

MADRAS HEALTH

HEALTH REVIEW MONTHLY

Vol. I]

JANUARY 1962

[No. 1



SUED BY THE
IRECTOR OF
PUBLIC HEALTH,
MADRAS.



OUR OBJECTIVES

- (a) Giving departmental information to our Officers.
- (b) Publication of readable articles on Public Health Programmes and principles.
- (c) Incorporating news items relating to the advancements and researches in the field of Public Health.
- (d) Reports on meetings, seminars, workshops etc., which have a bearing on public health.
- (e) Serving as a medium for sharing of thought and experiences among Public Health and allied personnel.

Cover Photo :—Healthy child helps build a healthy Nation.

YOUR ATTENTION PLEASE

- (1) Articles or reports incorporated in this Journal can be reproduced with due acknowledgement.
- (2) The opinions expressed by the contributors are not necessarily those of the Government or this department.
- (3) Authors desirous of contributing articles and papers on health problems are requested to kindly mail their items to the "Assistant Director of Public Health (Health Education Bureau) Office of the Director of Public Health, P.B. No. 722, Cathedral Post, MADRAS-6."
- (4) Articles should be typewritten and should ordinarily not exceed 1200 words.

CONTENTS

Foreword by Dr. N. Parthasarathy L.M.S., B.S.Sc., Director of Public Health, Madras State, Madras.

Editorial by Dr. V. R. Srinivasan M.B.B.S., D.P.H. (cal), Assistant Director of Public Health (Health Education Bureau), Madras.

Messages from

1. Sri D. P. Karmarkar, Minister for Health, Government of India.
2. Sri K. Kamaraj, Chief Minister, Madras.
3. Col. V. Srinivasan, Director General of Health Services, Government of India.
4. Sri K. Srinivasan, Secretary to Government, Education and Public Health Department, Madras.

Articles & Write-ups

1. "Education for Health - Some principles and their application" from "California Health" By Dorathy B. Nyswander Ph.D., Professor of Public Health Education, Berkely, U. S. A.
2. Implementing R. C. A. Experiences in Rural Extension Training Centre Syllabi. Notes from a detailed report by Dr. C. S. Krishnamoorthi, M.B.B.S., B.S.Sc., Nutrition Officer, Office of the D. P. H.
3. "Analysis of Common Food Stuffs taken in Madras State" by Miss. L. Kasthuri, Chemical Assistant, Nutrition Laboratory, Office of the D. P. H.
4. "Exhibitions — A light study" by Sri G. Kittu Rao B.Sc., L.C. & S.E., Technical Officer, Health Education Bureau.
5. The Nutrition Stall in the National Agriculture Fair, Madras.
6. Epidemic Report.
7. Activities of part-time T. B. Clinic, Poonamallee.

FOREWORD

The circulation of a monthly journal among the Public Health staff and staff of Primary Health Centres has been a long felt need. Sharing of information and experiences among our officers and auxiliary Health personnel in the field is essential for the success of our plans and programmes and we do hope that our new journal "Madras Health" will be serving as an effective medium among our personnel facilitating exchange of views.

Health Education is a two way process. While the health worker will have to be a stimulator, opportunities should be provided at the same time for the common man to evince interest in the programme and participate in it, as the goal of health education is action by the common man.

The role to be played by the health worker in this process will be somewhat different from the part he had been playing hitherto. How to *involve the people* in health programmes so that they themselves may take active interest in carrying out the programmes is in a way a new thing to be learnt by the health worker. A series of articles elucidating this concept will be incorporated in our journal.

I am sure that all our Officers will participate in this useful venture enthusiastically by periodically contributing articles based on their experiences as also news items of health interest from their area of work.

This journal replaces the quarterly "Public Health" abstracts and Reviews and the cyclostyled monthly Public Health Newsletter.

—N. Parthasarathy

EDITORIAL

The present journal expected to be the worthy successor to the Public Health abstracts and Reviews, incorporating with it the erstwhile published News letter also to serve as a Comprehensive medium of communication of scientific news, trends and field observations will it is hoped be well received by one and all alike.

The purpose of getting a journal of this kind is to make an attempt to collect valuable information from various sources, contributors and specialists on different subjects for the benefit of the readers to keep themselves abreast of latest developments.

Incidentally it is hoped that this will serve as a good source of information and reference to enable any one to organise programmes on health subjects as well as to offer help to get to know other sources which may give additional information.

As the usefulness of a journal is enhanced by the active support of the sponsors, contributors and readers, it is earnestly hoped that every one will spontaneously come forward offering their valuable assistance, guidance and criticism to make the Journal more readable and make it grow from strength to strength to reach ever widening circle of friends.

Sharing of your experiences will be of immense help for promotion of field programmes.

Comments and criticisms from you are always welcome to improve the Journal as well to sustain it.

Readers are requested to give their views on what should be the objectives of this journal.

—V. R. Srinivasan.

MINISTER FOR HEALTH
INDIA
NEW DELHI

29th January, 1962.

K. KAMARAJ
CHIEF MINISTER OF MADRAS

FORT. ST. GEORGE
MADRAS
February 7, 1962.

