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FAMILY PLANNING—A NEWER DIMENSION IN NURSING CARE

By

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Medical care, like the science itself is a dynamic concept which is modified or adjusted with the newer knowledge in medical science. Since nurse in a modern hospital forms the pivot for providing such care, it will be logical to presume that approach to the preparation of a nurse will change with the progress in medical thoughts. For example, a nurse does not have to apply poultice and plaster to the chest of a patient of pneumonia any more, but instead has to ensure that antibiotic as advised is administered with clock like precision. Numerous such examples can be cited from the past history of medical progress, indicating the changing pattern of nursing care. Most of these changes can be directly traced to the scientific or technological advances related to the diagnostic or therapeutic care of patient. But there is little evidence on record, in the history of medicine in our country, where a social factor influencing health problems has been accepted to institute a change in the pattern of nursing care.

In India, the first trial in this field, related family planning services through hospital care, was started by the Nursing Council when it made recommendation[1] for incorporating the topic in the nursing curriculum. These recommendations were in keeping with the country's efforts to deal with India's most important health problem *i.e.* rapidly increasing population. But what a nurse was expected to do in the field of family planning and for that what was to be included in the nursing curriculum remained unidentified. This particular aspect was investigated by Family Planning Research Project attached to Lady Hardinge Medical College and Hospital, in its preliminary phase. This Project has been studying Methods for Raising Effectiveness of Hospital in Promoting Family Planning Through Hospital Care. The findings from a number of diagnostic studies conducted in this Project were utilized to develop an orientation programme in family planning for the nursing staff of the hospital. This paper deals with some of the pertinent findings from the diagnostic studies, approach to the planning of orientation programme and its applicability for wider use in the rest of the country.

1. Findings from the diagnostic studies :

Preliminary survey covering 28 medical colleges in India showed that only 7 family planning clinics attached to the teaching hospitals have organized programme for nurses. In practically all institutes the programme was organized by the regional family planning centres. This covered provision of 3-4 lectures given to senior nursing students. An other intensive study was carried out in one medical college to study the role of nurses in family planning.

A total of 50 trained nurses working in the hospital were interviewed with a semi-structured questionnaire. It provided the following information.

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[1]Recommendations of the Indian Nursing Council, 29th November, 1967.

Only 8 (16 per cent) nurses has the knowledge of the wider concept of family planning *viz* spacing, limitation and family welfare, 25 (50 per cent) of them understood it as only limitation.

Most of the nurses 44 (88 per cent) nurses looked upon this problem as a national problem while 3 (6 per cent) nurses mentioned it only as a family problem.

Only 8 (16 per cent) nurses knew about all the methods for contraception while 14 (28 per cent) nurses did not have any knowledge about the methods.

To identify the need for family planning in a patient, 21 (42 per cent) nurses indicated parity, socio-economic status, health of mother and children, as the factors, while 14 nurses had completely omitted the health factor.

All the nurses knew about the existence of family planning clinic in the hospital, but there were only 16 (32 per cent) who did not know about any other family planning clinic in the area.

Enquiry as to their own role for imparting information about family planning clinic revealed that 35 (70 per cent) nurses had given such information to the patients in the hospital.

There were 19 (38 per cent) nurses who did not refer any case to the family planning clinic giving reasons as lack of time and not a part of their duty (10), never thought of it (4) religious reasons (3), no response (2).

15 nurses (30 per cent) had expressed doubts about family planning advice which was mainly due to lack of knowledge (9) on the subject. At the same time 29 (58 per cent) nurses did not feel competent to advise patients for family planning.

Patients' need and acceptance of family planning advice :

Approximately 75 per cent of the patients attending this hospital were in the fertile age. group. Only 9 per cent of them were aware of the family planning clinic functioning in the hospital, whereas 33.6 per cent of the patients when informed about family planning services were willing to utilise the same.

Basic philosophy :

The summary findings as quoted above give a picture of the prevailing situation which needs to be strengthened for promoting family planning services through nursing care. One of the interesting findings pertained to the patients' interest in obtaining family planning service and nurses' unpreparedness to render this because of lack of knowledge or confidence to undertake such work. This pattern is contrary to the usual picture of community health care where the staff if prepared and a service is established preceding people's demand for utilising the same.

Besides, introduction of a new service like family planning can always create a problem when service staff (nurses) does not visualise it as a part of their duty, because it did not form a part of their routine work so far. Therefore, provision of mere information about the basic facts on family planning may not motivate them to take action unless efforts are made to enable them understand and to incorporate family planning services as a part of nursing care.

Findings from another study indicate that hospital sercices in family planning cannot be improved by only sensitizing the doctors, without concurrent preparation of the nurses to participate in the family planning programme. The organization of an orientation course for the nursing staff was therefore considered necessary as a first step in the action phase of the Research Project.

Planning for the orientation programme :

The important factors which greatly contributed to the planning of a successful orientation programme included :

(a) acceptance by the nursing superintendent to preside over the first meeting of nurses with the staff of the Family Planning Research Project, to get an idea of the type of work undertaken by the Project,

(b) unanimous decision of the nursing staff to invite the staff of the Research Project to organise the orientation course,

(c) support received from the nursing superintendent and other senior nursing staff members in planning the programme.

The following points were taken into consideration to outline the contents for the orientation courses :

(i) Topics should cover minimum of the information on basic subjects so as to repeat what nurses already know;

(ii) Emphasis to be given to the applied aspects of the topic with particular attention to the role of a nurse in view of the problems discussed;

(iii) Topics to be presented in a manner that they are made informative, interesting and meaningful from nurses' point of view;

(iv) The methods of presentation to be based on discussion, demonstration rather than a didactic approach to the subject;

(v) Discussion guides and memeographed material to be supplied to stimulate participation; and

(vi) Teaching aids to be prepared and suitably used for making the presentation more effective;

This orientation programme did not have any test or examination at the end of the course. Instead an attempt was made to plan the lessons carefully and assess nurses reactions at the end of each session.

Nature of contents :

Broadly stated the topics can be divided under the following heads :

A. **Basic information :**

(i) Overpopulation—a social problem influencing individual and community health;

(ii) Patient as a biological and a social being;

(iii) Factors influencing fertility control.

B. **Hospital and its structure :**

(i) Number of patients in the fertile age-group attending the O.P.D. and the types of patients in the hospital and their eligibility for family planning advice;

(ii) Hazards of improvident maternity;

(iii) Role of a hospital in the community.

C. **Newer aspects in nursing care :**

(i) Medical indications for cessation (temporary and permanent) of pregnancy;

(ii) Problems of communication as a part of nurse—patient relationship;

(iii) Nurses' role in providing family planning services.

Specific illustrations connected with most of the topics mentioned above were developed from the experience of research studies. At the same time an attempt was also made to limit the number of topics to the minimum essential.

5. **Orientation course—the first trial :**

The nursing superintendent fitted the orientation course in the daily routine of nursing staff enabling a batch of 25-30 sisters and staff nurses to attend one hour session, held twice a week. A total of three courses were carried out to cover the trained staff working in the hospital.

At the end of each session, nurses were given an evaluation sheet to comment on the presentation of the topic and its applicability in their work situations. Suggestions were also invited from the nurses for further improvement in the presentations. In order to elucidate their frank opinion and suggestions they were requested not to sign their names on the evaluation sheets. All batches of the nurses appreciated the course in general and suggested only minor changes in the total course content. Therefore, no basic change was brought about in the pattern of the course outlined for the first batch.

Orientation course—Extension :

A preliminary report of the trial of orientation course conducted by Family Planning Research Project for the nursing staff of Lady Hardinge Medical College and Hospital was sent to the Nursing Adviser, Ministry of Health, Government of India. With her approval and suggestions, two seminars on family planning one for

the nursing superintendents and the other for the sister tutors of local hospitals were organized in Delhi jointly by the Central Family Planning Institute and the Research Project staff. The findings of the Research Project and the experience gained in conducting the orienation courses referred above provided basis and guidance for the discussions in the sister tutors' seminar.

The success of these seminars has led to the decision and planning similar seminars to be held for the nursing staff all over India. These are being sponsored by the Central Family Planning Institute, in collaboration with state health departments.

Conclusion and recommendations :

1. The trained nursing staff in various hospitals are not conversant with the scope of family planning services through hospital care, hence there is a need to strengthen this concept through orientation courses.

2. The course should provide an orientation in family planning to :

(i) trained nurses and sister tutors,

(ii) student nurses.

3. The decisions which are taken in the above mentioned seminars should be put into effect as early as possible in the hospital sponsoring the training programme.

4. Mere inclusion of the family planning subject in the syllabus would be hypothetical unless the topic is incorporated in the routine services provided by nursing staff.

5. Simultaneous training of the doctors is also required along with the orientation of the nurses.

6. Basic data connected with the problem of fertility such as number of eligible patients in the fertile age-group attending the hospital, parity in relation to foetal loss, problems of unwanted pregnancy, trends in admission of abortion cases from local hospitals may be collected and utilized for training.

7. Local resources of the college-hospital for organising orientation course to be fully utilized particularly, where the nurses training centre is within a medical college-hospital.

8. The report of the trial of the course conducted by Family Planning Research Project has provided a guideline only, the contents may be modified and further developed suited to local conditions.

9. There is a further need to develop guidelines on :

(a) how to teach family planning to student nurses,

(b) how to incorporate family planning services as part of nursing care in the hospitals.

Acknowledgement :

Our thanks are due to the Medical Superintendent of Lady Hardinge Medical College and Hospital for their keen interest and the leadership exercised in initiating the activities which led to the organisation of seminars. We are also thankful to Col. B. L. Raina, Director, Central Family Planning Institute and Miss T. K. Adranvala, Advisor in Nursing to Directorate General of Health Services for their continued interest and support received in conducting the research and training programme.

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A PLAN FOR PRIMARY HEALTH CENTRE RECORDS

By

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Introduction

Records are eyes and ears of any comprehensive health care work. Their maintenance becomes an integral part of health care. An attempt was made (Mathen 1959) to suggest a list of records to be maintained at Primary Health Centre, but in the absence of a Statistical clerk, it was not possible to implement those suggestions. Moreover, the recommendations were geared towards purely preventive work. The work carried out is a comprehensive health care with main emphasis on prevention. This requires a more realistic approach to the problem of records to make them more informative. In fact all records should be reviewed in order to modify them to the needs of the changed circumstances.

Comprehensive curative and preventive service records with family as a basic unit have been used successfully by Gopalakrishnan, et al (under publication). It is impossible for the Medical Officer to carry out any health survey in those villages, but they can make use of their records over the years. For effective planning, execution, co-ordination and evaluation of the comprehensive health care, it is essential that Medical Officers at the Primary Health Centres must maintain a certain minimum number of records. At present the higher echelon ask for special reports and returns which are probably the only records along with the O.P. Attendance Register maintained by these Health Centres.

This paper attempts to make suggestion for maintaining certain basic minimum records at a Primary Health Centre level.

Basic Services

The records have to be maintained for the services given. The seven basic services which are given from the Primary Health Centres and Sub-centres are—

1. Medical Relief
2. Maternity & Child Health and Family Planning
3. School Health Services
4. Health Education
5. Environmental sanitation
6. Control of communicable diseases
7. Collection of vital statistics.

Each of these services have certain proformae or records for their planning, execution and evaluation. Health education permeates all fields. The last function of—'Collection of Vital statistics' varies from State to State in which usually the Medical Officer is not directly involved. This work is carried out by the existing system of collection of vital statistics by the Village Registrars for onward transmission to the Taluk and District level. Medical Officers are mainly involved in supplementing the vital statistics or helping in correction of causes of deaths.

For medical relief, the O.P. Register is maintained, but probably, it is not written legibly

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so as to be used for their preventive and follow-up services.

The M.C.H. Services have standard forms which are being used by various health centres depending upon the initiative of the M.C.H. Staff. With the addition of family planning work, other sets of records have come into picture which are probably not being linked up with the M.C.H. services. Similarly the School Health Service Records do not exist in all the health centres. A simple physical examination is done and a small para is written as an annual report in the Register maintained in schools.

In addition, various control and eradication programmes operating in the country are being gradually handed over to the Primary Health Centres during their maintenance phase with all their records and an additional staff of a badic health worker. In this connection, the Malaria Eradication and Maintenance Programme and Smallpox Eradication Programme have good records. Similarly, Leprosy and T.B. Control Programmes are also gradually coming up with their programmes and records. So, it is apparent that gradually large number of records are taking shape and are existing at the peripheral level in these health centres which are not linked up with each other, but exist in isolation.

Certain areas where the programmes about the Trachoma, Filaria, etc., are existing, also have their own records.

Thus Primary Health Centres have a very important role to plan in the maintenance of these comprehenisve records. The only drawback is that at present there is no special staff members who can be made responsible for this. The time has come when these records should be standardised and linked up so as to make them a real comprehensive, so that with the minimum effort, one should have their maximum utility. At the peripheral level, these records give the Medical Officer and the higher authority an idea of the quantity of services proveded with the gaps and lacuna existing in them. These records also may be used for planning of surveys or for operational research. In addition, the Medical Officer can give suggestions and advice in various Panchayat and Block meetings about the existing health conditions in the area.

Essential Records

A suggestion is made for maintaining at least the following records in their intensive work area around the main centre and sub-centres. It is not possible at present stage to cover the whole area, but a beginning can be made.

1. Daily O.P. Register.
2. Follow-up Register for communicable and non-communicable diseases.
3. Birth, Death and Immunization Register
4. Maternity Home-visiting Register
5. Family Planning Register
6. Child Health Register
7. Leprosy Home-visiting Case Register
8. T.B. Home-vistiing Register
9. Sanitation Register
10. Handicapped Persons Register

1. O.P. Register

This is the most important source of morbidity records for a rural community provided some legible diagnosis is written. It should have the address of the village which will in turn help about consolidating the village-wise records. Epidemiologically, it will point out the increase in the number of cases from particular diseases which need action at community level. This Register has no value if it is not scrutinised or diseases are not classified regularly.

