

CENSUS OF INDIA 1991

QUALITY CONTROL PLAN FOR THE 1991 CENSUS

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QUALITY CONTROL PLAN FOR THE 1991 CENSUS

APPLICATION OF STATISTICAL QUALITY CONTROL METHODS IN 1991 CENSUS

INTRODUCTION

1.1 Techniques of Statistical Quality Control (SQC) have increasingly been used at various stages of generation of statistical data collected in large scale sample surveys and censuses. For the first time in the Indian Census, the technique of Statistical Quality Control (SQC) was adopted in the 1981 Census, with a view to achieving adequate level of accuracy of manual coding. From the considerations of time and cost, it was not possible to apply sampling inspection on an extensive scale.

Since the introduction of SQC was tried out for the first time in the 1981 Census, it was felt that it should be applied on a limited scale to guage its utility and administrative convenience. It was accordingly applied to codes given for economic questions in the Individual Slips pertaining to selected areas.

1.2 *Sampling Vs. 100% Inspection* : Sampling inspection should be preferred over 100% inspection of items as it will result in considerable economy in cost. A layman's view is that 100% inspection will ensure greater accuracy of data. This may not be the case, generally, because of the effect of 'inspection fatigue involved in 100% inspection. Inspection plan sampling or otherwise does not ensure 100% accuracy of final data output even if executed under extremely controlled conditions. From pragmatic considerations, therefore, we have to see whether the mistakes are within tolerable range in the sense that their existence does not mask the inherent characteristics of the data. In fact, a good sampling plan should ensure greater accuracy of data compared to 100% inspection. A good quality control plan should have two requisites : (1) it should produce data which should have acceptable level of accuracy according to some pre-assigned criterion : (2) it should effect considerable economy in cost compared to 100% inspection.

1.3 *Basic tools for Statistical Quality Control* : There are four different tools available for Quality Control. They are :

(a) Control Chart for measurable quality characteristics;

(b) Control Chart for percentage defective;

(c) Control Chart for number of defects;

(d) Acceptance Sampling Plan.

Control Charts are mainly aimed at prevention of errors through process control, when the products are homogeneous. The control limits in a Control Chart are either based on certain assumptions regarding the parent population or large sampling distribution of derived statistics. It examines whether the variation in the process is due to chance mechanism. The acceptance sampling procedure is a corrective device where the incoming products may be heterogeneous. Under stable conditions, we can derive exact probability distribution of the number of defective units observed in the sample. Further, the Acceptance Sampling Plan conforms to a number of pre-determined standards.

As the primary concern is to ensure reasonable accuracy of data through corrective measures, it is proposed to adopt Acceptance Sampling procedure as the SQC device. Of course, process control will be effected through prompt monitoring system.

In Acceptance Sampling, it is assumed that there is a population divided into lots or work-units. If the lots conform to certain standards, they are accepted. If not, the lots require to be corrected by some pre-determined method.

The main aim of applying SQC techniques in the census is to see whether the Coding work is going on under statistically controlled conditions in the sense that the magnitude of error is within the tolerable range. The results of such an exploratory exercise undertaken in the 1981 Census justify a confidence in the application of the techniques and further extension of SQC operations both in terms of coverage and content has to be undertaken in the 1991 Census. Accordingly, it has been decided to adopt the application of SQC techniques to all non-precoded questions in the 1991 Census, and the application of SQC will be extended to all Cities/UA's having population of 5 lakhs and above. Besides these cities, in order to give representation to major states which do not have any city having population of 5 lakhs or more, it has been decided to extend the application of SQC methods to the largest city in those states such as Cuttack U.A. (Orissa). In addition Delhi U.A. and Chandigarh U.A. where sampling has not been adopted will also be covered by SQC.

1.4 *Concepts and Definitions* : Before we pass on to further exposition of the plan, it is necessary to define a few terms used in SQC.

Clerk or Coder, and Noter or Quality Control (QC) Clerk

Clerk or Coder : A person engaged in editing or coding of Individual Slips will be called a Clerk or a Coder. An individual who duplicates the work of a Clerk on sample basis in the SQC system will be known as a Noter or a QC Clerk or Coder.

Item : An Individual Slip processed by a Clerk will be called an item.

Defect and Defective : An item will be called defective if it contains at least one mistake, defect or error. A defective item is also briefly called a "defective". Consequently, a defective may contain more than one defect.

Lot : The entire work is assumed to be divided into lots or work-units. For the purpose of Quality Control, a lot will normally be coterminous with about 200/500 Individual Slips.

Incoming Quality (IQ) : It denotes the percentage of defectives in a lot processed by a Clerk.

Process Average (P) : It is the percentage of defective items in a lot processed by an adequately skilled Clerk under normal conditions. This is also termed as Acceptable Quality Level (AQL).

Lot Tolerance Percentage Defective (LTPD) : If a lot has this defective rate or higher, it should normally be rejected.

Indifferent Quality Level (IQL) : It is the percentage of defective items in a lot corresponding to which the probability of accepting the lot is 50%. The inspection standard is measured by I.Q.L.

Producer's Risk (α) *and Consumer's Risk* (β): Producer's Risk is the probability of rejection of an acceptable lot (i.e. a lot with AQL). Consumer's Risk is the probability of acceptance of a substandard lot (i.e. a lot with LTPD). The values of 'α' and 'β' are usually taken as 5% and 10% respectively.