MESSAGE

I am happy to learn that the Public Health Directorate of Madras State has proposed to bring out a journal under the name "Madras Health", with the idea of keeping the health personnel in the State informed of the day-to-day advancement in the field of public health and will also be a guide to the personnel working in the Primary Health Centres, and District and Municipal Health Organizations. I have great pleasure in wishing the "Madras Health" all success.

D. P. Karmarkar.

The need for departmental journals to acquaint the public with details of work being done by Government in various fields has grown over since the advent of planned development. Without adequate publicity, the public is likely to take all progress achieved for granted. I heartily commend the proposal of the Public Health Department to bring out the monthly 'Madras Health'. It should certainly help all health staff serving in the State to be better equipped to serve Government and the people. I wish the journal all success.

K. Kamaraj

Lt. Col. V. SRINIVASAN
Director General of Health Services

DIRECTORATE GENERAL OF
HEALTH SERVICES,
New Delhi-2, the 1st Feb, 1962

K. SRINIVASAN, I.A.S.,
SECRETARY TO GOVERNMENT,
Education & Public Health Dept.

MADRAS

1st February, 1962.

Dear Dr. Parthasarathy,

I am very glad to learn that your Directorate is bringing out a Journal "MADRAS" HEALTH".

I wish the Journal all success.

Yours sincerely,

V. Srinivasan

I am glad to learn that the Public Health Department proposes to publish a monthly journal titled "MADRAS HEALTH" from January 1962. I trust the journal will prove very useful to all the Public Health workers and keep them informed of the various developments in the field of Public Health.

I wish the venture every success.

K. Srinivasan

145374

was an indispensable guide to the field worker in the selection of facts; it was a necessary element in any sound descriptive science."

It seems to me that our period of apprenticeship in health education is well over. We have, through pioneer work, identified a vast array of the problems in learning-teaching; we have fumbled, often successfully, with solutions to these problems. The task now is to bring together the theoretical concepts which will enable us to "anticipate solutions" and give us greater insight into "explanations" of why things turned out as they did.

Principles for group learning

I have had to make a choice of the principles which I would present here. Those I have selected are pertinent chiefly to group learning situations. Other principles may be more important than the ones I have chosen.

Two Processes in Problem-solving

The first principle is this: *In every problem-solving situation there are two major processes at work; one, a process that is concerned with the task at hand; the other a process which is independent on the dynamic impacts of personality needs, perceived threats and protective reactions of the members present.* Thus every group situation has two dimensions and it is possible to analyze separately, for working purposes, the progress of the group in terms of where the members are in each dimension. It is possible, too, for the health educator, on the basis of this analysis to predict the role he may usefully play.

The defined steps on the task-oriented dimensions from the identification and clarification of the problem to the decision making outcome are not difficult for us to see. Not so clear, however, are the steps which a group takes in the second dimension; that of resolving the feeling of its members. And it is only through this resolution of feelings, apparently, that creative energy of members is released to work on the task.

Especially helpful here has been the experimental and theoretical work of Bion (2) who postulates a frame work of three stages of movement in the group-feeling dimension. The first stage is that of dependency—in which the group looks for a leader, someone to tell them what to do, someone to give them the answers. The second stage is one of sparring, of establishing one's place in the group. Protective mechanisms of fight and escape are used by all of us during this period. And when this battle of feelings is over (it may be a battle of one second or extended over weeks), the final stage is reached which Bion calls "pairing." This is the stage in which we as members accept ourselves for what we bring to the task and accept others. It is at this stage that, freed from the needs to assert ourselves, to defend our selves, we are able to think and to share without fear.

What are the practical implications of this principle for us? Immediately we think off the staff meetings of our agency. To the educator, staff meetings are educational opportunities; they are the core of in-service growth of staff. The use and misuse of staff meetings is of vital concern to us. Again, all of us are members of working committees; committees in the Agency,

the community the nation. Sometimes we find ourselves as chairman, leader, consultant administrator or supervisors of others in various enterprises. What use do we make of this principle which states that in every problem-solving situation two major processes are at work?

First of all the principle gives us a framework within which we can make working diagnoses on two levels of movement in practically any situation. Thus we are comfortable whether we are called in at the beginning of a series of meetings or enter midstream. On the one dimension of task-orientation, we may see a group struggling to come up with methods of solving the problem before the problem is defined in a way that has the same meaning for every one; if this is the case we know what group role is needed and we participate on that basis. On the second dimension, through listening, observing the kinds and direction of interchange taking place, being sensitive to gestures and postures, it is possible to form a hypothesis that the group is still in the dependency stage and may continue that way unless help is given the chairman to see what he is doing, or methods devised to enable the members to contribute to the solution of the problem. Again, the educator has a hypothesis whose correctness he may test in terms of what happens when he suggests new approaches.