2. Follow-up Register :

This Register should have entries of all cases which need home follow-up or back at the clinic. It may not be possible for all the centres to carry out this work.

3. Birth, Death and Immunization Register :

Arrangement should be made with the local Registrar to extract the birth and death records village-wise. The list of new borns is very important for planning the child health services. The deaths should be verified for diagnosis so as to have better records of causation of deaths. The local Registrar's records can be corrected and supplemented by this arrangement.

4. Maternity Home-visiting Register :

This Register is very useful for the Midwives. It should have the names and addresses of all the pregnant women village-wise who should be advised to come to the Centre and sub-centres for all M.C.H. services. The deliveries may be conducted by local Barber women, but the M.C.H. staff should know about all pregnant women and children. This Register should be linked up with the Family Planning and Child Health Register.

5. Family Planning Register :

As soon as mother has delivered, her name should go on to the Family Planning Register and offered all available family planning methods, so that she can choose one for herself. In this way one can keep a track and approach all eligible mothers.

6. Child Health Register :

At the same time, the child's name should be entered on this Register and followed up for encouraging the mother to bring him to the well-baby clinic, to complete immunization and advise about nutrition, etc. These activities may be carried out by home visits. The main point is that no child should be missed. This Register should have columns so as to cover the child during infancy, pre-school group and the work done.

7 & 8. Leprosy and T. B. Registers :

These registers maintained village-wise help in keeping a track of the patients on their continuity of treatment, follow-up of contacts and out-come of each case. In its absence, it is just like working in darkness. Under the District T. B. Control programme, the Primary Health Centres have to maintain the list of cases in their area with entries in the Central Register at District level.

9. Sanitation Register :

This Register should have basic data about housing, water supply, refuse disposal, latrines, sewage disposal, hotels, food shops, fairs, schools, etc., village-wise. The Sanitary Inspector should do the sanitary survey of each village every year and maintain its records for planning and evaluation. The rural water supply scheme have brought in many sanitary wells, overhead storage tanks with distribution pipes and sanitary tanks which need a periodic supervision and recommendations.

Construction of soakage pits, refuse and compost pits, and latrines and their progress can be watched from this Register.

Periodic inspection of all tea-stalls and hotels in these villages and maintaining their records will help in improving them.

All emergency chlorination, insecticidal spraying can be planned quickly with these records.

This register must be reviewed by the Local Medical Officer and higher officers from district level.

10. Handicapped Register :

This Register should have a record of all handicapped congenital and acquired, so as to plan programmes for consultants and visiting specialists or for referral. Most important are eye, hearing and ortho-pedic defects which are amenable to treatment and follow-up.

Display of Records :

In addition to maintaining these records, it is essential to have a visual or graphical display of some records for a quick reference. It is essential for inspecting officers who do not have much time to go through the details of these records and registers.

The following suggestions are made :

(a) Map of the area showing the villages, means of communications, health centres, medical, educational facilities, etc., available in the area.

(b) **Population :**

A graph showing
(i) Population village-wise
(ii) Birth-rate village-wise of the area

(c) **Mortality data :**

Graph showing
(i) Crude death rate
(ii) Infant mortality rate
(iii) Maternal mortality rate

(iv) Causation of death—only 5—10 leading causes can be maintained.

(These can be village-wise or consolidated for the area)

(d) **Morbidity :**

A graph showing frequency curve for

(i) O. P. attendance rate per thousand population for all causes and five leading causes, *viz.* Respiratory, Gastro-intestinal, skin, injuries, NYD fever, etc. These should be plotted month-wise. The same graph should have a line drawn for maximum and minimum average for the last five years. Any sudden fluctuation can be spotted out.

(ii) Map showing reported infectious disease cases in the area.

(iii) Map showing the distribution of leprosy, T.B., V.D., cases, etc.

These maps will be helpful to the Medical Officer in the study of epidemiology and control of diseases.

Co-ordination :

The maternity, child health, family planning, birth and death and immunization registers, etc., should be linked up among themselves. This needs a lot of joint staff meetings for recording. Actually a good intra-personnel relations with overall co-ordination by the Medical Officer is necessary to maintain these records. The staff has to be convinced first about their utility to elicit their co-operation. One unwilling worker can spoil the entire records.

Organisation of the work :

The overall responsibility and initiative rests with the Medical Officer. It all depends on his interest and the use, he makes of these records. The various para-personnel should be made responsible for maintaining and supplying these data, *viz.*, Sanitary Inspector for vital statistics and sanitary records, etc. Public Health Nurse/ Health Visitor/Midwife for M.C.H./Family Planning and School Health etc. Medical Officer and Pharmacist for O.P. Register/Follow-up and referral. Basic Health worker for T.B./ Leprosy/Fever and other diseases.

The clerk of the Health Centre should be asked to consolidate and display them in a presentable form.

A plan for responsibility for record maintenance is shown below :

RECORDS RESPONSIBILITY

	O.P.	M.C.H. service	School health services	Control of Communicable diseases	Environmental sanitation	Vital statistics	Display
	1.	2.	3.	4.	5.	6.	7.
Medical Officer				OVERALL RESPONSIBILITY			
Public Health Nurse/ Health Visitor		×	×	×			
Pharmacist	×						
Sanitary Inspector					×	×	
Basic Health Worker				×			
Clerk	×	×	×	×	×	×	×

Records responsibility :

The whole record system needs extra registers, graph papers, drawing sheets, pith-boards, drawing pins and special ink, etc. This is possible to obtain if the case is made out to the higher authorities about their utility.

Summary :

This paper suggests some of the essential records which should be maintained and displayed at each Primary Health Centre in the country.

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AN EXAMINATION OF DATA ON AGE AT DEATH OBTAINED FROM TWO SOURCES

By
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Age is an important item of information collected in a demographic survey. This may be 'current' age or age when a particular event of significance took place like marriage, birth of a child, death, etc. But it is found that age statements are often subjected to extensive error. Factors like personal preferences and predilections, ignorance, deliberate misstatement, carelessness, etc. tend to make the age returns of dubious value.

Matching techniques may be employed for assessing the reliability of age data collected in a survey if a proper and valid reference standard is available. For instance, birth records may be used to check age statements. But obviously, such a procedure is beset with practical difficulties. However, in the absence of an authentic record, it might still be possible to arrive at broad conclusions regarding the reliability of the data if parallel information is obtained from an alternative source. This may be possible when some existing records provide the frame for sample selection. If the two sources are independent, agreement in data would roughly indicate the correctness of age statements. On the other hand, if the two sources are dependent *i.e.* they have more or less a common origin, agreement is then a poor indication of accuracy. It may, however, be noted that consistency tends to be enhanced due to preferences of the informants for end-digits like 0 and 5, even when the stated ages may not be true.

In a survey carried out in Calcutta for studying certain aspects of mortality the official death registration records were used as a frame to select the sample for investigation. It was thus possible to obtain age at death (as also a few other items of information) from two sources *viz.* official records and investigators' reports. In all 479 deaths were investigated. As the investigation of the households were planned to take place within a short time of the occurrence of death the sources were not expected to be completely independent, for, in a number of instances the informants for the two sources might have been the same. Nevertheless, it was thought that a comparison of the two series of data would indicate some broad features of age reporting. Thus in this paper an attempt has been made to assess the extent of agreement of age data with respect to characteristics like sex of the decedent and educational status of the informant and to examine its broad implications. During the field investigation the educational status of the head of the household was elicited and for the purpose of the above analysis it was assumed that this generally represented the educational level of the informant for both the sources. This is apparently a limitation of the study though not a serious one. The results of matching the data are given in Table 1, by sex of the decedent.

Table 1

Extent of agreement between age at death officially registered and investigated by sex.

Age registered vs Age investigated	Male	Female	Total
Age registered = =Age investigated	122 %(47.5)	105 (47.3)	227 (47.4)
Age registered less than age investigated	74 %(28.8)	74 (33.3)	148 (30.9)
Age registered greater than age investigated	61 %(23.7)	43 (19.4)	104 (21.7)
Total (%)	257 (100)	222 (100)	479 (100)

The agreement in the age returns shown in the table could have arisen for different reasons. First, it could have been partly due to correct ages being recorded by both the sources and second, it might be partly due to the ages being misstated in the same manner by them arising largely out of preferences for end-digits like 0, 5 etc. Similarly, disagreement might have been due to wrong statements of ages by one or both the sources and there is no means to know which is right and which is wrong. Thus the results of the comparisons may not lead to a precise measure of accuracy of age reporting. These and other aspects have been examined at some length in the subsequent sections of the report.

Identical ages were reported by the two sources in nearly half the number of cases—about 47 per cent—with practically no sex differential. From what has been observed in the foregoing paragraph, this does not necessarily imply that in all these the age at death has been correctly stated just as disagreement does not mean inaccuracy in both. The occurrence of accidental agreement in some cases particularly due to a tendency to approximate the age in round figures ending in 0 or 5 cannot be entirely ruled out.

It is a widely held view that the quality of information depends upon the education of the informant. The effect of education on agreement has therefore been studied and the results are shown in Table 2.

Table 2

Extent of agreement between age at death officially registered and investigated by sex of the decedent and education of the informant.

Age registered vs Age investigated	Male			Female			Total		
	Illiterate	Below matric	Matric & above	Illiterate	Below matric	Matric & above	Illiterate	Below matric	Matric & above
Age registered =Age investigated	30	49	43	19	45	41	49	94	84
(%)	(41.7)	(46.2)	(54.4)	(33.9)	(50.0)	(53.9)	(38.3)	(48.0)	(54.2)
Age registered less than age investigated	27	32	15	22	27	25	49	59	40
(%)	(37.5)	(30.2)	(19.0)	(39.3)	(30.0)	(32.9)	(38.3)	(30.1)	(25.8)
Age registered greater than age investigated	15	25	21	15	18	10	30	43	31
(%)	(20.8)	(23.6)	(26.6)	(26.8)	(20.0)	(13.2)	(23.4)	(21.9)	(20.0)
Total	72	106	79	56	90	76	128	196	155
(%)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)

It is seen that agreement between the two sources has improved with educational status of the informant. Over 50 per cent of the cases for which the informants were of the level of matric and above have tallied. Since factors producing age distortion tend to diminish with educational status, the agreement rate observed for this category may broadly reflect the extent of correct age returns common to both the sources. This view is generally supported by the fact that among the disagreeing returns closeness or near-agreement between data increased with education (Table 3). For instance, for the informant class 'matric & above' a difference of 1 between the stated ages was observed in about 23 per cent (highest) while a disparity of 4 or more was found in only about 13 per cent (lowest) of the total cases. In the absence of any criteria to establish the extent of accuracy of age reporting among the entries which did not coincide, it would be hazardous to venture a guess regarding the over-all accuracy of the two information sources. Probably, the degree of accuracy may be approximately obtained on the basis of certain plausible guesses regarding the proportions of correct entries. We may, perhaps, assume that 50 per cent of the entries differing by 1, 25 per cent of the entries differing

Table 3

Degree of agreement between age at death officially registered and investigated by education of informant.

Degree of agreement	Illiterate	Below matric	Matric & above	Total
1. Complete agreement	49	94	84	227
(%)	(38.3)	(48.0)	(54.2)	(47.4)
2. Disagreement :				
difference of 1	7	29	36	72
(%)	(5.5)	(14.8)	(23.2)	(15.0)
difference of 2	6	15	11	32
(%)	(4.7)	(7.7)	(7.1)	(6.7)
difference of 3	5	9	4	18
(%)	(3.9)	(4.6)	(2.6)	(3.8)
difference of 4 & over	61	49	20	130
(%)	(47.7)	(25.0)	(12.9)	(27.1)
Total	128	196	155	479
(%)	(100)	(100)	(100)	(100)

by 2 and 15 and 10 per cent of those differing by 3 and 4 or more respectively are correct. As regards the entries in agreement, we may assume, on the one hand, that all of them are correct and on the other 75 per cent are correct. On these assumptions the percentage accuracy associated with respondents of the level of matric and above would be seen to lie roughly between 55 and 70 per cent. Accuracy of age reporting might differ between the two sources, but on a total consideration of the results presented in a subsequent table (Table 4), it would appear that the difference might not be substantial. It would, however, be far less worth while estimating the accuracy relating to the lower educational categories in view of the greater uncertainties involved.

Digit preference and age misstatement :

It was stated earlier that preference for terminal digits like 0, 5 was expected to operate with greater force among the less educated informants and that such a phenomenon resulted in some 'spurious' correspondence between the two sets of data. In order to study these phenomena more clearly the data were analysed for digit concentration and agreement and the results are shown in Table 4.

The above table gives the intensity of concentration of end-digits 0, 5 and other combinations and the degree of agreement by educational level. In both the series the ages at death reported show a distinct bias for 0, 5 (which is more pronounced in advanced ages) which tends to become weaker with increasing education. The implication, therefore, is that inaccurate age statements would have been made more frequently by the less educated informants. Further, individual age matching has shown greater correspondence in the case of ages ending in 0 and 5 than the rest in all educational categories. While it may be reasonable to assume that normally correct ages with 0, 5 as end-digits are less liable to error when reported by different agencies, accidental correspondence among incorrectly stated ages may occur because of digit preferences. The latter type of agreement (due to digit preference) may be of little consequence in the ages (incorrectly stated) ending in digits other than 0 or 5. Thus, in view of the greater concentration of the above stated preferred digits among the age statements of the illiterate, which is an unmistakable evidence of a greater occurrence of erroneous reports, it is permissible to observe that the presence of fictitious agreement would have really pushed up the over-all agreement.

Table 4

Concentration at end-digits 0 and 5 or other combinations and extent of agreement in age statements by source and education of informant.

