EARLY CHILDHOOD MORTALITY

AND

PERINATAL PERIOD MANAGEMENT IN URBAN POOR

Report Submitted to

THE MINISTRY OF HEALTH AND FAMILY WELFARE
(Under USAID Child Survival Programmes), Government of India

by

The Department of Pediatrics, Maulana Azad Medical College,
New Delhi-110 002

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EARLY CHILDHOOD MORTALITY AND PERINATAL PERIOD MANAGEMENT IN URBAN POOR

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INTRODUCTION

Nearly one third of the world's population lives in substandard housing conditions in urban areas - a situation likely to worsen with the current demographic trend of the population doubling every thirty years. It is estimated that of the 830 million people in India, almost a quarter lives in urban areas; of these over 60% live in sub human conditions deprived of basic social and health services. In Delhi alone, about 35,00,000 people live in slums which may be broadly classified as unauthorized colonies, JJ resettlement colonies, walled cities or Katras and Jhuggi Jhompri (JJ) clusters (Bastees). Of these, the last, namely JJ clusters are the worst off as far as habitat and availability of basic services are concerned. Estimates by the slum wing, Delhi Development Authority (DDA) indicate that about 1.3 million people reside in these JJ clusters.

In majority of cases, the urban poor (JJ clusters) of cosmopolitan cities are probably worse off than the rural poor with respect to availability of basic amenities of life (water supply and sanitation) and health care delivery. In rural areas, there is a definite envisaged Primary Health Centre with its network. Conversely, in a prime metropolitan city like Delhi, multiple authorities administer health care services (Central Government, Municipality, State Administration, Dispensaries, Polyclinics, Private

Sectors and so forth). Unfortunately, however, these services are not effectively networked for delivery of health care to the underprivileged urban poor. Recent surveys of the National Institute of Health and Family Welfare (1,2) and voluntary sectors (Society for Action in Community Health - SACH) have revealed an abysmally low utilization of the existing health services by the residents of Delhi's JJ Clusters.

In this setting, therefore, it would be logical to assume a higher rate of childhood mortality. However, there is no precise quantification of this aspect as the urban poor are not covered by the Sample Registration System (SRS) - the only reliable source of vital statistics on a national scale. Rough estimates from occasional surveys on a limited scale indicate that early childhood mortality is considerably higher than the projected national figures. It is, therefore, vital to get reliable estimates of under five mortality and its secular change amongst the urban poor. This would prove invaluable in prioritizing the child survival programmes in the national context.

It is now well recognized that the peri-natal and neonatal periods are important components of early childhood mortality. Baseline information on management of peri-natal and neonatal period in the urban poor is scanty. This data

METHODS

Bastees were selected as their economic, social, sanitary and health conditions are considered to be worst.

According to the latest list obtained from the slum wing of Delhi Development Authority (DDA), there are, at present 929 JJ Bastees in Delhi inhabiting about 2.5 lakh families. These have been divided into five zones (Table 1). The surveyed clusters were selected from these 929 areas.

TABLE 1: JJ Bastee Zones as per DDA List

Zone	No. of clusters
Central	93
East	123
North	227
South	282
West	204

b. **Sample Size**

The childhood mortality survey was conducted strictly according to the guidelines laid down by a recent UNICEF publication from the Regional Office of the Middle East and North Africa (3).

Prior to starting the survey, it was anticipated that the proportion of children dead by the Preceding Birth Technique would range from 0.10 to 0.15. From the earlier data (3) it was estimated that roughly 4 to 6 married women in the age range 15-49 years would need to be interviewed for one index woman of Preceding Birth Technique. It was decided that a precision of 1.5% would be adequate. The cluster design effect was assumed to be 2. Based on these assumptions, the maximum sample size required for by the Preceding Birth Technique was calculated to be 18,000 ever-married women in the age range 15-49 years. The **Basic Sampling Unit (BSU)** was, therefore, defined as a household with **at least one** ever married woman in the age group of 15-49 years.

C. Cluster Selection

In the initial proposal submitted it was envisaged that 3600 households would be surveyed in each zone by selection of 6 clusters of 600 households in each zone. However, later it was realized (3), that it would be more accurate and representative to split the sample size into as many clusters as possible.

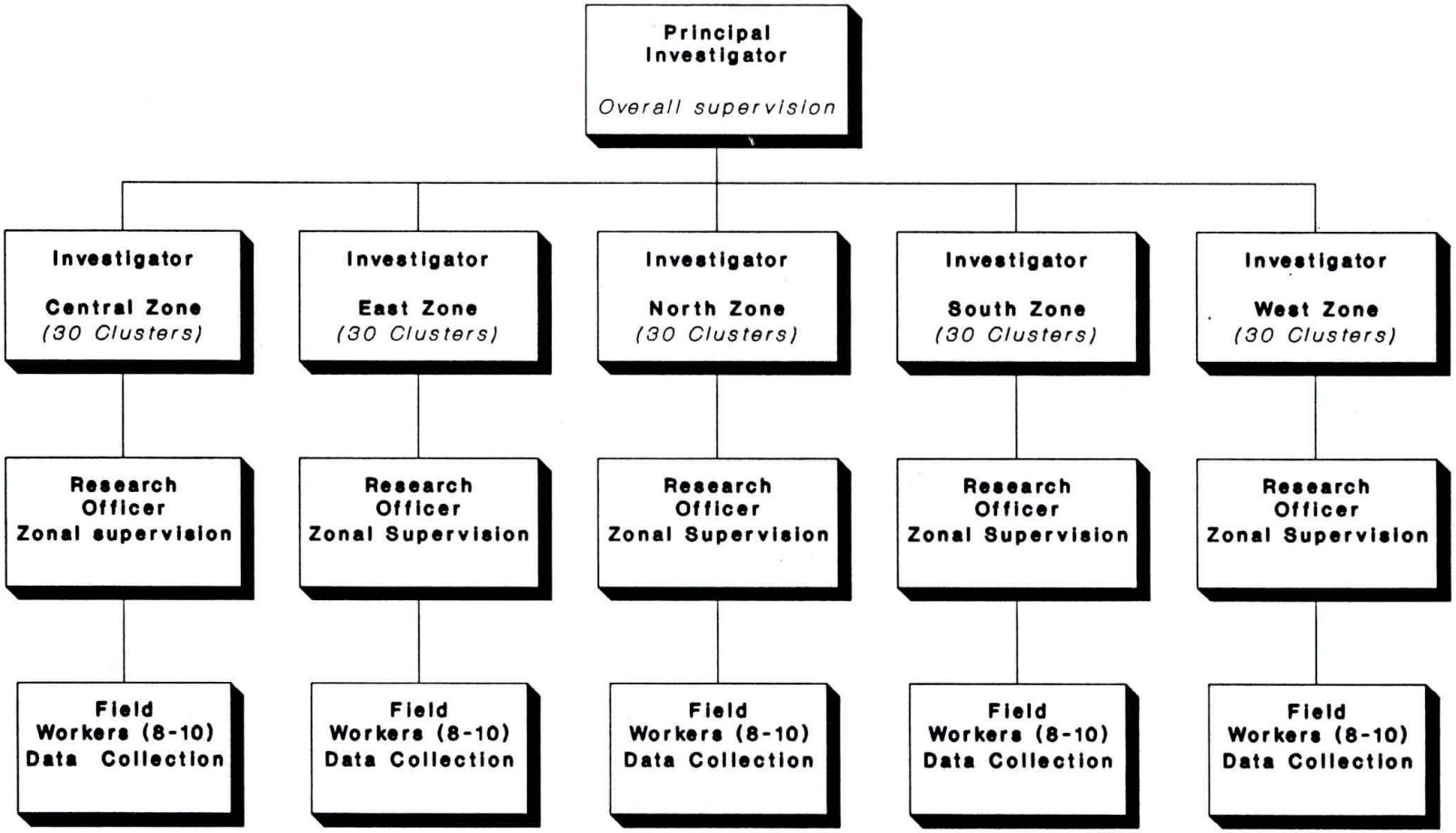
The UNICEF booklet had suggested that the BSU number for a cluster should not generally exceed 100 and be so

much that it could be easily covered in one day by the recruited field workers (3). However, these recommendations pertain to a countrywide survey. The present study had objectives of health education and evaluation of knowledge. attitude and practices on peri-natal practices in addition to mortality survey. Further, due to the distance involved and need to establish confidence and contact with the local population, it was felt that two days would be a more realistic period required for each cluster. It was decided to evaluate at least 120 Basic Sampling Units in each cluster. The cluster number for 18000 households was, therefore, calculated to be 150.

The 929 Jhuggi Jhompri clusters had number of households ranging from 25 to 7000. Based on the sample size required in each cluster, areas with less than 120 households were excluded from the randomization procedure.

The randomization procedure adopted was probability proportional to size as described in the UNICEF booklet (3). Many Bastees had a population which was larger than the sampling interval so they were selected more than once (2 to 5 times). Independent samples (more than one) were selected from such Bastees. In this way, a list of 150 selected Bastees was prepared. The geographic division of these selected Bastees was 14 in Central Zone, 25 in East

FIG.1. ORGANIZATIONAL SETUP



Zone, 35 in North Zone, 51 in South Zone and 25 in West Zone. Since the geographic North and South Zones have larger populations as compared to other areas, the selected clusters were more than 30. However, for the purpose of conducting the survey five administrative teams (Fig.1) were conceived under the supervision of an Investigator/ Senior Research Officer. For the sake of uniformity and equal division of labor, each administrative team was entrusted with the task of surveying 30 clusters. A few clusters from the geographic South Zone had to be, therefore, transferred to administrative Central (n=16) and West (n=5) Zones. Similarly 5 clusters were transferred from the geographic North Zone to administrative East Zone. The clusters to be transferred were decided on the basis of geographic contiguity of the selected areas. During the course of the survey, one of the selected areas got burnt out in South Zone and one cluster could not be located. The next eligible, geographically contiguous cluster as per the DDA list was substituted for these areas. The final 150 clusters surveyed by the five administrative zones are detailed in Annexure 1. These areas are also shown in a map of Delhi in Annexure 2.

In a few instances, it was observed that the number of households as per the DDA list was exaggerated (the lists are prepared as per the ration cards and often the resi-

dents make fake entries). In these clusters, the minimum requirement of 120 BSU's could not be fulfilled (Table 2). The minor deficiency was made up from the adjoining unnamed clusters (if available) or the adjoining area as per the selected cluster list.

TABLE 2: Details of Clusters where Quota of 120 BSU's could not be Completed

Zone	Shortfall in 120 BSU		
	<5	5-10	>10
Central	5	2	0
East	2	0	0
North	1	0	0
South	0	0	0
West	4	3	1
Total	12	5	1

The zonal figures refer to the number of clusters which had a shortfall in 120 BSU. The total BSU shortfall was 80. The zone wise distribution was central-27, East-2, North-1 and West-50.

d. **Household Selection**

Although, strictly this is not totally under the purview of preparatory phase, it would be pertinent to elaborate this aspect now. The individual household selection amongst the clusters was the most crucial and tough task. A comprehensive list of all the households in Jhuggi Jhompri Bastees is not available. It was also not technically feasible to carry out a quick survey of all the households for this purpose. The situation was further complicated by different geographical shapes of the various clusters. Despite all these constraints, it was decided to have as uniform as possible, individual household selection procedure. The basic principle applied was that the selected households should be spread as far wide as possible and the selection should be random rather than in a haphazard manner. Every household would, therefore, have an equal chance of being included in the survey.

The methodology employed for this aspect is detailed below. For bigger areas which were selected more than once, each selection was treated as an individual cluster. If blocks or natural subdivisions were available for such areas, these were used to subdivide for the individual clusters. Rarely in other cases, geographic subdivisions had to be created.

The household selection procedure for each cluster was determined by the number of households according to the DDA list (Table 3).

TABLE 3: Household Selection Procedure According to Number of Households

	Cluster size	Household selection
1.	Upto 165	Every successive
2.	166 - 176	Four out of five (Drop every fifth)
3.	177 - 198	Three out of four (Drop every fourth)
4.	199 - 264	Two out of three (Drop every third)
5.	265 - 396	One out of two (Drop every second)
6.	397 - 528	Select every third
7.	529 - 660	Select every fourth
8.	Above 660	Select every fifth

The selected clusters in each Zone were subdivided into three according to the household size: (i) upto 396; (ii) 397 to 1000;and (iii) Above 1000. A birds eye view was obtained to get an idea of the centre and periphery of the selected cluster. The selected clusters were surveyed in an alternating manner from the periphery to the centre and vice versa in each Zone in each subdivision according to

household size referred to above. Owing to the varying geographic constructions of the clusters, the direction (periphery to centre or vice versa) could not be strictly adhered to in all cases; the general direction, however, was maintained.

An attempt was made to select at least one natural in road into the cluster for each worker. If the natural inroads exceeded the number of workers, a randomization of the inroads was performed. If the natural inroads were less than the number of workers, two workers were employed for some of these inroads with one worker sticking to the left side and the other to the right.

If as per the randomization procedure, the worker encountered a non existent house (without roof) or a permanently locked house or an ineligible house (only men, no ever-married women) then the next eligible household was selected as per procedure.

In some small clusters, the eligible households finished by the randomization procedure without the worker having completed his quota of BSU's for the area. In such a case, the worker started from the middle of the first two selected households and adopted the same procedure as before till the required number of BSU's was completed.

For the next worker with this eventuality, he started from the middle of the last two houses and proceeded to the beginning.

The envisaged randomization procedure was fairly successful; only 3.8% of the households had to be selected out of the randomization procedure.

A household was designated as temporarily locked if it was eligible and the inhabitants were in town but were not available at the time of survey. The usual time when the index woman could be contacted was determined from the neighbours. A record of these houses was kept by the field workers. At least two revisits were done before categorizing them as missed respondents and allowing substitutions. A total of 324 houses were initially categorized as 'temporarily locked' and 144 finally ended up as missed respondent'. Thus with perseverance 56% of such women could be recontacted.

2. Preparation of Questionnaires and Health Education Material.

a. Questionnaires

All the questionnaires were finalized in the local language (Hindi) after adequate pretesting in the field by

investigators, research officers and workers. The details of the various questionnaires are elaborated below.

(i) Basti Information Questionnaire.

In this questionnaire, basic demographic information for the surveyed JJ Bastees was collected. (Annexture 2). This included information on water supply, garbage disposal, sanitation, presence of public toilets (Sulabh Shauchalaya), health, services available, etc. The questionnaire was filled up by actual observation (by Research Officers) and dialogue with the population.

(ii) Mortality Questionnaire

In strict accordance with guidelines of the UNICEF booklet (3), the mortality questionnaire was carefully translated into Hindi. It was confirmed that the questions were exactly translated back into the same English by an independent person. Due care was exercised not to change the order of the questions while translating.

A few additions were incorporated in the UNICEF questionnaire after pretesting. These included an introductory paragraph stating the purpose of the survey and instructions for the field workers to ensure proper interview technique and filling up of the form. The interview date and identification number of the cluster household head

(the usual identification in Bastees) were printed in the beginning. A column for children's' name was also incorporated to facilitate recall.

To obviate problems during data analysis and compilation, each mortality questionnaire was given a unique identification number (Annexure 4). For households with more than one eligible woman, extra pages 3 and 4 of the mortality questionnaire were printed (Annexure 5). There was no printed serial number for these extra pages; the serial number of the original mortality questionnaire was copied by the workers on these pages. New instructions and innovative ways of assessing age of mother were introduced in the mortality questionnaire which are detailed later.

(iii) Perinatal Questionnaire

The KAP questionnaires for both mothers and Dais (Traditional Birth Attendants) were prepared by the Project Investigators in consultation with Dr. Kamla Ganesh, Professor of Obstetrics and Gynecology at Maulana Azad Medical College, New Delhi.

Mothers who had delivered a child in the 3 months preceding the survey date were included for the KAP study in the perinatal questionnaire. It was estimated that with a birth rate of approximately 30 per 1000 population, the

eligible women per cluster would be about 4. A lot of changes were suggested in the questionnaire after pretesting in the field; leading questions were minimized and emphasis was laid on current practices.

The 'Perinatal Proforma' was designed to assess the KAP with respect to care during pregnancy, labor and post partum period (Annexure 6). The questionnaire was usually filled up by supervisors (Research Officers); and only occasionally by the best Field Workers of the zone.

(iv) Dai Questionnaire

A Dai (Traditional Birth Attendant) was defined as a person, invariably a woman) who was regularly utilized by the community to assist in child birth. This broad definition was also used for an earlier study (4) by the Urban Basic Services (UBS) which had revealed that only 15% Dais' were trained and most deliveries in the community were conducted by untrained birth attendants.

The 'Dai Proforma' was filled by Supervisor (occasionally best Field Worker) by interviewing the two most popular Dai's (if available) of that area. The information collected in this proforma (Annexure 7) was similar in nature to the 'Perinatal Proforma'.

b. Health Education Material

Since a large number of families were to be interviewed for the mortality status and KAP Survey, the opportunity was also utilized to disseminate health education. This health education was not restricted to the families being interviewed or the mortality survey period. A lot of health education material was developed for this purpose.

(i) Hand Outs

These health education handouts were disbursed to the population at the end of 'Health Education Session'. The handouts in a written and pictorial manner included basic information on diarrheal diseases, nutrition, care during pregnancy and immunization (Annexure 8). Invariably many other mothers in the vicinity of the selected households were collected for health education and they also received these handouts.

(ii) Handbook for Basti Sevika

This hand book was developed by SACH (Society for Action in Community Health) for training of Health Workers in the JJ Bastees. This booklet was distributed to all the field workers (Annexure 9). It provides information on the concept of primary health care and important health problems. It was designed to develop better insight in the

Field Workers so that they can effectively impart health education to the community.

(iii) Panch-Tantra

This small handbook giving important health information in number of five was also utilized for health education (Annexure 10). This was modified and translated in Hindi to adapt to this Project.

(iv) Video and Audio Cassettes.

Video and audio cassettes providing important health education were also collected and utilized.

3. Recruitment and Training of Staff

a. Recruitment

The organizational set up of the project with respect to field work has already been alluded to in Fig.1. The Senior Research Officer was responsible for overall field supervision in one zone. The five Research Officers (one for each zone) acted as field supervisors. Only 2 of the 5 supervisors were male. All of them had previous experience of working in the community (as Medical Social Worker/ Doctor) either in rural or urban areas and had the leadership quality, capacity for team work and establishing good rapport with the respondents.

With the help of Research Officers, 6 to 8 Field Workers (Interviewers) were selected for each zone. These workers were mostly women (only three were males) either from JJ Bastees or JJ resettlement colonies. Majority of them had previous experience of working is community level health workers in various Health Programmes of Delhi Administration or Non Governmental Organizations (NGO's). All of them were literate and good in establishing rapport with respondents.

b. <u>Training</u>

Before embarking on the actual survey, the staff was adequately trained for this purpose.

The Supervisors and Field Workers were motivated by explaining the importance of data to be collected and what would be done with it. The essentiality of accurate measures of mortality and the field worker's contribution to this aspect was highlighted.

An outline of the survey plan was discussed. The administrative arrangements during the work such as working hours and salary, survey schedule, transportation arrangement and day to day procedures were finalized.