That many health councils die, that staff morale is low, that there is turnover in staff of some departments and not in others, that cooperative enterprises between divisions or between agencies fail to bear fruit, may more often be the result of our neglect of the emotional dimension in staff and committee work than of lack of logical planning. It is hardly necessary to add that when we work with persons from cultural patterns or levels in the community socially far distant from one another and possessing different values and attitudes, we are in a no-man's land until these differences in values and understanding of feeling about them are the common possession of the group. Perhaps this hypothesis concerning the two dimensions of working groups lies behind our simple maximum of "Take time; have patience; don't move until the group is ready to move."

Use of Perceptions in Planning

A second principle in education in health is this: *The perceptions of those who are to be taught furnish important data to be used in program planning.*

In a recent book by Simmons and Wolff, (3) "Social Science in Medicine," the thesis is developed that diagnosis, treatment and rehabilitation in disease must take into account the manifold ways in which the patient perceives the situations and stresses which his society and culture bring to bear on him. Medical care thus becomes more than the treatment of a disease; it implies treatment of a disease in a man who is a reacting organism in a dynamic world. Repeatedly the authors stress that it is not a given situation or crisis which produces symptoms in the patient; it is his perception of the situation and the threats which this perception hold for him.

Saunders in (4) "Cultural Differences and Medical Care" when contrasting the perceptions of Spanish-speaking Americans and Anglo-Americans with regard to concepts of "time," "change," "acceptance," "rejection," "formal organizations," etc., makes it all too evident that program planning

of any kind will lead to failure if knowledge and appreciation of existing differences in perception are not taken into account. The case studies of Spicer (5) and Paul (6), the work of Foster, (7) and Kelly (8), all these give us direct evidence that planning for other people instead of with them is a very wasteful use of professional effort.

It is not difficult to see these differences in perception and what happens when we neglect them—if two very different cultures are juxtaposed. It is quiet another thing to recognize and accept the existence of differences in perception of the people with whom we work every day. For example: there are probably no two persons here in this audience having identical perceptions of what I am trying to do this morning, yet the tendency for each of us will be to think that other persons see the situation exactly as we do. Each one of us has different meanings for the words I am using, different attitudes as to the value or worthlessness of the concepts. It is not until we share and explore our different perceptions that it is possible have a discussion which makes sense.

Thus a great need at present in health education is for studies of the perceptions of people just like us. We need, too, dozens of significant studies in perception before we will have data, which are better than hunches, to guide us in programs we are attempting in the chronic diseases, accident prevention, care of the aged, prenatal education, and fluoridation.

The older study of Schwack-hamer (9) "Choice and Change in Doctors" and Koos' (10) study of Regionville indicate the wealth that will be ours when we know what values, fears, misconceptions, reactions, are held by different groups within our social structure. Not until we have such knowledge will we be able to use other than empirical approaches in developing interagency committees, defining functions of Councils of Social Agencies, helping board members and staffs of voluntary agencies to see their goals through the same eyes, improving educational work with patients and staff in hospitals, putting new life into food service courses, arguing for flexibility in health department policies and procedures and, in truth, meeting the needs of the communities we serve.

In the meantime, lacking research data, we peck away at the problem. We obtain crude ideas of the perceptions of neighborhood groups through creating permissive climates in which the people have freedom to express their wants and feelings. The training and supervision of health education aides in Peru have prepared these aides to obtain many perceptions of needs, values, attitudes and health practices in villages that the professional health worker often fails to take into account. It is in this light of regarding perceptions as data for program planning that I interpret Biddle's (11) theories in training community leaders, Wale's (12) work in Puerto Rico, the community enterprises all over the world of the Friends Service Society, and the emphasis on community development which is part of India's long-range program. To me all these efforts stem from the principle that the perceptions of the people to be "changed" are basic to planning.

A more valid approach, but one not always available to us is that of employing a behavioral scientist to obtain data on perception for us. An example will illustrate what I mean. Public health workers in California are

concerned with the relative ineffectiveness of service and educational programs for Spanish-speaking Americans. The incidence of tuberculosis, infant and maternal death rates, occurrences of juvenile delinquency—all are high among these people. Several approaches have been tried. More physician time has been given to schools and clinic services. Nurses and sanitarians, who speak Spanish have been employed. Educational materials in Spanish have been prepared. The results have not been noteworthy.

Through the joint sponsorship of the Bureau of Health Education of the California State Department of Public Health and the University of California School of Public Health a few thousand dollars were secured from the Rosenberg Foundation for a research project under the direction of a cultural anthropologist. A community served by a county health department which had better success than many in serving Spanish-speaking people was selected for the study. In a few months time the findings opened up hitherto unknown facts about the group. Factions within the group were shown to exist; power figures discovered; many unknown autonomous subgroups brought to light; attitudes toward health practices and medical care described; channels for obtaining information pinpointed; some of the value systems uncovered. It is now possible for the Health department staff to begin a training program for themselves to figure out how each staff member will need to adapt his work or change his methods of teaching.

One final illustration of the importance of "perceptions held" for program planning is found in the problem now confronting those of us from North Carolina and California who are starting our training programs in health education on Indian reservations. How can we glean from the voluminous anthropological studies the understandings we must have? How, over the barrier of language differences, can we secure the perceptions of health practices as the Indian sees them? How can the urge to bring to the Navajo what we know is good for him be kept under control until we learn what the Navajo sees as being good for him?