	Concentration and agreement	Registration				Investigation			
		Illiterate	Below matric	Matric & above	Total	Illiterate	Below matric	Matric & above	Total
1.	Total	128	196	155	479	128	196	155	479
2.	Age ending in 0, 5	99	110	75	284	88	103	65	256
3.	Do-% *i.e.*, $\frac{\text{row 2}}{\text{row 1}} \times 100$	77.3	56.1	48.4	59.3	68.8	52.6	41.9	53.4
4.	Agreement in total	49	94	84	227	49	94	84	227
5.	Do-% *i.e.*, $\frac{\text{row 4}}{\text{row 1}} \times 100$	38.3	48.0	54.2	47.4	38.3	48.0	54.2	47.4
6.	Agreement in 0, 5	40	55	47	142	40	55	47	142
7.	Do-% *i.e.*, $\frac{\text{row 6}}{\text{row 2}} \times 100$	40.4	50.0	62.7	50.0	45.5	53.4	72.3	55.5
8.	Age ending in other than 0, 5	29	86	80	195	40	93	90	223
9.	Agreement in other than 0, 5	9	39	37	85	9	39	37	85
10.	Do-% *i.e.*, $\frac{\text{row 9}}{\text{row 8}} \times 100$	31.0	45.3	46.3	43.6	22.5	41-9	41.1	38.1
11.	Age ending in even digits	83	120	103	306	89	130	108	327
12.	Do-% *i.e.*, $\frac{\text{row 11}}{\text{row 1}} \times 100$	64.8	61.2	66.5	63.9	69.5	66.3	69.7	68.3

The general preference for ages ending in even digits over those ending in odd digits could also be seen from Table 4. Nearly two-thirds of the reported ages end in even digits. While a distinct pattern in concentration of 0 and 5 is observed in relation to education, no such pattern is discernible in the concentration of even digits (including 0), implying a wider spread of reported ages ending in even digits with increasing education of the informant.

It was observed from Table 4 that for more than half the number of deaths, 59.3 per cent among the registered and 53.4 per cent among the investigated, the reported ages either ended in 0 or 5. Further, among these, 50.0 per cent and 55.5 per cent respectively were found to be in mutual agreement. In view of the greater concentration of such ages and the high degree of correspondence among them it may be worthwhile to examine the data in greater detail as shown in Table 5.

It may be seen from Table 5 that for about one-third of the cases the age recorded was 0 and the agreement rate was very high (97.8 and 93.8 per cent for the two sources). It is possible that apart from correct ages being recorded by both the sources, age preference might have to some extent influenced the agreement rate.

Table 5

Distribution of deaths in specified ages ending in 0 or 5 and the extent of agreement among them by source of information.

Age (ending in 0, 5)	Registration No.	%	Investigation No.	%	Number agreeing	Agreement (%) Reg.	Inv.
0	93	32.7	97	37.9	91	97.8	93.8
5	4	1.4	1	0.4	1	25.0	100.0
10	1	0.4	—	—	—	—	—
15	4	1.4	1	0.4	—	—	—
20	3	1.1	4	1.6	1	33.3	25.0
25	8	2.8	3	1.2	—	—	—
30	21	7.4	13	5.1	5	23.8	38.5
35	8	2.8	10	3.9	2	25.0	20.0
40	10	3.5	7	2.7	2	20.0	28.6
45	14	4.9	13	5.1	6	42.9	46.2
50	22	7.7	13	5.1	5	22.7	38.5
55	25	8.8	14	5.5	4	16.0	28.6
60	13	4.6	15	5.9	3	23.1	20.0
65	8	2.8	15	5.9	4	50.0	26.7
70	15	5.3	15	5.9	3	20.0	20.0
75	16	5.6	11	4.3	6	37.5	54.5
80	12	4.2	13	5.1	7	58.3	53.8
85+	7	2.5	11	4.3	2	28.6	18.2
Total	284	100	256	100	142	50.0	55.5

While a strict comparison of individual ages ending in 0 or 5 cannot be made on account of inadequate data, one may observe that wherever cell frequencies are 10 or more, the agreement appears to be better in the case of investigation. However, more useful comparisons may be attempted by combining the ages into meaningful groups, such as infant age (0), pre-school and school age (5-15), working age (20-60) and old age (over 60). The percentages of agreement in such a system of classification are (97.8, 11.1, 15.3 and 19.0) and (93.8, 50.0, 20.7 and 17.2) for registration and investigation respectively. It is thus evident that the fairly high over-all correspondence among the ages ending in 0 and 5 is due to the high agreement rate observed in age recorded as 0, which may to some extent vouchsafe to the correctness in the age returned as 0 while for the rest of the ages in this category the reporting seems to be far from satisfactory.

Effect of grouping :

The extent of closeness or divergence in the data from the two sources has been examined in the foregoing paragraphs by individual matching. If the data from these sources were analysed without a cross-reference and compared, some of the divergences observed earlier would have been concealed. For instance, when the returns were classified into five-year age groups, the distributions appeared to be fairly close to each other (Table 6). Obviously, this is due to the ironing out of minor differences which ostensibly is one of the purposes of grouping.

Table 6

Percentage distribution of decedents by age group and source.

Age group	Registration	Investigation
0-	19.4	20.3
1-4	9.0	8.6
5-9	4.0	3.3
10-14	1.3	1.5
15-19	3.1	4.0
20-24	4.2	4.0
25-29	4.0	4.0
30-34	6.1	5.0
35-39	2.9	3.1
40-44	3.8	3.5
45-49	4.8	6.1
50-54	7.9	5.8
55-59	8.6	6.5
60-64	3.8	5.8
65-69	3.5	4.6
70-74	3.5	4.4
75-79	4.6	3.5
80 & over	5.6	6.1
Total (Number)	100 (479)	100 (479)

This is also due in part to the transferrence of ages from wholy different part of the age range—misstatement of ages due to carelessness usually cancelling one another out when tabulated—and this fact is often overlooked while drawing conclusions.

Individual matching of data on age at death available from two sources both subjected to error, *viz.* official registration and investigation of households was done to study the nature and significance of agreement. The analyses were made with respect to characteristics like sex of the decedent and educational status of the informant. In this discussion, the educational status of the head of the household recorded at the time of the investigation of the households was assumed to generally hold good for the informant also.

The observed agreement in the age returns could have arisen for various reasons. Agreement could have been partly due to correct age statements by both the sources and partly due to the preference for end-digits like 0 and 5 and amongst other digits due largely to sheer coincidence. Similarly, disagreement might have been due to wrong statements of ages by one or both the sources. In the absence of a known objective standard which might be used for identifying the correct age statements, the reliability of the data was broadly assessed on the basis of certain plausible assumptions.

The data were also examined to study the pattern of concentration and the consequent distortion in the age returns.

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EPIDEMIOLOGY OF ROAD ACCIDENTS

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Introduction :

Fatal and non-fatal injuries due to road accidents are increasing year by year. The loss of life is often times needless and disabilities which result from non-fatal injuries involve high costs of hospitalization. It has been noted in an earlier study[1] by the senior author (Jerath) that about two-thirds of the fatal injuries were not attended by physicians. This was thought to be because such injuries were noted after deaths or else the durations of the injuries were very short. When the loss in earning power is taken into consideration the total financial burden of these accidents is unquestionaly high. Since the promotion of health and the prevention of disabilities are areas of concern of the public health profession, road accidents come within the sphere of public health activities, it is necessary that causative forces be examined, and if possible, suggestions for the means of control of the accidents should be made.

The statistical data of road accidents compiled in the Statistical Abstract of Punjab[2], 1963 reveal that the total number of accidents is increasing each year.

The rates for total accidents and fatal accidents in the Punjab for the year 1962-63 were 271 and 110 per 10,000 vehicles, respectively. The numbers of persons killed and injured in road accidents reported for the Punjab between the year 1958 and 1964 were given as follows :

Year	Persons killed	Persons injured
1958-59	231	496
1959-60	259	592
1960-61	305	551
1961-62	322	598
1962-63	341	602
1963-64	382	677

The figures speak for themselves.

The study that was undertaken by the authors relate to the city of Ludhiana. The objective of the study was to discover and identify the roles of several variables and other related factors in road accidents. These were examined in terms of the host, the agent and the environment.

Methods :

Pertinent data from reports of fifty accident which occurred within the Ludhiana Municipal limits between the years 1954 and 1965 were assembled. The sources of these reports were the records of the court and the office of the Superintendent of Police. These, however, did not represent all the accidents that occurred during the period since some of the older records had been destroyed and few of the records were not available. Records of road accidents prior to 1954 were non-existent. The available

records contained the following information on each accident :

1. An accident report with statements of witnesses, including a sketch and challan report of the police inspector.
2. Civil Surgeon's report on the injuries or post-mortem.
3. Report of the police department mechanic on the vehicle of the "accussed".
4. Police department photographs of the accident.
5. Statements of the "accused" and his witnesses.
6. Court judgment.

These data were systematically analyzed. Supplementary field observations and measurements were also made as needed.

Data :

When the locations at which the accidents under review occurred were plotted on the map (figure 1) four locations were noted to be most vulnerable. They were in the order of magnitude, the Jagraon Bridge area on the Ferozepur road, the railway underpass, Bharat Nagar crossing, and the Grand Trunk road near the Dholewal Octroi post.

Table No. 1

Activities of Victims at the time of the accidents.

Activities	Number	Percentage
Walking	37	56.9
Cycling	14	21.5
Sitting on road side	5	7.8
Riding in Tonga	3	4.6
Riding on Motor cycle	2	3.1
Riding in a Car	2	3.1
Riding in a rickshaw	1	1.5
Riding in a bullock cart	1	1.5
TOTAL	65	100.0

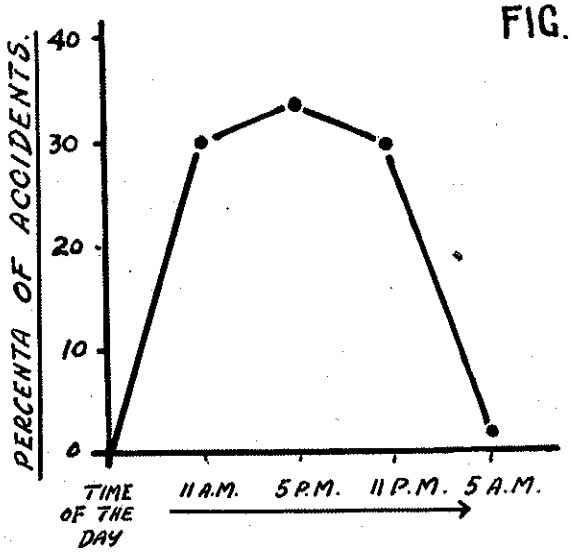
The locations accounted for 54% of the accidents that were reviewed. It was noted that the road ways on the Jagraon Bridge and in the underpass were of 21 ft. and 22 ft. width respectively and considerably narrower than the approaches which were 28 to 30 ft. (figure 3). Since these are the two important crossings across the railway tracks, the traffic density was always high at almost all hours of the day time. At these two locations more accidents occurred on the approaches than on the bridge *per se* or in the underpass. The traffic policemen were not noted at these points on all days nor all throughout the year. The records show that 45 out of total of 50 accidents, or 90% of the total occurred either where the policemen were not regularly posted or at the time when policemen were not at the post. The largest percentage of the accidents took place where the road widths were approximately 24 ft. Accidents were fewer when the road widths were less or greater than this figure. Most of the accidents occurred between 11 : 00 a.m. and 11 : 00 p.m. with a peak between the hours, 4 : 00 p.m. to 6 : 00 p.m. (Figure 2).

The analysis of the activities of the "victims" at the time of the accidents shows that a large percentage of them *i.e.*, 56% were pedestrians. This was followed by cyclists at 21.5% and those sitting on the road-side at 7.8%. The distribution by activities are shows in Table 1. On the other hand, a spot check of the traffic in the city at selected points during the peak traffic hours showed that the cyclists constituted 60% and the pedestrian only 12% of the traffic. The distribution of the victims by age and sex shows that a large number of them were males in the very productive age of life.

In the age span of 20 to 45 years, for the males, the percentage was 80%, for the females, 36%. This is shown in Table 2. The examination of the nature of injuries showed that half of the fatal injuries involved the head and face; 25% the abdomen and spine; and 20.8% the chest. In the non-fatal injuries 49.9% involved the arms and legs; 27.7% the head and face; 11.2% the chest, and 11.2% the abdomen and spine see table 3.

In the analysis of the agent considered to be responsible for the accidents 34% involved trucks; 18% motor cars; 16% scooters; 10% buses and others, 22%. These are shown in table 4. Of the 50 vehicles involved in the accidents 33 or 66% were not loaded and 17 or

FIG. 2



GRAPH SHOWING OCCURRENCE OF ACCIDENTS BY TIME OF DAY.

ROAD ACCIDENTS, LUDHIANA CITY (54-65)

Table 2

Victims by age and sex.

AGE	MALES		FEMALES		COMBINED	
	Number	% age	Number	% age	Number	% age
0- 4	3	5.5	2	18.1	5	7.8
5- 9	1	1.8	—	—	1	1.5
10-14	2	3.7	2	18.1	4	6.1
15-19	5	9.3	—	—	5	7.8
20-24	7	12.9	—	—	7	10.8
25-29	6	11.2	1	9.2	7	10.8
30-34	8	14.8	—	—	8	12.2
35-39	6	11.2	1	9.2	7	10.8
40-44	6	11.2	2	18.1	8	12.2
45-49	—	—	—	—	—	—
50-54	4	7.4	1	9.2	5	7.8
55-59	1	1.8	—	—	1	1.5
60-64	2	3.7	2	18.1	4	6.1
65-69	—	—	—	—	—	—
70-74	—	—	—	—	—	—
75-79	2	3.7	—	—	2	3.1
80-84	—	—	—	—	—	—
85-90	1	1.8	—	—	1	1.5
Total	54	100.0	11	100.0	65	100.0

34% were loaded. The reports on the conditions of the vehicles showed that 40 out of a total of 50, or 80% had no mechanical defects, while only 20% had some recognizable defects. A very large proportion of the "accused", 75% was found to be in the age span of 20 to 34 years. The distribution of the "accused" by age is given in table 5. The court records show that out of 50 drivers involved 42, or 84% were driving rashly, while only 16% are said to have been within the speed limits and observing traffic laws.