Extra care was taken for training of the mortality questionnaire. Each and every sentence of the questionnaire was explicitly discussed. Tips on interviewing technique and gaining the confidence of respondents were provided. Proper emphasis was laid on avoidance of 'leading questions', guessing age of lady, importance of completing each assigned interview, following standardized procedures and asking questions as exactly worded in the questionnaire. The possible problem areas were discussed and tentative solutions to anticipated problems were suggested.

Initially dummy interviews were conducted in the hospital Subsequently the interviews were monitored in the field. The actual field work commenced only after we were satisfied with respect to the quality of data entry.

The Supervisors were explained the household selection procedure in minute details and the importance of random selection. Written details were available with each Supervisor for ready reference. They were instructed to monitor at least 5% of interviews, how to check the forms for errors and correct the problems on the spot.

A similar procedure was adopted for the Bastee Dai and Perinatal questionnaires and for Health Education.

4. Setting up of an Office and Computer Facilities

A project office was opened up in the Department of Pediatrics, Maulana Azad Medical College with statistical and clerical staff. The main responsibilities were :

(i) To keep all the questionnaires and health education material for subsequent distribution.

(ii) To keep a record of the completed proformas received from each Zone.

(iii) To assist in manual checking of questionnaires.

(iv) To send the questionnaires for data punching and receive them back.

(v) To send the error forms back to field for necessary corrections after reinterview and to receive them back.

(vi) To help in final data analysis.

The office acquired a computer (PC 386 AT) for data analysis. Any problems from the field were referred to this office which acted as a sort of control room.

B. Field Work

The field work for the mortality questionnaire was completed in a little over two months period beginning in early June. To minimize the chances of measurement error, adequate stress was given to practical training and monitoring. Specific duties were assigned to the Investigator,

Supervisor and Field Worker as per guidelines laid down in the UNICEF booklet (3). These guidelines were available in written form with the Supervisors.

The selected JJ Bastee had been physically verified by at least one of the workers a day prior to the survey date. Before starting the survey, the Supervisor was expected to talk to the leader (Pradhan) of the Bastee and other opinion leaders (including females) to inform them about the purpose of the project and the methodology adapted. Subsequently, from a common collection point as per the randomization scheme, the inroads were distributed to the various workers. The Field Workers were instructed to contact the Supervisor immediately in case of any problems. The Supervisor was asked to personally monitor at least 5% of the interviews (one per Field Worker per cluster). The Investigators conducted random checks on the Supervisors and Field Workers in each cluster. The Field Workers and Supervisors met at an appointed time (usually lunch) to review the situation and discuss problems. The information regarding households to be contacted for perinatal proformae was passed on to the Supervisors. At the end of the day, the Supervisor manually checked the mortality proformae for completion, coding errors and inconsistencies. The incomplete and error forms were immediately sent back to the

respective households for correction/reverification. On completion of a cluster, the forms were returned to the office on the next day between 9 to 10 a.m. For sake of uniformity and to prevent losses, the details of completed forms were submitted on a proforma (Annexure 11).

Weekly meetings were held at the central Office between the Investigators and Supervisors. The main purpose of these was to effectively monitor the data quality and progress in each zone. This was achieved by:

(i) Discussing the problems faced and offering solutions through innovations.

(ii) Monitoring the adherence to time schedule.

(iii) Pointing out the errors (especially for a worker who would be repeating the same mistake).

(iv) Confirming that the guidelines and instructions were being strictly adhered to.

(v) Returning back error forms (detected after computer and manual check) which had escaped attention in the field for reverification/correction.

Innovations for Mortality Survey

The mortality survey was conducted in strict accordance with the guidelines laid down by the UNICEF booklet (3). Due emphasis was laid on explaining the purpose of the survey, securing co-operation and politeness. Efforts were

made to involve other members of the household, particularly the husband, to improve accuracy of the data. However, a few unusual problems specific to JJ Bastees were encountered to which no obvious solutions were available. These were overcome by innovations which are detailed below.

The JJ Bastees are usually constructed in a haphazard manner and the individual households do not have specific number or 'identification mark. There is, therefore, a possibility of two workers visiting the same house. Also retracing the temporarily locked houses the second or third time is cumbersome. To obviate these problems, after visiting the selected house, the workers were instructed to put a cross (X) with a colored indelible ink pen on the wall near the door. The worker put her individual identification number below the cross only if the interview was completed, the cross was encircled. With this innovation, retracing of the required households become easy and confusion was minimized. It also provided a ready check for the Investigators and Supervisors, especially for the accuracy of the randomization procedure.

It was important to collect the details of accuracy of randomization and the extent of ineligible household (permanently locked, only men, etc.). A uniform methodology was evolved by asking the workers to fill in the records of

the households visited on a printed proforma (Annexure 12).

The exact age recording for women constituted a major obstacle during the pretesting. The population surveyed was mostly illiterate and further no importance was given to knowledge about exact age. Birth records were non-existent. Over 95% of women did not know the date, month or year of birth. Age was often loosely stated as a range. To minimize this problem,the woman's age was tallied with that obtained by splitting her age into various components (age at marriage, first live birth after how much time of marriage and age of first live born child). If there was wide discrepancy between the stated and calculated ages, the woman was patiently asked to review her age. In addition to timing with major events, this innovation proved particularly useful in determining the women's age with better accuracy.

The recall problem with ages of children (particularly the younger ones) was less. However, the month of birth was often stated as per local calender. Even when the month and year of birth were stated, the workers sometimes committed mistakes in calculating the age of child in completed years and months. To minimize this problem, a table with a sliding scale was created (Annexure 13). This readily provided the calculated age from the local calendar month and year of birth. With this innovation the

calculation errors diminished considerably and a uniformity was maintained in conversion of local months to English months.

The interviewers were stressed the importance of reconfirming the ages of children if the interval between them was below 10 to 11 months or above 3 to 4 years.

The workers sometimes committed mistakes in coding sex of child since the names of children were also written, the errors could be easily rectified.

Data Compilation and Analysis

a. Compilation

The data was received from each Zone after a cluster was finished. A strict entry and exist record of all forms from each Zone was maintained. Excessive care was taken to scrutinize and compile the mortality questionnaire forms.

During the planning stage, it was envisaged that data entry would be done through a software supplied by the UNICEF, Regional Office for the Middle East and North Africa (5). However, this software proved unsuitable for the purpose of the survey. Data entry with this was very time consuming and somewhat confusing. The entry format was not planned in sequence with the mortality questionnaire.

It became obvious that in the time available, we would not be able to finish the job with this software. A decision was, therefore, taken to design an indigenous software. In this interim preparatory period of 10-12 days, only a manual scrutiny of forms was done to detect errors.

The software designed for this survey had about 20 range and consistency checks. Important amongst these were age of women, number of completed forms, discrepancy in sex, calculated age of child, calculated age at death, interval between two children and discrepancy in live and dead status. A separate consistency file kept a record of all consistency errors while simultaneously showing them on the screen. Automatic skips were also designed in the software depending on the number of children or required entries. The spreadsheet for this software programme is provided in Annexure 14. This indigenously designed software proved considerably faster. However, our computer time was at a premium and the data had to be punched commercially. A strict entry and exit record for commercial data entry was maintained.

The punched data was scrutinized manually to detect any punching or field errors. The punching errors were simultaneously edited in our computer while the field error

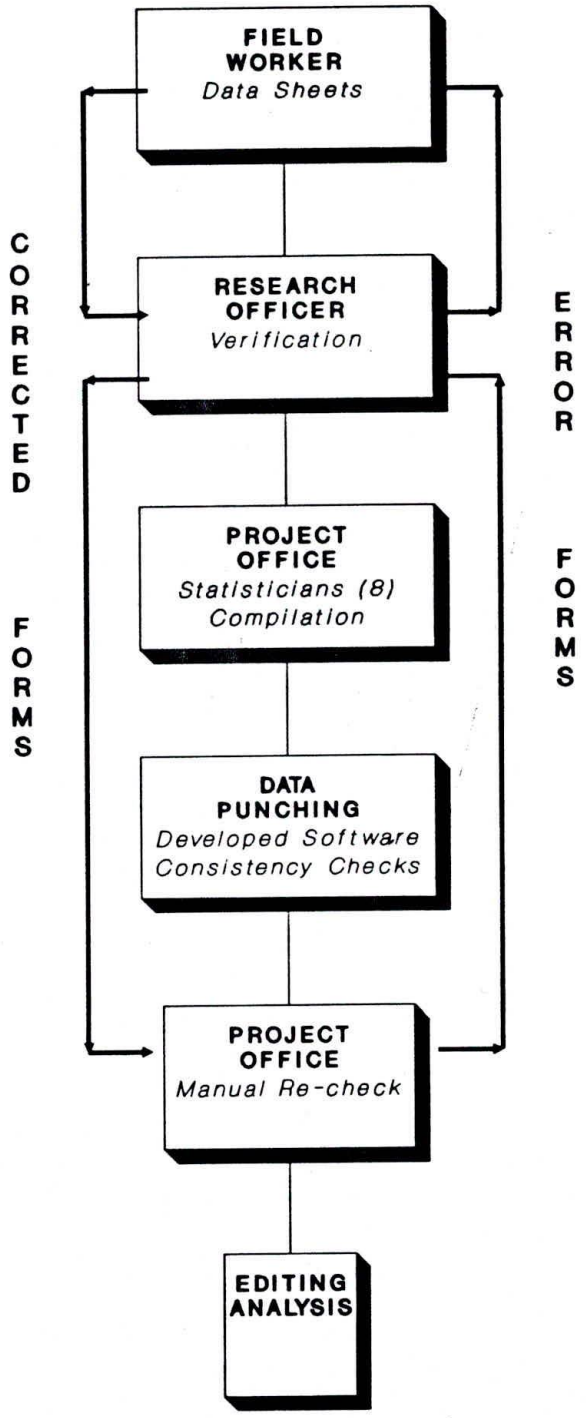
forms requiring revisit were given to supervisors at the weekly meeting. This process was continued actively during the mortality survey period to provide an adequate feed back and get the forms corrected in time. It also provided vital information an errors being committed by a particular field worker or puncher.

Fig.2 depicts the process of data compilation in a flow chart.

b. Analysis

The childhood mortality was estimated by indirect methods as per guidelines provided by the United Nations (3,6). The Q FIVE software supplied by United Nations (6) was utilized for the Brass Technique.

FIG.2. DATA COMPILATION



OBSERVATIONS

PART A: MORTALITY SURVEY

A. CIVIC AMENITIES

The current state of important civic amenities in the surveyed population as per the information collected in Bastee proforma is provided in Table 4. For this purpose, information for a cluster was recorded only on one proforma even though that area may have been selected more than once for the mortality survey. Information for a few clusters could not be recorded in the Central Zone.

TABLE 4: Details of Important Civic Amenities in the Surveyed Population

Zone	Number surveyed	No. of house-holds	Approx. Populat-ion	No. of water points*	No. with Dhaloas	No.with public utilities
Central	14	18,885	94,425	109	10 (71)	8 (57)
East	27	25,541	1,27,705	304	15 (56)	12 (45)
North	24	33,327	1,66,635	509	8 (33)	11 (46)
South	25	32,136	1,60,680	238	15 (60)	11 (44)
West	25	19,927	99,635	110	10 (40)	11 (44)
Total	115	1,29,816	6,49,080	1,270	58 (50)	53 (46)

* Functional and safe water points, namely, India Mark II + Tap. Figures in parentheses represent percentages of surveyed Bastees.

(i) Water Supply

Most residents of JJ Bastees did not have access to sufficient water to meet their daily needs. The usual sources were tap, shallow hand pump or deep bore hand pump. On an average there was 1 safe water source (tap + deep bore India Mark II hand pump) for every 102 households or 1 safe water source for a population of 511. The distribution of these water sources was highly heterogeneous amongst the various Bastees and also within the Bastee particularly in the fringe areas. About 12% of the clusters surveyed by us (which included 8.5% of households) did not have even a single source of safe potable water. At places, people had to travel a distance of at least 1 km to procure water. The official agencies have attempted to supply water to some of these areas through water tanks. This is a fairly expensive method with a limited storage capacity.

The available water supply was generally intermittent and of low/moderate pressure. Due to limited storage capacity and nature of water supply, large queues were observed. Innovations were done to extract water from taps even with low pressure and a large number of shallow hand pumps were installed by the Bastee people. The official agencies have declared these shallow hand pumps unsafe for drinking purposes.

(ii) Garbage Clearance

Only half the Bastees had a garbage collection point (Dhaloa) for removal by the Municipal authorities. Usually these Dhaloas were not regularly cleaned and constituted an environmental hazard.

(iii) Drainage

The drainage was generally defective and /or blocked leading to accumulation of slush.

(iv) Public Utilities

Roughly half (46%) the Bastees had pay and use latrine facilities (Sulabh Shauchalays and mobile latrines). These were poorly maintained with shortage of water. Majority of the population is, therefore, forced to resort to open defecation (road side, fields, public parks, railway lines, etc.).

A comparison of the civic amenities documented in this survey with a recent study conducted by Urban Basic services (4) and the desired norms is presented in Table 5. The results of the two surveys are comparable and it is obvious that the civic amenities of this population are in a deplorable state. Urgent remedial action is necessary to contain these important sources of health hazard.

TABLE 5 : Comparison of Civic Amenities.

Parameter	Present study	UBS Survey (1990)	Desired Norm
Safe water points (taps + Mark II) per households	1:102	1:111	1:20
% Bastees with Public Utilities (Sulabh Shauchalaya)	53	57	-
No. of latrine seats/ person	NA	1:85	1:20

B. DETAILS OF HOUSEHOLDS

The pertinent details of the households surveyed are summarized in Table 6 and Figs. 3 and 4. Of the 22,181 houses visited, only 3204 (14.4%) could not be surveyed. The important reasons for these included permanently locked houses (67.8%), only men or ineligible women residing (24.3%), missed respondents (4.6%) and refusals (3.3%). The co-operation for the survey was excellent.

FIG.3. HOUSEHOLDS NOT SURVEYED

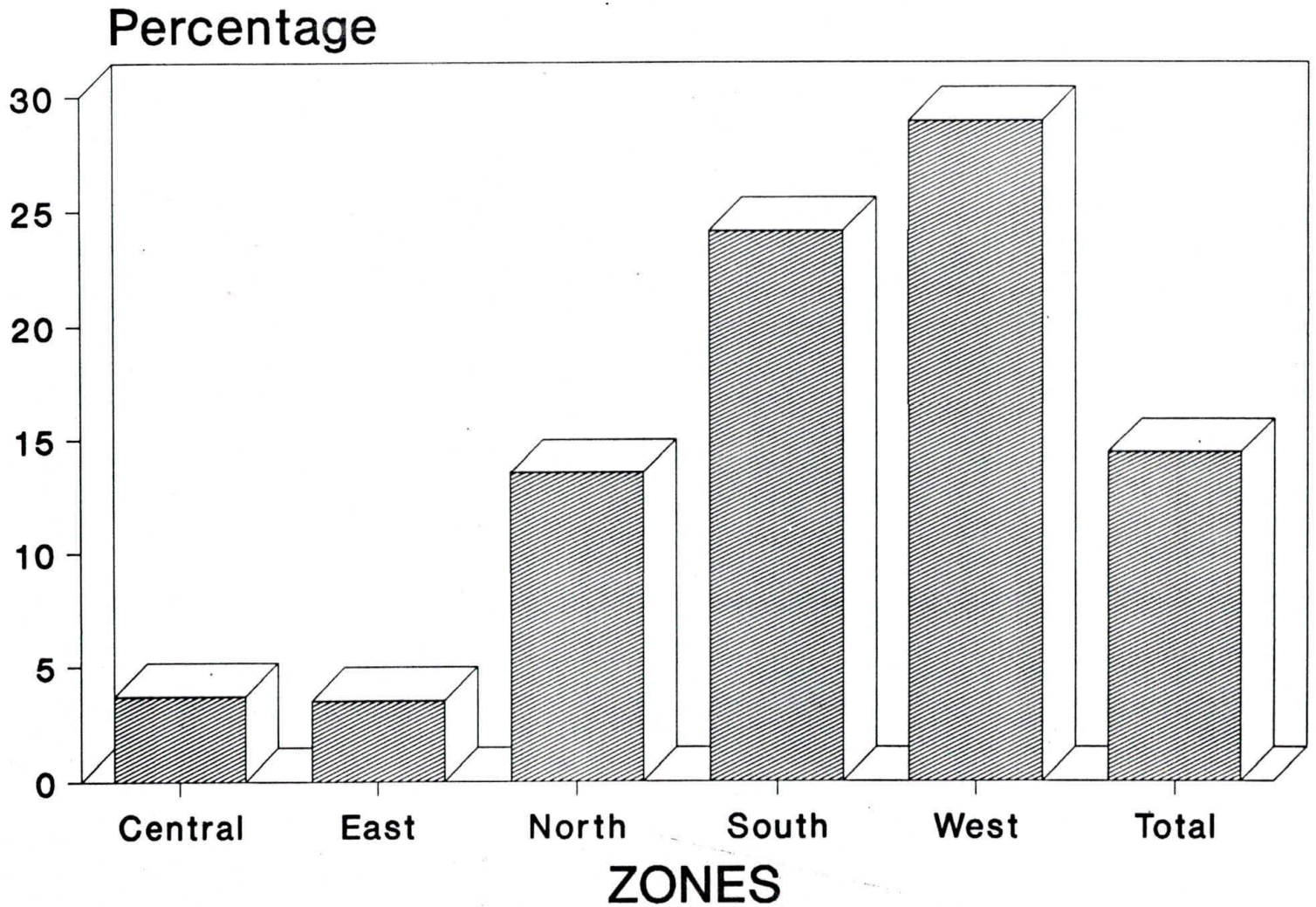
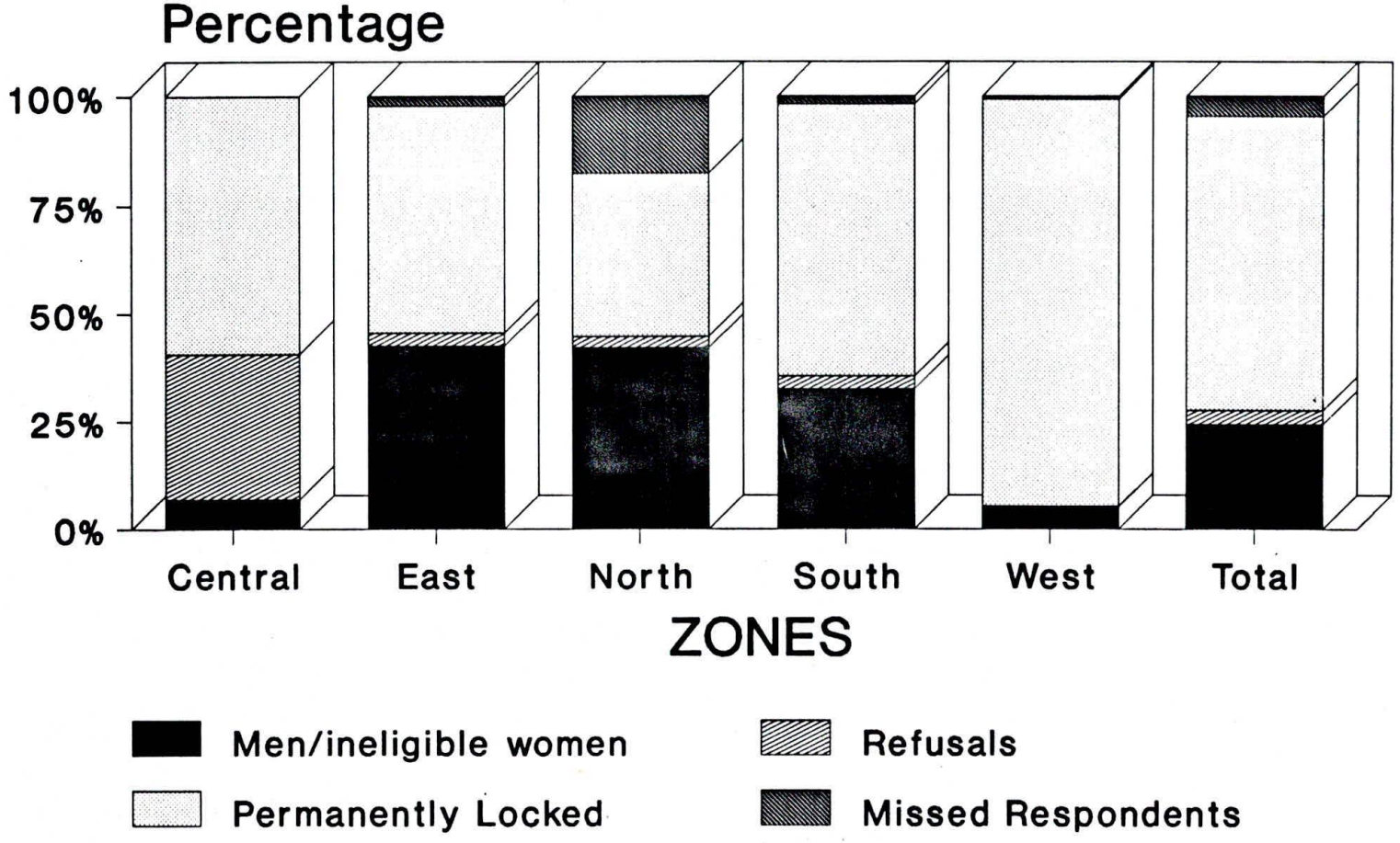


FIG.4. HOUSEHOLDS NOT SURVEYED (REASONS)



The households not surveyed were mostly located in the West (28.9%) and South (24.1%) Zones. Permanently locked houses constituted almost all (94.1%) these households in West Zone and roughly half (52-63%) in other zones except North (38%). In the North Zone, the most frequent reason was absence of eligible women.