Is it this second principle we have in mind when we say, "Start where people are?"

During the past two years I have grown weary with my own attempts to emphasize the various factors conducive to bringing about "change." From many angles, we have looked at "motivation," the psychological nature of "participation," the building of "new frames of reference through discussion-decision techniques." But when these factors are treated in isolation the relationship between them is not seen. It has been a heart-breaking experience in working with students to have spent hours in the laboratory on problems in which the participatory experience has been exciting and productive, only to have a student ask "Now when are we going to learn something about motivation?"

Planning Process Has Changed Potential

Thus through dissatisfaction with this type of piece-meal psychological analysis of how learning or "change" takes place, and the inadequacy of this approach for practitioners in health education, I have come to a very simple principle which for many months I have been consciously testing.

It is this: "*The planning process itself is an educational method which has the potentialities for stressing the major psychological factors which bring about 'change'.*" This is my third principle.

If it is a valid principle it may serve also as a criterion to be used by health education workers in answering the question: "To which activities should I devote a major portion of my time?"

Let us look at the planning process for a moment. It is called into play in problem-solving situations. Thus the principle of working in the two dimensions of task-orientation and feeling is consistent. Since different people are involved in planning, the principle pertinent to securing the understanding of perceptions held is present. But also inherent in the planning process is a galaxy of psychological factors, each of which has been tested as to its efficacy in the learning process. We say that there must be *motivation*. If we believe, with Allport (13), that motivation to activity is aroused in the organism's effort to reduce tensions of one kind or another, does this definition of motivation hold in the planning process? I believe it does: I believe that planning is a tension-reducing process; and that as such it serves as a motivating situation whether it be planning the production of a pamphlet or planning a state-wide institute on prematurity.

It has been interesting during the past year to note this phenomenon of reduction of tension in work committees made up of graduate students. Great variability exists among students in their tolerance for the "uncertainty" present in democratic planning procedures; great variability, therefore, in their perceptions of the time necessary to work through the interpersonal tensions which are part of the planning. But whatever may be the personality needs students bring to the planning meetings, the underlying tension to be resolved is that of producing a plan which meets their stated or unstated criteria of success. The relief from tension when the task of planning is finished appears to be comparable to the satisfaction of a fine dinner after great hunger.

Each planning situation, too, appears to offer the possibilities for inducing "change" found in the classical studies of Kurt Lewin (14) and his students.

For here in planning sessions both small and large groups become ego-involved and group-goal-involved. Members develop goals and methods to reach their goals. They become a small temporary unit in society with a frame of reference peculiarly theirs. They become peers; they can, without fear, listen to, test, accept new ideas and attitudes. They set their own rate of "change". They develop common perceptions related to the task at hand.

This principle that the planning process is a major educational method is used by all those who have planned national and international seminars. That it is not accepted by all health workers, however, is evident. Especially so is this lack of acceptance seen in the kinds of courses and curricula in the health field that have become stereotyped. I have in mind the extension courses and summer courses in health education for teachers; the prenatal and infant care courses for mothers; the courses for food service workers;

the programs with P. T. A. and other agencies. We become so fascinated in getting a captive audience which will listen to what we think they should know that we forget entirely the answers to the question "How do people learn; how do they change?" We have forgotten Deering's (15) wise words "We do not easily give up something which we have helped to plan."

Community Organization is Complex Process.

A fourth principle is concerned with community organization. It may be stated something like this:

Bringing people together to work on problems (often called community organization) is a complex process involving: (1) analysis of the validity of the objectives for the group; (2) relation of objectives to the various levels and kinds of power structure in the community, and; (3) the concepts of leadership held by professional workers.

There is probably no one here who at some time or other has not questioned the validity of the formal and informal community groups whose obvious objectives are concerned with some phase of health services or practices. We have participated in health committees of the Council of Social Welfare, neighborhood health councils, school health committees or health education committees of the voluntary health agencies. We may have been instrumental in helping in the birth of a new health committee. Often these have been frustrating experiences—monthly luncheon meetings with one group; exciting weekly meetings with another which grew into less and less exciting sessions until finally it was a "chore" to attend; school health councils that started with such fine objectives and deteriorated into "program" sessions; time spent in so many meetings with so few results.

We health workers have been at fault. Our colleagues in the welfare and education fields have been equally culpable. We have been ignorant of the existence or feared the 40 decision-makers of Floyd Hunters' (16) community. Yet in our councils composed largely of professional workers we have broken our hearts over problems whose solution lay in their hands. We have huddled together in the safety of our common convictions and failed to think of the many ways in which these 40 men and women might become involved in the "change" process.

