LIVING ON THE PREMISES?</p> <p>Yes <input type="checkbox"/> 25 No <input type="checkbox"/> 2</p> <p>(IF YES, STOP QUESTIONNAIRE, ASK HOUSEHOLD QUESTIONNAIRE)</p>
<p>12. DO YOU HAVE A METER?</p> <p>Yes <input type="checkbox"/> 26 No <input type="checkbox"/> 2</p> <p>(IF NO, GO TO QUESTION 15)</p>	<p>11. ESTIMATE HOW MANY GHEE CANS THEY TAKE EACH MONTH?</p> <p>(WRITE IN) <input type="checkbox"/> 27 <input type="checkbox"/> 28 <input type="checkbox"/> 29</p>	<p>10. HOW MUCH DO THEY PAY EACH MONTH?</p> <p>(WRITE IN RIALS) <input type="checkbox"/> 30 <input type="checkbox"/> 31</p>	<p>9. DO THEY PAY FOR THE WATER THEY USE?</p> <p>Yes <input type="checkbox"/> 32 No <input type="checkbox"/> 2</p> <p>(IF NO, GO TO QUESTION 11)</p>	<p>8. HOW MANY PEOPLE APART FROM CUSTOMERS AND PEOPLE WORKING IN THE BUSINESS USUALLY SHARE YOUR KENNEDY CONNECTION?</p> <p>(WRITE IN) <input type="checkbox"/> 33 <input type="checkbox"/> 34</p>	<p>7. DO YOU GIVE OR SELL WATER TO ANOTHER FAMILY OR BUSINESS?</p> <p>Yes <input type="checkbox"/> 35 No <input type="checkbox"/> 2</p> <p>(IF NO, GO TO QUESTION 12)</p>

<p>18. DO YOU USUALLY GET SUFFICIENT KENNEDY WATER?</p> <p>Yes <input type="checkbox"/> 36 No <input type="checkbox"/> 2</p> <p>(IF YES, GO TO QUESTION 21)</p>	<p>17. ABOUT HOW MUCH DO YOU PAY EACH MONTH FOR KENNEDY WATER?</p> <p>(WRITE IN RIALS) <input type="checkbox"/> 37 <input type="checkbox"/> 38 <input type="checkbox"/> 39</p>	<p>16. ABOUT HOW MUCH KENNEDY WATER DOES YOUR BUSINESS USUALLY USE EACH MONTH?</p> <p>(WRITE IN CUBIC METRES) <input type="checkbox"/> 40 <input type="checkbox"/> 41 <input type="checkbox"/> 42</p>	<p>15. HOW MANY HOURS A DAY IS KENNEDY WATER USUALLY AVAILABLE?</p> <p>(WRITE IN NUMBER OF HOURS) <input type="checkbox"/> 43 <input type="checkbox"/> 44</p>	<p>14. DO YOU GET WATER FOR YOUR BUSINESS FROM A NEIGHBOUR'S KENNEDY CONNECTION?</p> <p>Yes <input type="checkbox"/> 45 No <input type="checkbox"/> 2</p> <p>(IF NO, GO TO QUESTION 20)</p>	<p>13. WHAT IS YOUR ACCOUNT NUMBER?</p> <p>(WRITE IN) <input type="checkbox"/> 46 <input type="checkbox"/> 47 <input type="checkbox"/> 48 <input type="checkbox"/> 49</p> <p>(GO TO QUESTION 15)</p>																														
<p>20. WHY DON'T YOU HAVE A KENNEDY CONNECTION FOR YOUR BUSINESS?</p> <table border="0"> <tr> <td>Connection not available in area <input type="checkbox"/> 55</td> <td>KWWS refused connection <input type="checkbox"/> 56</td> <td>Limited supply <input type="checkbox"/> 57</td> </tr> <tr> <td>1 2</td> <td>1 2</td> <td>1 2</td> </tr> <tr> <td>Water too expensive <input type="checkbox"/> 52</td> <td>Connection and meter too expensive <input type="checkbox"/> 53</td> <td>Water too salty <input type="checkbox"/> 54</td> </tr> <tr> <td>1 2</td> <td>1 2</td> <td>1 2</td> </tr> <tr> <td>Other <input type="checkbox"/> 50</td> <td>Don't know <input type="checkbox"/> 51</td> <td></td> </tr> <tr> <td>1 