TABLE 6 : Details of Households Surveyed

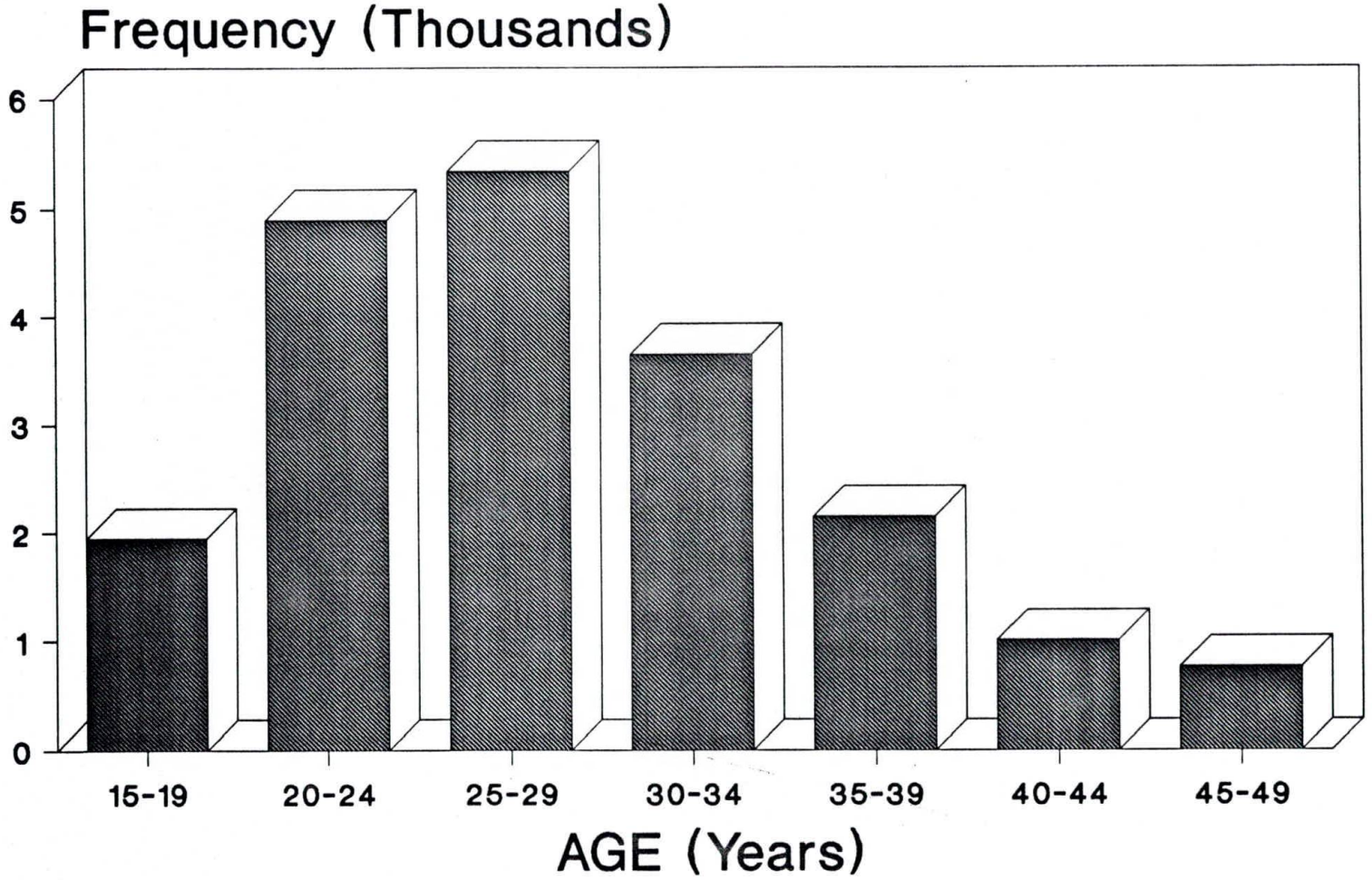
Details	Zones					
	Middle	East	North	South	West	Total
1. Households visited	3911	3786	4834	4843	3807	22,181
2. Households not surveyed						
Total*	145 (3.7)	134 (3.5)	655 (13.5)	1169 (24.1)	1101 (28.9)	3,204 (14.4)
a) Only men, women <15 yr or >49 yr +	10 (6.9)	57 (42.5)	276 (42.1)	381 (32.6)	57 (5.1)	781 (24.3)
b) Refusals+	49 (33.8)	4 (3.0)	17 (2.6)	34 (2.9)	1 (0.1)	105 (3.3)
c) Permanently** locked	86 (59.3)	70 (52.3)	247 (37.7)	735 (62.8)	1036 (94.1)	2174 (67.8)
d) Missed respondents+	Nil	3 (2.2)	115 (17.6)	19 (1.7)	7 (0.7)	144 (4.6)

* Figures in parentheses indicate percentage of total households visited.

\+ Figures in parentheses indicate percentage of total households not surveyed.

** Residents gone to their native village or uninhabitable house

FIG.5. AGE DISTRIBUTION OF WOMEN
(5 Year Groups)



C. EVALUATION OF MORTALITY DATA QUALITY

1. Age Distribution of Women

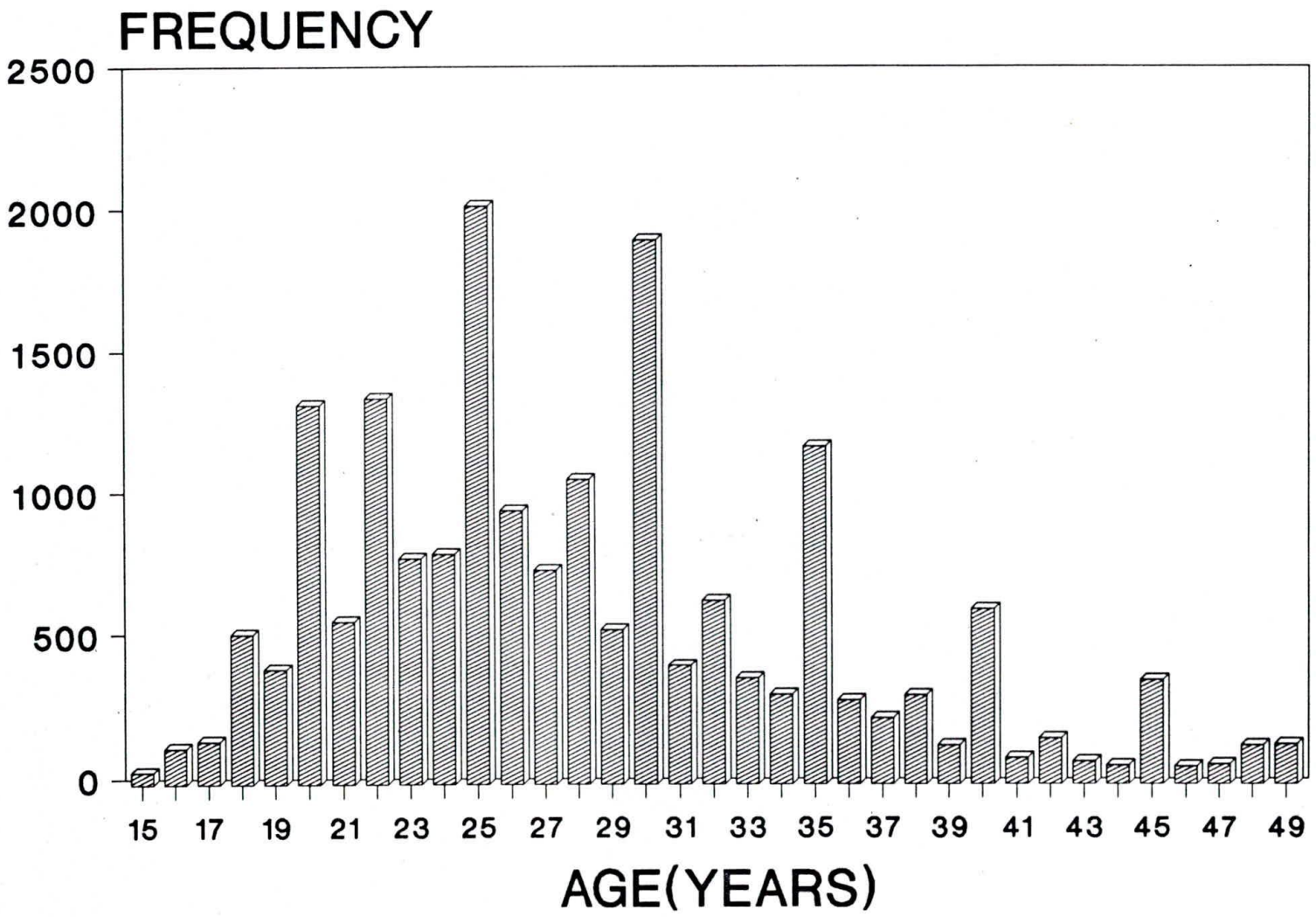
The age distribution of 15-49 year old women by 5 yearly groups is depicted in Table 7 and Fig.5.

TABLE 7 : Age Distribution of Women by Five Yearly Groups

Age group of women (Years)	Number of women	Percentage
15-19	1940	9.85
20-24	4894	24.84
25-29	5333	27.07
30-34	3639	18.47
35-39	2136	10.84
40-44	999	5.07
45-49	760	3.86
Total	19701	100.00

In this survey, women above 40 years were slightly under represented. The percentage of 15-19 year old girls also appears to be somewhat lower. In this context, it would be important to remember that the urban poor population surveyed primarily comprised nuclear families which

FIG.6. AGE DISTRIBUTION OF WOMEN



had migrated from their native places in search of work. It is, therefore, not surprising that roughly half the women (51.91%) were aged between 20 to 29 years and four fifths (80.76%) between 20 to 39 years. There is a possibility that younger and older women may not have been sought in each household, or may have been missed because interviewers were concerned to find women who had younger children (3). This possibility could be true for a mortality questionnaire designed in conjunction with an EPI coverage module. However, this situation appears remote for the present survey since the questionnaire was designed specifically to estimate early childhood mortality and due care (including quality checks) was taken to ensure that information was recorded for all women in the 15-49 year age group. The observed age distribution, therefore, appears to be a true reflection of the population surveyed.

The quality of age reporting of women can be further assessed by a plotting a histogram of women's ages by single years (Fig.6). Age heaping occurs when age is reported more often as a digit ending in '0' or '5'. Despite all the innovations and care employed to ascertain the age of women accurately, there is evidence of age heaping in the data. This is particularly marked at 25, 30 and 35 years.

FIG.7. DISTRIBUTION OF REPORTED BIRTH MONTH

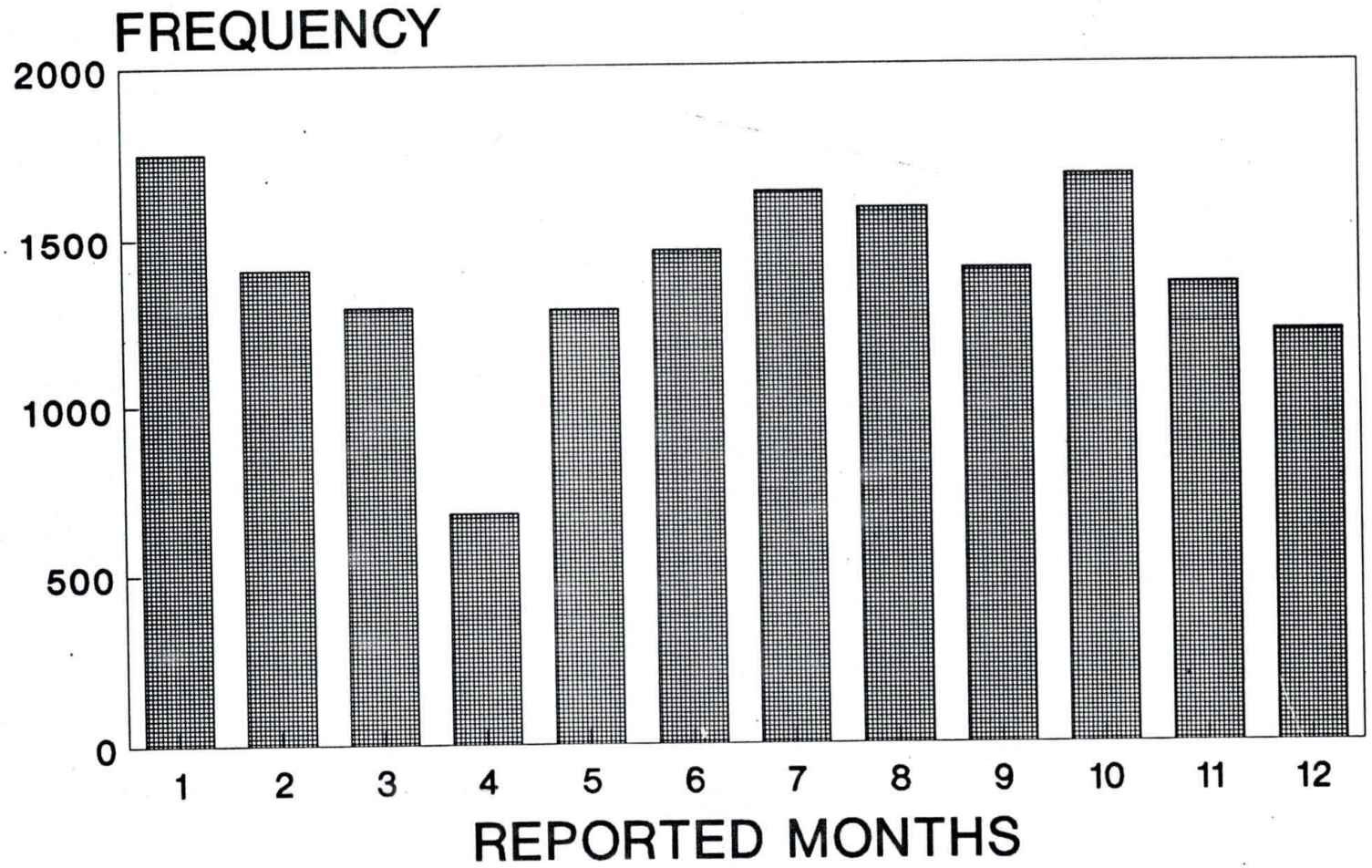
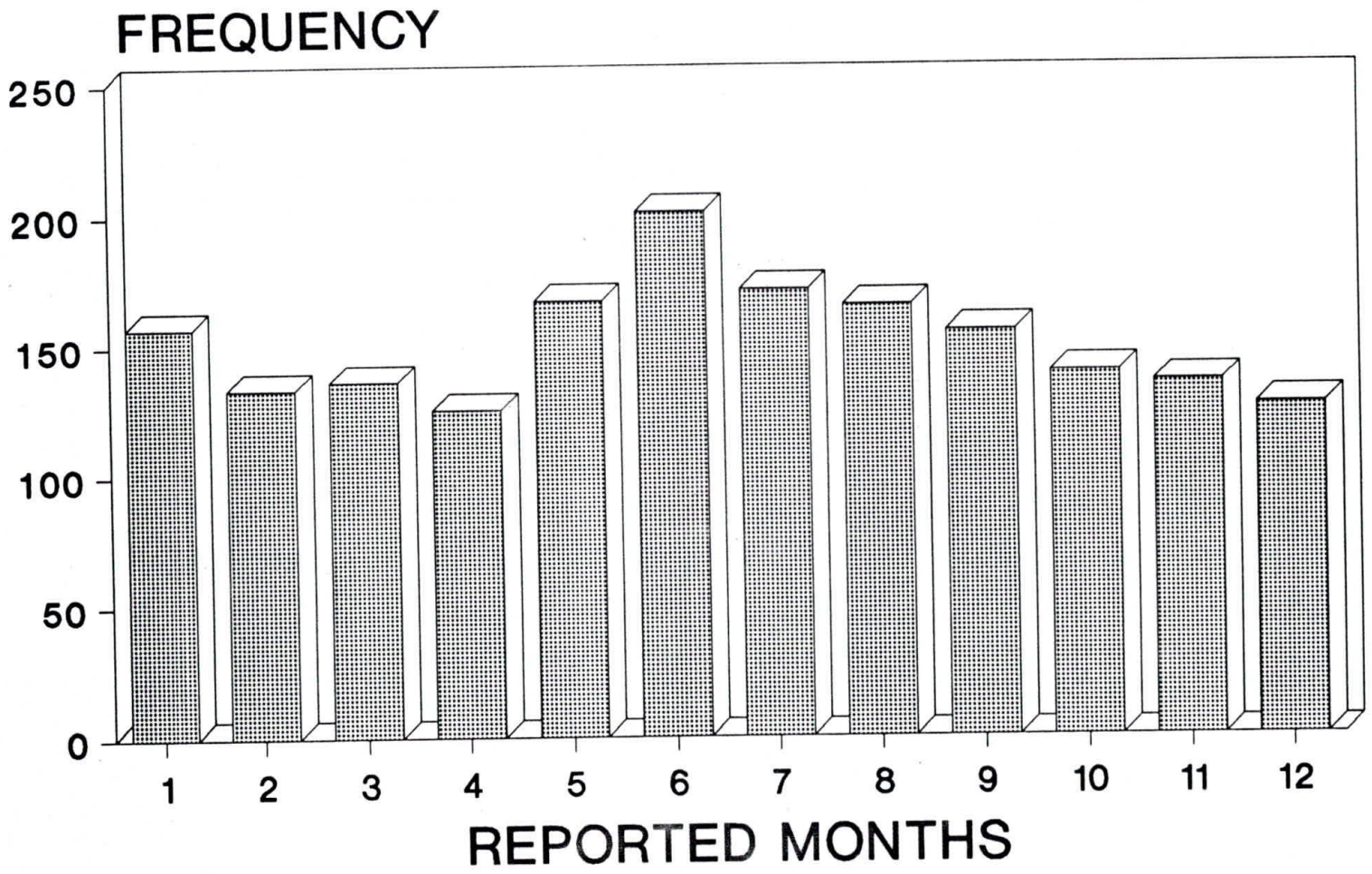


FIG.8. DISTRIBUTION OF REPORTED DEATH MONTH



The observed age heaping can not be entirely considered to be representative of the quality of field work. It is primarily a reflection of the literacy status and attitude of the population surveyed. Birth records were virtually non existent and the exact date, month and year of birth was not remembered by over 95% of women. Age in completed years was often stated loosely or in a range. Patience, perseverance and innovation was required to ascertain the age. Strict instructions were issued not to guess the age in any woman.