Discussion :

From the records that were available it was not possible to pin-point the causative factors. In all probability the probable causes would be numerous, as has been noted in more detailed studies made in the U.S. (McFarland 1957) of road accidents.

The involvement of the high number of pedestrians as victims is not unlike that of Montreal (McDonyall, 1960) where four-fifths of the victims were pedestrians. Ludhiana City is very mobile due to a large number of persons going on cycles. Pedestrians were found to number only 12% at peak traffic hours, and yet they contributed the highest percentage of the "victims" at such hours.

Large number of accidents took place at locations near the congested areas. In the case of the narrow underpass and the Jagraon Bridge most of the accidents were on the approaches. At the traffic bottle necks the flow of vehicles is at a very slow pace, but on the approaches

there appears to be more "rashness" and jockeying to get ahead.

While no investigation has been done to ascertain the age distribution of drivers at large, it is generally believed that the drivers of trucks and cars in Ludhiana or going through Ludhiana are young men. 75% of the "accused" were in the age range of 24 to 34 years and motors were involved in 52% of the accidents under review. This fact together with the findings that 80% of the vehicles had no mechanical defects, 66% of the vehicles were not loaded with articles for which drivers are presumably responsible, 84% of the drivers had been considered by the court to have been driving rashly, and 90% of the accidents occurred at locations and at times when the traffic policemen were not present or not on duty, strongly indicates human factors. This has also been found true in the U.S. (McFarland, 1957).

Table 3

Nature of injuries of the victims.

Place	Fatal injuries		Non-fatal injuries	
	Number	% age	Number	% age
Head and Face	12	50.0	5	27.7
Abdomen and	6	25.0	2	11.2
Chest	5	20.8	2	11.2
Arms & Legs	1	4.2	9	49.9
TOTAL	24	100.0	18	100.0

Victims :

The "victim" is defined as a person who suffered injuries as a result of accidents and was considered as such by the court of law.

Table 4

Agent involved in Accidents.

Agent	Number	% age
Truck	17	34%
Car	9	18%
Scooter	8	16%
Bus	5	10%
Bullock Cart	4	8%
Tractor	3	6%
Horse	1	2%
Tonga	1	2%
Rickshaw	1	2%
Tempo (3 wheeler)	1	2%
Total	50	100%

Table 5

Distribution of "Accused" by age.

Age	Number	Percentage
15-19	2	3.8
20-24	10	18.8
25-29	23	43.3
30-34	6	11.3
35-39	8	15.2
40-44	2	3.8
45-49	2	3.8
50-54	—	—
55-59	—	—
Total	53	100.0

Accused :

The "accused" is defined as a person who caused hurt to another person by means of his vehicle and was considered as such by the court of law.

Summary and Conclusions :

Data from available records of 50 road accidents within Ludhiana City were collected from court and police records and were systematically analyzed. The analysis indicated the following :

1. There were four locations which accounted for 54% of the accidents.

2. The approaches to congested areas were more vulnerable places than the congested areas themselves.

3. 56.9% of the victims were pedestrians, while 21.5% were cyclist, and 7.8% were those who were sitting on the roadside, However, during peak traffic hours between 4 : 00 p.m. to 6 : 00 p.m. when

many of the accidents occurred, the cyclists constituted 60% of the traffic while the pedestrians only 12%.

4. The vehicle most involved in accidents were trucks 34%, motor cars 18%, scooters 16%, and buses 10%. Of the trucks involved 66% were not loaded, while only 34% were loaded.

5. The majority of the drivers involved, 75% were in the age range of 24 to 34 years. 84% were considered to have been driving rashly.

6. Only 20% of the vehicles involved were considered to have been mechanically faulty.

7. 90% of the accidents occurred at times when traffic policemen were not present or at places where they are not posted.

Acknowledgements :

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Editorial

ACCIDENTS—AN EMERGING HEALTH PROBLEM IN INDIA

Accidents in recent times have assumed a major health problem in certain developed countries replacing those from infective and parasitic diseases. In an analysis of W. H. O. of 553 million people residing in 19 countries percentage distribution of accidential deaths was found as follows :

Motor vehicle	36.0%
Fall	22.0%
Drowning	8.6%
Other transport	6.2%
Fire and explosion	4.6%
Poisoning	3.8%
Fire arms	1.3%
Other causes	17.4%

It was further observed that road traffic accidents including motor vehicle accidents take a toll of nearly 100,000 lives in the world every year.

The tragedy of road traffic accidents is that they have been found to involve mainly the young adults resulting in a serious economic impact on the community. The economic loss due to fatal accidents and disabilities caused by accidents have been found to be enormous.

In India, though the problem of accidents exists, it is still over shadowed by more acute problems of communicable diseases and under-nutrition.

On a finer scrutiny, however, it could be seen that with introduction of industrialisation, urbanisation and modern mechanised way of living the country is fast facing problems of accidents.

From records of fatal accident occurring in Calcutta during the last ten years since 1958 it was found that deaths from accidents was increasing very rapidly and in a recent year road traffic accidents contributed to 60 per cent of the total accidental deaths. Adult males belonging to the age group 25-44 years were the main victims.

In the present issue, the paper on epidemiology of road accidents indicates that the number of deaths from accidents in the state of Punjab is also increasing at a high rate.

To assess the exact size of the problem country-wide statistical information about road traffic accidents is necessary. Until such facilities are made available epidemiological studies of road traffic accidents at local levels will be of immense value.

India being mainly inhabited by rural communities the above mentioned survey results are of significant interest. Of course it is quite obvious that problem due to accidents in urban and rural areas would be different.

Accidents, therefore, should be studied as an ecologic problem.

In order to arrive at satisfactory preventive measures a balanced approach has to be made which means—epidemiology, causation and prevention.

In this respect the biological principles, which govern disease in a community should be considered to hold good for injuries as well.

The fundamental need in epidemiological studies would therefore, be the incidence of accidents which should be collected under certain criteria.

Accidents can be defined as unexpected events resulting in injury and/or loss of property. There may be some occasions where accidents do not result in injury. For the purpose of epidemiological studies injuries resulting from accident should be the main concern.

These injuries may be fatal and non-fatal. The non-fatal injuries may be again minor requiring very little or no medical attention and major requiring medical attention to the extent of hospitalisation.

Records are generally available for fatal accidents and those causing major injuries. But a comprehensive epidemiological studies will demand all varities of injuries. Field surveys will, therefore, have to be undertaken for a representative picture in the community.

The accidents thus recorded need be broadly classified according to the circumstances in which they occur. It has been found that most of them are related to transport, occupation and domestic life. A small number falls outside this classification *e.g.* recreation, fall in the street, etc. The next step is to look for the causal factors influencing the occurrence of accidents. Basically the same cardinal factors of agent, host and environment contribute towards causation of accident. But they are so intimately interoven that for a given kind of accident a mass of data has to be collected and analysed to show the correlation between one another.

The success of a control programme depends on sorting out from the larger volume those that are critically essential.

The start is, therefore, through field investigation individual case study of patient, the family group and immediate surrounding in which they live, togather knowledge of when and under what circumstances cases are occurring.

For study of causation of road traffic accidents, various facets of the three factors namely road, vehicle (including driver) and road user should be looked into.

Comparative statistics from different countries shows that casualties are related to the number of vehicles and population. There being agreement between number of casualties and the expression $0.0003\ (NP^2)\ \frac{1}{2}$ when N is the number of vehicle and P the population.

This should not, however, imply a given number of accidents is inevitable but they do suggest a background against which preventive measures can be assessed.

The three broad principle for prevention of accidents *viz.* education, engineering and enforcement as suggested by the Research Workers on accident prevention in other countries may also be considered for their applicability in this country.

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THE KUMBH FAIR (1966) —ASPECTS OF ENVIROMENTAL SANITATION AND OTHER RELATED MEASURES

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&

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In a previous communication (Bagchi and Banerji, 1967), the origin and historical aspects of the '*Kumbh*' and the role of the occasion for spiritual sanitation of the Hindu have been discussed. The present communication deals with public health measures adopted with special emphasis on enviromental sanitation and anti-epidemic measures.

Russel and Sundarajan (1928) had indicated that besides other factors, fairs and festivals play a part in the generation of epidemic waves of Cholera. In some years, especially when there are '*Kumbh*' and '*Ardh* (Half) *Kumbh*' at Allahabad and Hardwar, the epidemics are exceptionally severe. Out of the six pandemics during the nineteenth century which had their origin in India, the second (1826-37), fourth (1866-70) and sixth (1892-95) spread from Hardwar by pilgrims to north-western Punjab, and then by the overland route to Afganisthan, Persia, Southern Russia and finally invaded Europe and America (Wu Lein-Teh et. al., 1931).

Uttar Pradesh holds four hundred fairs annually and the state has the largest number of centres of pilgrimage. The '*Kumbh*', not only attracts people of this state but is also visited in millions by people from all over India (visitors from other countries and continents also attended the '*Kumbh*' of 1966). If cholera was imported by pilgrims arriving from endemic areas in India, the fair could be the starting point of a widespread epidemic and the fast modes of travel would considerably help the spread.

With the objective of reducing the ravages of Cholera following the '*Kumbh*', compulsory inoculation against cholera was introduced by the Government of Uttar Pradesh for the first time in Hardwar '*Ardh-Kumbh*' in 1945 and the measure was subsequently extended to all the important fairs and festivals including pilgrim routes, during the next five years (compulsory inoculation at Allahabad for the duration of the whole 'Kumbh Fair' was enforced for the first time in '*Ardh-Kumbh*' fair, 1960). Since the '*Ardh-Kumbh*' Fair of 1945, when compulsory inoculation was first enforced, no outbreak of Cholera occurred in these big fairs except that in 1948 at the Allahabad '*Ardh-Kumbh*' Fair, when compulsory inoculation had not been enforced at all and 267 bacteriologically proven cases of cholera occurred in the fair area causing 157 deaths and a very widespread and severe epidemic was caused by returning pilgrims in the eastern and central parts of Uttar Pradesh. There were 52,604 deaths from cholera in the state that year (Prasad, 1961). Banerji (1949) and Gopal (1951) have evaluated in detail the results of compulsory and voluntary inoculation in important fairs and festivals of Uttar Pradesh. In this connection, Pollitzer (1959) states that "The observations embodied there leave no room for doubt that, in contrast to voluntary vaccination, compulsory immunization of the pilgrims intending to visit the fairs was an eminently successful method. Indeed, one might say that the heroic efforts made in this direction, particularly on the occasion of 1950 Kumbh Fair at Hardwar, won battles which, unlike those fought during wars, saved

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numerous lives instead of sacrificing them". This achievement was further excelled in 1960 in Allahabad, when the fair was held in a much bigger area, spread over 32 square miles. It was attended on the main bathing day by 4 million pilgrims. Not a single case of cholera occurred and no flies were to be seen anywhere in the area. 1.3 million rupees were spent on medical and public health arrangements out of a total budget of 6.5 millions.

It is in the background of the foregoing that medical and health arrangements were made during the '*Kumbh*' of 1966. From the public health point of view the whole area within a radius of 10 miles of the fair area had to be sanitated. The inner fair area of 2000 acres (see map) was devided into ten circles for administrative purposes. Each circle was a well defined area, self contained with regard to public health requirements and was placed in charge of a senior Medical Officer of Health of the state Public Health Service, The Assistant Director of Medical & Health Services, Range II, with his headquarters at Allahabad was in overall charge of the entire medical and health measures. He was assisted by officers in charge of (i) conservancy stores, (ii) medical stores, (iii) spray unit, (iv) vehicle section, (v) lodging houses, (vi) compulsory inoculation, and (vii) circle officers. The circle officer organized and supervised the arrangements according to local needs. He had adequate staff of one chief sanitary inspector, 2 sanitary inspectors, 15 sanitary jamadars, 20 to 25 mates and 250 to 300 sweepers, depending upon actual requirements. The chief organized public health measures were :—

1. Enviromental Sanitation—
   (a) Disposal of refuse and camp sanitation,
   (b) Disposal of excreta,
   (c) Drainage,
   (d) Safe water supply,
   (e) River sanitation,
   (f) Disposal of hairs and
   (g) Antifly measures.
2. Foof sanitation.
3. Control of infectious diseases.
4. Health education.

In addition, extensive arrangement for medical care of pilgrims were also made. Some of the measures organized merit consideration in detail.

Refuse Disposal :

The circle staff had to start work in predawn hours and by daybreak the whole area was swept clean of all refuse and garbage which was transported to the nearest incineration pit—12′×12′×4′. Besides this, sweepers (scavengers) were posted at suitable places especially near the eating establishments and on the road side, so that any garbage or animal excreta left indiscriminately (which is the usual habit) was picked up within minutes and transported away. Incineration was continuous and the pits when full were closed, tightly packed and sealed. The surface was treated with lime and bleaching powder and sprayed with gammexane to eliminate chances of fly breeding. 448 such pits were used.

Disposal of Excreta :

A large gathering like this presents a great challenge to efficient disposal of excreta covering the total population which is partly floating and which varies in strength from day to day. Thus a very flexible arrangement is called for. The problem is made more complex due to congregation of various cultural groups whose sense and needs of sanitation in general and disposal of excreta in particular are at great variance. Thus efficient disposal of excreta presented the most difficult problem, yet was achieved with excellence. Trench latrines 36′ to 72′ long, 1.5′ wide and 5′ deep were made available in blocks at suitable places (see map) depending on estimated area requirements. At a time 2 to 3 rows of 25 seats were thrown open for use. Each seat was partitioned by suitable screen to ensure privacy. Male and female sweepers were on duty at all hours of day and night to ensure complete coverage of the deposited excreta by a mixture of lime and bleaching powder within a minute or so after use. This service was so efficiently organized and supervised that it was impossible to find excreta not adequately covered on surprise visits. Each trench was subsequently tightly packed with earth; lime and bleaching powder was sprinkled over it and gammexane was sprayed over the area to prevent fly breeding. These operations, extremely efficiently carried out, contributed

most to the apt description—'a flyless *Kumbh*'. Sweepers were always on duty at the site and clusters of families were provided tentage accomodation reasonably near their area of work to ensure efficiency. Each latrine site was provided with electric light and waterpoint to ensure use of latrines without any inconvenience.