2</td> <td>1 2</td> <td></td> </tr> </table>			Connection not available in area <input type="checkbox"/> 55	KWWS refused connection <input type="checkbox"/> 56	Limited supply <input type="checkbox"/> 57	1 2	1 2	1 2	Water too expensive <input type="checkbox"/> 52	Connection and meter too expensive <input type="checkbox"/> 53	Water too salty <input type="checkbox"/> 54	1 2	1 2	1 2	Other <input type="checkbox"/> 50	Don't know <input type="checkbox"/> 51		1 2	1 2		<p>19. WHY DON'T YOU GET MORE? (Do not read out. Code each answer)</p> <table border="0"> <tr> <td>Limited supply <input type="checkbox"/> 61</td> <td>Water too expensive <input type="checkbox"/> 62</td> <td>Water not clean enough <input type="checkbox"/> 63</td> </tr> <tr> <td>1 2</td> <td>1 2</td> <td>1 2</td> </tr> <tr> <td>Limited storage <input type="checkbox"/> 58</td> <td>Other <input type="checkbox"/> 59</td> <td>Don't know <input type="checkbox"/> 60</td> </tr> <tr> <td>1 2</td> <td>1 2</td> <td>1 2</td> </tr> </table> <p>(GO TO QUESTION 21)</p>			Limited supply <input type="checkbox"/> 61	Water too expensive <input type="checkbox"/> 62	Water not clean enough <input type="checkbox"/> 63	1 2	1 2	1 2	Limited storage <input type="checkbox"/> 58	Other <input type="checkbox"/> 59	Don't know <input type="checkbox"/> 60	1 2	1 2	1 2
Connection not available in area <input type="checkbox"/> 55	KWWS refused connection <input type="checkbox"/> 56	Limited supply <input type="checkbox"/> 57																																	
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Limited storage <input type="checkbox"/> 58	Other <input type="checkbox"/> 59	Don't know <input type="checkbox"/> 60																																	
1 2	1 2	1 2																																	

REPEAT COLUMNS 1 TO 10 FROM CARD 1
PUNCH (2) IN COLUMN 11

<p>26. ESTIMATE HOW MANY GHEE CANS THEY TAKE EACH MONTH?</p> <p>12 13 14</p> <p>(WRITE IN)</p> <p>(GO TO QUESTION 28)</p>	<p>25. HOW MUCH DO THEY PAY EACH MONTH?</p> <p>15 16 17</p> <p>(WRITE IN)</p>	<p>24. DO THEY PAY FOR THE WATER THEY USE?</p> <p>18</p> <p>Yes 1 No 2</p> <p>(IF NO, GO TO QUESTION 26)</p>	<p>23. HOW MANY PEOPLE APART FROM CUSTOMERS AND PEOPLE WORKING IN THE BUSINESS SHARE YOUR SWEET WATER SUPPLY?</p> <p>19 20</p>	<p>22. DO YOU SHARE THE CONNECTION WITH ANOTHER BUSINESS OR FAMILY?</p> <p>21</p> <p>Yes 1 No 2</p> <p>(IF NO, GO TO QUESTION 28)</p>	<p>21. IS YOUR BUSINESS CONNECTED TO A PIPED SUPPLY OF SWEET WATER?</p> <p>22</p> <p>Yes 1 No 2</p> <p>(IF NO, GO TO QUESTION 27)</p>
<p>31. DO YOU USUALLY GET SUFFICIENT WATER FROM THIS SOURCE?</p> <p>23</p> <p>Yes 1 No 2</p> <p>(IF YES, GO TO QUESTION 33)</p>	<p>30. HOW MUCH DO YOU USUALLY PAY FOR THIS WATER EACH MONTH?</p> <p>24 25 26</p> <p>(WRITE IN RIALS)</p>	<p>29. ABOUT HOW MANY GHEE CANS OF THIS WATER DOES YOUR BUSINESS USUALLY USE EACH WEEK?</p> <p>27 28 29</p> <p>(WRITE IN)</p>	<p>28. HOW MANY HOURS A DAY IS THIS SWEET WATER AVAILABLE?</p> <p>30 31</p> <p>(WRITE IN NUMBER OF HOURS)</p>	<p>27. DO YOU USUALLY GET SWEET WATER FOR YOUR BUSINESS FROM A NEIGHBOUR'S PIPED SUPPLY?</p> <p>32</p> <p>Yes 1 No 2</p> <p>(IF NO, GO TO QUESTION 33)</p>	