Operating Characteristic (OC) Curve : Efficacy of a design is brought out by what is called Operating Characteristic Curve, where the probability of acceptance of a lot with a given sample design, is plotted against the Incoming Quality (IQ). Two points on the OC Curve are $1-\alpha$ and β. The closer the corresponding values of IQ, the better is the sample design.

Average outgoing Quality (AOQ) : It is expected percentage of defective items in a lot after sampling inspection.

Average Outgoing Quality Limit (AOQL): It is the maximum AOQ of a lot after sampling inspection.

Expected Inspection Rate : It is the percentage of items we are expected to inspect for a given sampling plan.

1.5 *Size of Bundles and Lots* : A 10 per cent sample of Individual Slips is to be drawn for the first phase of tabulation for which instructions have been issued separately.

For applying the SQC techniques in the coding of Individual Slips of 1991 Census, it has been decided to use bundles of 2000 Individual Slips, which can be handled effectively by the Coding Staff. Generally, an Urban Enumeration Block consists of 600 to 800 Individual Slips. Thus, a bundle may consist of three or more Enumeration Blocks, with 1800 to 2200 Individual Slips approximately. A 10% sample of Individual Slips (i.e., about 180 to 220 slips) already drawn for the purpose of tabulation would be having stamp '1' and would have been folded as per instructions. Serial number of selected slips would have been written on the cover page of the pad alongwith total number of selected slips in the following manner.

Number of slips stamped.

(1) : 5(8, 18, 28, 38, 48).

(2) :

(3) :

Now continuous numbering in red ink to each selected Slip is to be given on the cover page of the pad, which should be in the following order :

Pad No.	No. of Slips Selected	Serial No. of the Slip given in bracket
1.	5	8, 18, 28, 38, 48 (1, 2, 3, 4, 5)
2.	5	8, 18, 28, 38, 48 (6, 7, 8, 9, 10)
3.	5	8, 18, 28, 38, 48 (11, 12, 13, 14, 15)

and so on.....

After giving continuous number to the Selected Slips (i.e., about 200) which will be the lot for SQC, the Control Person of the SQC Unit would select a Random start between 0 and 9 for sample selection for each lot, for the application of SQC techniques. For this purpose, any particular row or column of the random number table may be selected. Select a single digit number between 0 and 9 (both inclusive) for the first lot. The number zero will stand for random start 10. Thereafter, select every 10th slip as follows :

> For example if the random start is 5, the selected slips will be 5, 15, 25.....195 for the lot. Another random start may be selected from the random number table for the next lot. About 20 slips would be selected for the application of SQC techniques from each lot.

1.6 *SQC Scheme for Delhi U.A. and Chandigarh U.A.* : The above mentioned Scheme of SQC will not be applicable to Delhi U.A. and Chandigarh U.A. where sampling has not been adopted. A lot or a work-unit for the purpose of SQC would be around 500 Individual Slips. Each of the lots of slips normally coincides with an Enumeration Block (E.B). If an Enumeration Block has less than 500 Individual Slips, it should be tagged on to a neighbouring block to make a lot of at least 500 Individual Slips. For SQC purpose, a sample of 10% slips will be selected in the same manner as was done in 1981 Census.

The procedure in short is described as below :

Suppose the lot consists of 567 filled in Slips in 12(50 slips) pads and the random starts for the pad and the slips are 7 and 10 respectively. Dividing 567 by 50, the quotient got is 11, ignoring fraction. The selection of the sample Slips will commence from the 10th Slip of the 7th Pad of the lot with interval 11 in a circular fashion. The 10th slip of the 7th pad will now be called the first "Sample Slip". Choose every 11th Slip from the pad till no more Slip could be taken in the sample. The last selected slip from the 7th pad will be the 43rd Slip.

The pad which comes next is the 8th. Starting from the 4th Slip (taking into account the carryover of 7 slips from the preceding pad), every 11th slip in this pad (4th, 15th, 26th etc.) will be the sample Slips.

Take the pads one after another sequentially and continue selection of Slips till the required sample size of 50 is realised. There may be a shortfall in the sample size after you have selected the last Slip from the last pad. Continue selection of sample Slips from the first and the subsequent pads and stop as soon as you have exactly 50 Slips in the sample. In the present illustration, the last Slip of the last pad (i.e. the 12th pad), which has come into the sample is the 13th Slip of the pad and the 24th selected Slip in the sample. Taking into account the carry-over of 4 slips of the pad and the 24th selection continues starting with the 7th Slip of the first pad. The selection stops at the 32nd Slip of the 6th pad when the sample size of 50 realised.

1.7 *Acceptance Sampling Plan* : After careful consideration, it has been decided that Statistical Quality Control will be adopted on a limited scale in urban areas only and will be applied to all non-precoded questions of the individual slips of the 1991 Census. The Acceptance Sampling Scheme to be used for the SQC operation depends on size of the lot and the required average outgoing quality limit (AOQL). Based on the SQC results from the 1981 Census, it is estimated that the incoming error rate will be about 4 per cent. Due to limited time and resources it is accordingly proposed to accept an Acceptance Sampling Plan of (20,1) or (50,5) with an outgoing error rate of around 4%.