In spite of all the arrangements, there were people who would still use the open areas and for their use, eight specially demarcated areas (flag areas) were set aside, which were serviced regularly by manual collection of the deposited excreta, thus eliminating chances of fly breeding. Besides these, cheap hand flush latrines were also made available for purchase and installation by those who wanted them.

In all, 25,152 seats were provided throughout the area and the complete elimination of fly breeding speaks of the efficiency of the measures adopted for disposal of excreta and garbage.

Safe Water Supply :

Chlorinated piped drinking water supply was provided by the Local Self Government Engineering Department. In addition to the 2 permanent, 11 deep tube wells were commissioned and more than 130000 ft. of pipeline was laid besides provision of 600 hand pumps (shallow tube wells) and 4070 public stand posts. A field Public Health Laboratory from the Provincial Hygiene Institute, Lucknow, examined 230 samples of drinking water from the city and fair area. 138 were excellent, 40 satisfactory, 17 suspicious and 35 were unsatisfactory. The Health Department advised adequate chlorination in case of suspicious and unsatisfactory samples, 425 samples of river water were examined for the detection of *Vibrio Cholerae* with negative results.

Drainage :

This did not pose much of a problem because of the nature of the soil. All accumulations of water from standposts, kitchens etc. were utilized for road watering by the help of pumps. There is a drain which received and transported the waste water from the adjoining populated locality Daraganj. This was connected to the sewarage system of the city.

River Sanitation :

Interception of dead bodies of humans and animals was done and these were towed to the main stream of the river beyond the fair area. Special barricaded area was reserved for shaving of head—a ritual which many pilgrims observed. The hair was collected in jute bags loaded with sand. 1590 bags of hair were disposed of in the midstream of the river beyond the fair area.

Antifly Measures :

Insecticidal spraying operations were in practice throughout the duration of the fair. The trench latrines, night soil pits and rubbish pits, were sprayed daily whereas the kitchen, both private and community, were sprayed biweekly. The closed trenches, hutments and tents were sprayed once a week. The adjoining parts of the city were also covered by periodic insecticidal spraying.

Food Sanitation :

Efficient food and community kitchen sanitation ensure control of gastrointestinal disorders. The administrative authority made available essential articles of diet at controlled price from fair price shops. Most of the pilgrims consumed food cooked in their own kitchen under field conditions with no respect for kitchen hygiene. A number of roadside eating establishments catered to the needs of the floating population and the only aspects which received attention at these places were supply of water of satisfactory quality and efficient removal of garbage. Flies were conspicious by their absence. Samples of food were analysed by the field laboratory of the Public Analyst to the Government and the proportion of foodstuff of substandard quality was surprisingly very low—3 per cent only. One special feature was the large community kitchen managed by religious or philanthropic organizations which fed a large number of pilgrims daily. These lacked all the principles of clean food preparation. The consumption of food (*prasad*) from these community kitchens which had received the blessings of the chief priest of the order is considered to be an act of sanctity and gratification. People waited hours to receive a morsel of food, fruits or sweets which was blessed by the head of the religious order and consumed the same with great satisfaction that His blessings have been bestowed upon. In spite of utter disregard of food sanitation it was astonishing that very few cases of intestinal disorder were seen at the field hospitals. Only spiritual faith and achievements sustained them against the hazards.

Control of Infectious Diseases :

Compulsory anticholera inoculation was enforced from Jan. 1 to Feb. 18, 1966. No person travelling from outside the city limits of Allahabad could enter the fair area without a valid certificate of inoculation. All the road and rail approaches were guarded by 'Inoculation Inspection Posts' and a senior public health officer was especially deputed to organize and supervise these. Twenty of these were established to ensure that no pilgrim could enter the city or fair area without receiving inoculation. Under instructions from the Ministry of Health, Government of India, free inoculation was made available throughout the country and road and rail stations did not sell tickets to passangers without a valid certificate of inoculation if the destination was Allahabad or its vicinity within a radius of 10 miles. The inoculation posts also served as medical inspection posts for pilgrims passing through for obvious signs of infectious diseases. Facilities for observation for suspected cases were provided by a medical unit with indoor accommodation of 2 beds at each posts. Personnel engaged at these posts were 1113.

Health Education :

Fairs and festivals in the background of the rich cultural heritage of the country provide opportune situations for organization of big exhibitions, which if properly planned and organized play a vital role in education of the mass. The state Health Education Bureau organized an extensive health education exhibition. Special emphasis was laid on activities such as promotion of health, prevention of disease, creation of understanding of the population problem with emphasis on planning of small healthy and happy family. A field demonstration area to show the use of household sanitary conveniences was set up. Film shows not only attracted people by the educational situation was fully exploited. Visitors were engaged in discussion by demonstrations in various sections and were reexposed to films, talks and group discussions on the subject of choice daily. The popularity of the family planning section was due to the two consultation booths (one for male and one for females) where visitors were engaged in group discussions on family planning and availability and application of the entire range of contraceptives and other appliances. These informal group discussions provided opportunity to the visitors to come out with their fears and apprehensions, if any.

Medical Aid :

Provision of medical aid was made in each circle at outpatient clinics and attached hospitals with beds ranging from 16 to 64 depending upon area, population etc. A central hospital of 64 beds with medical, surgical and female wards, operation theatre, orthopedic centre and laboratory was available for any contingency. Adequate ambulance service was also available at each of the circle hospitals.

Allahabad, being a place of permanent pilgrimage throughout the year, has an Infectious Diseases Hospital of 70 beds well equipped and adequately staffed. Fifty additional beds were provided with facilities of immediate further expansion if needed. Infectious diseases hospitals with 24 beds for cholera cases were established in Arail and Jhusi in view of the difficulty of transport of cases due to traffic restrictions. In addition, 4 dispensaries of the indigenous system were also established for pilgrims desirous of receiving treatment by this system of medicine. Further, a large number of social service organisations contributed to a very large extent to the provision of medical relief. No case of cholera occurred during the duration of the fair.

Medical inspection of passengers by rail was arranged at 13 border railway stations of the state to prevent import of infectious diseases. Additional 108 inspection post also were in operation at railway stations covering the area of 100 miles radius around Allahabad.

Traffic Arrangements :

Prevention of accidents, jamming of pedestrian traffic followed by stampede and loss of life posed a serious problem in the light of past experience. Smooth flow of all types of traffic was achieved by the administrative authorities by regulation of pathways of entry to fair area, provision of large concentration areas, free circulation areas, and exitways to reach the city, railway and roadways stations. No vehicular traffic was allowed in the area a day or two before each important bathing day. The strictest possible regulation of traffic not only avoided any calamity due to accidents or disorganization but also ensured smooth flow of pilgrims. Special processions, colourful as they were, with elephants and horses, music and chanting of holy scriptures, were smoothly guided under very strict police and traffic control

to the central bathing area (*Sangam*). The boat traffic of the rivers and central bathing area was similarly controlled and guided by river police and no major accident occurred in the important bathing days. The discipline maintained in traffic regulation was of the highest order. Eight pontoon bridges were erected to connect the bathing area with these across the river Ganga to ensure free and smooth flow of traffic.

Besides the public health measures, facilities like road and rail travel, post and telegraph communications, police arrangements and others, too numerous to mention were provided with the objective of meeting the necessities of the hour of the great gathering of humanity.

The public health measures were more than justified as evident from the absence of a cholera epidemic following the fair and the low attendence at the hospitals and dispensaries during the period of the fair. No better evidence in support of preventive community health measures could be cited.

Summary :

1. The role played by the '*Kumbh*' fairs held periodically in the spread of cholera has been stated.

2. Compulsory innoculation against cholera was implemented.

3. The antiepidemic and environmental sanitations measures deployed in the '*Kumbh*' fair of 1966 have been indicated.

4. A flyless '*Kumbh*' without a single case of cholera was achieved.

5. Certain other related measures for the health and welfare of the pilgrims have been discussed.

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INCIDENCE OF PREMATURITY AND PERINATAL MORTALITY
A STATISTICAL STUDY

By

T. J. RAMAIAH*

Infant mortality rate has been brought down remarkably due to the relentless efforts made by Pediatricians and the Public Health personnel during the last two decades. But, mortality during first one week of life is assuming increasing importance with reduction in infant mortality as it remained almost constant. Prematurity is considered to be a sensitive index of nations' health, having been one of the most important causes of mortality around birth. Moreover, Grewar et al (1962) maintain that the premature baby who survives the nursery period is three times more likely to die in the first year and ten times more likely to be handicapped than the non-premature. Thus, studies aimed at finding out the incidence and underlying causes of prematurity and perinatal mortality will go a long way in preventing a number of these untimely deaths by being instrumental in initiating improved methods of practice at all stages.

The aim of the present paper is to study the incidence of prematurity and the associated mortality during perinatal period and their relationship with certain maternal factors like religion, economic status, age, parity and antenatal condition.

Material and Methods :

This study is based on 4056 cases of consecutive single births (includes stillbirths) which occured in Goa Medical College hospitals during the period 1961-65 (inclusive). The information was collected on birth weight of infants, survival time if dead, religion, economic status, maternal age, parity, length of gestation, antenatal condition of mother and congenital anomalies.

Prematures are those whose birth weight was less than 2050 gms in males and 1975 gms in females (Ramaiah and Narasimham, 1967) and or those viable cases with length of gestation less than 37 weeks.

Perinatal mortality rate is defined as the total number of deaths which occurred before, during and within seven days of delivery of babies with birth weight 1000 gms or more, per 1000 births or as percent. This definition of perinatal mortality is in conformity with the conventional definition "number of late foetal deaths (28 week's gestation or more)+ number of deaths under one week of age" because the fetus weighs about 1000 gms at 28 weeks of gestation.

Premature perinatal mortality is the perinatal mortality among prematures only, expressed per 1000 premature births or as percent.

The classification of economic status, presented here, is the classification adopted in the history sheets of the patients on the basis of the type of wards, class I or II or III, chosen by them on their admission to the hospital. However, the limitations of such a classification are realised.

Results :

As shown in Table 1, the incidence of prematurity is 8.65 percent of all births, the respective figures in males and females being 8.50 percent and 8.81 percent. It is also observed that out of 4056 births 205 are stillborn. 50.24 percent of the stillborn are premature and this is about eight times the prematurity among liveborn. However, sex-wise differences in the incidence of prematurity are not observed.

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Table 1

Incidence of Prematurity.

	Males		Females		Incidence of Prematurity
	Total	Prematures	Total	Prematures	(Total) %
Live-born	1926	125(6.49)	1925	123(6.39)	6.44
Still-born	109	48(44.04)	96	55(57.30)	50.24
Total	2035	173(8.50)	2021	178(8.81)	8.65

Figures in paranthesis are percentages.

The premature perinatal mortality is 50.14 percent (Table 2.); and it is fourteen times the perinatal mortality of 3.59 percent among matures. Thus, the probability of survival of a premature infant during perinatal period is fourteen times lower than that of a mature infant. Although sex does not seem to influence premature perinatal mortality and overall perinatal mortality, the difference in perinatal mortality of male and female mature born is statistically significant ($t=1.970$; $P<0.05$) being higher in male infants. Among the live born, out of a total of 125 male prematures there were 35 deaths *i.e.*, a mortality rate of 28% where as among male matures the mortality rate is 0.94 percent. In female liveborn, out of a total of 123 prematures 38 (30.89%) died whereas in mature babies the mortality rate is 0.78 percent.

Table 2

Premature perinatal mortality and perinatal mortality.

	Prematures		Matures		All cases	
	Total	No. of deaths	Total	No. of deaths	Total	No. of deaths
Males	173	83(47.98)	1862	78(4.19)	2035	161(7.91)
Females	178	93(52.25)	1843	55(2.99)	2021	148(7.32)
Total	351	176(50.14)	3705	133(3.59)	4056	309(7.62)

Figures in Paranthesis are percentages.

The distribution of survival time of the live-born non-survivors is presented in Table 3. Among males, 26 infants out of 52 (*i.e.* 49%) died within 24 hours and 39 (*i.e.* 74%) died within 72 hours after birth. Out of 26 and 39 who died within 24 and 72 hours after birth, 22 (84%) and 29 (74%) are prematures respectively. In females, 57.7 percent of the deaths occured within 24 hours after birth and 78.8 percent within 72 hours after birth. Again, 80 percent of the deaths within 24 hours and 73.2 percent of those within 72 hours are prematures. Thus, first 24 hours of life is the most important period from the point of view of survival and more so in the case of prematures.

While mature and premature non-survivors among female infants do not differ in their survival times, male matures survive, on an average, for a significantly longer period than male prematures ($t=2.203$, $D.F.=50$, $P=0.0301$). Males and females do not differ signi-

Table 3

Distribution of Survival time of live-born non-survivors.

Survival time (hrs)	No. of males			No. of females		
	Matures	Prematures	Total	Matures	Prematures	Total
1	0	5	5(9.62)	1	5	6(11.54)
1-12	2	9	11(21.15)	4	14	18(34.62)
12-24	2	8	10(19.23)	1	5	6(11.54)
24-48	3	5	8(15.38)	4	4	8(15.38)
48-72	3	2	5(9.62)	1	2	3(5.77)
72-96	2	1	3(5.77)	1	2	3(5.77)
96-144	4	4	8(15.38)	1	4	5(9.62)
144-168	1	1	2(3.85)	1	2	3(5.77)
Total	17(32.69)	35(67.31)	52(100)	14(26.92)	38(73.08)	52(100)
Mean S.T. +S.D. −(hrs)	72.00 ± 56.58	35.22 ± 56.28	47.25 ± 58.45	39.41 ± 48.04	42.14 ± 64.97	41.40 ± 60.53

Figures given with in brackets are percentages

ficantly in their survival times, either within matures or in prematures or in total. This finding of significant difference cannot, however, be substantiated from the present study as the number of non-survivors is too small and the scope is limited.