But other levels and kinds of power exist in a community which are related to other problems. Surely the power structure in a community which can decide whether a new factory shall be introduced is not the power structure which will have the final decisions as to whether a multiphasic screening program shall be started, whether fluoridation shall be voted in, or that mothers shall, from their own convictions, decide to have a prenatal examination before the fourth month of pregnancy. Who are the gatekeepers, the opinion-makers, the decision-makers, in these situations? And shall the leadership be tightly held by the health officer, the health educator, or the executive secretary and staff of the Welfare Council for each and every type of health concern? Moreover, how do the concepts of leadership held by these professionals affect the groups with which they are associated? Is then the term "community organization" misleading? May it be detrimental to the development of the many different kinds of working groups needed in the community? The answers to all these questions will be found only after

a sober analysis of the meaning of this principle as it applies to a particular community at a given point in time.

Social Distance is Significant Factor.

Hydrick (17) in his work in Java in the early 1920s was one of the first workers in health to make practical application of the fifth principle, namely: *The social distance between the educator and the group taught is a significant factor in education.* This principle was incorporated into the Cincinnati Unit Plan of 1919 and in the early health education demonstrations in New York City. Of late years, however, it seems to hold less importance for us. That it is sound psychologically, I have no doubt, though there are certain unique situations in which it should be tested.

The many studies in social stratification have intrigued me as a health education practitioner. I ask myself, "What do these findings about class structure, social mobility, and social status hold for me?" By themselves they mean little but when, accepting the data, I bring into play the dynamics of the psychology of learning by individuals, and the dynamics of group interaction new perspectives are opened up. Descriptive data suddenly become data to be used in program planning.

How much simpler it becomes to explain the meager results of health campaigns and the wastefulness in propaganda distributions, to account for the rejection by a community of health measures which they themselves have said they wanted. And light dawns as to the real nature of the barriers which so often are raised in community, state and nation by groups fearful of social mobility. Surely no country has more communication problems because of social distance than we, made up as we are of peoples from all over the earth and each of these people with its own class and status hierarchies.

To me unanswered at this time are questions like these: "For what types of problems is sanction or approval by status persons a necessity? In which of our subculture patterns is status important in sanctions for 'change'? How can we prepare leaders selected from a defined social class without creating social distance between the newly trained leader and the group from which he came?"

We need, however, to ask similar questions in work closer to home. Do we need, in official and voluntary health agencies, to find, train and employ "change-agents" who are closer to the understandings and value patterns of the groups needing help? In building and maintaining our own professional status is it possible that we have forgotten why we are in the health field?

The incorporation of volunteers into the school and clinic programs is one of our few concessions to the principle of social distance. Yet here again the objectives of using volunteers, their selection, training, and the kinds of work they are given to do creates a confused picture. And when one sees the use of Junior League members in clinics in an underprivileged district one wonders if the over-all objective was the "education" of the Junior Leaguer or hoped-for "change" in the mothers attending the conferences. The social distance between worker and client in this case does appear to be somewhat exaggerated.

The community education work in Puerto Rico, Japan, and India appears to be trying to reduce the social distance between worker and the community as part of a planned effort to bring about "change." Yet those of you who have seen the Ford Foundation film, "Life in the Village," must have wondered, as I did, if the social distance factor is still not a formidable barrier. Hydrick's selection of health visitors in Peru with whom I talked seemed to be much closer socially to the people with whom they worked.

Evaluation Helps Change

The last principle is one that never seems to fail if it is used intelligently with full recognition of the other principles I have presented. It is a principle upon which I fall back when all else seems to fail in bringing about "change." It is this; *Evaluation of educational programs and methods by staff provides a supporting structure for introducing changes in content and methods.*

We talk about evaluation in health education *ad infinitum*. No program planning is complete without at least lip service to its importance. I suspect however, that we practitioners are doing a bit better than formerly in stopping at various steps in our programs to ask "How well did we do?" But evaluation as a practical reality in health administration is not easy to do. The staff is a working staff; there are services to be rendered. The concept of evaluation is foreign to many lay board members and the public in general. A perception of professional people expressed frequently by citizens is that the professional man is trained and knows his job. The realization that the job could be better done arises only when either incident or crisis reveals gaps.

Yet for attacking stubborn quarter-century or half-century-old practices which are ineffective, wasteful of money and professional time; for helping administrators to perceive health education as something more than information giving; in difficult situations like these, shared experience of evaluating the educational program of the agency may be the only way that status persons (administrators, supervisors and board members) can become receptive to the data they need to understand how people change.

In this joint endeavor, health educators need to bring to the staff the best resources the community and state has in health education or an allied field. For the evaluation, to be effective, will not belabor the statistics of mailing list, pamphlets distributed, motion picture audiences and speeches given. It will be concerned about the changes in knowledge, attitudes and behavior that have taken place because of these educational exposures. Perhaps, if no additional funds are available, a very small section of a city might be polled by health department staff and trained volunteers to ascertain if any of the objectives of the educational program (safety education, obesity prevention, cancer control) have been reached. In this way the staff gets its own insights into the "facts of life" about the learning process and becomes the first to wish for changes in methods.

A very wise health officer in one of the district offices on the Navajo reservation made his own personal evaluation of the educational methods staff had been using. "It is funny," he said, "we have been showing movies and giving talks on sanitation every night for the past six months but I don't think I could put my finger on a single thing that is different because

we have done all this work. The Indians look and they listen—but I wonder if they *really* look and listen. There must be other ways of doing education." When his staff is able to join him in as simple an evaluation as this—other ways will be forthcoming.