This age heaping is not a serious deficiency in computing child mortality by the Brass technique since the method requires grouping of women by five yearly intervals.

2. Age Reporting for Children

Birth month of children was reported in only 39.55% of cases. The distribution of reported month of birth in these children in shown in Fig.7. There does not appear to be any severe deficiency with respect to this data.

Amongst the children who had expired, the death month was reported in only 35.32% of cases. The distribution of reported month of death in these children is shown in Fig.8. Once again, there does not seem to be any severe deficiency with respect to this data.

In roughly two thirds of the cases, the month of birth or death was not reported. This is primarily a reflection of the literacy status, culture and attitude of the population surveyed. These deficiencies do not affect the Brass estimates or the Preceding Birth Technique, which do not rely on dates at all. Live tables, however, are very sensitive to such misreporting.

3. Sex Ratios of Children

Table 8 summarizes the sex ratios of children ever born and those who died by five year age groups of women.

TABLE 8 : Sex Ratios by Five Year Age Groups of Women

Age group	Male CEB/ Female CEB	Total males dead/ total females dead
15 - 19	1.02	1.00
20 - 24	1.09	1.19
25 - 29	1.09	1.02
30 - 34	1.12	1.06
35 - 39	1.13	1.11
40 - 44	1.18	1.11
45 - 49	1.20	1.20
Total	1.12	1.09

CEB = Children ever born.

The sex ratios for children ever born should usually fall within the range 1.02 to 1.07 and should not vary greatly by age of mother, but they may vary substantially for small samples (3).

There was marginal under-reporting of female children in the 20-24 and 25-29 years age group which increased slightly till 35-39 years age group and was substantial for 40-44 and 45-49 year age groups. The sex ratios for deaths were mostly lower than the sex ratios of children ever born except for the 20-24 year age group. The sex ratios for dead children were above 1.07 in the 20-24, 35-39, 40-44 and 45-49 year age groups.

There is thus a possibility of slight under-reporting of female births, probably those who died. This is particularly true for the 20-24 and 45-49 year age groups. Thus we may assume that our calculations derived from these age groups may be slight underestimates. The possibility of a relatively smaller sample size for the older age groups (>40 years) can not, however, be totally discounted.

4. Average Parities by Age of Mother

The average parities by five yearly age groups for all children and separately for males and females are depicted in Table 9.

The average parities for male and female children and both sexes combined increased with maternal age and there was no deviation from the expected pattern. The present data is, therefore, reliable in this context.

TABLE 9 : Average Parities by Age Group of Women (All Women in Samples)

Age group	N	Average Parities Male	Female	Both Sexes
15-19	1940	0.17	0.17	0.34
20-24	4894	0.84	0.77	1.61
25-29	5333	1.58	1.46	3.04
30-34	3639	2.22	2.00	4.22
35-39	2136	2.61	2.33	4.94
40-44	999	2.94	2.49	5.44
45-49	760	3.17	2.65	5.82
Total	19701	1.62	1.45	3.07

The average parities for the oldest age group of women, who have completed, or nearly completed their child bearing, show an approximate average completed family size which indicates a fairly high fertility.

5. Proportion Dead of Children Ever Born

Table 10 summarizes the proportion dead of children ever born (males, females and both sexes) by five year age groups of women.

TABLE 10: Proportions Dead of Total Children Ever Born

Age group (years)	All women	Proportions dead Male	Female	Both sexes
15-19	1940	0.154	0.157	0.156
20-24	4894	0.146	0.133	0.140
25-29	5333	0.140	0.150	0.145
30-34	3639	0.161	0.170	0.165
35-39	2136	0.180	0.183	0.181
40-44	999	0.201	0.214	0.206
45-49	760	0.215	0.214	0.219
Total	19701	0.165	0.169	0.167

These proportions increased steadily with age (for both sexes) after the 20 - 24 year age group. However, for males, the proportion was lower in 25-29 year age group in comparison to the earlier two age groups. A higher childhood mortality in the younger age group women is well documented (3) and is the probable explanation for these observations. There does not appear to be a marked rise in proportions after the 25-29 year age groups; data, therefore, appears to be fairly reliable in this context.

D. ESTIMATES OF CHILDHOOD MORTALITY

Considering the data quality discussed above, the indirect methods, namely, the Brass Technique and the

Preceding Birth Technique would be the most appropriate for this situation.

1.Brass Technique

Tables 11 to 13 depict the mortality estimates from the Q FIVE computer software supplied by the United Nations (6). The population surveyed is best represented by the South Model in the Coale-Demeny/Trussel equations and South Asian in the United Nations Palloni-Heligman equation. The under five mortality rate, i.e., q(5) represents the number of deaths in under five children per thousand live births whereas infant mortality rate, i.e., q(1) refers to deaths below one year of age per thousand live births. The probability of dying between 1 to 5 years of age is the difference of these two parameters. The estimates of childhood mortality by the two equations are not markedly variant. Since a default value of mean age at maternity was utilized for the Palloni-Helignman equations and also for the sake of simplicity, only the South model of Coale Demeny version will be referred to for the mortality estimates. The under five mortality rate (q 5) shows the least variation amongst different models and is most stable to errors (3). This should, therefore, be the preferred estimate of mortality.

TABLE 11: Input Data for Delhi Slums (Both Sexes) - Enumeration Date : July, 1991

Age Group of Women	Number of Women	Number of Children Ever Born	Number of Children Dead
15-19	1940	665	104
20-24	4894	7872	1099
25-29	5333	16224	2348
30-34	3639	15357	2540
35-39	2136	10541	1913
40-44	999	5436	1118
45-49	760	4421	968

A default value of 27.0 for mean age at maternity was not utilized for Palloni Helligman Equations.

TABLE 12 : Indirect Estimation of Childhood Mortality for Both Sexes (Coale - Demency Models)
Enumeration Date: July, 1991

Age of Woman	Average No. Children Born	Surviving	Proportion Dead	Age x	Coale-Demeny Models (Trussell EquationS) North q(x)	t(x)	South q(x)	t(x)	East q(x)	t(x)	West q(x)	t(x)
15-19	.343	.289	.156	1	.147	(1.2)	.141	(1.2)	.156	(1.2)	.152	(1.2)
20-24	1.609	1.384	.140	2	.132	(2.6)	.139	(2.6)	.141	(2.7)	.140	(2.6)
25-29	3.042	2.602	.145	3	.134	(4.5)	.144	(4.6)	.143	(4.7)	.142	(4.7)
30-34	4.220	3.522	.165	5	.160	(6.7)	.167	(6.9)	.165	(7.1)	.165	(7.0)
35-39	4.935	4.039	.181	10	.188	(9.1)	.187	(9.5)	.185	(9.7)	.185	(9.5)
40-44	5.441	4.322	.206	15	.211	(11.7)	.208	(12.3)	.207	(12.6)	.207	(12.2)
45-49	5.817	4.543	.219	20	.220	(14.5)	.219	(15.4)	.218	(15.8)	.218	(15.1)

Coale-Demeny:	North		South		East		West	
Age of Woman	Reference Date	q	Reference Date	q	Reference Date	q	Reference Date	q
Infant Mortality Rate : q(1)								
15-19	1990.3	.147	1990.3	.141	1990.3	.156	1990.3	.152
20-24	1989.0	.104	1988.9	.109	1988.9	.121	1988.9	.113
25-29	1987.1	.095	1986.9	.104	1986.8	.116	1986.9	.106
30-34	1984.9	.098	1984.6	.110	1984.4	.125	1984.5	.113
35-39	1982.4	.099	1982.0	.114	1981.8	.130	1982.0	.116
40-44	1979.8	.103	1979.2	.120	1978.9	.139	1979.3	.122
45-49	1977.0	.100	1976.1	.120	1975.8	.139	1976.5	.119
Probability of Dying Between Ages 1 and 5: $_4q_1$								
15-19	1990.3	.118	1990.3	.104	1990.3	.063	1990.3	.089
20-24	1989.0	.076	1988.9	.062	1988.9	.044	1988.9	.058
25-29	1987.1	.065	1986.9	.056	1986.8	.041	1986.9	.053
30-34	1984.9	.069	1984.6	.064	1984.4	.046	1984.5	.058
35-39	1982.4	.070	1982.0	.068	1981.8	.049	1982.0	.060
40-44	1979.8	.074	1979.2	.076	1978.9	.054	1979.3	.065
45-49	1977.0	.071	1976.1	.075	1975.8	.053	1976.5	.063
Probability of Dying by Age 5: q(5)								
15-19	1990.3	.248	1990.3	.231	1990.3	.209	1990.3	.227
20-24	1989.0	.172	1988.9	.164	1988.9	.159	1988.9	.165
25-29	1987.1	.154	1986.9	.154	1986.8	.152	1986.9	.154
30-34	1984.9	.160	1984.6	.167	1984.4	.165	1984.5	.165
35-39	1982.4	.163	1982.0	.175	1981.8	.173	1982.0	.169
40-44	1979.8	.170	1979.2	.187	1978.9	.185	1979.3	.179
45-49	1977.0	.164	1976.1	.186	1975.8	.185	1976.5	.175

Note: A q value of .999 Denotes value below A Level 1 Model Life Table
" .000 " Above A Level 25 "

Table 13 : Indirect Estimation of Childhood Mortality for Both Sexes (Palloni - Heligman Equations)

Age of Woman	Average No. Children Born	Surviving	Proportion Dead	Age x	United Nations Models (Palloni-Heligman Equations) Latin Am. q(x)	t(x)	Chilean q(x)	t(x)	So.Asian q(x)	t(x)	Far East q(x)	t(x)	General q(x)	t(x)
15-19	.343	.289	.156	1	.150	(1.1)	.167	(1.3)	.149	(1.1)	.153	(1.2)	.151	(.1)
20-24	1.609	1.384	.140	2	.142	(2.5)	.147	(2.7)	.143	(2.5)	.142	(2.6)	.142	(2.5)
25-29	3.042	2.602	.145	3	.145	(4.3)	.147	(4.5)	.146	(4.4)	.143	(4.4)	.144	(4.3)
30-34	4.220	3.522	.165	5	.168	(6.4)	.167	(6.7)	.169	(6.6)	.165	(6.5)	.166	(6.5)
35-39	4.935	4.039	.181	10	.188	(8.8)	.184	(9.2)	.188	(9.0)	.184	(8.9)	.187	(8.9)
40-44	5.441	4.322	.206	15	.204	(11.6)	.205	(12.0)	.210	(11.9)	.204	(11.5)	.204	(11.6)
45-49	5.817	4.543	.219	20	.219	(15.2)	.218	(15.6)	.220	(15.8)	.218	(14.8)	.219	(15.1)

Mean Age at Maternity = 27.00 (Default value used)

Age of Woman	United Nations : Latin Am. Reference Date	q	Chilean Reference Date	q	So.Asian Reference Date	q	Far East Reference Date	q	General Reference Date	q
Infant Mortality Rate: q(1)										
15-19	1990.5	.150	1990.2	.167	1990.5	.149	1990.3	.153	1990.4	.151
20-24	1989.1	.110	1988.9	.130	1989.0	.112	1988.9	.114	1989.0	.114
25-29	1987.3	.102	1987.0	.124	1987.2	.104	1987.2	.106	1987.2	.105
30-34	1985.1	.105	1984.8	.132	1985.0	.110	1985.0	.109	1985.1	.109
35-39	1982.7	.107	1982.3	.137	1982.5	.113	1982.7	.110	1982.7	.111
40-44	1979.9	.111	1979.5	.145	1979.6	.120	1980.0	.113	1979.9	.115
45-49	1976.4	.112	1976.0	.144	1975.8	.122	1976.8	.109	1976.4	.114
Probability of Dying Between Ages 1 and 5: $_4q_1$										
15-19	1990.5	.124	1990.2	.062	1990.5	.113	1990.3	.109	1990.4	.110
20-24	1989.1	.075	1988.9	.040	1989.0	.070	1988.9	.067	1989.0	.068
25-29	1987.3	.065	1987.0	.037	1987.2	.062	1987.2	.059	1987.2	.060
30-34	1985.1	.070	1984.8	.041	1985.0	.067	1985.0	.062	1985.1	.064
35-39	1982.7	.072	1982.3	.043	1982.5	.071	1982.7	.063	1982.7	.066
40-44	1979.9	.075	1979.5	.048	1979.6	.079	1980.0	.066	1979.9	.069
45-49	1976.4	.077	1976.0	.048	1975.8	.080	1976.8	.061	1976.4	.069
Probability of Dying by Age 5: q(5)										
15-19	1990.5	.255	1990.2	.218	1990.5	.245	1990.3	.245	1990.4	.245
20-24	1989.1	.177	1988.9	.165	1989.0	.174	1988.9	.173	1989.0	.174
25-29	1987.3	.160	1987.0	.156	1987.2	.160	1987.2	.158	1987.2	.159
30-34	1985.1	.168	1984.8	.167	1985.0	.169	1985.0	.165	1985.1	.166
35-39	1982.7	.171	1982.3	.174	1982.5	.175	1982.7	.166	1982.7	.170
40-44	1979.9	.178	1979.5	.186	1979.6	.189	1980.0	.171	1979.9	.176
45-49	1976.4	.180	1976.0	.185	1975.8	.192	1976.8	.163	1976.4	.175

Note: A q value of .999 Denotes value from Table with life expectancy less than 35
" .000 " greater than 75

Figs. 9 to 11 depict the estimated infant mortality, under 5 mortality and 1 to 5 year mortality over the years. In this context, it is important to remember that many of these JJ Bastees came into existence within the last 10 to 15 years. The pre 1980 estimates should, therefore, be viewed as those of this population and not the urban slum area.

The values for the two youngest age groups depart from the observed trend due to the known biases associated with the estimates from these age groups (3) :

(i) Children of the youngest women, 15-19, are known to experience higher majority of their children than are those of older women.

(ii) The children of the youngest women are more likely to be first births, who are also likely to have higher mortality than all births in a population.

(iii) This bias is especially strong in later-marrying populations where the women bearing children at younger ages are more likely to be a selected group, for instance women who left school earlier than usual, women from poorer groups in the population, etc.

For all these reasons, estimates based on the mortality experience of these women is unlikely to reflect the overall mortality experience of the population. The