Table 4

Religion and prematurity with associated mortality.

Religion		Males		Females	
		No.	Mortality	No.	Mortality
Hindus	Matures	845	49(5.80)	819	37(4.52)
	Prematures	87(9.33)	41(47.13)	101(10.98)	40(39.60)
Christians	Matures	960	25(2.60)	972	19(1.95)
	Prematures	77(7.42)	38(49.35)	71(6.81)	46(64.80)
Muslims	Matures	57	3(5.26)	52	1(1.92)
	Prematures	9(13.64)	5(55.56)	6(10.34)	5(83.33)

Figures given with in brackets under 'Mortality' are horizontal percentages and under 'No.' are percentages out of total.

The incidence of prematurity among Hindu male infants is 9.33 percent and in Hindu females is 10.98 percent (Table 4). The corresponding figures for males and females among Christians are 7.42 percent, and 6.81 percent, respectively. Although apparently it is seen that prematurity rate is higher among Hindus than among Christians, the difference is found to be statistically significant in females only ($t=3.22$, $P=0.0013$ for females; $t=1.63$, $p > 0.05$ for males). A statistical comparison of the prematurity rates among muslims could not be made because of scanty data.

Again, while premature perinatal mortality remains same in Hindu and Christian male infants, females demonstrate a statistically significant difference ($t=1.963$, $p=0.05$), being higher among Christians. Thus, while incidence of prematurity is higher among Hindu females infants, the premature perintal mortality is higher among Christians female infants, males

exhibiting no significant differences. It can also be seen that the mortality among prematures is consistantly many times higher than that among matures within each of the religious groups in males as well as in females. Moreover, the mortality among matures appears to be the lowest in Christians, in both the sexes. The factors responsible for this phenomenon are unknown, if not attributable to the size of the sample.

Table 5

Economic status and Prematurity with associated mortality.

Economic Status		Males		Females		Total	
		No.	Mortality	No.	Mortality	No.	Mortality
I	Matures	71	1(1.41)	79	0(0)	150	1(0.67)
	Prematures	1(1.39)	0(0)	8(9.20)	5(62.50)	9	5(55.56)
II	Matures	238	4(1.68)	261	5(1.92)	499	9(1.80)
	Prematures	12(4.80)	3(25.00)	12(4.40)	6(50.00)	24	9(37.50)
III	Matures	1553	73(4.70)	1503	52(3.46)	3056	125(4.09)
	Prematures	160(9.34)	80(50.00)	158(9.51)	80(50.63)	318	160(50.31)

Figures given within brackets under 'Mortality' are horizontal percentages" and under 'No.' are percentages out of total.

It can be seen from Table 5 that the incidence of prematurity increases as the economic condition deteriorates. Thus, economic status of the families bears negative correlation with the incidence of prematurity. The inconsistency exhibited by the highest stratum in females, however, may be attributed to the smallness of the data. The mortality condition among matures shows uniform deterioration with economic status, while the same is not exhibited by the prematures although it tends to be higher in the lowest economic group which may be due to the smallness of the data. However, the perinatal mortality increases with the fall in economic position. Thus, it can be said that the economic and social status of mothers, probably influence the factors in her psychological functioning which react reciprocally with the biological factors and effect the outcome of pregnancy.

Table 6

Maternal age and Prematurity with associated mortality.

Materma' Age (Yrs)		Males		Females		Total	
		No.	Mortality	No.	Mortality	No.	Mortality
20	Matures	104	4(3.84)	93	3(3.23)	197	7(3.55)
	Prematures	11(9.56)	7(63.64)	17(15.45)	7(41.18)	28(12.44)	14(50.00)
20 —	Matures	375	16(4.27)	393	12(3.05)	768	28(3.65)
	Prematures	29(7.18)	10(34.48)	25(5.98)	9(36.00)	54(6.57)	19(35.18)
24 —	Matures	520	15(2.88)	490	9(1.84)	1010	24(2.38)
	Prematures	45(7.96)	19(42.22)	39(7.37)	23(59.00)	84(7.68)	42(50.00)
28 —	Matures	392	14(3.57)	409	10(2.44)	801	24(3.00)
	Prematures	43(9.89)	22(51.16)	41(9.11)	20(48.78)	84(9.49)	44(52.38)
32 —	Matures	261	16(6.13)	269	12(4.46)	530	28(5.28)
	Prematures	22(7.77)	9(40.91)	22(7.56)	9(40.91)	44(7.67)	18(40.91)
36 —	Matures	82	5(6.10)	83	2(2.41)	165	7(4.24)
	Prematures	5(5.75)	4(80.00)	10(10.75)	6(60.00)	15(9.09)	10(66.67)
40 —	Matures	65	4(6.15)	68	2(2.56)	133	6(4.51)
	Prematures	6(8.45)	3(50.00)	4(5.56)	2(50.00)	10(7.52)	5(50.00)

Figures given with in brackets under 'Mortality' are horizontal percentages" and under 'No.' are percentages out of the total of matures and prematures in the respective groups.

The distribution of maternal age (Table 6) are available only for 1960 male and 1963 female births out of the total of 2035 and 2021 respectively, whereas, for prematures, the distributions are available only for 161 male and 158 female births out of the total of 173 and 178 births, respectively. The maternal age does seem to influence prematurity and premature perinatal mortality. The incidence of prematurity, in males and in females, is almost maximum in mothers of age less than 20 years. Then there is a fall at 20-24 years of age group succeeded by rise from maternal age 24 years and above. Extremeties of the distribution exhibit certain erratic changes which can mainly be attributed to smallness of the data. The effect is more prominent among females than among males. The total correlation coefficients between maternal age and prematurity turned out to be—0.350 5 and—0.3979 in males and in females respectively and they are statistically insignificant ($P > 0.1$; D.F.=10, in both).

As regards premature perinatal mortality, males demonstrate a more distinct trend than females, with a maximum mortality rate of 63.64 percent among mothers of less than 20 years of age and minimum of 34.48 percent between 20 and 24 years of age. The trends in over all perinatal mortality are smooth and clear with maximum in mothers of age less than 20 years (9.56 percent for males and 9.09 for females). Thus, it can be said that the relationship describes a parabola with the trough reaching its lowest at maternal age between 20 and 24 years where prematurity and perinatal mortality are minimum. Hence, it can be said that the optimal child bearing age corresponding to maximum survival rate is between 20 to 24 years of age.

Table 7

Parity and Prematurity with associated mortality.

Parity		Males		Females		Total	
		No.	Mortality	No.	Mortality	No.	Mortality
0	Matures	419	20(4.77)	366	9(2.46)	785	29(3.69)
	Prematures	42(9.11)	12(28.57)	38(9.41)	14(36.84)	80(9.25)	26(32.50)
1	Matures	279	9(3.23)	339	9(2.65)	618	18(2.91)
	Prematures	20(6.69)	9(45.00)	18(5.04)	7(38.89)	38(5.79)	16(42.10)
2	Matures	243	2(0.82)	194	4(2.06)	437	6(1.37)
	Prematures	9(3.57)	3(33.33)	15(7.18)	8(53.33)	24(5.21)	11(45.83)
3-4	Matures	290	9(3.10)	287	10(3.48)	577	19(3.29)
	Prematures	24(7.64)	14(58.33)	27(8.60)	16(59.26)	51(8.12)	30(58.82)
5-7	Matures	201	11(5.47)	218	6(2.75)	419	17(4.06)
	Prematures	15(6.94)	6(40.00)	22(9.17)	8(36.36)	37(8.11)	14(37.84)
8 & above	Matures	59	5(8.47)	61	4(6.56)	120	9(7.50)
	Prematures	5(7.81)	4(80.00)	3(4.69)	3(100.00)	8(6.25)	7(87.50)

Figures given within brackets under 'Mortality' are horizontal percentages" and under 'No.' are percentages out of the total of matures and prematures in the respective groups.

The effect of parity on prematurity and perinatal mortality can be assessed from Table 7. The distributions of parity are available only for 1606 male and 1588 female births; and only for 115 male and 123 female premature births. The incidence of prematurity gradually comes down up to para 2 in males and para 1 in females and then shows an upward trend. Thus the incidence of prematurity is minimum (3.57 percent) at para 2 in males and at para 1 (5.04 percent) in females. The total correlation coefficients between parity and prematurity, for males and females are 0.0339 and 0.0312 respectively and they are insignificant.

The overall perinatal mortality describes a similar curve as that of prematurity in that the lowest perinatal mortality rate of 1.98 percent occured at para 2 in males and of 4.48 percent at para 1 in females. This shows that the odds

on survival are maximum at para 2 for male child and at para 1 for female child. The premature perinatal mortality exhibits an erratic behaviour.

Congenital abnormalities were present in 12 males and 8 females out of a total of 2035 male infants 2021 female infants studied *i.e.*, an incidence rate of 0.59 and 0.39 percent respectively. Five of males and four of females died. Two of males and one of females were premature.

Table 8

Antenatal condition and disease complicating pregnancy and Prematurity.

		Males		Females	
		No.	Mortality	No.	Mortality
Anaemia	Total	246(12.09)	48(19.51)	229(11.33)	34(14.85)
	Prematures	43	29(67.44)	42	25(59.52)
Oedema	Total	54(2.16)	12(22.22)	73(3.62)	6(8.22)
	Prematures	12	8(66.67)	9	3(33.33)
Placenta-Previa	Total	22(1.81)	3(13.36)	12(0.59)	2(16.67)
	Prematures	8	3(37.50)	5	2(40.00)
Eclampsia & Pre-eclampsia	Total	13(0.64)	5(38.46)	12(0.59)	5(41.67)
	Prematures	5	4(80.00)	5	4(80.00)
Hydramnios	Total	11(0.54)	5(45.45)	15(0.74)	11(73.33)
	Prematures	4	3(75.00)	7	7(100.00)

Figures with in brackets under 'Mortality' are horizontal percentages" and under 'No.' are percentages out of total.

The mortality rate of infants of mothers with hydramnios is the highest, 45.45 percent in males and 73.33 percent in females, followed by eclampsia and pre-eclampsia (Table 8). The corresponding premature perinatal mortality rates are also high. Moreover, out of total of 51 mature infants 8 (15.69 percent) and 34 premature infants 23 (67.65 percent), born to mothers with conditions plancenta previa, eclampsia, and hydramnios, died. Thus it can be said that the probability of survival of mature infant during perinatal period is about four to five times that of a premature infant, born to mothers with certain conditions complicating pregnancy. However, generalisations regarding the role of antenatal condition of mothers either in prematurity or in perinatal mortality cannot be made on the basis of the few observations available here.

Discussion :

Estimates of incidence of prematurity reported in India are on the basis of birth weight (less than 2500 gms) as defined by WHO (1950), although it was agreed that this standard was too high for Indian conditions. This introduces an error by over-estimating the actual incidence. The incidence of prematurity arrived at in the present study, on the basis of the definition suggested by Ramaiah and Narasimham (loc. cit.) is 8.65 percent of all births; where as it is 6.44 percent among liveborn and 50.24 percent among stillborn.

Reliable, comprehensive and nation-wide estimates of perinatal mortality are lacking in our country. The studies conducted in different parts of the country reported varying estimates (Bhaskara Rao, 1966) *Viz.* Calcutta (1958)-71.2; Hyderabad (1960)-51.7; Madras city (1960-61)-60.6 per 1000 births. The estimate of perinatal mortality arrived at in the present study is 76.2 per 1000 births. Varying periods and scope, however, do not permit valid comparisons.

It is observed that 58.52 percent of the deaths among premature and 76.69 percent of deaths among mature are stillborn deaths. Hence, if the etiology and underlying causes of stillbirths are well understood, the prematurity and perinatal mortality can possibly be brought down considerably.

Also, certain maternal influences might act upon the individual in antenatal intranatal, or postnatal life such as haemorrhage, infection, asphyxia, trauma, toxaemia, hydramnios, eclampsia and pre-eclampsia etc. Thus, comprehensive antenatal care concomitant with a careful historical search into the medical and reproductive background of the mother, father and family might delineate the factors implicated in causing fatal disease and mortality.

Summary and conclusions :

4056 cases of consecutive single births which occured in Goa Medical College hospitals during 1961-65 (inclusive) were studied to find out the incidence of prematurity, premature perinatal mortality and overall perinatal mortality.

Incidence of prematurity is 8.65 percent of all births. It is eight times more among stillborn than that among liveborn.

The premature perinatal mortality is 50.14 percent and perinatal mortality is 76.2 per 1000 births. Mortality rate among prematures is about fourteen times higher than that among matures. Sex does not seem to influence mortality.

5.05 percent of all births are stillborn and it is responsible for 58.52 percent of deaths among premature and 76.69 percent of deaths among mature.

Economic status bears negative correlation with incidence of prematurity.

The optimum child bearing age can be said to be between 20 and 24 years. The odds on survival are maximum at para 2 in male infants and at para 1 in female infants.

The probability of survival of a mature infant is four to five times that of a premature infant, born to mothers with conditions complicating pregnancy.

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INCIDENCE OF DIPHTHERIA CARRIERS AMONG SCHOOL CHILDREN IN VISAKHAPATNAM*

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In recent times, several reports appeared from different parts of India revealing that the incidence of diphtheria has been on the increase (Tribedi et al., 1953; Thanawala, 1954; Singha and Ta ylor, 1959; W. H. O. Press Release, 1960; Basappa, 1963 and Kutty et al., 1964). Statistical studies from some cities and rural areas also revealed the mortality and morbidity rates from diphtheria to be high (Lal and Seal, 1949; Bhattacharji, 1959 and Bhattacharji et al., 1960). Pandalai (1945) reported that the incidence of the disease was the highest among children between 2-15 year of age. Bhargava and Bhatt (1960) recorded a rise in its incidence in the age group of 6-9 years, the school-going period, where contact with carriers could be held responsible for the increase. From these reports, it is apprehended that diphtheria might be another serious public health problem cropping up in India among school-going children.