Another effective use of informal evaluation methods has been used by a health department staff near our school. At the request of the health education staff each division director drew up a list of the most important tasks on which the division wanted help from the educational division. The discussion of this vast array of services became the subject matter of weekly staff meetings for two months. Criteria were developed for choosing the services to which the health education staff should give priority. Through these staff meetings not only was created a realistic health education program for a large department but also were laid the basic corner stones of sound education principles such as I have presented.

Through evaluation techniques of one kind or another we may some day, in the not too distant future, put an end to a fragmentation of learning about health that now besets many communities. I refer to the three or four week health campaigns and to the health days and health weeks in which some health educators still are expected to participate. Fund raising and change in behavior are two entirely different objectives. Often the same educational methods are used for both. Evaluation studies may bring out this difference.

What have I tried to say? It is this. There are many principles based on theory which we are testing daily in our educational work. Some of these principles or hypotheses stand up better under testing than others; further work will lead possibly to their revision. At the moment the six principles I selected for this presentation are bases for considerable creative experimental work in the field. There are others equally stimulating but I shall leave those for another day and another speaker.

References

1. Malinowski, Bronislaw, "A Scientific Theory of Culture and Other Essays." University of North Carolina Press, Chapel Hill, 1944.
2. Bion, W. R., *Experience in Groups*, I-VI. Human Relations, 1948-1950.
3. Simmons, L. W., and Wolff, H. G., "Social Science in Medicine" Russell Sage Foundation, New York, 1954.
4. Saunders, Lyle, "Cultural Difference and Medical Care," Russell Sage Foundation, New York, 1954.
5. Spicer, Edward H., "Human Problems in Technological Change," Russell Sage Foundation, New York, 1952.
6. Paul, Benjamin D., "Health, Culture and Community," Russell Sage Foundation, New York, 1955.

7. Foster, George M., *International Report: Changing Health Concepts in Latin America*, Health Education Journal, Vol. XI, No. 2, April 1953, Central Council for Health Education Tavistock House Tavistock Square, London, W. C. 1.
8. Kelly, Isabel, "The Bienstar Social Rural Program with Special Reference to the Pilot Project in Villa Jose Cardel, Vera Cruz, Mexico." Institute of Inter-American Affairs, 1954 (Mimeo)
9. Schwackhamer, Gladys, "Choice and Change in Doctors."
10. Koos, E. L., "The Health of Regionville," Columbia University Press, New York, 1954.
11. Biddle, W. W. "The Cultivation of Community Leaders," Harper and Bros., New York, 1953.
12. Connell, C. F., Wale, F. G., and Withey, S. B. (Editors) *Community Change: an action program in Puerto Rico*. Jr. of Soc. Issues, 1953, Vol. 9, No. 2.
13. Allport, Gordon W., "Becoming," Yale University Press, New Haven, 1955.
14. Lewin, K., "Field Theory in Social Science," Harper, New York, 1951.
15. Deering, Irah, "Let's Try Thinking," Antioch Press, Yellow Spring, Ohio, 1942.
16. Hunter, F., "Community Power Structure," The University of North Carolina Press, Chapel Hill, 1953.
17. Hydrick, J. L., "Intensive Rural Hygiene Work and Public Health Education of the Public Health Service of Netherlands India," Rockefeller Foundation, New York City.
18. Bendix, Reinhard and Lipset, S. M., "Class, Status and Power," The Free Press, Glencoe, Illinois, 1953.

Implementing R. C. A. Experiences in Rural Extension Training Centre Syllabi

A seminar on incorporating Research-cum-Action Project experiences of Rural Latrine programme in the syllabus for Rural Extension Training Centres was conducted at Poonamallee on 11-10-61. The Assistant Development Commissioner (Training), the Principals and Chief Instructors in Home Science from the seven R.E.T.Cs in the State participated in the seminar along with R.C.A. personnel.

The Administrative Officer, Research-cum-Action Project welcomed the gathering and introduced the staff members of the Project and Orientation Training Centre and the Assistant Director of Public Health (Health Education Bureau) to the Community Development personnel who in turn introduced themselves to those present. The Administrative Officer then gave a short account of the working of the R.C.A. Project and the Orientation Training Centre from their inception.

The Social Scientist gave a brief account of the functioning of the project with special reference to her role in the project. After giving the required background the discussion then centred round as to the type of training that should be given to the Community Development Workers for carrying out an effective rural sanitation programme on R.C.A. Project lines. The Public Health Sanitary Engineer explained the Engineering aspects of the Project. The improved type of sanitary latrine was then demonstrated and the structural features of the latrine were discussed in detail by the group.

The Health Educator discussed the Methodology for educating village people on the safe disposal of human excreta.

Ways and means for implementing R.C.A. experiences in the R.E.T.C. syllabi were discussed.