FIG.9.ESTIMATED INFANT MORTALITY

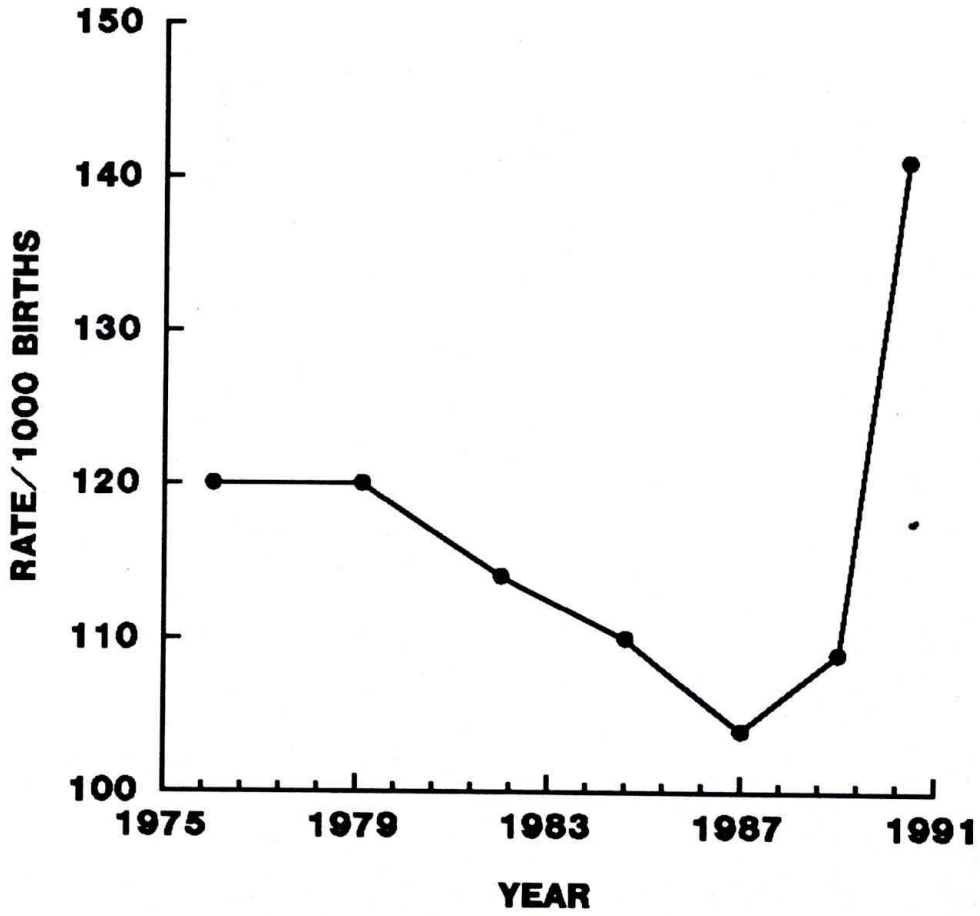


FIG.10.ESTIMATED UNDER 5 MORTALITY

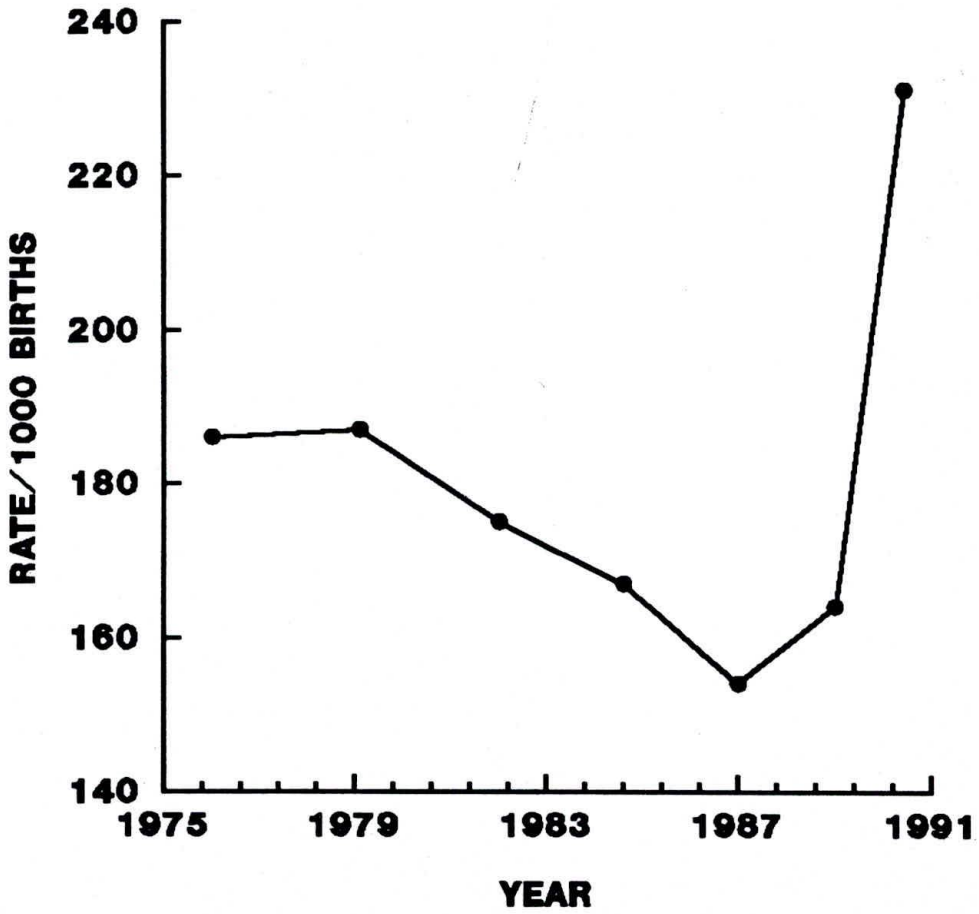
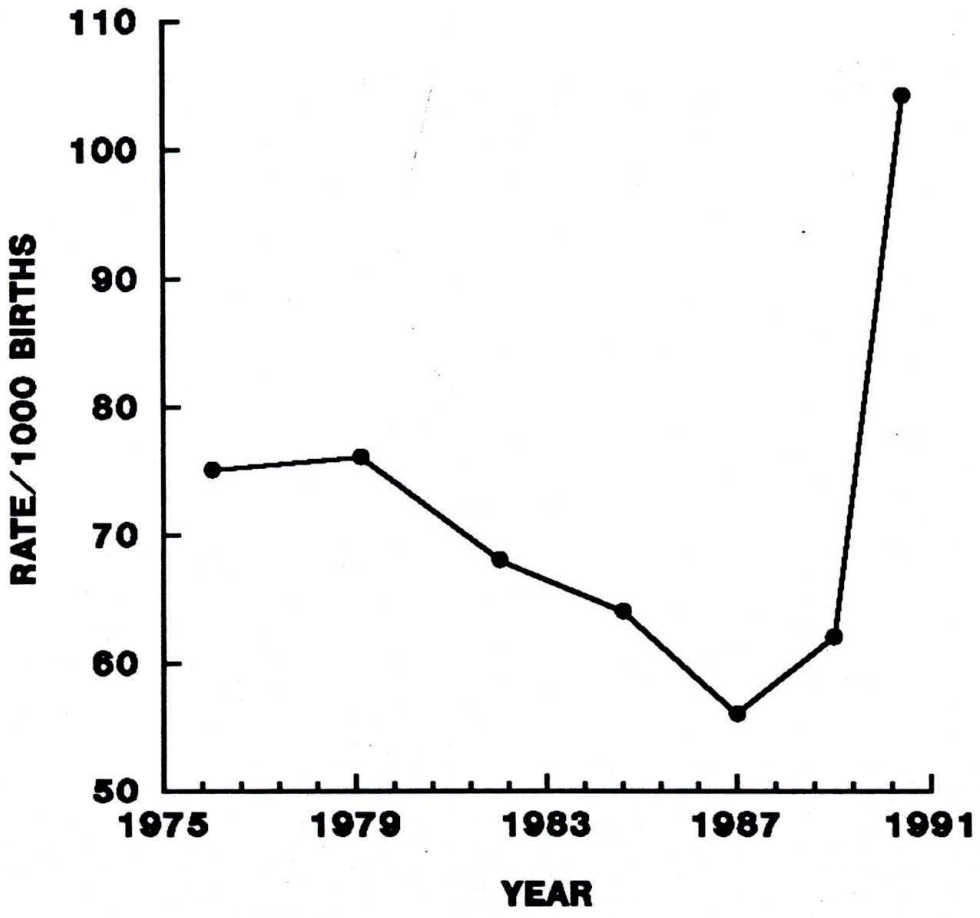


FIG.11.ESTIMATED 1-5 YR MORTALITY



indirect estimation methods use models of fertility and mortality to distribute these births and deaths in time and by age. Even though no information on age of these children is used in the estimation procedure, by this method, the two youngest age groups give us the estimated probability of dying by age one (infant mortality rate) and the probability of dying by age two. They are also the estimates which relate to the closest time periods to the survey (around 1-5 and 3-4 years prior) because, on average, mothers from these age groups gave birth more recently than older mothers (3).

For the reasons stated above these estimates of mortality do not accurately reflect the probabilities of death by ages one and two for the whole population. Older mothers in the population have children who are likely to have higher probabilities of surviving to these ages, yet, their mortality experience does not figure in the estimates. **It is best, therefore, to disregard the estimates from the 15-19 and 20-40 year old women, and to look for other methods of obtaining mortality estimates for the more recent period (3).**

This does not necessarily contradict the advice given above for translating estimates from older mothers into one mortality index for each group. It only means that

whatever index we use, we should disregard the estimates obtained for the mortality levels of the two youngest age groups (3).

On the graph (Figs. 9 to 12) it may appear as though mortality has risen recently, when it only means that these indirect estimates for the time closest to the survey are not representative of levels of childhood mortality in the population as a whole (3).

One of the assumptions implicit in the Brass method is that the age pattern of fertility has been constant in the recent past. In effect, we assume that the age pattern of current fertility is the same as that earlier. Hence,one possible explanation of the irregular pattern observed in some surveys is that the ratio of average parities is a poor description of the prevailing age pattern of fertility. Another quite different possibility is age error. A third possibility is that the survey missed certain women, which biased the estimates (3). There are no such obvious irregular patterns observable in the present survey.

A method which produces an estimate nearer to the survey date without reliance on death dates is the Preceding Birth Technique.

It would be useful to examine the data separately for boys and girls. Tables 14 to 17 summarize the childhood mortality for boys and girls, separately. The under five mortality rate (q 5) and infant mortality rate (q 1) from the South model is compared for both sexes in Figs. 12 and 13.

The infant mortality for males is marginally higher than females and shows a downtrend till the last two age groups. The downtrend in female q1 starts from 40 to 44 years age group (reference period 1979.1) and continues till 20-24 year age group (reference period 1989) after which the expected upsurge is obvious. These findings are probably due to under-reporting of female deaths in the 45-49 and 20-24 year age groups, the male to female sex ratio of dead children in these two age groups is high (1.19 and 1.20, respectively). The infant mortality estimates referring to these two age periods should, therefore, be considered as underestimates.

On considering under five mortality, a gradual decline for males is obvious till the youngest two age groups. For females, as for q1, the decline for q5 begins from 40-44 year age group (reference period 1979.1) and lasts till 20-24 year age group (reference period 1989). This once again suggests that the mortality estimates for these two period are underestimates.

FIG.12.SEX & UNDER 5 MORTALITY

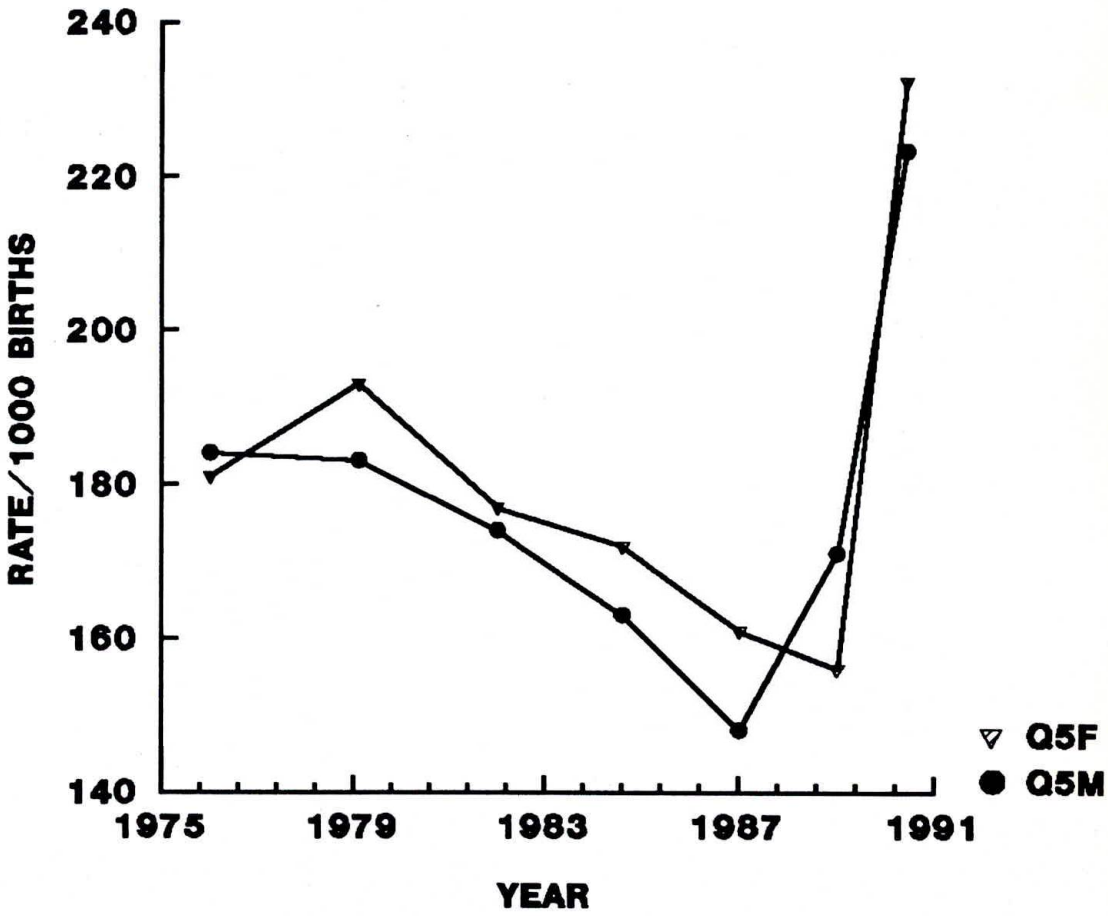


FIG.13.SEX & INFANT MORTALITY

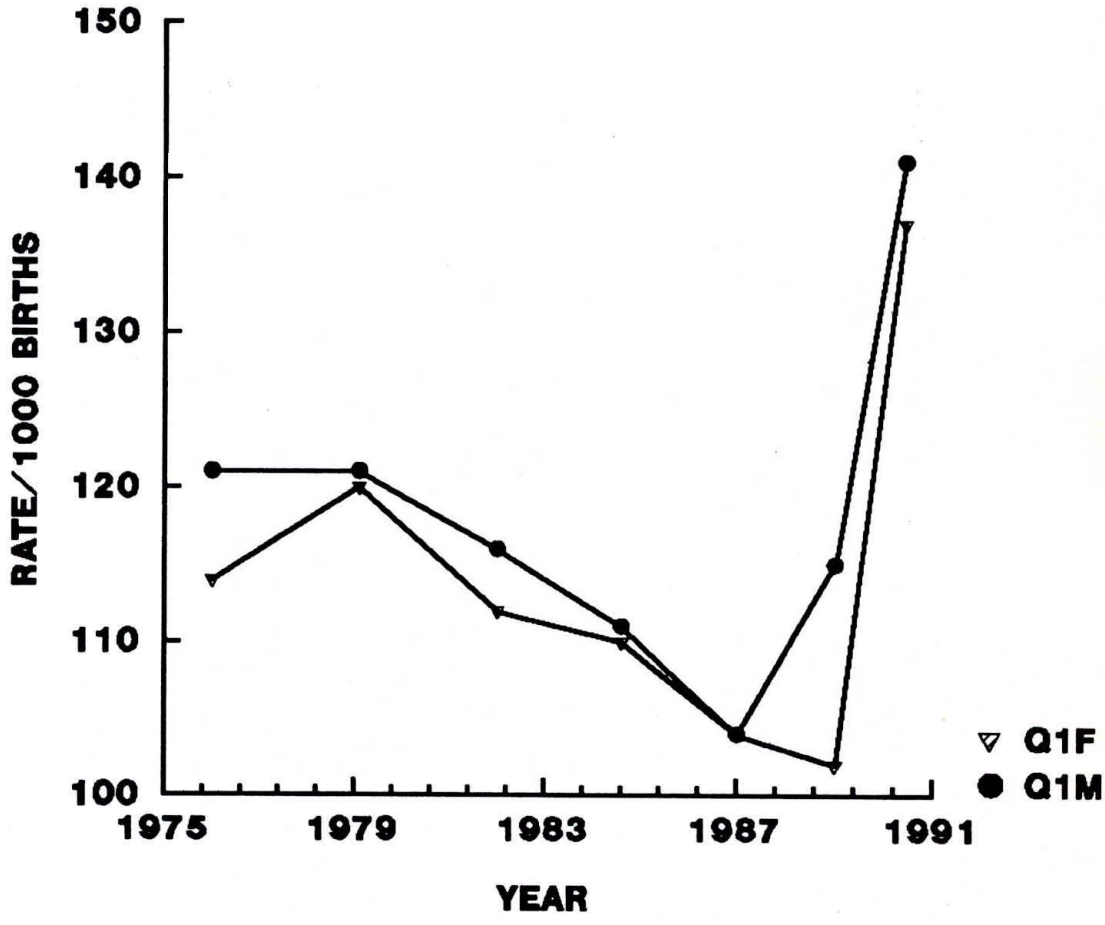


TABLE 14 : Indirect Estimation of Childhood Mortality for Males (Coale Demeny Models)

Age of Woman	Average No. Children Born	Surviving	Proportion Dead	Age x	Coale-Demeny Models (Trussell Equations) North q(x)	t(x)	South q(x)	t(x)	East q(x)	t(x)	West q(x)	t(x)
15-19	.174	.147	.154	1	.147	(1.2)	.141	(1.2)	.155	(1.2)	.151	(1.2)
20-24	.838	.715	.146	2	.139	(2.6)	.146	(2.6)	.148	(2.6)	.147	(2.6)
25-29	1.585	1.363	.140	3	.130	(4.5)	.139	(4.6)	.138	(4.7)	.137	(4.7)
30-34	2.223	1.864	.161	5	.156	(6.7)	.163	(7.0)	.161	(7.1)	.161	(7.0)
35-39	2.615	2.144	.180	10	.186	(9.1)	.185	(9.6)	.184	(9.8)	.183	(9.6)
40-44	2.939	2.347	.201	15	.206	(11.8)	.203	(12.4)	.202	(12.7)	.202	(12.3)
45-49	3.170	2.488	.215	20	.216	(14.6)	.215	(15.5)	.214	(15.9)	.214	(15.2)

Coale-Demeny:	North		South		East		West	
Age of Woman	Reference Date	q	Reference Date	q	Reference Date	q	Reference Date	q
	Infant Mortality Rate: q(1)							
15-19	1990.4	.147	1990.4	.141	1990.3	.155	1990.3	.151
20-24	1989.0	.111	1989.0	.115	1988.9	.129	1988.9	.121
25-29	1987.1	.094	1987.0	.104	1986.8	.114	1986.9	.106
30-34	1984.9	.099	1984.6	.111	1984.4	.125	1984.5	.114
35-39	1982.4	.102	1982.0	.116	1981.7	.133	1982.0	.119
40-44	1979.8	.105	1979.1	.121	1978.9	.140	1979.3	.124
45-49	1976.9	.102	1976.0	.121	1975.7	.140	1976.4	.122
	Probability of Dying Between Ages 1 and 5: $_4q_1$							
15-19	1990.4	.111	1990.4	.095	1990.3	.056	1990.3	.080
20-24	1989.0	.076	1989.0	.063	1988.9	.043	1988.9	.058
25-29	1987.1	.060	1987.0	.050	1986.8	.036	1986.9	.047
30-34	1984.9	.064	1984.6	.058	1984.4	.041	1984.5	.053
35-39	1982.4	.067	1982.0	.065	1981.7	.045	1982.0	.056
40-44	1979.8	.070	1979.1	.071	1978.9	.049	1979.3	.060
45-49	1976.9	.067	1976.0	.071	1975.7	.049	1976.4	.058
	Probability of Dying by Age 5: q (5)							
15-19	1990.4	.241	1990.4	.223	1990.3	.203	1990.3	.220
20-24	1989.0	.179	1989.0	.171	1988.9	.166	1988.9	.172
25-29	1987.1	.148	1987.0	.148	1986.8	.146	1986.9	.148
30-34	1984.9	.156	1984.6	.163	1984.4	.161	1984.5	.161
35-39	1982.4	.161	1982.0	.174	1981.7	.172	1982.0	.168
40-44	1979.8	.167	1979.1	.183	1978.9	.182	1979.3	.177
45-49	1976.9	.162	1976.0	.184	1975.7	.182	1976.4	.174

Note: A q Value of .999 Denotes Value Below A Level 1 Model Life Table
" .000 " Above A Level 25 "

TABLE 15 : Indirect Estimation of Childhood Mortality for Males (Palloni - Heligman Equations)