To assess the magnitude of the problem, a study of the incidence of clinical diphtheria alone would not be sufficient. Several other factors, such as the presence of virulent organisms in a particular locality, the level of herd immunity in the said community and suitable environmental factors for the transmission and spread of disease, should be also taken into consideration. It was, therefore, decided to study the incidence of carriers of diphtheria bacilli among school children and simultaneously to determine the immunity status of the community against the infection.

The present paper deals only with the study of the carrier rate of Corynebacterium diphtheriae among school children from the Visakhapatnam area in Andhra Pradesh during the year 1964-65.

Material and Methods :

The children brought under the study were from two selected schools, one in a rural area called Simhachalam about 8 miles from Visakhapatnam and the other in Visakhapatnam itself. Among them, 210 boys and 80 girls were from the rural school and 198 boys and 200 girls were from the urban. They belonged to different age groups ranging from 6 to 16 years. The distribution of children covered in the study according to age and sex is shown in Table 1.

A total of 688 throat swabs were collected from them by rubbing the swabs firmly on tonsillar surface and pharynx. Care was taken to swab as large a surface of the pharyngeal mucus

*The studies reported here formed a part of the dissertation submitted by K. C. Bhuyan in part fulfilment of M.D. Degree Examination of the Andhra University held in June, 1966.

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Table 1

Distribution of children according to age and sex.

Area	Total No. of children	Age group in years		Sex	
		6-11	11-16	Boys	Girls
Rural	290	190	100	210	80
Urban	398	313	85	198	200
Total	688	503	185	408	280

membrane as possible. The original intention was to collect nasal swabs simultaneously, but the idea had to be abandoned when we found children to be non-cooperative towards nasal swabbing. The throat swabs were brought to the Department of Microbiology as early as possible and used for culture. No attempt was made for direct microscopic examination of the material. The media and techniques used for the isolation and identification of C. diphtheriae were as described by Cruickshank (1960). The isolates were then classified into gravis, intermedius and mitis types on the basis of their morphology, cultural characteristics and biochemical reactions (Wilson and Miles, 1964).

All the strains of C. diphtheriae isolated were tested for toxigenicity by the standard intradermal virulence test using guinea-pig (Cruickshank, 1960). Two white guinea-pigs weighing about 400 grams were selected for each batch of 4 test strains. A known virulent and a known avirulent strain were included with each batch of test strains. The control animal was injected with 1000 units of diphtheria antitoxin intraperitoneally, a day before the test. To prevent the test animal from dying, it was given 50 units of antitoxin intraperitoneally immediately after the test inoculations. Toxigenic strains produced in the test animal a hyperaemic area of about 1-2 cms. in diameter after 24 hours. After the third or fourth day, the hyperaemic area slightly decreased leaving a central necrotic area. On further observation, the surrounding reaction faded away completely leaving only a necrotic patch with a scab. No such reaction was observed in the control guinea-pig. With a non-toxigenic strain, no reaction of any kind was observed even in the test animal.

Results :

Out of 688 swabs cultured, 26 (3.7%) yielded positive culture of C. diphtheriae. Ten strains (3.4%) were isolated from the rural group and 16 (4.0%) from the urban (Table II). All the children with positive culture showed neither signs of clinical diphtheria nor any other manifestations like enlarged or congested tonsils. It will be seen from Table II that there is no significant difference between the incidence of C. diphtheriae in rural and urban areas.

Table 2

Incidence of C. diphtheriae in rural and urban areas.

	Rural	Urban	Total
No. positive	10 (3.4%)	16 (4.0%)	26 (3.7%)
No. negative	280 (96.6%)	382 (96.0%)	662 (96.3%)
Total	290 (100%)	398 (100%)	688 (100%)

$X^2=0.15$; n=1 ; '60 < P < .70

As will be seen from Table III, 22 (4.4%) children with latent infection belonged to 6-11 years age group and only 4 (2.2%) to 11-16 years. Further analysis of the figures contained in Table III showed that in the age group 6-11 years, 7 children were from the rural school and 15 from urban area, whereas in 11-16 years age group, 3 belonged to rural area and one to urban.

Table 3

Incidence of C. diphtheriae : Influence of age.

	Age group in years		Total
	6-11	11-16	
No. positive	22 (4.4%)	4 (2.2%)	26 (3.7%)
No. negative	481 (95.6%)	181 (97.8%)	662 (96.3%)
Total	503 (100%)	185 (100%)	688 (100%)

X^2%1.83 ; n=1 ; .10 < P < .20

In Table IV is given the distribution of diphtheria carrier state among school children according to sex. Of the 26 children from whom C. diphtheriae was isolated, 16 (3.9%) were boys and 10 (3.6%) girls. From rural area, 7 boys and 3 girls were found to harbour the organism, whereas 9 boys and 7 girls in urban area had latent infection.

Table 4

Incidence of C. diphtheriae : Influence of sex.

	Boys	Girls	Total
No. positive	16 (3.9%)	10 (3.6%)	26 (3.7%)
No. negative	392 (96.1%)	270 (96.4%)	662 (96.3%)
Total	408 (100%)	280 (100%)	688 (100%)

$X^2 = .05$; $n = 1$; $.80 < P < .90$

Out of 26 C. diphtheriae strains isolated, 9 (34.6%) were found to be gravis and 17 (65.4%) belonged to mitis type. No intermedius type was isolated. The results of virulence tests revealed that 16 (61.5%) strains to be virulent and 10 (38.5%) avirulent. All the gravis diphtheria bacilli were virulent, while only 7 out of 17 (40.6%) mitis strains were found to be toxigenic (Table V).

Table 5

Results of virulence tests of 26 strains of C. diphtheriae.

Type	No. virulent	No. avirulent	Total
Gravis	9	—	9
Intermedius	—	—	—
Mitis	7	10	17
Total	16	10	26

The distribution of virulent and avirulent diphtheria bacilli according to area, age and sex is presented in Table VI.

Table 6

Distribution of virulent and avirulent diphtheria bacilli.

	Area		Age group		Sex	
	Rural	Urban	6-11	11-16	Boys	Girls
No. virulent	6	10	13	3	12	4
No. avirulent	4	6	9	1	4	6
Total	10	16	22	4	16	10

There is no evidence from the small numbers available that factors like area, age and sex had any positive influence on the distribution of virulent and avirulent organisms in the group studied ($P > .05$). Further the preceding analysis reveals that out of 688 children examined, 16 virulent carriers and 10 avirulent carriers were detected, which works out at 2.3% and 1.5% respectively.

Discussion :

It has long been recognised that diphtheria bacillus is not always confined to those who are suffering from the clinical disease in its typical form. Frequently, the organism has been isolated from cases of mild sore throat when associated with a typical epidemic of diphtheria and less often from healthy contacts and still less frequently from non-contacts (Wilson and Miles, 1964). There is not enough literature on the study of the carrier rate of C. diphtheriae in India. The fact that the children are acquiring immunity at a rapid rate, as shown by the Schick test surveys from different parts of India (Prasad and Park, 1961; Niyogi et al., 1962 and Suri and Khosla, 1964) reveals that most of these areas are foci of diphtheria bacilli capable of causing mild or inapparent infections in the community.

The present investigation has brough out that the incidence of diphtheria bacilli (3.7%) among healthy school children in this area is high. A study on the throat flora of rural population by Sant and Bhatt (1963) from Bombay also showed that out of 199 swabs, 11 (5.5%) yielded positive culture of C. diphtheriae. There was no significant association between the colonization of diphtheria bacilli in normal throats of children and the area from where they were drawn. The even distribution of carriers among rural and urban children in the present study is in correlation with the observations on herd immunity in diphtheria recorded by other workers in this country (Prasad and Park, 1961 and Suri and Khosla, 1964), since the latent or inapparent infections are mainly responsible for the development of herd immunity. No direct comparison could be made between the current series and that of others, as the latter have not reported the incidence of latent infection.

From the analysis of the incidence of C. diphtheriae according to age, it has been shown that it occurred twice as frequently in the lower age group as in the higher age group, even though the statistical treatment of the results

Table 4

Incidence of C. diphtheriae : Influence of sex.

	Boys	Girls	Total
No. positive	16 (3.9%)	10 (3.6%)	26 (3.7%)
No. negative	392 (96.1%)	270 (96.4%)	662 (96.3%)
Total	408 (100%)	280 (100%)	688 (100%)

$X^2 = .05$; $n = 1$; $.80 < P < .90$

Out of 26 C. diphtheriae strains isolated, 9 (34.6%) were found to be gravis and 17 (65.4%) belonged to mitis type. No intermedius type was isolated. The results of virulence tests revealed that 16 (61.5%) strains to be virulent and 10 (38.5%) avirulent. All the gravis diphtheria bacilli were virulent, while only 7 out of 17 (40.6%) mitis strains were found to be toxigenic (Table V).

Table 5

Results of virulence tests of 26 strains of C. diphtheriae.

Type	No. virulent	No. avirulent	Total
Gravis	9	—	9
Intermedius	—	—	—
Mitis	7	10	17
Total	16	10	26

The distribution of virulent and avirulent diphtheria bacilli according to area, age and sex is presented in Table VI.

Table 6

Distribution of virulent and avirulent diphtheria bacilli.

	Area		Age group		Sex	
	Rural	Urban	6-11	11-16	Boys	Girls
No. virulent	6	10	13	3	12	4
No. avirulent	4	6	9	1	4	6
Total	10	16	22	4	16	10

There is no evidence from the small numbers available that factors like area, age and sex had any positive influence on the distribution of virulent and avirulent organisms in the group studied ($P > .05$). Further the preceding analysis reveals that out of 688 children examined, 16 virulent carriers and 10 avirulent carriers were detected, which works out at 2.3% and 1.5% respectively.

Discussion :

It has long been recognised that diphtheria bacillus is not always confined to those who are suffering from the clinical disease in its typical form. Frequently, the organism has been isolated from cases of mild sore throat when associated with a typical epidemic of diphtheria and less often from healthy contacts and still less frequently from non-contacts (Wilson and Miles, 1964). There is not enough literature on the study of the carrier rate of C. diphtheriae in India. The fact that the children are acquiring immunity at a rapid rate, as shown by the Schick test surveys from different parts of India (Prasad and Park, 1961; Niyogi et al., 1962 and Suri and Khosla, 1964) reveals that most of these areas are foci of diphtheria bacilli capable of causing mild or inapparent infections in the community.

The present investigation has brough out that the incidence of diphtheria bacilli (3.7%) among healthy school children in this area is high. A study on the throat flora of rural population by Sant and Bhatt (1963) from Bombay also showed that out of 199 swabs, 11 (5.5%) yielded positive culture of C. diphtheriae. There was no significant association between the colonization of diphtheria bacilli in normal throats of children and the area from where they were drawn. The even distribution of carriers among rural and urban children in the present study is in correlation with the observations on herd immunity in diphtheria recorded by other workers in this country (Prasad and Park, 1961 and Suri and Khosla, 1964), since the latent or inapparent infections are mainly responsible for the development of herd immunity. No direct comparison could be made between the current series and that of others, as the latter have not reported the incidence of latent infection.

From the analysis of the incidence of C. diphtheriae according to age, it has been shown that it occurred twice as frequently in the lower age group as in the higher age group, even though the statistical treatment of the results

did not indicate any significant difference between the two age groups. Our finding of higher incidence of carriers in the lower age group than in the older is to be expected, since the highest incidence of clinical diphtheria in India is in children below the age of 10 years (Thanawala, 1954; Bhargava and Bhatt, 1960 and Basappa, 1963). Though the influence of sex was noted by Zingher (1917) and Dudley (1929) while studying herd immunity in diphtheria and by Thanawala (1954) and Bhargava and Bhatt (1960) while reporting on the incidence of the disease, we did not find any particular effect of sex on the carrier rate in healthy school children either in rural or in urban areas.

From the foregoing analysis and discussion, it is clear that place and sex have no bearing on the incidence of diphtheria bacilli among healthy children and it is worthwhile to study other possible influencing factors like crowding in schools, situation of the school in open or congested locality and the socio-economic status of the children. Further, the distribution of virulent and avirulent organisms in the community was in no way related to the area, age and sex of the study population.

In the present series, carrier rates of virulent and avirulent bacilli are fairly high when compared to the figures of Vardon (1923) and Pandalai (1945). In India, Vardon (1923) found the virulent carrier rate 0.7% in a series of 1000 persons of all ages drawn from different parts of the country. A survey of latent diphtheria in Visakhapatnam by Pandalai (1945) revealed a virulent carrier rate of 0.57% and avirulent carrier rate of 0.28%, whereas the corresponding figures in the present study are 2.3% and 1.5% respectively. From the present data, it is difficult to draw a firm conclusion if there has been a change in the incidence of carriers among children in the Visakhapatnam area during the last 20 years between the present survey and the earlier one of Pandalai (1945).

Summary :

A study of the carrier rate of C. diphtheriae among school-going children in and around Visakhapatnam is described and relation of carrier state to area, age and sex is considered.

Swabs from the throats of 688 children between 6 and 16 years age from rural and urban schools were examined. C. diphtheriae was isolated from 26 (3.7%) of these healthy children who neither showed symptoms of clinical diphtheria nor had any history of contact. Of these strains, 9 were found to be gravis type and 17 belonged to mitis type. All the gravis diphtheria bacilli were virulent, while only 7 out of 17 mits strains were found to be toxigenic.

The present study did not reveal that either the place or the sex affected the incidence of diphtheria bacilli among healthy children. Higher incidence of diphtheria carriers among children in the 6-11 year age group was noticed.

The carrier rates of virulent and avirulent diphtheria bacilli for the population in and around Visakhapatnam between the age of 6 and 16 years during the specified time interval were found to be 2.3% and 1.5% respectively. The factors like area, age and sex had no influence on such distribution in the population.