Area of Operation	Size of lot	SQC Sampling Scheme
All Cities/UA's except Delhi U.A. & Chandigarh U.A.	200	(20, 1)
Delhi U.A. & Chandigarh U.A.	500	(50, 5)

1.8 *Monitoring of Outcome of Sampling Inspection* : The editing of the Slips of a bundle (consisting of 3 or more Enumeration Blocks) should be completed first before it is passed on for noting work.

The secondary aim of SQC is to effect process control through prompt monitoring of the outcome through sampling inspection.

Error listing forms filled up by the Adjudicator will be used to monitor individual performances. Quality Control Charts based on the error rates or the cumulative error rates in respect of each Clerk (or Coder) reveal whether his work is under statistical control or not. The latter is more effective. Appropriate preventive measures should be taken whenever necessary.

The statements of errors by type brought out by sampling inspection will help in locating the mistakes more frequently committed.

1.9 *Evaluation of Coding Error* : The data generated by Statistical Quality Control, will provide useful information on Clerks' contribution to total error in Census.

CHAPTER 2

ORGANISATION OF THE QUALITY CONTROL WORK

2.1 *Scope of the Statistical Quality Control Plan* : In the 1991 Census SQC will be restricted to Cities/ UA's having population of 5 lakhs and above only. To give representation to major states which do not have any city of this status, it has been decided to extend the application of SQC to the largest city in those states. Under this category only Cuttack U.A. (Orissa) would find place. In addition, Delhi U.A. and Chandigarh U.A. where Sampling has not been adopted will also be covered by SQC. The list of Cities/UA's covered by the SQC is given in Appendix 1. In states where sampling is adopted for data processing SQC will be confined only to the first stage of tabulation i.e. 10% sampling of individual slips.

The Quality Control Units will be located at the Coding Cells where the Individual Slips for the concerned areas are going to be processed manually.

2.2 *Organisational Set-up of the Quality Control Unit* : The Data Processing Division of the Office of the Registrar General, India have already fixed the norms for the coding of Individual Slips. Some preliminary study has shown that a ratio of 9 : 1 between the numbers of Coders and Noters is reasonably adequate. There should be 1 Adjudicator for each group of 3 Noters. One Senior official (Investigator or Asstt. Director) should be in-charge of the Quality Control Unit and will be designated as the Control Person in the Quality Control set-up. In a few cases, the quantum of work may not justify appointment of more than 1 Noter. Nevertheless, the nature of the Quality Control Work demands that there should be a minimum of 2 Adjudicators in the system. Though the Quality Control Unit will work under the overall supervision of the Deputy Director to be posted at the Coding Cell, it should be *operationally completely independent* of the Coding Cell in all other respects. This operational independence is a *sine qua non* for effective implementation of SQC. As the personnel requirements for the Quality Control Unit are not much, it should be possible to deploy regular employees of the Directorates for working as Adjudicators and Control Person. The Noters may either be drafted in form the pool of Assistant Compilers of the State Directorates or be choosen from among the Checkers and Supervisors of the Coding Cell. This is not likely to affect the strength of Checkers and Supervisors in the Coding Cell. The adjudicator who must be highly proficient Coder should be of the rank of Computor/Statistical Assistant.

2.3 *Working of the Proposed Quality Control Plan* : As the matter stands, now, the editing of the Slips of a block should be completed first before they are ready for coding. The edit operation is outside the purview of the sampling inspection. The combined operation of Quality Control and coding should be viewed as being partitioned into 5 sub-operations viz., noting, coding, adjudication (1), re-coding & adjudication (2) which are to take place in this order. It is essential that this sequence is maintained under all circumstances.

Before a lot is coded, the Noter will receive from the Control Person the pads of a lot, all tied together, from which he will select a sample of about 20/50 Slips in the manner described in Chapter 1 with the help of the random numbers provided by the Control Person. He will look at the written responses of the filled in Individual Slips and write the corresponding codes on blank Noting Forms (Q. C. 2) or blank Individual Slips with rubber stamp of the "Name of Noter" in the end, which also he receives from the Control Person. As soon as he is through with the noting work of all the 20/50 sample Slips he should hand over the filled in Noting Forms alongwith all the pads of the lot properly tied together as before, to the Control Person. The Control Person should then send the lot back to the Coding Cell for coding. As soon as he receives the coded lot, back from the Coding Cell, he will pass on the lot alongwith the corresponding filled in Noting Forms to the Adjudicator for adjudication. The Adjudicator will compare the codes assigned by the Coder and the Noter in the sample slips and record the errors in the Error Listing Form (Q.C. 3A and Q.C. 3B). If the number of defective Slips in the sample is observed to

be equal to or less than the acceptance number, the mistakes are removed from the defective Slips and the lot is passed as being of acceptance level of quality. If, on the other hand, the number of defectives exceeds the acceptance number, the entire lot is rejected and must be re-coded. After the review is over, the Adjudicator submits the lot, the filled in Noting Forms and Error Listing Form(s) to the Control Person for further necessary action. As soon as the Control Person receives a lot back from the Adjudicator, he checks whether the lot is accepted or rejected. In the latter case the lot is sent back to the Coding Cell for re-coding. After the re-coded lot comes back to him, he gives it over to a different Adjudicator alongwith blank Error Listing Form(s) and associated Noting Forms for second review. At the second review, a lot is always accepted. At the conclusion of the second review, the Adjudicator sends the filled in Noting Form(s) and the lot back to the Control Person.