During the last half hour of the discussion, the Assistant Development Commissioner recorded the suggestions the participants as follows:—

1. The staff of the R.C.A.P should visit each Rural Extension Training Centre for atleast a week and help in evolving an effective action program for villages around the Centres.
2. Consider facilities required for the Centre in implementing this programme.
3. Help that can be rendered by the Health Educators and Public Health Engineers in Thanjavur and Madurai Districts in teaching the syllabus and organizing practical work.
4. How to co-ordinate Health Inspectors of all Primary Health Centres. They should be trained in the Orientation Training Centre with two years.
5. How to extend the same type of help to other centres. That the centres in Thanjavur and Madurai Districts will receive help and guidance through the Health Educators and Public Health Engineers.
6. Methods and steps to be taken to involve school staff in the surrounding villages in these programmes.

Analysis of Common Food Stuffs Taken in Madras State

By Miss. KASTHURI

Chemical Asst. Nutrition Laboratory Office of D.P.H. - Madras.

Problem of malnutrition.

The knowledge of nutrition is very essential because the health of an individual and the nation partly depends upon the good nutrition supplied by the diet they take. It is well known that the diet taken by many in India is extremely ill balanced and the deficiency varies from Province to Province. For example many in South India take a diet which has abundant supply of carbohydrates but lacking in protein, some vitamins and some minerals like Iron. Poor people suffer because they do not get sufficient food and the rich suffer by excesses and faulty food habits. *Malnutrition in India is mainly due to bad cooking practices and inadequate knowledge about good nutrition.*

Educating people on nutrition.

An effective remedy for the problem of mal-nutrition is an educational programme which will teach the public what to eat and what not to eat. They should also be taught to use more effectively the simple foods without losing, their nutrient value. The Nutrition research Institutes and Laboratories in South India** have taken great pains to find out the nutritive value of different kinds of food stuffs available in South India and bring them to the notice of the people.

Work in the Nutrition Laboratory:

Our present Knowledge of what constitutes an adequate diet is based on an enormous amount of research work done on animals in the Laboratory and observations made on human beings. By repeated experiments it has been established that diseases are not always due to germs but due to lack of some of the nutrients in the diet. The Nutrition Laboratory attached to the Public Health Department in Madras State is engaged in finding out the nutritive value of common foods taken daily.

Nutrient value of iddly:

In South India 'Rice' is a common food article for many people. It is a cheap and energy yielding food. The usual procedure to find out nutrient values of a particular food is to prepare the dish in the Laboratory itself for analysis and compare the results with food articles prepared in hotels or other food preparing sources. The preparation of Rice Iddly is as follows:

Ingredients:

Parboiled Rice - 2 ollocks (420 gms) Black gram dhal - 3/4 ollocks (135 gms) Salt - 1 teaspoon. Total number of iddlies made - 24.

Method: Soak the rice and the Black gram dhal separately in water for a few hours. Then wash and grind Black gram well into a smooth paste

** 1. Nutrition Research Laboratory - Hyderabad Deccan
2. Central Food Technological Research Institute, Mysore.
3. Nutrition Laboratory, Office of the D. P. H., Madras

adding about 2 ollocks of water while grinding. After that, grind rice separately to a slightly coarse paste and add to the smooth Black gram paste and mix thoroughly. Add sufficient salt while mixing. Then leave the mixture overnight and make iddies after the flour has fermented well by rising in level, to make the flour soft and porous. Cooking soda is added and fermentation is not done. Fermentation helps in getting yeast value. So addition of soda is not recommended.

NUTRIENTS IN RICE IDDLY

Rice Iddly contains the following nutrients.

Moisture	...	71.75%
Protein	...	3.0%
Fat	...	0.048%
Carbohydrate	...	22.92%
Minerals	...	1.43%
Caicium	...	0.024%
Phosphorus	...	0.072%
Iron	...	5.0%
Calories	...	107

Roasted Bengal gram chutney or sambar used while taking iddies are good source of supplements in proteins.

Preparation of Roasted Bengal gram chutney

Ingredients: Roasted Bengal gram	1	ollock	or	95	gms.
Green chillies:	4		or	30	gms.
Coconut	$\frac{1}{2}$	shell	or	20	gms.

For seasoning:

Black gram dhal and mustard (1 teaspoon)

Recipe:

First, pick and clean the roasted Bengal gram. Then grind it to paste. After that add $1\frac{1}{2}$ teaspoon of salt to taste and finally add the seasonings to it and serve with Iddly.

Nutrients:

Moisture	—	67%
Protein	—	22.23%
Fat	—	0.83%
Mineral	—	8.3%
Fibre	—	3.6%
Calcium	—	0.04%
Phosphorus	—	0.205%
Iron	—	13.36%
Carbohydrate	—	0.65%
Calories	—	360

Exhibitions—A Light Study

By

G. KITTU RAO B.SC. L.C. & S.E.

Technical Officer, Health

Education Bureau

In recent times exhibitions are considered one of the effective visual education media for mass communication. In the initial stages a few implements and some educative charts form the main contents, costing only a few Rupees. But the techniques have undergone many changes and the exhibitions now occupy hundreds of square feet costing thousands of Rupees. Let us now discuss the main items of a modern exhibition.