<p>35. HOW MANY PEOPLE APART FROM CUSTOMERS AND PEOPLE WORKING IN YOUR BUSINESS USUALLY SHARE THIS WELL?</p> <p>33 34</p> <p>(WRITE IN)</p>	<p>34. DO YOU SHARE WATER FROM THIS WELL WITH ANOTHER BUSINESS OR FAMILY?</p> <p>35</p> <p>Yes 1 No 2</p> <p>(IF NO, GO TO QUESTION 37)</p>	<p>33. DO YOU GET WATER FOR YOUR BUSINESS DIRECTLY FROM A WELL?</p> <p>36</p> <p>Yes 1 No 2</p> <p>(IF NO, GO TO QUESTION 43)</p>	<p>32. WHY DON'T YOU GET MORE?</p> <p>Limited supply 40 Water too expensive 41 Water not clean enough 42</p> <p>1 1 1 2 2 2</p> <p>Limited storage 37 Other 38 Don't know 39</p> <p>1 1 1 2 2 2</p>		
<p>41. DO YOU USUALLY GET SUFFICIENT WATER FOR YOUR BUSINESS FROM THIS WELL?</p> <p>43</p> <p>Yes 1 No 2</p> <p>(IF YES, GO TO QUESTION 43)</p>	<p>40. WHAT IS THE COST PER MONTH OF THE WELL WATER YOU USE?</p> <p>44 45 46</p> <p>(WRITE IN RIALS)</p>	<p>39. ABOUT HOW MANY GHEE CANS DOES YOUR BUSINESS USUALLY USE EACH WEEK?</p> <p>47 48 49</p> <p>(WRITE IN)</p>	<p>38. ABOUT HOW FAR AWAY IS IT IN METRES?</p> <p>50 51 52</p> <p>(WRITE IN METRES)</p>	<p>37. IS THE WELL INSIDE YOUR PREMISES?</p> <p>53</p> <p>Yes 1 No 2</p> <p>(IF YES, GO TO QUESTION 39)</p>	<p>36. DO THE PEOPLE SHARING THIS WELL PAY YOU FOR THE WATER THEY USE?</p> <p>54</p> <p>Yes 1 No 2 Some but not all 3</p>

<p>45. ABOUT HOW MANY GHEE CANS OF THIS WATER DOES YOUR BUSINESS USUALLY USE EACH WEEK?</p> <p><input type="text"/> 55 <input type="text"/> 56 <input type="text"/> 57</p> <p>(WRITE IN NUMBER OF GHEE CANS)</p>	<p>44. HOW FAR AWAY IS THIS IN METRES?</p> <p><input type="text"/> 58 <input type="text"/> 59 <input type="text"/> 60</p> <p>(WRITE IN METRES)</p>	<p>43. DO YOU CARRY WATER FOR YOUR BUSINESS FROM A PUBLIC TAP IN THE STREET OR FROM A MOSQUE?</p> <p><input type="text"/> 61</p> <p>Yes 1 No 2</p> <p>(IF NO, GO TO QUESTION 42)</p>	<p>42. WHY DON'T YOU GET MORE? (Do not read out. Code each answer)</p> <p>Limited supply <input type="text"/> 65 Water too expensive <input type="text"/> 66 Water not clean enough <input type="text"/> 67</p> <p>1 1 1 2 2 2</p> <p>Limited storage <input type="text"/> 62 Water too far away <input type="text"/> 63 Other/don't know <input type="text"/> 64</p> <p>1 1 1 2 2 2</p>	