Age of Woman	Average No. Children Born	Surviving	Proportion Dead	Age x	United Nations Models (Palloni-Heligman Equations) Latin Am. q(x)	t(x)	Chilean q(x)	t(x)	So Asian q(x)	t(x)	Far East q(x)	t(x)	General q(x)	t(x)
15-19	.174	.147	.154	1	.148	(1.1)	.165	(1.3)	.148	(1.1)	.151	(1.2)	.150	(1.1)
20-24	.838	.715	.146	2	.149	(2.5)	.154	(2.6)	.150	(2.5)	.149	(2.6)	.149	(2.5)
25-29	1.585	1.363	.140	3	.140	(4.3)	.143	(4.5)	.141	(4.4)	.139	(4.4)	.139	(4.3)
30-34	2.223	1.864	.161	5	.164	(6.4)	.163	(6.8)	.165	(6.6)	.161	(6.5)	.162	(6.5)
35-39	2.615	2.144	.180	10	.186	(8.9)	.182	(9.3)	.187	(9.1)	.182	(8.9)	.185	(8.9)
40-44	2.939	2.347	.201	15	.200	(11.7)	.201	(12.1)	.205	(12.0)	.200	(11.6)	.200	(11.7)
45-49	3.170	2.488	.215	20	.215	(15.3)	.214	(15.7)	.216	(15.9)	.214	(14.9)	.215	(15.2)

Mean Age at Maternity = 27.00 (Default Value used)

United Nations: Latin Am.			Chilean		So Asian		Far East		General	
Age of Woman	Reference Date	q	Reference Date	q	Reference Date	q	Reference Date	q	Reference Date	q
Infant Mortality Rate: q(1)										
15-19	1990.5	.148	1990.2	.165	1990.5	.148	1990.3	.151	1990.4	.150
20-24	1989.1	.120	1988.9	.139	1989.0	.119	1988.9	.122	1989.0	.123
25-29	1987.3	.103	1987.0	.123	1987.2	.103	1987.2	.105	1987.2	.107
30-34	1985.1	.109	1984.8	.133	1985.0	.109	1985.0	.110	1985.1	.113
35-39	1982.6	.114	1982.3	.140	1982.5	.114	1982.6	.112	1982.6	.117
40-44	1979.9	.116	1979.4	.147	1979.5	.121	1980.0	.114	1979.9	.120
45-49	1976.3	.117	1975.9	.147	1975.7	.123	1976.7	.111	1976.4	.120
Probability of Dying Between Ages 1 and 5: $_4q_1$										
15-19	1990.5	.100	1990.2	.051	1990.5	.103	1990.3	.095	1990.4	.089
20-24	1989.1	.070	1988.9	.038	1989.0	.072	1988.9	.067	1989.0	.064
25-29	1987.3	.056	1987.0	.031	1987.2	.057	1987.2	.053	1987.2	.051
30-34	1985.1	.061	1984.8	.035	1985.0	.063	1985.0	.057	1985.1	.056
35-39	1982.6	.065	1982.3	.039	1982.5	.068	1982.6	.059	1982.6	.059
40-44	1979.9	.067	1979.4	.042	1979.5	.074	1980.0	.060	1979.9	.061
45-49	1976.3	.068	1975.9	.042	1975.7	.076	1976.7	.057	1976.4	.062
Probability of Dying by Age 5: q(5)										
15-19	1990.5	.233	1990.2	.208	1990.5	.236	1990.3	.232	1990.4	.225
20-24	1989.1	.181	1988.9	.171	1989.0	.182	1988.9	.181	1989.0	.179
25-29	1987.3	.153	1987.0	.150	1987.2	.154	1987.2	.153	1987.2	.152
30-34	1985.1	.164	1984.8	.163	1985.0	.165	1985.0	.161	1985.1	.162
35-39	1982.6	.171	1982.3	.173	1982.5	.174	1982.6	.164	1982.6	.169
40-44	1979.9	.175	1979.4	.183	1979.5	.186	1980.0	.167	1979.9	.174
45-49	1976.3	.178	1975.9	.183	1975.7	.190	1976.7	.162	1976.4	.175

Note: A q Value of .999 Denotes Value from Table with Life Expectancy Less Than 35
" .000 " Greater Than 75

TABLE 16 : Indirect Estimation of Early Age Mortality for Females (Coale Demeny Models)

Age of Woman	Average No. Children Born	Average No. Children Surviving	Proportion Dead	Age x	Coale-Demeny Models (Trussell Equations) North q(x)	North t(x)	South q(x)	South t(x)	East q(x)	East t(x)	West q(x)	West t(x)
15-19	.171	.144	.157	1	.143	(1.3)	.137	(1.3)	.153	(1.3)	.148	(1.3)
20-24	.771	.668	.133	2	.125	(2.6)	.131	(2.6)	.134	(2.7)	.132	(2.7)
25-29	1.455	1.237	.150	3	.139	(4.5)	.149	(4.6)	.148	(4.7)	.147	(4.7)
30-34	1.994	1.654	.170	5	.166	(6.7)	.172	(6.9)	.170	(7.1)	.170	(7.0)
35-39	2.318	1.893	.183	10	.191	(9.0)	.190	(9.5)	.188	(9.7)	.187	(9.5)
40-44	2.490	1.958	.214	15	.220	(11.6)	.217	(12.2)	.216	(12.5)	.216	(12.1)
45-49	2.647	2.082	.214	20	.216	(14.4)	.214	(15.3)	.214	(15.7)	.214	(15.0)

Coale-Demney:	North		South		East		West	
Age of Woman	Reference Date	q	Reference Date	q	Reference Date	q	Reference Date	q
Infant Mortality Rate: q(1)								
15-19	1990.3	.143	1990.3	.137	1990.3	.153	1990.3	.148
20-24	1988.9	.097	1988.9	.102	1988.8	.113	1988.8	.105
25-29	1987.0	.095	1986.9	.104	1986.8	.117	1986.9	.107
30-34	1984.9	.097	1984.6	.110	1984.4	.125	1984.6	.112
35-39	1982.5	.096	1982.1	.112	1981.9	.127	1982.1	.112
40-44	1979.9	.102	1979.3	.120	1979.0	.139	1979.4	.120
45-49	1977.1	.094	1976.2	.114	1975.9	.130	1976.6	.111
Probability of Dying between Ages 1 and 5: $_4q_1$								
15-19	1990.3	.124	1990.3	.110	1990.3	.070	1990.3	.095
20-24	1988.9	.075	1988.9	.059	1988.8	.045	1988.8	.060
25-29	1987.0	.073	1986.9	.063	1986.8	.047	1986.9	.061
30-34	1984.9	.076	1984.6	.070	1984.4	.052	1984.6	.066
35-39	1982.5	.075	1982.1	.073	1981.9	.053	1982.1	.066
40-44	1979.9	.081	1979.3	.084	1979.0	.061	1979.4	.073
45-49	1977.1	.072	1976.2	.076	1975.9	.055	1976.6	.065
Probability of Dying by Age 5: q(5)								
15-19	1990.3	.249	1990.3	.232	1990.3	.212	1990.3	.229
20-24	1988.9	.165	1988.9	.156	1988.8	.153	1988.8	.159
25-29	1987.0	.161	1986.9	.161	1986.8	.159	1986.9	.161
30-34	1984.9	.166	1984.6	.172	1984.4	.170	1984.6	.170
35-39	1982.5	.164	1982.1	.177	1981.9	.174	1982.1	.170
40-44	1979.9	.175	1979.3	.193	1979.0	.191	1979.4	.184
45-49	1977.1	.159	1976.2	.181	1975.9	.179	1976.6	.168

Note: A q Value of .999 Denotes Value Below A Level 1 Model Life Table
" .000 " Above A Level 25 "

TABLE 17 : Indirect Estimation of Early Age Mortality for Females (Palloni Heligman Equations)

Age of Woman	Average No. Children Born	Surviving	Proportion Dead	Age x	United Nations Models (Palloni-Heligman Equations) Latin Am q(x)	t(x)	Chilean q(x)	t(x)	So Asian q(x)	t(x)	Far East q(x)	t(x)	General q(x)	t(x)
15-19	.171	.144	.157	1	.147	(1.1)	.165	(1.3)	.147	(1.1)	.151	(1.3)	.150	(1.2)
20-24	.771	.668	.133	2	.135	(2.5)	.140	(2.7)	.136	(2.6)	.134	(2.7)	.135	(2.6)
25-29	1.455	1.237	.150	3	.150	(4.3)	.153	(4.6)	.151	(4.4)	.149	(4.4)	.149	(4.3)
30-34	1.994	1.654	.170	5	.173	(6.4)	.173	(6.7)	.174	(6.5)	.170	(6.5)	.171	(6.5)
35-39	2.318	1.893	.183	10	.190	(8.8)	.186	(9.1)	.191	(8.9)	.186	(8.8)	.189	(8.8)
40-44	2.490	1.958	.214	15	.212	(11.5)	.214	(11.9)	.218	(11.8)	.212	(11.4)	.212	(11.5)
45-49	2.647	2.082	.214	20	.214	(15.0)	.213	(15.4)	.215	(15.6)	.212	(14.6)	.214	(14.9)

Mean Age at Maternity = 27.00 (Default Value Used)

United Nations: Latin Am			Chilean		So Asian		Far East		General	
Age of Woman	Reference Date	q	Reference Date	q	Reference Date	q	Reference Date	q	Reference Date	q
Infant Mortality Rate: q(1)										
15-19	1990.5	.147	1990.2	.165	1990.5	.147	1990.3	.999	1990.4	.150
20-24	1989.0	.101	1988.8	.122	1989.0	.106	1988.9	.107	1989.0	.105
25-29	1987.2	.099	1987.0	.125	1987.1	.106	1987.1	.107	1987.2	.104
30-34	1985.1	.101	1984.8	.132	1985.0	.110	1985.0	.109	1985.1	.106
35-39	1982.8	.101	1982.4	.134	1982.6	.112	1982.7	.108	1982.8	.105
40-44	1980.1	.106	1979.7	.145	1979.8	.121	1980.2	.113	1980.1	.111
45-49	1976.5	.102	1976.1	.137	1976.0	.116	1976.9	.103	1976.6	.105
Probability of Dying Between Ages 1 and 5: $_4q_1$										
15-19	1990.5	.152	1990.2	.071	1990.5	.120	1990.3	.999	1990.4	.135
20-24	1989.0	.079	1988.8	.040	1989.0	.067	1988.9	.066	1989.0	.071
25-29	1987.2	.077	1987.0	.042	1987.1	.067	1987.1	.065	1987.2	.070
30-34	1985.1	.079	1984.8	.047	1985.0	.072	1985.0	.068	1985.1	.073
35-39	1982.8	.079	1982.4	.048	1982.6	.074	1982.7	.067	1982.8	.072
40-44	1980.1	.086	1979.7	.056	1979.8	.085	1980.2	.073	1980.1	.079
45-49	1976.5	.080	1976.1	.050	1976.0	.079	1976.9	.062	1976.6	.072
Probability of Dying by Age 5:q(5)										
15-19	1990.5	.277	1990.2	.224	1990.5	.249	1990.3	.999	1990.4	.264
20-24	1989.0	.172	1988.8	.157	1989.0	.165	1988.9	.166	1989.0	.169
25-29	1987.2	.168	1987.0	.162	1987.1	.166	1987.1	.165	1987.2	.167
30-34	1985.1	.173	1984.8	.173	1985.0	.174	1985.0	.170	1985.1	.171
35-39	1982.8	.172	1982.4	.176	1982.6	.177	1982.7	.168	1982.8	.170
40-44	1980.1	.183	1979.7	.193	1979.8	.196	1980.2	.179	1980.1	.181
45-49	1976.5	.174	1976.1	.180	1976.0	.186	1976.9	.159	1976.6	.169

Note: A q Value of .999 Denotes Value from Table with Life Expectancy Less Than 35
" .000 " Greater Than 75

In contrast to infant mortality, the under five mortality is higher for females. This should not lead us to question the reliability of the date. A more logical explanation is that the under five mortality (particularly 1 to 5 year mortality) is actually higher for females. This is compatible with the well known preference for male children, particularly in this situation.

2. Preceding Birth Technique

With this technique we can derive reliable estimates of childhood mortality closer to the date of survey. This method, is quite robust to error (3).

There were a total of 6485 women with the youngest live born child below 2 years age (only those children were considered whose age was known with certainty) and a preceding birth also. There were 878 deaths amongst the preceding births, giving the proportion dead as 0.135.

The mean age of all last births (10.4 months) was calculated from 5834 cases in whom the age of child in years and months was known with certainty.

The mean birth interval length for the interval between the last and preceding birth was 32.85 months. This was calculated from 4295 cases in whom the ages of both

children (youngest child and preceding birth) in years and months were known with certainty.

The estimate of 135 deaths per thousand live births, therefore, refers to 36.7 months or roughly three years (q3 or under three mortality rate). This refers to a time period 28.8 months ago (roughly 2 years 5 months ago) or to the year 1989.2.

Assuming a design effect of 2.5 for cluster sampling, the 95% confidence intervals for the estimated q3 (under three mortality) are 122 to 148.

To make comparisons with the Brass Technique meaningful, the q3 requires conversion to common indices q5 and q1) The converted q5 is 146 and q1 is 100.

From the section on Brass Technique we are aware that the estimates from the two youngest age groups should be disregarded as overestimates. We can substitute those estimates by the converted under five (q5) and infant (q1) mortality rates derived from the Preceding Birth Technique. Figs. 14 and 15 graphically depict the estimated secular change for both sexes combined for q5 and q1. Only the last value is derived from the Preceding Birth Technique the earlier ones being the Brass estimates. The values

FIG.14.UNDER 5 MORTALITY CHANGE

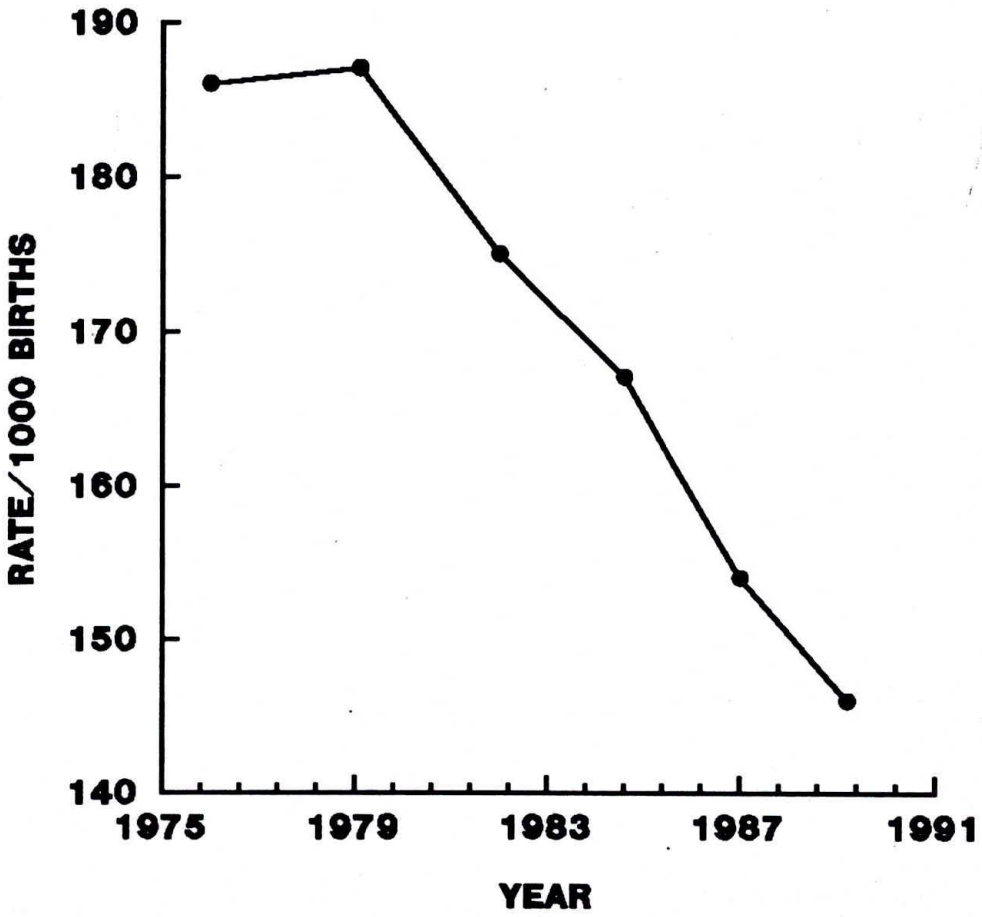
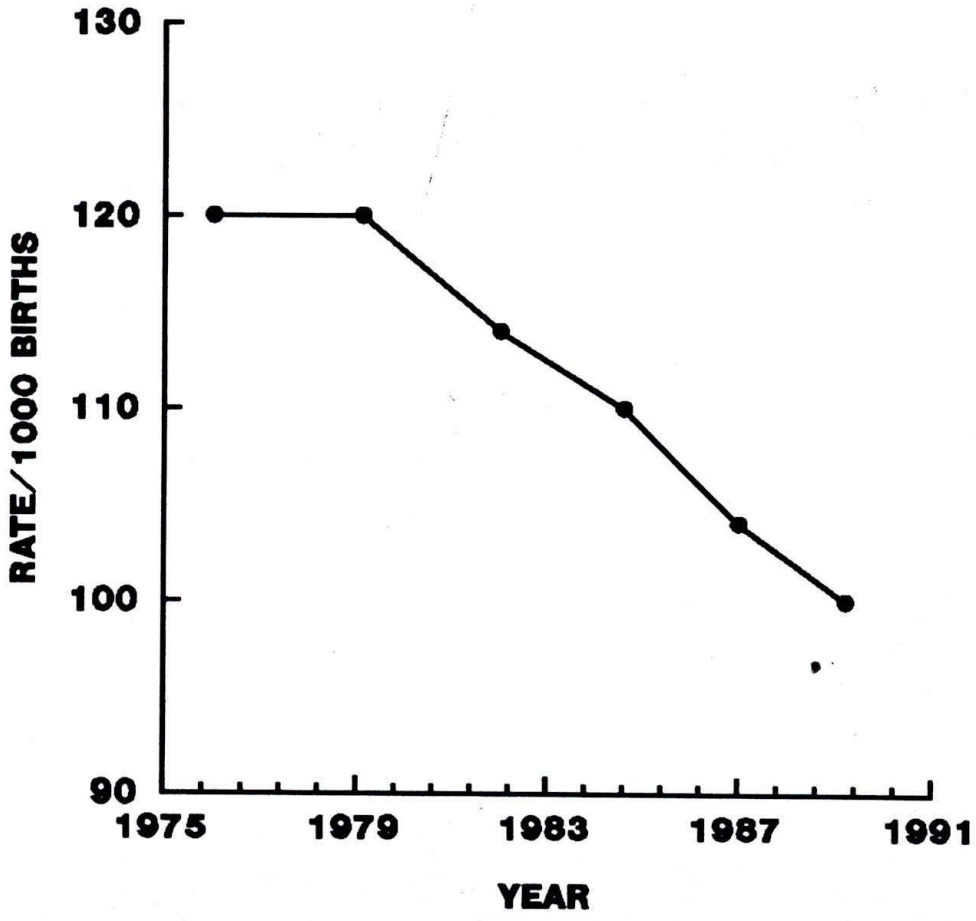


FIG.15.INFANT MORTALITY CHANGE



derived from the Preceding Birth Technique are compatible with the Brass estimates and indicate a gradual declining trend in both under five and infant mortality rates. In thirteen years (from 1976.1 to 1989.2), the under five mortality has declined by 16.7% and infant mortality by 21.5%.