It is evident that the role of the Control Person is very crucial. Besides co-ordinating the flow of material in the Quality Control Unit, he is also to ensure smooth and timely movement of lots from the Coding Cell to the Quality Control Unit and vice versa. He should have prior knowledge as to the programme of coding work in the Coding Cell indicating the dates and the order in which the lots are to be coded. He should see to it that the lots are made available for noting before the coding work of the same are taken up by the Coding Cell. In fact, the coding programme should be drawn up jointly by the Officers in-charge of the two Units. It will be convenient if the lots which are going to be coded during the next week, are taken up for the noting work during the current week. In order to avoid disruption in the flow of feed to the DDE's, the Control Person must ensure that the lots which have already passed through all the necessary operations of SQC viz., noting, coding, first adjudication, re-coding & second adjudication are sent back to the appropriate section without any delay. The Control Person, should, therefore, maintain a log book indicating flow of material to/from various persons, in the Form prescribed for the purpose (Q.C. 1).

2.4 *Timing of Sampling Inspection and Monitoring of Coders' Performance* : The usual procedure of adopting 5 days from Monday through Friday as reference week poses some problem as there may be intervening holidays. There may be spillover from the preceding week to the next, disturbing smooth working of the inspection plan. A reference week will, therefore, be defined as a block of 5 consecutive working days excluding the holidays coming in between. As the adjudication work will commence only after a lot is coded, there should normally be a time-lag between the reference week of coding and that of sampling inspection.

The Adjudicator will compile two more statements (Q.C. 4 & Q.C. 5A/5B) one giving individual performances of the Coders in terms of occurrences, of defectives and rejection of lots and the other displaying distribution of errors by type as revealed by sampling inspection. For this purpose, the lots will be equally divided between the two Adjudicators. As a rule the statements pertaining to the lot reviewed by one Adjudicator should be compiled by the other Adjudicator. The two summary statements are to be made in triplicate. The Adjudicators will submit all the copies of the statements to the Control Person. The Control Person will retain two copies each of the statements with him and pass on the third copy with comments to the Coding Cell without delay for suitable remedial measures at their end.

2.5 *Various Quality Control Forms* : Besides the log book to be used by the Control Person for keeping record of flow of material, there will be four other Forms for use by the Quality Control Unit. Out of these two—Q.C. 2 & Q.C. 3 will be primary Forms recording the outcoming of sampling inspection. The other two, viz. Q.C. 4 & Q.C. 5 are the summary statements to be compiled from the primary Forms. The specimen Forms are given in Appendix 2.

CHAPTER 3

INSTRUCTIONS TO QUALITY CONTROL PERSONNEL

3.1 *Noter's Duties* : A lot may consist of three or more Enumeration blocks (except in case of Delhi U.A. and Chandigarh U.A.). It is necessary that you should be conversant with the coding manual. You have to select a sample of 20 slips as per procedure laid down in Chapter I and complete the coding of all non-precoded questions of these sample slips using the empty noting Forms (Q. C. 2) to write the codes. States having large number of blank Individual Slips of 1991 Census can also use them but they have to put the rubber stamp of "Name of Noter" in the end. It is absolutely imperative that you do not write on the original Slips you have selected out of the lot. The work you do is called "noting". Given below are step by step instructions which you must follow precisely. The instructions apply for each lot you are going to work on.

1. Alongwith the lot of Slips, the Control Person must have given you the total number of filled in Slips in the lot and one random number (random start) to identify the first sample Slip. Quickly count the number of filled in Slips in the lot, excluding blank and cancelled Slips. In case it differs from the one indicated by the Control Person, bring the matter to his/her notice and get the difference reconciled.

2. Now on the cover page of the pad continuous numbering in red ink to selected slips of the 10% sample is to be given. Thus, in a lot this numbering may go upto 180 to 220.

3. Suppose the lot consists of 200 slips and the random start is 7. The selection of sample slips will commence from the 7th slip of the first pad of the lot with interval 10 in a systematic fashion. Thus, the slips numbering 7, 17, 27, 37 and so on would be selected for SQC purposes.

4. In case of Delhi U.A. and Chandigarh U.A. where sampling has not been adopted the above mentioned Scheme of SQC will not be applicable. For Delhi U.A. and Chandigarh U.A. a lot or a work unit for the purpose of SQC would be around 500 Individual Slips. Each lot normally coincides with an Enumeration Block (E.B.). If an Enumeration Block has less than 500 Individual Slips, it should be tagged on to a neighbouring block to make a lot of at least 500 Individual Slips. For SQC purpose, a sample of 10% slips will be selected in the same manner as was done in 1981 Census.

The procedure in short is described below :

Suppose the lot consists of 567 filled in slips in 12 (50 slips) pads and the random starts are 7 and 10. Dividing 567 by 50, you obtain the quotient as 11, ignoring fraction. The selection of the sample Slips will commence from the 10th Slip of the 7th pad of the lot with interval 11 in a circular fashion. The 10th slip of the 7th pad will now be called the first "Sample Slip". Choose every 11th Slip from the pad till no more slip could be taken in the sample. The last selected slip from the 7th pad will be the 43rd Slip.

The pad which comes next is the 8th. Starting from the 4th Slip (taking into account the carryover of 7 slips from the preceding pad), every 11th Slip in this pad (4th, 15th, 26th etc.) will be the sample Slips.