<p>49. DO YOU BUY WATER FOR YOUR BUSINESS FROM WATER TRUCKS?</p> <p><input type="text"/> 68</p> <p>Yes 1 No 2</p> <p>(IF NO, GO TO QUESTION 54)</p>	<p>48. WHY DON'T YOU GET MORE WATER FROM THESE SOURCES? (Do not read out. Code each answer)</p> <p>Limited supply <input type="text"/> 72 Water too expensive <input type="text"/> 73 Water not clean enough <input type="text"/> 74</p> <p>1 1 1 2 2 2</p> <p>Limited storage <input type="text"/> 69 Too far away <input type="text"/> 70 Other/don't know <input type="text"/> 71</p> <p>1 1 1 2 2 2</p>		<p>47. DO YOU USUALLY GET SUFFICIENT WATER FOR YOUR BUSINESS FROM THESE SOURCES?</p> <p><input type="text"/> 75</p> <p>Yes 1 No 2</p> <p>(IF YES, GO TO QUESTION 49)</p>	<p>46. ABOUT HOW MUCH DOES THIS USUALLY COST YOUR BUSINESS EACH WEEK?</p> <p><input type="text"/> 76 <input type="text"/> 77</p> <p>(WRITE IN RIALS)</p>

<p>DUPLICATE COLUMNS 1 TO 10 FROM CARD 1 PUNCH (3) IN COLUMN 11</p>				<p>53. WHY DON'T YOU GET MORE? (Do not prompt. Code each answer)</p> <p>Limited supply <input type="text"/> 15 Water too expensive <input type="text"/> 16 Water not clean enough <input type="text"/> 17</p> <p>1 1 1 2 2 2</p> <p>Limited storage <input type="text"/> 12 Other <input type="text"/> 13 Don't know <input type="text"/> 14</p> <p>1 1 1 2 2 2</p>	<p>52. DO YOU USUALLY GET SUFFICIENT WATER FROM WATER TRUCKS FOR YOUR BUSINESS?</p> <p><input type="text"/> 18</p> <p>Yes 1 No 2</p> <p>(IF YES, GO TO QUESTION 54)</p>	<p>51. HOW MUCH DOES THIS WATER COST EACH WEEK?</p> <p><input type="text"/> 19 <input type="text"/> 20 <input type="text"/> 21</p> <p>(WRITE IN RIALS)</p>	<p>50. HOW MANY TRUCKLOADS OF WATER DO YOU USUALLY BUY EACH WEEK?</p> <p><input type="text"/> 22 <input type="text"/> 23</p> <p>(WRITE IN TRUCKLOADS)</p>
<p>58. WHY DON'T YOU GET MORE? (Do not prompt. Code each answer)</p> <p>Limited supply <input type="text"/> 27 Water too expensive <input type="text"/> 28 Water not clean enough <input type="text"/> 29</p> <p>1 1 1 2 2 2</p> <p>Limited storage <input type="text"/> 24 Other <input type="text"/> 25 Don't know <input type="text"/> 26</p> <p>1 1 1 2 2 2</p>		<p>57. DO YOU USUALLY GET SUFFICIENT OF THIS WATER FOR YOUR BUSINESS?</p> <p><input type="text"/> 30</p> <p>Yes 1 No 2</p> <p>(IF YES, GO TO QUESTION 59)</p>	<p>56. ABOUT HOW MUCH DOES THIS USUALLY COST YOU EACH WEEK?</p> <p><input type="text"/> 31 <input type="text"/> 32</p> <p>(WRITE IN RIALS)</p>	<p>55. HOW MANY GHEE CANS OF WATER DO YOU USUALLY BUY EACH WEEK?</p> <p><input type="text"/> 33 <input type="text"/> 34 <input type="text"/> 35</p> <p>(WRITE IN GHEE CANS)</p>	<p>54. DO YOU BUY WATER FOR YOUR BUSINESS FROM TRADITIONAL WATER VENDORS?</p> <p><input type="text"/> 36</p> <p>Yes 1 No 2</p> <p>(IF NO, GO TO QUESTION 59)</p>		

<p>62. IF SWEET WATER WERE AVAILABLE FROM AN IMPROVED KENEDY SYSTEM IN THIS AREA AT HIGH PRESSURE 24 HOURS A DAY WOULD YOU CONNECT TO THIS SYSTEM?</p> <p>Yes <input type="checkbox"/> 37 1</p> <p>No <input type="checkbox"/> 2 2</p> <p>Already connected <input type="checkbox"/> 3 3</p> <p>Landlord's responsibility <input type="checkbox"/> 4 4</p> <p>(IF CODE 2 OR 4 GO TO QUESTION 64; IF CODE 3 GO TO QUESTION 65)</p>	<p>61. ABOUT HOW MUCH WATER FROM ALL SOURCES DOES YOUR BUSINESS USUALLY USE EACH MONTH?