It should, however, be cautioned that the estimates for childhood mortality should be considered as underestimates be cause of some evidence of under-reporting of females deaths.

E. COMPARISON WITH AVAILABLE DATA

There appears to be no precise quantification of childhood mortality in urban slums of India. However, it would be useful to compare the results of this survey with the projected national figures and available data from micro-studies in a similar environment (Tables 18 and 19). In this context, it is once again pointed out that the pre 1980 estimates of this survey may not necessarily represent those of urban slums since many JJ Bastees were built after this period. However, they do provide vital information on mortality experience of this population.

TABLE 18: Comparison of Infant Mortality Rate (q1)

Year	1989.2	1986.9	1984.6	1982	1979.2	1976.1
1. Present survey	100*	104	110	114	120	120
2. SRS India Urban (7)	62	62	66.1	65.2	72.2	80
3. SRS India rural (7)	102	104.6	113.3	113.7	129.7	139
4. SRS India combined (7)	94	96.4	104	104.8	120	120
5. Delhi (8)	37.9	42.2	44.4	47.6	41.7	55.2
6. Urban Slum (9)	-	-	123	-	-	-
7. Delhi slum (10)	-	-	112	-	-	-

* Estimates based on preceding birth technique.

The urban slum q1 estimates from the present survey are comparable with Sample Registration System (SRS) figures for rural India (7). The SRS urban estimates are only two thirds of the urban slums. Unfortunately, data from the SRS is not published for Delhi since the sample size is too low. The infant mortality in slums is about 2 1/2 times the projected figures for Delhi by the Bureau of Economics and Statistics (8).

TABLE 19 : Comparison of Under Five Mortality Rate (q5)

Year	1989.2	1986.9	1984.6	1982	1979.2	1976.1
1. Present survey	146*	154	167	175	187	186
2. SRS India urban (7)	85.3	92.5	96.0	92.4	102.7	128.5
3. SRS India rural (7)	146.7	156.3	171.7	165.8	198.6	215.9
4. SRS India combined (7)	139.5	144.8	156.8	152.4	182.2	199.4

* Estimates based on preceding birth technique.

Infant mortality rate figures for urban slums have been quoted in various reports (9,10). Comparisons with these figures are difficult since the methodology has not been described and these appear to be based on micro-studies. In slums, estimates have ranged from 26 to 208, averaging 86 in one study. In another study in slums of Delhi, q1 averaged 112 but went upto 200 in one slum (10).

On comparing the under five mortality rate, essentially similar conclusions emerge (Table 19). The SRS estimates for rural India are roughly comparable whereas those for urban areas are considerably lower (about 60%). Unfortunately, similar estimates, even from micro-studies are scare for q5 in urban slums.

From the above comparison it can be seen that childhood mortality in urban slums is considerably higher than the projected estimates for that area. The slum areas are not included for estimating the vital events in reliable surveys like the Sample Registration System. These areas comprise a significant proportion of the urban population. It is, therefore, obvious that the projected figures are underestimates. A further implication of this finding is the need to focus urgent remedial action in these "hidden areas" in the context of Child Survival Programmes.

PART B : KAP SURVEY

A : Knowledge, Attitudes and Practices of Mothers with Regard to Pregnancy, Childbirth and Neonatal Care

Six hundred and thirty two mothers were interviewed from 150 JJ clusters on various aspects related to KAP with regard to pregnancy, childbirth and neonatal care. The pertinent details are summarized below.

1. Age and Parity

Two thirds (66%) of the mothers were aged between 20-30 years while the rest were equally distributed between 15-19 years and 31-40 years. Almost half (48%) the women had a parity of more than 3 and 18% were primiparous.

2. Birth Spacing

Almost 91% mothers considered that an adequate birth interval was essential for health of mother and child. Of the mothers answering in the affirmative, 63.2% felt a birth interval of 1-3 years was adequate for maternal and child's health, while 36% felt that more than 3 years interval between births was essential. A total of 59% women stated their awareness of birth control methods and a little over half (53%) felt that continued breast feeding was an effective method of contraception.

3. Perinatal Outcome

Nearly all (94%) of the women had experienced an uneventful delivery during the last childbirth. Only 2.6% of the multiparous women interviewed had experienced intrauterine death in the delivery preceding the last birth. Of the 618 mothers who live births, 4.6% had experienced death of their child under 3 months of age - 55% dying in the neonatal period and the rest between 1-3 months of age. Only half the mothers were aware of their child's cause of death.

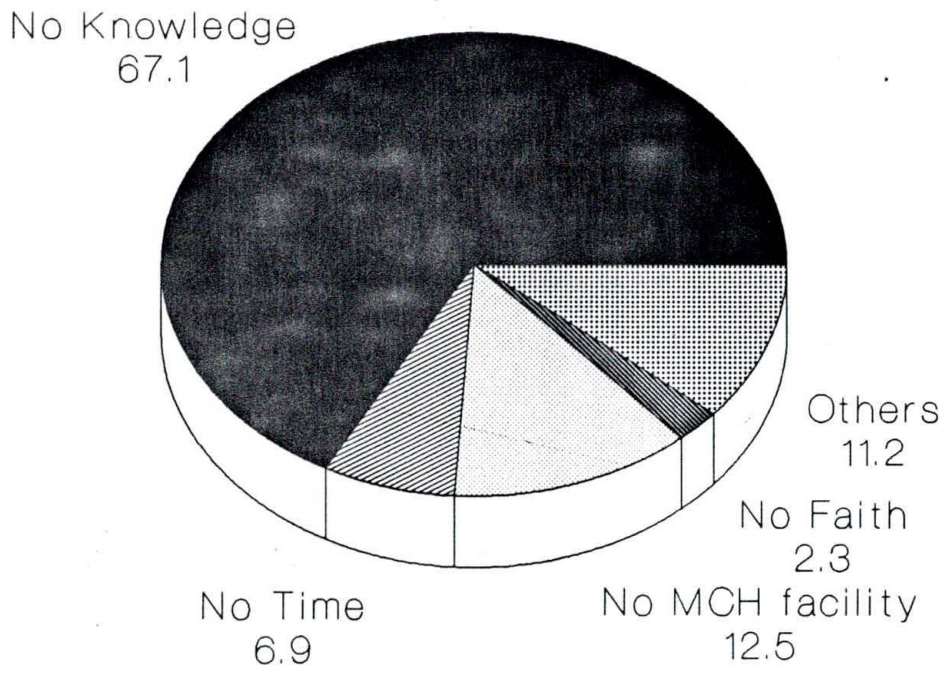
4. Antenatal care

Nearly two thirds 62% women felt that antenatal care was essential, but only 55% could get antenatal care during their last pregnancy. Almost all (98%) of these women availed of hospital based antenatal services.

TABLE 20 : Distribution of Women by Antenatal Visit

Visit No.	% women
One	13.6
Two	31.7
Three	27.4
Four or more	27.3

FIG.16. REASONS FOR NOT AVAILING ANC



Only a third of mothers had recorded a minimum of four antenatal visits (Table 20) which is considered adequate for satisfactory perinatal outcome (11). In a recently published report by the Indian Council of Medical Research (12), it was reported that in urban slums in three major metropolises of the country only 36% women received four or more antenatal checks during their pregnancy and 34% wanted these antenatal checks during an illness.

Nearly half (45%) of the women did not receive any antenatal care. The reasons for these are shown in Table 21 and Fig.16. Two-thirds (67.1%) of the women were ignorant of the need for antenatal care.

Table 21 : Reasons for not Receiving Antenatal Care

Reasons	%
1. No knowledge	67.1
2. No time	6.9
3. No MCH facility in neighbourhood	12.5
4. No faith	2.3
5. Miscellaneous	11.2

5. Nutrition During Pregnancy

We assessed the woman's concept of dietary intake in pregnancy, which is presented in Table 22.

Table 22 : Dietary Intake in Pregnancy

Quantum of dietary intake	% Respondents	
	Awareness	Actual intake
1. Normal (Pre-pregnant)	41.1	33.5
2. More than normal	24.8	22.6
3. Less than normal	28.1	31.8
4. Uncertain	6.0	12.1

It is evident that only a quarter of the mothers interviewed felt the need for an increased dietary intake during pregnancy. The data with regard to actual intake compared well with their existing knowledge. This suggests that awareness of dietary needs during pregnancy was poor and economic constraints probably had a lesser influence than maternal education and awareness on their actual dietary intake. The ICMR study in urban slums also observed that only 37.3% women were aware that there is need to consume a larger dietary intake during pregnancy (12), an observation similar to that of the present study.

Interestingly 93% of women believed that adolescent girls must get adequate nutrition and almost a similar number stated that they got sufficient food to eat during their adolescence. However, what these women considered as adequate intake is open to question in view of the above observations on dietary intake during pregnancy.

6. Smoking and Alcoholism

About 12% of women stated that they smoked both before and during pregnancy, while only 2% women admitted to alcohol consumption during pregnancy. However the study did not attempt to quantify the extent of smoking or alcohol intake.

Interestingly the recently published ICMR study (12) observed that in the urban slums only 2% women smoked and there was no alcohol consumption. These differences might have been due a much larger number of urban slum clusters represented in the present study (150 clusters) compared to the ICMR study (21 clusters).

7. Iron and Folic Acid Intake

Nearly half (55%) of the women were aware of the need for iron and folic acid during pregnancy for prevention of anemia, and an almost similar number(60%) were aware that these tablets were available free of cost at MCH Centres.

When asked regarding consumption of iron and folic acid tablets during their last pregnancy, 51% answered in the affirmative. About 20% women stated that they had consumed some form of tonics during their pregnancy.

8. Tetanus Immunization

Nearly three-fourths (78%) of the respondents were aware that some injections were administered to pregnant women. Only two-thirds (63%) stated that they had received tetanus immunization during pregnancy. Nearly half (52%) women had received at least 2 doses of tetanus toxoid during the antenatal period, 9% had received only one dose, the rest either had not received the toxoid or were uncertain about the doses received.

9. Work and Rest During Pregnancy

Of all respondents, about 25% stated that they were normally doing heavy work, including lifting of weights and about 26% stated that even during pregnancy they continued to do heavy work/labor.

About 72% women felt that pregnant women should get additional rest and about 76% of the respondents stated that they got sufficient rest during their last pregnancy. However, the study did not attempt to assess mother's

knowledge as to what constituted adequate rest during pregnancy.

10. Complications During Pregnancy

The respondents were asked to state if the selected symptoms in pregnancy pose a risk for mother/fetus/both. Table 23 summarizes the answers obtained.

TABLE 23 : Awareness of Risk of Obstetrical Complications

Symptoms	Risk present Yes(%)	No(%)	Uncertain(%)
1. Vaginal bleeding	80.8	8.2	11.0
2. Edema feet	56.0	30.8	13.2
3. Headache, dizziness, visual blurring	45.2	40.9	13.9
4. Burning micturition	48.3	29.7	22.0

A quarter (24%) of women stated that they had suffered from one or more of the above symptoms during their last pregnancy. When asked where they sought medical advice for their problems, 26.7% stated that no help was sought, 35.2% sought help from Government health facilities, 16.3% from private doctors and 14.3% from Dais.

11. Place of Delivery

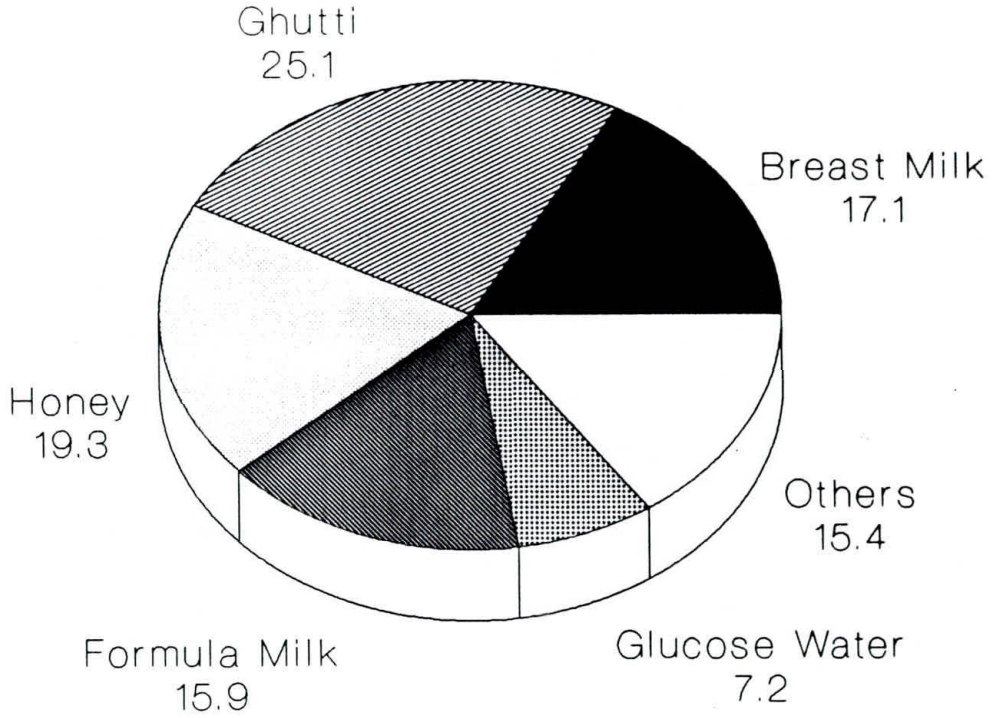
A vast majority (82.5%) of women had their delivery at home, 15.8% at Government hospitals/centres and the rest availed of private medical facilities. In contrast the ICMR study had observed that 43% of urban slum dwellers delivered their babies at the hospital (12). The reasons for opting for the place of delivery are listed in Table 24.

TABLE 24 : Reason for Choosing Place of Delivery

Place of Delivery	Reasons	%
Home Delivery	1. By choice	86.2
(n=522)	2. No means to reach hospital	1.9
	3. Apathy in government hospitals	1.9
	4. Others	9.9
Institutional	1. By choice	93.8
Delivery	2. Obstetrical problems	3.1
(n=98)	3. Non availability of Dai	3.1

In case of home deliveries, the **persons who conducted the births** were Dai (TBA) 85.4%, relatives(6.1%), Nurse/ANM (5.1%),doctor(2.4%) and Others 1.0%. The ICMR collaborative study (12) had also revealed that 61% of the home deliveries were conducted by TBAs, most of whom were untrained.

FIG.17. TYPE OF FIRST FEED



12. Cord Care

The instruments used to cut the cord as stated by the women are listed in Table 25.

Table 25 : Instruments for Cord Cutting

Instrument	%
1. Blade	70.1
2. Knife	2.0
3. Scissor	17.5
4. Others	1.1
5. Not known	9.3

Nearly three fourths (73%) of the women stated that the cord cutting instrument was boiled for at least 10 minutes and 67% stated that the thread for tying the cord was also boiled. In the only other large multicentric study on KAP with regards to childbirth in urban slums conducted by the ICMR (12) it was observed that while 97% women were aware that the instrument for cord cutting was to be sterilized, only 75% actually sterilized the instrument.

13. Neonatal Feeding

(a) First feed : The type of first feed offered to the baby after birth is depicted in Table 26 and Fig.17.

Table 26 : Type of First Feed

	Type of feed	%
1.	Breast milk	17.1
2.	Ghutti	25.1
3.	Honey	19.3
4.	Formula milk	15.9
5.	Glucose water	7.2
6.	Others	15.4

Ghutti was the first feed in 17%, honey in 10% and formula feeds in 12% of cases in the 1990 ICMR multicentric study in urban slums (12). These findings were comparable to our observations.

(b) Colostrum : When asked the time at which breast feeding was initiated, most women did not clearly remember and so the data was not analysed further.

When asked regarding the feeding of colostrum, 42% women stated that they had fed colostrum to their baby. No satisfactory reasons were elicited from those who had not fed colostrum.

c) **Top Feeds**: About 15% mothers were either exclusively or partially top feeding their babies at the time of the interview. Almost 90% of these mothers were diluting the milk with water. Sixty per cent of the mothers were using a bottle to feed their baby and the rest a cup and spoon. Surprisingly almost half of these mothers had initiated top feeding under one month of age. The reasons given by the mothers for initiating top feeds are provided in Table 27.

TABLE 27 : Reasons for Initiating Top Feeds

Reasons	%
1. Breast milk insufficient	50.0
2. Maternal illness	12.5
3. Doctor's advice	6.3
4. Breast milk didn't suit	6.3
5. Others	24.9

14. Immunization

The mother's knowledge with regard to immunization schedule and the diseases against which protection is offered was abyssimally low. However, 49% mothers stated that their children had received some form of immunization upto the time of this study.

B. Knowledge, Attitudes, Practices of Dais with Regard to Perinatal and Neonatal Care

A total of 180 Dais were interviewed to assess their KAP with regard to pregnancy,childbirth and neonatal care. In 40% of the clusters selected for the survey, no Dais were available. The largest proportion of clusters without any Dais were located in the West and South Zones.

1. Background Information

(a) Age : Two-thirds (68%) of the Dais interviewed were between 30 to 50 years of age. Only 5% were under 30 years of age, the rest being more than 50 years.

(b) Caste Status: Forty-four per cent of Dais belonged to the Scheduled Castes, 21% were from the upper castes (Thakurs and Brahmins), 7% were non-Hindus and 18% were from other Backward castes. These observations are contrary to popular belief that most Dais are essentially from the Scheduled Castes.

(c) Training and Experience : Only 16% of the Dais had received any formal training. Of the remaining, 44% had acquired the skills from relatives,16% were self taught and 15% had learnt it from other Dais. Fifty per cent of the Dais had a traditional background of this occupation and a third (32%) were into the trade for the first time.

Almost a third(28%) were in this profession for under 5 years and a similar number were in it for 6-10 years. Thirty per cent had been in this profession for between 11-20 years, the rest having more than 20 years experience.

(d) Income and Workload: Most Dais could earn some income from being in this profession. Only 72 Dais responded to our query on their monthly income. About 43% earned Rs.150.00 or less per month, 10% between Rs.150-300 per month, 27.7% between Rs.300-500 per month and the rest claimed to earn more than Rs.500 per month. Eighty six Dais their earnings per delivery attended. The charges levied by them Dais ranged from a few rupees to over Rs.250 per delivery. About 40% earned Rs.100.00 or less and an equal proportion earned between Rs.101-250 per delivery attended. About 6% stated that they were paid in kind by the family for their services.

Most Dais conducted less than 5 deliveries per month. The more popular Dais conducted more than 10 deliveries per month and they constituted about 10% of the Dais interviewed.

2. Confirmation of Pregnancy

Nearly half (54%) of Dais stated that they could confirm a pregnancy between 1 to 3 months. Early confirmation of

pregnancy was in most cases possibly an intelligent guess from missed menstrual cycle or symptoms of morning sickness. Only 36% Dais were aware of the method of calculating the `due date' of delivery from the mother's last menstrual period. As many as 20% had no idea of estimating the `due dates of delivery'.