Take the pads one after another sequentially and continue selection of Slips till the required sample size of 50 is realised. There may be a short-fall in the sample size after you have selected the last Slip from the last pad. Continue selection of sample Slips from the first and the subsequent pads and stop as soon as you have exactly 50 Slips in the sample. In the present illustration, the last Slip of the last pad (i.e., the 12th pad), which has come into the sample is the 13th Slip of the pad and the 24th selected Slip in the sample. Taking into account the carry-over of 4 slips from the last pad, the selection continues starting with the 7th Slip of the first pad. The selection stops at the 32nd Slip of the 6th pad when the sample size of 50 realised.

5. Take a fresh blank Noting Form (or blank Individual Slip with rubber stamp of "Name of Noter" in the end) provided to you. Copy the location code, serial no. of household, pad no. and Slip no. of the sample Slip and identification particulars

of the individual viz., name, relationship to head, male/female, and age on to the blank Noting Form. Also enter your name at the bottom of the Form.

6. Using the standard coding procedures code all the non-precoded questions on the sample Slip, taking care not to write anything on this Slip. Enter the codes in the corresponding boxes of the Noting Form.

7. Carry out instructions 3 and 5 (4 & 5 for Delhi U.A. and Chandigarh U.A.) for the new sample Slip.

8. Take the pads one after another sequentially and continue the selection of slips and carry out instructions 5-6.

9. Clip the 20/50 completed Noting Forms for this lot together and give these to the Control Person alongwith the lot of Slips securely tied together.

10. Receive a new lot from the Control Person and go back to instructions.

3.2 *Adjudicator's Duties* : Each of the lots of the Slips, submitted to you by the Control Person, contains all the completed and coded Slips of a lot. You further received a bundle of 20/50 Noting Forms on which codes of all non-precoded questions have been entered. You further received an Error Listing Form (Q.C. 3A & 3B) on which the names of the Coder, the Noter and yourself have to be entered. Please see whether this is a first review or a second review. Before you start your work, enter the identification particulars of the lot at the appropriate places. Write the numbers of all the constituent blocks in the space provided against 'Lot No.'. You have to match the codes given in each of the 20/50 sample Slips with the corresponding codes on the Noting Forms and if the two codes differ, you have to find out in which of the records the error lies. Following are the step by step instructions which you must follow precisely. These instructions apply for each lot you are going to work on. The work you will be doing is called "adjudication" and it is of utmost importance that you perform this task correctly.

1. Receive the lot of Slips, the bundle of Noting Forms and the blank Error Listing Form from your Control Person.
2. Check the box beside "REVIEW" to see whether this is a first or a second Review. If first then the box contains a "1" otherwise a "2".
3. Take the first Noting Slip from the pile and determine the Slip No. written on it.
4. Locate the Slip with the same number (Pad No. and Slip No.) in the lot. This Slip is the first "sample Slip".
5. Put the Slips side by side and compare the first corresponding code on both Slips.
6. If the codes agree, go to instruction 12.
7. If the codes disagree, write in the next line in the respective columns :
   - — Pad No.
   - — Slip No.
   - — Question No.
   - — Noter's code
   - — Coder's code
8. Using standard coding procedures determine what the correct code should be and enter this code in the column headed "Adjudicator".
9. If your code disagrees with that of the Noter put a check mark " √ " in the column "Error-Noter".
10. If your code disagrees with that of Coder put a check mark " √ " in the column "Error-Coder".
11. If your code disagrees with both Noter and Coder put check mark " √ " in both "Error-Noter" and "Error-Coder" columns.
12. Compare the next codes on the Slips and continue with instruction 6.
13. If the matching of the two Slips is completed put the noting Slip back in the respective pile in correct sequence, get the next noting Slip from the pile and proceed with instruction 4.
14. When all 20/50 sample Slips have been compared, do the following.
15. Take the Error Listing Form and review it. Check all entries to see whether there are two or more errors which come from the same Slip. Check also whether there are check-marks on the corresponding lines in the "Error-Coder" column. If so, draw a circle around these check-marks.
16. Continue doing this until all groups of check-marks in the Error-Coder column which relate to the same Slips have been circled.

17. For each lot count the number of circles and add to this sum the number of single uncircled check-marks in the "Error-Coder" column. This total should give the number of sample Slips with errors (number of defective Slips). Enter the number in the box provided for the purpose.

18. The acceptable number of defectives have been de ermined as below :

All Cities/UA's except Delhi/Chandigarh U.A. :	1
Delhi/Chandigarh U.A. :	5

If the number of Slips with errors is equal to or less than the specified number indicated, above against the corresponding area, put check mark (✓) in the "Accept" box; otherwise, put check mark (√) in the "Reject" box.

19. If you put check mark in the "ACCEPT" box, correct the errors in the sample Slip only.

20. If this is a second review, always put check mark (√) in the "ACCEPT" box only and correct the errors in the sample Slips.