</p> <p><input type="checkbox"/> 38 <input type="checkbox"/> 39 <input type="checkbox"/> 40</p> <p>(WRITE IN CUBIC METRES)</p>	<p>60. DO YOUR BUSINESS PREMISES HAVE ANY OF THE FOLLOWING?</p> <p>Fitted bath/shower <input type="checkbox"/> 44 1 Yes 2 No</p> <p>Fitted sink/basin <input type="checkbox"/> 45 1 Yes 2 No</p> <p>Flush toilet <input type="checkbox"/> 45 1 Yes 2 No</p> <p>Water heater <input type="checkbox"/> 41 1 Yes 2 No</p> <p>Water storage tank <input type="checkbox"/> 42 1 Yes 2 No</p> <p>Motor vehicle <input type="checkbox"/> 43 1 Yes 2 No</p>	<p>59. DO YOU GET WATER FROM ANY OTHER SOURCE?</p> <p>Yes <input type="checkbox"/> 47 1</p> <p>No <input type="checkbox"/> 2 2</p>
<p>65. HOW MUCH WATER WOULD YOU USE IN TOTAL EACH DAY AT THE FOLLOWING PRICES IF THESE IMPROVEMENTS CAME ABOUT?</p> <p>The same as you pay now? <input type="checkbox"/> 48 <input type="checkbox"/> 49 <input type="checkbox"/> 50 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Half the price you pay now? <input type="checkbox"/> 51 <input type="checkbox"/> 52 <input type="checkbox"/> 53 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Double the price you pay now? <input type="checkbox"/> 54 <input type="checkbox"/> 55 <input type="checkbox"/> 56 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p>		<p>64. WHY WOULDN'T YOU OBTAIN A CONNECTION? (Do not prompt. Code each answer)</p> <p>Connection too expensive <input type="checkbox"/> 59 1 2</p> <p>Water too expensive <input type="checkbox"/> 60 1 2</p> <p>Water too salty <input type="checkbox"/> 61 1 2</p> <p>Other <input type="checkbox"/> 57 <input type="checkbox"/> 58 1 2</p> <p>(GO TO QUESTION 66)</p>	<p>63. HOW MUCH WOULD IT COST YOU TO MAKE THE CONNECTION AND PIPE WATER INTO YOUR BUSINESS PREMISES FROM THE KENEDY SYSTEM?</p> <p><input type="checkbox"/> 62 <input type="checkbox"/> 63 <input type="checkbox"/> 64 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>(GO TO QUESTION 65)</p>

DUPLICATE COLUMNS 1 TO 10 FROM CARD 1
PUNCH (4) IN COLUMN 11

<p>71. HOW FAR AWAY IS THE TOILET WHICH YOUR BUSINESS USUALLY USES?</p> <p><input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p>	<p>70. WHAT TOILET FACILITIES DO YOU USE?</p> <p><input type="checkbox"/> 15</p> <p>Share neighbour's toilet <input type="checkbox"/> 1 1</p> <p>Public toilet <input type="checkbox"/> 2 2</p> <p>Other <input type="checkbox"/> 3 3</p> <p>Own toilet in adjacent premises <input type="checkbox"/> 4 4</p>	<p>69. HOW MUCH DO YOU PAY FOR SEWAGE DISPOSAL EACH YEAR?</p> <p><input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>(WRITE IN RIALS)</p> <p>(GO TO QUESTION 73)</p>	<p>68. HOW MANY PEOPLE APART FROM CUSTOMERS AND PEOPLE WHO WORK IN YOUR BUSINESS SHARE YOUR TOILET?</p> <p><input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> <input type="checkbox"/></p> <p>(WRITE IN)</p>	<p>67. IS THE TOILET FOR YOUR OWN BUSINESS OR IS IT SHARED BY A NEIGHBOUR?</p> <p><input type="checkbox"/> 21</p> <p>Own <input type="checkbox"/> 1 1</p> <p>Share <input type="checkbox"/> 2 2</p> <p>(IF CODE 1, GO TO QUESTION 69)</p>	<p>66. DO YOU HAVE TOILET FACILITIES ON YOUR BUSINESS PREMISES?</p> <p><input type="checkbox"/> 22</p> <p>Yes <input type="checkbox"/> 1 1</p> <p>No <input type="checkbox"/> 2 2</p> <p>(IF CODE 2, GO TO QUESTION 70)</p>