3. Nutrition in Pregnancy

Nearly three fourths (76%) of the Dais thought nutrition influenced pregnancy outcome. **Roughly half (53%) of the Dais felt that women should eat less during pregnancy so that smaller babies are produced leading to easy childbirth.** Thirty-three per cent, however, felt that they should eat more food during pregnancy. The rest felt that a normal dietary intake during pregnancy was good enough or they had no idea of what the nutritional intake in pregnancy should be.

4. Anemia

A majority (84%) of the Dais felt that women in our country were anemic and that this was aggravated during pregnancy. Sixty per cent felt that iron and folic acid should be taken during pregnancy and an almost similar proportion (63%) were aware that these tablets were available free of cost at MCH centres.

Table 28 summarizes the Dais ability to assess clinical features of anemia. The Dais however, had little concept of iron rich foods which mothers could consume during pregnancy.

TABLE 28 : Anemia Detection by Dais

	Symptoms	% awareness
*	Pallor of eyes, face and nails	58.0
*	Edema feet	3.0
*	Dizziness	4.0
*	Tiredness/breathlessness	2.0
*	No knowledge	33.0

5. Rest and Work in Pregnancy

Table 29 gives the attitudes of Dais with regard to rest and work during pregnancy.

Table 29 : Attitude to Rest and Work in Pregnancy

Attitude	Yes(%)	No(%)	Don't know(%)
a. Needs extra rest	71.1	7.8	21.1
b. Avoid strenuous work, but continue household chores	70.5	10.7	18.8
c. Rest only during last trimester	66.6	16.7	16.7

Roughly 60% Dais felt that women in JJ clusters got enough rest during pregnancy. Those answering to the contrary gave a variety of reasons for not getting sufficient rest- poverty and therefore need to work, excessive household chores, family problems,etc.

6. Tetanus Immunization

About 80% of the Dais had heard of the disease called tetanus. Forty-one per cent said that they had seen cases of neonatal tetanus in the community. About 73% Dais were aware that tetanus immunization was necessary for pregnant mothers but only 10% were aware that tetanus immunization to the mother protects her offspring. In fact 82% thought that tetanus immunization in pregnancy protected the mother against this infection. **Only 17% Dais were aware that at least two doses of tetanus immunization were required during pregnancy.** Only a third of Dais (31%) were aware that tetanus toxoid had to be administered between 6-9 months of pregnancy. Most were unaware of the actual number of doses that a woman must receive and at what interval. In fact, 9% Dais reported that a baby delivered by them had developed neonatal tetanus.

7. Advise on Antenatal Visits

Almost three-fourths (77%) of the Dais were advising mothers to attend antenatal clinics at MCH centres. In fact 50% of the Dais claimed that they accompanied the mothers to the MCH centers on one or more visits.

About 25% Dais felt that getting to the MCH Centre was a problem and/or the staff at the health centre were apathetic and failed to provide satisfactory advice.

8. High Risk Factors

When asked to state conditions likely to adversely influence pregnancy outcome,14% stated fetal malpresentation as an important risk factor. Five per cent stated that decreased fetal movements was a risk factor, while anemia and vaginal bleeding were stated to be risk factors only 3% of the Dais. Their knowledge about other risk factors was poor. Their awareness with regard to situations precluding safe domiciliary birth is summarized in Table 30.

DELIVERY PRACTICES

9. Attendance During Childbirth

Eighty-nine per cent Dais stated that she was called at the onset of labor pains and 83% stated that they were present throughout labor. Only 10% were called to cut the cord and deliver the placenta.

TABLE 30 : Maternal Conditions Precluding Safe Domiciliary Birth

Maternal conditions	Risk for domiciliary birth Yes	No	Don't Know
1. Short stature	64.4	30.1	5.5
2. Weight < 40 Kg	62.2	32.3	5.5
3. Age < 18 years	61.1	33.4	5.5
4. Age >= 35 years	55.5	49.0	5.5
5. Parity > 4	58.3	36.2	5.5
6. Fetal malpresentation	86.1	8.4	5.5
7. Previous Cesarian birth	87.7	6.8	5.5

10. Vaginal Examination

A total of 69% Dais stated that they carried out between 1-3 internal examinations during labor. Only 44% washed their hands before the examination procedure. When asked to state reasons for internal examination, only a small number of Dais responded (Table 31).

TABLE 31 : Reasons Stated by Dais for Internal Examination

Maternal condition	%
1. Fetal malpresentation	17.0
2. No labor pains	11.0
3. Excessive bleeding	11.0
4. To assess cervical dilatation	6.0

11. Delivery Posture

The delivery posture preferred by the Dais is summarized in Table 32.

TABLE 32 : Preference for Delivery Posture

Posture	% preference
1. Squatting	14.4
2. Lying only	25.5
3. Either squatting or lying	52.2
4. No reply	7.9

12. Cleaning and Washing

(a) Hands : A majority (91%) of Dais stated that they washed their hands before conducting a delivery. For this practice, 89% used soap and 6% used only water for hand washing. In contrast the ICMR study (12) observed that only 55% women washed their hands before attending to a delivery.

(b) Mother : The mothers perineum was cleaned before delivery by 84% of the Dais. While 62% used a wet cloth to clean the area, only 10% used soap and water for cleaning of perineum.

(c) House : The Bastee was said to be cleaned before a childbirth by 87% of Dais.

13. Labor Management

When asked as to what the Dais considered as prolonged labor, the answers ranged from one hour to more than 24 hours. This clearly indicates their lack of knowledge with regard to what constitutes prolonged labor. Nearly half (48%) of the Dais took the help of a nurse or local medical practitioner to give some intramuscular injections to the pregnant women to increase labor pains(a risky practice which should be strongly discouraged).

14. Delivery of Placenta

The replies obtained with regard to their practices on the delivery of the placenta are listed in Table 33.

TABLE 33 : Practices for Delivery of the Placenta

Practice	%
a. Nothing (allow spontaneous delivery of placenta)	13.3
b. Internal examination	13.8
c. Pull the cord	17.7
d. Abdominal massage	46.1
e. No response	9.1

Sixty one per cent Dais stated that in the event of retained placenta, the woman was referred to the hospital.

However, the stated duration beyond which referral was needed was highly variable (0.5 to more than 3 hours). Three per cent Dais had never faced the situation of retained placenta.

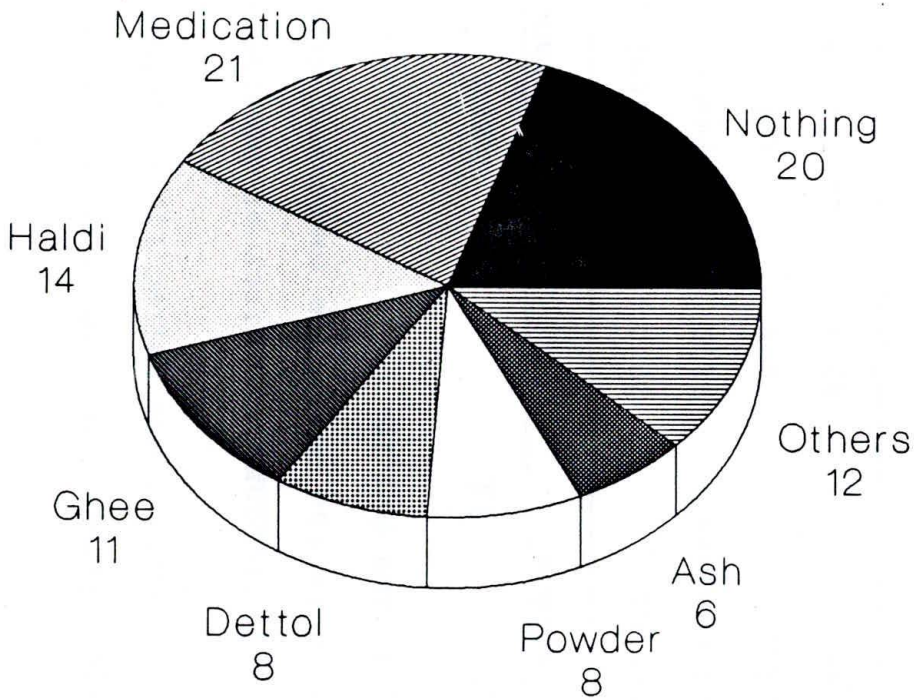
15. Maternal Death

Eight per cent Dais reported a maternal death amongst the cases delivered by them. However, most could not give the possible reasons for this death. Some of the causes alluded to included retained placenta, twin delivery, still birth and anemia in mother.

16. Hospital Referral in Labor

Twenty-two per cent Dais stated that they had an occasion to refer women in labor to hospital. Only a quarter stated reasons for doing so, which included prolonged labor, maternal fatigue, excessive bleeding and malpresentations. These statements do not, however, reflect whether the referrals made were early(at an optimal time) or what was the condition of the mother at the time of referral. Most Dais (85%) accompanied the referred mothers to the hospital and were satisfied with regards the treatment provided.

FIG.18. CORD APPLICATIONS



Neonatal Care

17. Cord Care

(a) Instrument: Eighty-four per cent Dais used a blade for cutting the cord, 10% used scissors and the rest a variety of instruments.

(b) Boiling: Ninety per cent Dais stated that the instrument for cord cutting was boiled for at least 10 minutes.

(c) Cord applications: A variety of substances were applied on the cord by the Dais. The responses obtained are listed in Table 34 and Fig.18.

Table 34 : Cord Applications

Substance	%	Substance	%
1. Nothing	20.0	5. Dettol	8.0
2. Medications	21.0	6. Powder	8.0
3. Haldi	14.0	7. Ash	6.0
4. Ghee	11.0	8. Others	12.0

In contrast to our observations an earlier study by the ICMR (12) observed that 31% women applied nothing to the cord while 62% applied medicated creams. This difference might be explained by the substantially larger number of slum women delivering in a hospital in the ICMR study as compared to the present one, where only 15-20% deliveries were institutional.

18. Clearing of Mouth at Birth

A vast majority (93%) of Dais felt that clearing of the mouth of the baby at birth was necessary and in fact carried out this practice routinely.

19. Asphyxia Management

About 80% Dais were able to identify an asphyxiated baby by virtue of it being apneic or blue at birth. The Dais were then asked regarding their practices when faced with an asphyxiated baby at birth. Their responses are listed in Table 35.

TABLE 35 : Asphyxia Management

Intervention	%
1. Pour warm water	38.0
2. Blow into baby's mouth	58.0
3. Others(camphor,onion,baby hung upside down,massage cord)	4.0
4. No response	8.0

20. Assessing Size (Weight) at Birth

Twenty per cent Dais stated that they guessed the possible birth weight. Four per cent responded that they could manage to weigh the baby(none possessed a weighing scale),

the rest made no assessment of baby's size at birth.

21. Bathing the Baby at Birth

Ninety-two per cent of Dais stated that they bathed the baby after birth. (We believe that this practice is potentially harmful as the baby runs the risk of becoming hypothermic).

The prevalence of this potentially harmful practice in urban slums was also observed in the ICMR study (12) where 97% of babies were bathed before 24 hours of age (majority within 8 hours of birth).

22. Feeding

(a) First Feed: Only 6% of Dais allowed breast milk as the first feed. The other responses are listed in Table 36.

Table 36 : Type of First Feed

Type of Feed	%
1. Breast milk	6.0
2. Ghutti	41.1
3. Honey	36.6
4. Glucose water	7.8
5. Top milk	1.6
6. Others	6.9

(b) Colostrum: Only 36% of Dais stated that they advised the feeding of colostrum to the baby.

(c) Initiation of Breast Feeds: Only half the Dais responded to our query regarding when breast feed was initiated after birth (Table 37).

TABLE 37 : Initiation of Breast Feeds

Time to First Feed	%
* At birth	5.5
* On first day	8.3
* On second day	8.3
* On third day	22.2
* Non responders	55.7

(d) Feeding Methods : The Dais knowledge with regards to feeding methods in babies not able to suckle at the breast was also assessed (Table 38). More than half the Dais resorted to cotton or spoon feeding.

TABLE 38 : Feeding Methods Propagated

Feeding Method	%
1. Cotton	33.3
2. Spoon	28.8
3. Bottle	12.2
4. Dropper	4.4
5. Non responders	21.3

(e) Lactagogues: The Dais attitudes with regard to lactagogues was evaluated but the responses were varied and interesting (Table 39).

TABLE 39 : Attitude with Regard to Lactagogues

Lactagogues	%
* Milk and Ghee	30.0
* Green leafy vegetables and fruit juices	33.0
* Meat,eggs,fish	11.0
* Pulses,Cereals	14.0
* `Ajvain'and `Jeera'	14.0

23. Care of LBW Babies

We were interested in evaluating how the Dais viewed Low Birth Weight (LBW) babies and the care they considered appropriate. Less than 10% Dais were conversant with the concept of special care for LBW babies.The responses of these Dais alone is presented in Table 40.

Hardly any Dai gave advice on maintenance of baby temperature which is essential to prevent hypothermia in this group of babies. In the ICMR study (12) too less than 1% health functionaries advised mothers on clothing and environment for their babies.

TABLE 40 : Care of LBW Babies

Advice	%
1. Adequate milk feeding	7.0
2. Ghutti/Tonic	3.0
3. Baby massage	3.0
4. Seek medical help	7.0

24. High Risk Referral

Almost half (46%) the Dais stated that they had experienced situations where the neonate had to be referred for medical help. However, they were unable to clearly state the risk situations that demanded the referral.

25. Infant Immunization

Three fourths (75%) Dais advised mothers on their infant's immunization. However, their awareness with regards to vaccine preventable diseases and what immunizations prevented them was very dismal (Table 41).

TABLE 41 : Awareness of Infant Immunization

Vaccines	%
* BCG	10.0
* Tetanus	11.0
* Poliomyelitis	8.0
* Pertussis	3.0

26. Family Welfare Services

About 46% Dais were aware of birth control methods. Only 37% stated that they accompanied women to MCH centres for Copper-T insertion or tubectomy. About 18% Dais admitted to carrying out abortions in the community.

COMMENTS

The awareness and utilization of MCH services by mothers in the JJ Bastees was poor. Their awareness and practices with regards to antenatal and neonatal care was largely a reflection of prevalent socio-cultural attitudes. Most mothers chose to deliver at home and locally available Dais (most of whom were untrained) were the prime caretakers during pregnancy, childbirth and possibly also of their neonates. However, the knowledge, attitudes and practices of these birth attendants were no better than that of the mother's. Their knowledge with regard to nutrition in pregnancy, rest and maternal tetanus immunization were far from satisfactory. Some of their practices with regard to labor management, its augmentation (particularly the use of oxytocin), delivery of placenta and neonatal care during the first few hours of life were potentially harmful. The `high risk' concept, its identification and subsequent referral was almost non-existent.

This state of affairs continues to prevail even several years after the Report of Task Force on Minimum Perinatal Care, Government of India (1982) (11), Task Force Report on Maternal Mortality and Morbidity, Government of India (1987) (13) and the adoption of the Safe Motherhood Initiative (Nairobi, 1987)(13).

There is need to launch a campaign to increase awareness of women in the reproductive age group on perinatal and neonatal care practices. Simultaneously efforts to train birth attendants (even new willing entrants) has to be dovetailed with other efforts to improve perinatal and neonatal outcome. Several workers have shown that `Delivery huts or booths' in the community where mothers can have safe childbirths is a workable proposition. These efforts can only succeed if adequate linkages are established between the community and existing health facilities in urban areas. The creation of a cadre of `Link Worker' (or Bastee Sewika) will help fill this void in the referral chain.

The urgent need of such efforts is strengthened by the observation that barring 3-4 States, in the rest of the country urban neonatal and perinatal mortalities have shown no decline over the last decade, unlike the rural region which has shown a 4% annual decline in neonatal mortality rates (7).

SUMMARY

In this survey, 150 Jhuggi Jhompri clusters of Delhi were studied with respect to early childhood mortality and knowledge, attitude and practices (KAP) of mothers and Dais for perinatal and neonatal care. A total of 22,181 households were visited for this purpose.

The current state of civic amenities in the surveyed population was deplorable. There was one safe water point for 102 households (desired norm is 1 in 20) and only 53% of the Bastees had Public Utilities.

The most recent estimates of childhood mortality obtained by preceding birth technique relate to the year 1989.2. These indicate an infant mortality rate of 100 and under five mortality rate of 146. With Brass technique there is evidence of secular decline in both infant and under five mortality. The infant mortality rate is marginally higher for boys whereas the under five mortality rate is higher for girls. The latter is probably a reflection of well known preference for the male child.

The estimates from the present survey are comparable with Sample Registration System figures from rural India and substantially higher than urban India. The infant mortality in slums is about two and a half times the projected figures for Delhi by the Bureau of Economics and Statistics.

It is apparent that childhood mortality in urban slums is considerably higher than the projected estimates for that area. The slum areas are not included for estimating the vital events in reliable surveys like the Sample Registration System. These areas comprise a significant proportion of urban population. It is, therefore, obvious that the projected figures are underestimates. A further implication of this finding is the need to focus urgent remedial action in these "hidden areas" in the context of Child Survival Programmes.

The KAP study of mothers and Dai's in JJ Bastees with regard to perinatal and neonatal care practices underscores the glaring inadequacies in the MCH services to this population.

Almost half (45%) the mothers did not avail of ante-natal services and only about 16% women had received the optimal four ante-natal checks during pregnancy. Knowledge with regard to nutrition, rest and complications during pregnancy was poor. As high as 12% of women continued to smoke even during pregnancy. However, the satisfying findings were that 63% mothers had been immunized with tetanus toxoid and 51% were receiving iron and folic acid tablets during pregnancy. It is strongly felt that intense health

educational efforts would improve the care of pregnant mothers and their offsprings.

Eighty-two per cent women chose to deliver at home and most deliveries were conducted by Dais (most of whom were untrained). The attitude and practices of Dais with regard to pregnancy and childbirth were far from satisfactory. In fact some of the practices relating to labor management and neonatal care were potentially harmful and need to be actively discouraged. The 'high risk' concept and referral were unfamiliar to most Dais, but what may offer a glimmer of hope is their willingness to be trained if given an opportunity.

RECOMMENDATIONS

On the basis of this survey, the following recommendations emerge :

1. The currently projected urban childhood mortality figures should be considered underestimates. The urbanites residing in slums must be included for estimating the realistic vital statistics.

2. The vital statistics for urban areas should have a separate category for urban poor.

3. In formulating Child Survival Programmes for urban areas, attention should be primarily directed to slum dwellers.

4. The high childhood mortality despite widespread availability of health services is a cause for concern. Efforts should be directed urgently to ascertain the specific causes for formulating effective remedies.

5. The areas which require immediate attention in this context include :

   (i) Improvement in the availability and quality of civic amenities to match the recommended norms.

   (ii) Intense and sustained Maternal and Child Health

related educational inputs to improve the knowledge, attitude and practices in this context.

(iii) Traditional birth attendants (Dais) must be identified and trained to ensure safe motherhood.

(iv) Creation of a community level link worker (Bastee Sewika) akin to community health volunteer in the rural areas merits consideration. This will facilitate delivery of primary health care for the urban poor.

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