21. Return the bundle of Noting Forms, the lot and the Error Listing Form to the Control Person.

3.3 *Adjudicator's Duties in respect of Compilation of Q.C.* 4 *and Q.C.* 5 : Besides your work of adjudication, the Control Person will give you the filled in Error Listing Forms (Q.C. 3A&3B)—first review only relating to the lots adjudicated by your colleague during the preceding week and blank Q.C. 4 and Q.C. 5A&5B Forms. Before you commence compilation, enter identification particulars of the lots and reference week (block of five working days) of sampling inspection. If you require to fill in more than one sheet of Forms, clip them together before passing them on to the Control Person. The manner in which the Forms are to be filled in, is simple. However, the essential points are mentioned below:—

3.3.1 *Instructions for filling up Q.C.* 4

Col. 2 : If there are more than one block in a lot give E.B. No. of each constituent block.

Col. 4 : Copy out the number from the box below col. 8 of the relevant Q.C. 3 Form.

Col. 5 : $\frac{\text{Col. 4}}{\text{Col. 3}} \times 100$

Col. 6 : Make appropriate entry from the 'Accept' or 'Reject' box at the bottom of relevant Q.C. 3 Form.

3.3.2 *Instructions for filling in Q.C.* 5 :

Cols. 2-10 of QC 5A, or Cols. 2-14 of QC 5B :

Assemble all the Error Listing Forms of all the lots corresponding to each Coder. Take up the Forms one by one and from entries in cols. 3 and 8, enter tally marks in appropriate columns of Q.C. 5 Form. After you have done with all the Error Listing Forms in respect of a Coder, write the frequency in each column, counting the tally marks.

3.4 *Control Person's Duties* : Your responsibility as a Control Person is to see that the entire operation runs smoothly and efficiently and to ensure that the staff concerned (Noters and Adjudicators) get their proper material. You should also see to it that each has a set of reference material for coding. You are not only to regulate the flow of material in your Unit but also to plan the coding schedule jointly with the Officer-incharge of the Coding Cell so that the sequence in which each sub-operation has to be executed, is preserved under all circumstances. The main duties that you will be performing, are given below :

1. Make sure that the Noter gets each lot before it has been coded and that the Noter has sufficient supply of blank Noting Forms. Before you give a lot to the Noter, count the total number of filled in Slips (excluding blank and cancelled Slips) and select one random number from the random number table (two random numbers for Delhi/Chandigarh U.A.). For Delhi/Chandigarh U.A. the first number indicates the pad number from which the selection of the Slips is to commence and the second number is meant for identifying the first sample Slip within it. For example, if there are 721 filled in Slips contained in 15 pads of a lot, select one random number between 1 and 15. Take the sampling interval as 14 (721/50=14, ignoring fraction). Independently, select another number between 01 and 14 from the random no. table. You have to communicate these numbers to the Noter.

2. Make absolutely certain that the Coder does not get the knowledge of the Slips selected in the sample. You must see to it that the

sample Slips do not have any identifying marks on them.

3. Whenever a lot is received back from the Coding Cell for adjudication, hand over the lot to the Adjudicator alongwith blank Error Listing Forms (Q.C. 3A&3B) with names of Noter, Coder and Adjudicator entered at the top of the Form. Similarly enter 1 or 2 in the box besides 'Review' if it is the first or the second review. In case of a second review, give also the name of the Re-Coder.

4. If a rejected lot comes back from the Adjudicator, you can see on the Error Listing Form whether the lot was rejected. Ensure that the rejected lot is re-coded by a different Coder than the one who did the initial coding. In case of the second review do not give the Adjudicator the Error Listing Form completed at the first review but only a blank Error Listing Form to be completed at the second review.

5. In case of accepted lots see to it that the correction is carried out by the Adjudicator in the sample slips. In case of rejected lots errors should be corrected by the Adjudicator only after the second review.

6. For the rejected lots, keep the Error Listing Forms of both the first and the second reviews, pinned together, though the statements Q.C. 4 and Q.C. 5A and 5B are to be compiled from the Error Listing Form emanating from the first review only.

7. You should properly index and file the various Quality Control Forms for the purpose of analysis in the future. The summary statements Q.C. 4, and Q.C. 5A & 5B would have been submitted to you in triplicate. You should make appropriate comments in the columns provided for the purpose, highlighting the mistakes most commonly found. You should also indicate whether individual Coders' performances are consistently good, consistently bad or satisfactory. This will help the Officer-in-charge of the Coding Cell in taking appropriate remedial measures. One copy each of the summary statements should be sent to the Coding Cell for the purpose. One set should be retained by you and the remaining set sent to the Centre for further action.

8. You should chalk out the programme of coding of lots jointly with the Officer-in-charge of the Coding Cell suitably. It will be convenient if the lots which are scheduled to be coded during the next week, are sent for noting during the current week.

9. You are required to organise the various sub-operations sequentially over time. It is simpler to treat a block of five consecutive working days as the reference week for each of the sub-operations. If the noting work commences one week earlier than the coding work, there will be one week's time-lag between the two. The Adjudicator's week may both start and end one day or two days later than the Coder's with regard to the same set of lots.

10. Keep and update a log book for each lot to make certain that it goes through the proper sequence of operations and in the correct order. Q.C. 1 has been prescribed for this purpose.