<p>74. WHY DO YOU NOT HAVE FLUSH TOILET CONNECTED TO THE MUNICIPAL SEWER?</p> <p>Service not available <input type="checkbox"/> 26 1 2</p> <p>Water too expensive <input type="checkbox"/> 23 1 2</p> <p>Connection too expensive <input type="checkbox"/> 27 1 2</p> <p>Don't need/want <input type="checkbox"/> 24 1 2</p> <p>Listed water supply <input type="checkbox"/> 28 1 2</p> <p>Other/don't know <input type="checkbox"/> 25 1 2</p>		<p>73. WHAT KIND OF TOILET FACILITY IS THIS?</p> <p><input type="checkbox"/> 29</p> <p>Flush connected to municipal sewer <input type="checkbox"/> 1 1</p> <p>Flush connected to septic tank <input type="checkbox"/> 2 2</p> <p>Non-flush connected to cess-pit <input type="checkbox"/> 3 3</p> <p>Other <input type="checkbox"/> 4 4</p> <p>(IF CODE 1, GO TO QUESTION 78)</p>	<p>72. HOW MUCH DOES THIS USUALLY COST EACH WEEK?</p> <p><input type="checkbox"/> 30 <input type="checkbox"/> 31 <input type="checkbox"/> <input type="checkbox"/></p> <p>(WRITE IN RIALS)</p> <p>(GO TO QUESTION 74)</p>		

<p>73. WHAT IS THE TOTAL VALUE OF SALES BY YOUR BUSINESS EACH MONTH?</p> <table border="1" data-bbox="480 342 594 405"> <tr> <td>32</td> <td>33</td> <td>34</td> <td>35</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p>(RIALS)</p>	32	33	34	35					<p>74. WHAT IS THE TOTAL INCOME INCLUDING PROFITS THAT YOU AND YOUR FAMILY GET FROM THE BUSINESS EACH MONTH?</p> <table border="1" data-bbox="647 342 764 405"> <tr> <td>36</td> <td>37</td> <td>38</td> <td>39</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p>(RIALS)</p>	36	37	38	39					<p>76. HOW LONG HAS THIS BUSINESS BEEN OPERATING?</p> <table border="1" data-bbox="878 342 938 405"> <tr> <td>40</td> <td>41</td> </tr> <tr> <td></td> <td></td> </tr> </table> <p>(WRITE IN YEARS)</p>	40	41			<p>77. ABOUT HOW MUCH WOULD IT COST TO BECOME CONNECTED?</p> <table border="1" data-bbox="1019 342 1105 405"> <tr> <td>42</td> <td>43</td> <td>44</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table> <p>(RIALS)</p>	42	43	44				<p>76. WHAT IS THE MAIN REASON WHY NOT?</p> <table border="1" data-bbox="1247 342 1279 375"> <tr> <td>45</td> </tr> </table> <p>Connection too expensive 1 Don't need/want 2 Other 3 Don't know 4</p>	45	<p>75. IF THE SEWER WERE EXTENDED TO THIS AREA WOULD YOU PAY TO CONNECT TO THE SYSTEM?</p> <table border="1" data-bbox="1446 342 1479 375"> <tr> <td>46</td> </tr> </table> <p>Yes 1 No 2 Landlord's responsibility 3 (IF YES, GO TO QUESTION 77)</p>	46
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