Acknowledgements :

We are indebted to Dr. V. S. Raghunathan, Principal, Andhra Medical College, Visakhapatnam, for affording facilities to carry out this study. We are also grateful to all the Members of the Staff of the Departments of Microbiology and Social and Preventive Medicine of the Andhra Medical College, for their assistance in the investigation.

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INDIAN JOURNAL OF PUBLIC HEALTH
Note to Contributors

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Articles are considered for publication on condition that these are contributed solely to the Indian Journal of Public Health. Articles must be type-written, double-spaced, on one side only of foolscap paper and may not ordinarily exceed 16 pages. Two copies of type-scripts are to be submitted. Graphs, charts diagrams or pen drawings must be drawn in Indian ink on white drawing paper. Blue or coloured inks cannot be reproduced. Photographs not suitable for half-tone work will not be reproduced. Illustrations should be numbered and legends clearly typed or written.

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INDIAN JOURNAL OF
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FIELD OBSERVATIONS ON THE BREEDING OF MUSCOID FLIES IN ORGANIC WASTES IN VILLAGES

By

P. KUMAR*

I—Introduction :

The effective control of house flies depends to a great extent on the elimination of certain potential sources of fly production in any community. The recognition of the relative significance of these sources, therefore, becomes an important job for public health workers engaged in environmental sanitation work. The various species of flies that breed in these organic wastes is also important to observe so as to know the most selective media the various species of flies utilise in different seasons of the year.

The present study conducted by Planning Research and Action Institute, U.P. describes the seasonal variations of the breeding of three species of flies *i.e. Musca, Calliphorid,* and *Stomoxys* in cattle litter, garbage and human faeces in the rural environment.

II—Method :

The study was conducted in two villages Matiary and Nawbasta about 7-9 miles from Lucknow in the year 1962. These villages represent the typical villages of central U.P. The majority of population in these villages is of agriculturists. Almost every house has a cattle shed with plenty of dung and cattle litter where flies largely breed. The garbages are scattered all over the village which are heaps of cattle dung and refuse. Open defecation is a common feature almost every where inside these villages.

Observations on fly breeding were made in the three important organic wastes *i.e.* cattle shed litter, garbage and human defecations by examining the presence of fly maggots in a large number of field samples of these media selected on a random basis in villages in different months which also represent the respective climate and seasons of the year. A representative sample of maggots observed were collected with forceps, dropped in vials containing 10% formaline as preservative and later on identified in the laboratory.

For identification, the posterior spriacles of the fly maggots were dissected and mounted in Barles's medium. Examinations were made under a miscroscope for the morphological characters of posterior spiracles specific for different species of flies. Larvae were separated into three categories *i.e. Musca sp., Calliphorid sp.* and *Stomoxys calcitrans.* The average number of larvae of the three categories of flies per sample was determined for comparing the observations and are shown in Table No. 2, 3 and 4.

III—Climatic or Atmospheric Conditions :

Meteorological data regarding temperature, humidity and rainfall was obtained from the local observatory and they have been given in Table 1. Data is given for winter, spring, summer and monsoon seasons of the year in which observations were made.

* Entomologist, Planning Research & Action Institute, U. P., Kala Kankar House, Lucknow.

Table No. 1

Meteorological Data for Lucknow for 6 specific months.

Sl. No.	Months 1962	Seasons	Highest Max. Temp. Co.	Average Max. Temp. Co.	Lowest Min. Temp. Co.	Average Min. Temp. Co.	Humidity %	Rainfall mm.
1.	January	Winter	18.8	16.8	3.3	6.3	48.2	9.1
2.	March	Spring	37.7	31.3	10.6	15.1	30.2	5.0
3.	May	Summer	44.4	40.3	22.0	25.0	27.0	1.0
4.	June	Summer	42.0	35.3	21.0	28.4	45.0	22.5
5.	July	Monsoon	41.0	37.0	23.0	26.4	65.0	32.5
6.	August	Monsoon	37.7	32.3	21.4	22.6	81.0	234.3
7.	September	Monsoon	34.5	31.6	18.3	23.5	77.0	252.6

IV—Observations :

The observations on the breeding of the three categories of flies have been explained below :—

(1) Musca species (Table No. 2)

Human defecation have been observed as preferential media for the breeding of *Musca species* in villages in almost all the months but more so in March (Spring) and June (Summer). Fly breeding in this media in summer was restricted to shady places.

Table No. 2

Comparative Breeding of Musca species in Three Organic Wastes.

Sl. No.	Months 1962	Average larvae per sample		
		Cattle shed litter	Garbage	Human faeces
1.	January	39.4	8.9	15.6
2.	March	36.3	12.7	42.8
3.	May	12.1	12.6	39.4
4.	June	10.7	12.8	47.5
5.	July	13.4	23.0	25.0
6.	Aug./Sept.	22.2	26·6	28.5

Cattle shed litter was most important substrate for the production of *Musca species* during January and March specially in view of the large quantity of this media present in villages. 'During winter in villages large quantities of vegetative refuse is thrown under the animals which when soiled with urine and dung becomes a prolific source of fly breeding. Such a litter in villages is called "Goita" which is not removed daily but at intervals of about 20-30 days. It is generally 4-6 inches thick and remains in all stages of decomposition which provides requisite thermal requirement for fly maggot to develop."

Garbages are important sources of *Musca* production during monsoons and in moist humid months.

(2) Calliphorid Species (Table No. 3)

The *Calliphorids* have not been observed to breed in human defecations. They prefer putrecible organic material at garbages during summer and monsoon for breeding. Cattle shed litter also supports the breeding of these species to some extent.

Table No. 3

Comparative Breeding of Calliphorid Species in the Organic Wastes.

Sl. No.	Months 1962	Average larvae per sample		
		Cattle shed litter	Garbage	Human faeces
1.	January	3.2	1.4	0.0
2.	March	3.4	6.1	0.0
3.	May	12.3	22.7	0.0
4.	June	10.5	11.2	0.0
5.	July	11.3	17.7	0.0
6.	Aug./Sept.	14.1	20.5	0.0

(3) **Stomoxys Calcitrans** (Table No. 4)

The breeding of this fly which is an important pest of domesticated animals in villages remains restricted in cattle shed litter and garbage heaps. The larvae of this species have never been observed to breed in human faeces in villages. The altogether absence of the breeding of this fly in these organic wastes during excessive summer months indicates the chances of this fly to aestivate in some protective places inside village environment. Its breeding has been restricted to cattle shed litter and garbage.

Table No. 4

Comparative Breeding of Stomoxys Calcitrans in three Organic Wastes.

Sl. No.	Months 1962	Average larvae per sample		
		Cattle shed litter	Garbage	Human faeces
1.	January	4.0	1.0	0.0
2.	March	0.9	5.7	0.0
3.	May	0.0	0.0	0.0
4.	June	0.0	0.0	0.0
5.	July	2.8	0.0	0.0
6.	Aug./Sept.	2.5	2.5	0.0

V—Discussions :

The preferential breeding of *Musca* species in human faeces in villages is a significant observation from public health point of view. An open defecation is a common feature in villages, effective shielding of night soil should bring reductions in the fly borne enteric infections and also some reductions in fly incidence. However cattle litter and garbages are such more potential sources of the production of *Musca species* specially in view of the huge quantities of these media available in villages as compared to human faeces. Studies of Siverly and Scoof (1955) indicate that *Musca domestica* breeds largely in gargages and animal excrement in urban communities in U.S.A. In the villages of U.P. in India cattle litter and human faeces had been observed to be the important production sources of this species of flies. The village garbage which is an accumulation of cattle dung also supports the production of this species to a great extent. The high breeding potential of human faeces has not been reported by the above authors because their surveys had been made on animal excrement only which were prevalent organic wastes in that country.

The observation that *Calliphorids* are produced more by garbages is well supported by the above studies and similarly the breeding of *Stomoxys Calcitrans.*

VI—Summary :

(1) Surveys of fly breeding in the three important fly production-media *i.e.* cattle shed litter, garbage and human excreta were conducted in two villages of U.P. near Lucknow during 1962. *Musca domestica* breeds in all the three organic wastes. *Calliphorids* were not observed to breed in human faeces but utilized garbage and cattle litter. *Stomoxys Calcitrans* also bred in cattle shed litter and garbages in villages.

(2) The utilization of these media by *Muscoid* flies varies seasonally.

VII—Acknowledgments :

Thanks are due to Director, Planning Research and Action Institute, for providing the facilities for this study., and to Dr. B. S. Sehgal, Specialist (Rural Health), P.R.A.I., Lucknow for his keen interest in the study.

VIII—Reference

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ASSOCIATION NEWS

West Bengal State Branch :

"A symposium on "Operational Research in Family Planning" was held on 2nd September 1967 at the Lecture Theatre of the School of Tropical Medicine, Calcutta organised by this State Branch. Sri A. K. Dutta, Secretary, Dept. of Health, Govt. of West Bengal inaugurated the symposium. All the members and guest were entertained with Lunch and Tea. Dr. S. Dasgupta, Deputy Director of Health Services, (Family Planning), Govt. of West Bengal, Dr. B. K. Das, A.D.M.S. (School Health & Health Education), West Bengal and Dr. B. Banerjee, Deputy Director of Health Services (Planning & Evaluation Cell), West Bengal have helped us to make this symposium successful. Govt. of West Bengal very kindly have agreed to give us financial help for this symposium".

PROGRAMME

Inaugurasion :—A. K. Dutta, Secretary
Dept. of Health, Govt. of West Bengal.
Welcome :— Dr. J. B. Chatterjee,
Director, School of Tropical Medicine, Calcutta.
Introduction :— Dr. J. K. Bhattacharjee,
President, I. P. H. A. (W. B.)

Morning Session .— 9 A.M. to 1 P.M.

Chairman :— Dr. S. C. Seal,
Indian Institute of social Welware and Business Management, Calcutta.

1. Operational Research in Administration & Organisation of Family Planning
9 A. M. to 10 A. M.
Sectional Chairman :—Dr. (Mrs.) M. Sen, Director A.I.I.H. and P.H. Calcutta.
Speakers :—Dr. S. Das Gtpta, Deputy Director of Health Services, (Family Planning) West Bengal.
Sri B. M. Singhi, Vice-President, Family Planning Association of India, and Member Governing Body, International Planned Parenthood Federation.
Dr. Leila Mehra, Deputy Commissioner, Family Planning, New Delhi.

15 Minutes break for Tea

2. Operational Research in Training of Family Planning Programme. 10-15 to 11-15 A. M.

Sectional Chairman :—Dr. (Mrs.) S. K. Sandhu, Central Family Planning Institute, New Delhi.

Speaker :—Dr. Joyce Biswas, Supdt. Dr. H. C. Mookherjee Memorial Health School. Singur, West Bengal.

Dr. G. Sen, Professor, Prev. & Social Medicine, Medical College, Calcutta.
Dr. S. R. Sen, Officer-in-Charge, Rural Training Centre, Burdwan.

3. Operational Research in Evaluation of Family Planning Programme, 11-15 A.M. to 12-30 P.M.

Sectional Chairman :—Dr. K. T. Mosley, Consultant in Family Planning (Ford Foundation), West Bengal.

Speakers :—Dr. A. Das Gupta, Consultant Demographer.
Dr. J. Maslwoski, Demographer, Health and Family Planning Division, U. S. AID, New Delhi

Dr. K. K. Mathen, Head of the Department of Statistics, A.I.I.H., and P.H. Calcutta. 12-30 P.M. to 1 P.M.—Discussion.

LUNCH

Afternoon Session : 2 P.M. to 5-30 P.M.

Chairman :—Dr. (Mrs.) M. Sen, Director, All India Institute of Hygiene & Publie Health, Calcutta.

4. Operational Research on Clinical Aspect in Family Planning. 2 P. M. to 3-30 P. M.

Sectional Chairman :—Dr. C.L. Mukherjee, Director of Health Services, West Bengal.

Speakers :—Dr. D. L. Poddar, Director Professor of Gynaecology and Obstetrics, N. R. S. Medical College, Calcutta.
Dr. Sreemanta Banerjee, Asst. Professor, Gynaecology and Obstetrics, Medical College, Calcutta.
Dr. (Miss) K. Kuder, Clinical Consultant of Family Planning (Food Foundation).
Dr. Leila Mehra, Deputy Assistant Commissioner, Family Planning New Delhi.

15 Minutes break for Tea

5. Operationnl Research on Communication in Family Planning—3·45 PM to 5 PM.
Sectional Chairman :—Dr. V. Ramakrishna, Deputy D. G. H. S. (Small Pox)
Speakers :—Col. N. Chatterjce, Professor, Health Education, A. I. I. H. & P.H., Calcutta. Dr. A. K. Dasgupta, D.A.D.H.S. (H.E.) West Bengal.
Dr. Uma Chowdhury, A.I.I.H. & P.H. Calcutta.
Dr (Mrs) Kamini Adhikari, Asst. Professor of Social Psychology Indian Institute of Management, Calcutta.

5 P. M. to 5-30 P. M. Discussion.

Vote of thanks—Dr. M. M. Ganguly, Hony. Secretary, I P.H.A. (W.B.Br.)

N.B.—Lunch will be served to the invitees by the State Branch of I. P. H. A.

BOOK-REVIEW

"Symposium on the Problem of Filariasis in West Bengal"

Transaction, Vol. 1, No. II, Calcutta—1966.

Indian Public Health Association, West Bengal branch, organised a symposium on the problem of Filariasis in West Bengal. The various aspects of the problem of Filariasis have been discussed by six eminent field workers including the Deputy Director of Filariasis of National Institute of Communicable disease. The papers presented gave a good coverage of the problem. The problem has three aspects *viz.* medical, organisational and the engineering. Prof. N. Majumdar has indicated the broad outlines of the Control of Filariasis both in the urban and rural areas. The papers presented provide very valuable information which are very useful to the new generation of public health workers. I believe this booklet will be a useful guide for everybody interested in the problem of filariasis. The Government of West Bengal has very rightly published as a Government of West Bengal publication. I recommend the transaction as a useful guide for the profession and also public health workers.

G- SEN

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