APPENDICES

APPENDIX 1

CITY/U.A. FOR SQC OPERATION 1991

State	City/U.A.		Population
1. Andhra Pradesh	1. Hyderabad	U.A.	4,273,498
	2. Visakhapatnam	U.A.	1,049,792
	3. Vijayawada		838,944
2. Assam	1. Guwahati	M.C.	577,591
3. Bihar	1. Patna	U.A.	1,098,572
	2. Jameshedpur	U.A.	834,535
	3. Dhanbad	U.A.	817,549
	4. Ranchi	U.A.	614,454
4. Gujarat	1. Ahmedabad	U.A.	3,279,778
	2. Surat	U.A.	1,517,076
	3. Vadodara	U.A.	1,115,265
	4. Rajkot	U.A.	651,007
5. Haryana	1. Faridabad Complex		613,828
6. Karnataka	1. Bangalore	U.A.	4,108,013
	2. Mysore	U.A.	652,246
	3. Hubli-Dharwad	M.C.	647,718
7. Kerala	1. Kozhikode	U.A.	800,852
	2. Kochi	U.A.	1,134,883
	3. Thiruvananthapuram	U.A.	825,450
8. Madhya Pradesh	1. Indore	U.A	1,104,065
	2. Bhopal	U.A.	1,063,662
	3. Jabalpur	U.A.	887,188
	4. Gwalior	U.A.	720,068
	5. Durg-Bhilainagar	U.A.	688,670
9. Maharashtra	1. Greater Bombay	U.A.	12,569,578
	2. Nashik	U.A.	723,669
	3. Pune	U.A.	2,414,020
	4. Solapur	U.A.	620,499
	5. Aurangabad	U.A.	591,968
	6. Nagpur	U.A.	1,657,135
10. Orissa	1. Cuttack	U.A.	439,273
11. Punjab	1. Ludhiana		1,012,062
	2. Amritsar		709,456
	3. Jalandhar		519,530
12. Rajasthan	1. Jaipur	U.A.	1,514,425
	2. Jodhpur		648,621
	3. Kota		536,444

APPENDIX 1—Concld.

State	City/U.A.		Population
13. Tamil Nadu	1. Madras	U.A.	5,361,468
	2. Coimbatore	U.A.	1,135,544
	3. Madurai	U.A.	1,093,702
	4. Tiruchchirappalli	U.A.	711,120
	5. Salem	U.A.	573,685
14. Uttar Pradesh	1. Kanpur	U.A.	2,103,483
	2. Lucknow	U.A.	1,669,136
	3. Varanasi	U.A.	1,018,370
	4. Agra	U.A.	903,350
	5. Allahabad	U.A.	841,638
	6. Meerut	U.A.	833,294
	7. Bareilly	U.A.	611,513
	8. Ghaziabad	U.A.	519,502
15. West Bengal	1. Calcutta	U.A.	10,860,399
	2. Asansol	U.A.	763,845
16. Chandigarh	1. Chandigarh	U.A.	574,646
17. Delhi	1. Delhi	U.A.	8,375,188

APPENDIX 2

QUALITY CONTROL OF CODING OF ALL QUESTIONS: CENSUS OF INDIA, 1991
Q.C. 1 CONTROL PERSON'S LOG BOOK

Name of State/District

Name of City/U.A.	Name or No. of Ward	E.B.* No.	Lot No.	Number of		Name with Dates of Allotment and Receipt					Remarks
				Pads	Slips@	Noter	Coder	Adjudi-cator 1	Re-Coder	Adjudi-cator 2	
1	2	3	4	5	6	7	8	9	10	11	12

*Blocks belonging to the same lot should be bracketted.

@Excludes blank and cancelled Slips.

APPENDIX 2

QUALITY CONTROL OF CODING OF ALL QUESTIONS: CENSUS OF INDIA, 1991
Q.C. 2 NOTING FORM

Location Code

Sl. No. of Household ( )

Pad No. ——————————

Slip No. ——————————

1 Name ——————————

3 Male/Female ——————————

4 Age ——————————

2

5

6

7

8

10

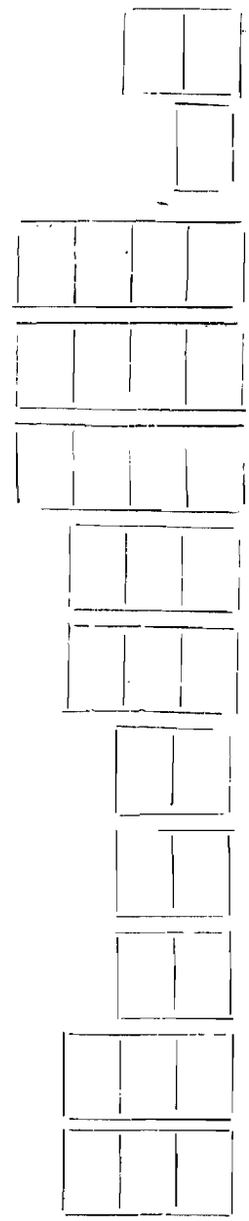
12

14A

15A

15A(ii)

15A(iii)



15A(iv)

15B

15B(ii)

15B(iii)

15B(iv)

18(a)

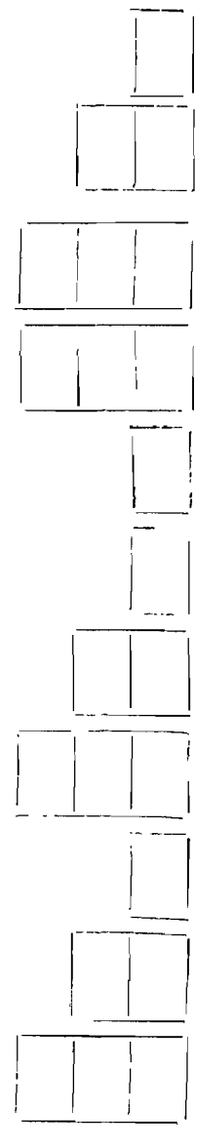
(c)

(d)

19(a)

(c)

(d)



Name of Noter ——————————

APPENDIX 2

QUALITY CONTROL OF CODING OF ECONOMIC QUESTIONS: CENSUS OF INDIA, 1991
Q.C. 3A ERROR LISTING FORM

Name of :

State .....

District .....

City/U.A. .....

Ward.....

Lot No .....

Name of :

Noter .....

Coder .....

Re-Coder .....

Adjudicator .....

Review [ ]

Page.....of.....

Questions 14A-15B(iv) [Excluding 14B, 15A(i) and 15B(i)]

Pad No.	Slip No.	Question No.	Code assigned by			Error	
			Noter	Coder	Adjudicator	Noter	Coder
1	2	3	4	5	6	7	8

Accept [ ]

Reject [ ]

No. of Slips with Errors [ ]

Date of adjudication.....

APPENDIX 2

QUALITY CONTROL OF CODING OF NON-ECONOMIC QUESTIONS : CENSUS OF INDIA, 1991
Q.C. 3F ERROR LISTING FORM

Name of :

State .....

District .....

City/U.A. .....

Ward .....

Lot No. .....

Name of :

Noter .....

Coder .....

Re-Coder .....

Adjudicator .....

Review

Page ..... of .....

Questions 2, 5, 6, 7, 8, 10, 12, 18 (a, c, d), 19 (a, c, d)

Pad No.	Slip No.	Question No.	Code assigned by			Error	
			Noter	Coder	Adjudicator	Noter	Coder
1	2	3	4	5	6	7	8

Accept

Reject

No. of Slips with Errors

Date of adjudication _____

APPENDIX 2

QUALITY CONTROL OF CODING OF ALL QUESTIONS: CENSUS OF INDIA, 1991
Q.G. 4 LOTWISE STATEMENT OF CODER'S PERFORMANCE DURING THE PRECEDING WEEK

Name of :
State———————
District———————
City/UA———————

Reference week of
Sampling Inspection———————

Name of Coder	Lot No.	Lot Size	No. of Defective Slips in the sample	Percentage Defectives	Rejected or Accepted	Remarks of Control Person
1	2	3	4	5	6	7

Compiled by———————
(with date)

APPENDIX 2

QUALITY CONTROL OF CODING OF ECONOMIC QUESTIONS: CENSUS OF INDIA, 1991
Q.C. 5A WEEKLY STATEMENT OF CODERS' ERRORS BY QUESTIONS

Name of :
State ——————
District ——————
City/UA ——————

Reference Week of
Sampling Inspection ——————

Name of Coder	Frequency of occurrence of errors by Questions									Remarks by Control Person
	14A	15A	15A(ii)	15A(iii)	15A(iv)	15B	15B(ii)	15B(iii)	15B(iv)	
1	2	3	4	5	6	7	8	9	10	11
All Coders										

Compiled by ——————
(with date)

REVISED

APPENDIX 2

QUALITY CONTROL OF CODING OF ECONOMIC QUESTIONS : CENSUS OF INDIA 1991
Q.C.5A WEEKLY STATEMENT OF CODER'S ERRORS BY QUESTIONS

Name of :
State_____
District_____
City/U.A_____

Reference Week of
Sampling Inspection_____

Name of Coder	Lot No.	Lot Size/ SQC Sample Size	Frequency of occurrence of errors by Questions									Remarks by Control Person
			14A	15A	15A(ii)	15A(iii)	15A(iv)	15B	15B(ii)	15B(iii)	15B(iv)	
1	2	3	4	5	6	7	8	9	10	11	12	13
All Coders												

Compiled by_____
(with date)

APPENDIX 2

QUALITY CONTROL OF CODING OF NON-ECONOMIC QUESTIONS : CENSUS OF INDIA 1991

Q.C.5B WEEKLY STATEMENT OF CODERS' ERRORS BY QUESTIONS

Name of :

State_____

District_____

City/U.A_____

Reference Week of

Sampling Inspection_____

Name of Coder	Lot No.	Lot Size/ SQC Sample Size	Frequency of occurrence of Errors by Questions													Remarks by Control Person
			2	5	6	7	8	10	12	18(a)	18(c)	18(d)	19(a)	19(c)	19(d)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
All Coders																

Compiled by_____

(with date)

APPENDIX 2

QUALITY CONTROL OF CODING OF NON-ECONOMIC QUESTIONS: CENSUS OF INDIA, 1991
Q.C. 5B WEEKLY STATEMENT OF CODERS' ERRORS BY QUESTIONS

Name of :
State ——————————
District ——————————
City/UA ——————————

Reference Week of
Sampling Inspection ——————————

Name of Coder	Frequency of occurrence of Errors by Questions													Remarks by Control Person
	2	5	6	7	8	10	12	18(a)	18(c)	18(d)	19(a)	19(c)	19(d)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
All Coders														

Compiled by ——————————
(with date)

MGIPF—685RGI/91—4-12-91—300.