Planning

A success or failure of an exhibition mostly depends on a planning and lay out. The planning must be such that it brings out something new, dynamic and attractive. The planning has to be done by a group of men who are conversent with exhibitions and those who actually take part.

Outer Shell

The outer shell is important, because that is the first attraction for the visitor to enter into the pavilion. If it is not attractive, it may fail to catch the eyes of the visitor and he may not like to go inside. Thus this may defeat the very purpose of the setting up of the exhibition. The outer shell should protect the valuable exhibits from the inclemencies of the weather and should be strong in structure. It should also be designed in such a way so as to afford proper moving space to facilitate visitors to move freely and see the exhibits without strain. Besides it must be very attractive, and at the same time one should guard himself that he does not consume the major part of the budget. It is also necessary that much time should not be taken in the construction of the pavilion, otherwise there will be very little time at their disposal for setting up the exhibition.

MODE OF DISPLAY

The most important aspect in an exhibition is the type of exhibits and the mode of display which have a direct bearing and leave a long standing impression on the visitors. Instead of overloading exhibits on different subjects, we should decide on the theme of the exhibits. All the exhibits should conform to this theme. Display does not mean that we make a model and put a board to state what that model is. A good display is one which will speak itself what it is. Of late the tendency is to give much emphasis on statistics and departmental activities. It has to be borne in mind that the average spectator is not a departmental man. Most of our countrymen are uneducated. Therefore all the information has to be communicated to them through the exhibits, where the knowledge of any language is not required.

Type of Exhibits

The type of exhibits depend on the proper selection of materials for presentation. The size of the exhibits must bear a proportion to the size of the pavilion or the compartments in the pavilion. They must be artistically designed so as to bring out the message in a manner easily understandable by the visiting public. Proper colour combinations must also be worked out for the exhibits with reference to the background. As emphasised before,

all the charts and written matter should be avoided. In exhibits people walk around. They have no time to read. Exhibits are meant to be seen and not to be read. Blown up photographs to the size of six to ten feet will be more life like and certainly be impressive than the hand written charts and paintings. Age old gallery display at times is rather monotonous. Instead a combination of several types of display like wall cut outs, special bases for certain exhibits, display stands and independent huge exhibits will certainly go a long way in the improvement of the display. Animation creates interest. Working models are interesting and lively. The technique of display needs a lot of improvement through research so that it may succeed in providing optimum results.

National Institute

A seminar on the role of exhibition was held in the City recently. It was decided to set up at New Delhi the Institute of Exhibition and display by the Bharat Krishak Samaj. The Institute will not only carry on research work for improving the techniques of the production of display material, but also on work relating to the other aspects of the science of exhibition. The Institute will also organise discussion and seminars on the subjects connected with exhibition and provide short courses of training to nominees of various Government departments business firms and others who participate in the exhibition.

Analytical Study

In a recent study of the health exhibition conducted by the Research-cum-Action team, the results showed that when life size, functioning exhibits were shown with people at hand to give required explanation, not only did the exhibits draw the attention of a large number of visitors, but it also helped to develop their interest in the exhibits. Not only did the people get interested in the exhibits, they also supported the ideas for which the exhibits stood.

A similar study can be made of any exhibition, under the following lines :

1. Composition and nature of people who saw the exhibition.
 - (i) By place of residence.
 - (ii) By literacy.
 - (iii) By age.
 - (iv) By income.
 - (v) By Occupation.
2. What people saw in the exhibition?
3. Exhibits which interested the people most.
4. Reasons for interest in the exhibition.
5. Exhibits considered to be most useful.
6. Visitors interest in using recommended practice of exhibits they considered more useful.
7. Knowledge gained by people from the exhibition.
8. Time taken by visitors to go round the stall.

When an exhibition is organised in your place next time, please prepare a study report and send it to us. We shall publish them in this journal and incidentally this will also help us in the preparation of materials.

The Nutrition Stall in the National Agriculture Fair, Madras 1962

The stall allotted to the Public Health Department in the National Agriculture Fair, Madras consists of exhibits pertaining to (a) the part played by Nutrition in the wellbeing of expectant mothers and children, its bearing on foetal growth and skeletal growth (b) the advantages of hand pound rice over milled rice and (c) balanced diet for different groups and conserving nutrients in food.

A. Nutrition and its bearing on Maternal and Child Health.

Models explaining the significance of including nutrient foods in the diet of expectant mothers are found arranged here.



Sri M. Bakthavatsalam, Minister for Home affairs, Madras
visiting the Nutrition Stall in the N. A. Fair.

These models of mothers have been prepared with a view to explaining the public the different stages of pregnancy and the importance of including nutritious foods in the diet of expectant mothers during the different stages of pregnancy. Nutritious foods in plates are found placed before the models of mothers so as the public can see for themselves the variety of foods expectant mother must take daily for the health of both herself and the foetus.

That the lack of Nutritious foods in the diet of expectant mother gives rise to disorders in the wellbeing of the mother and leads to abnormalities in the development of foetus is explained here with the help of some models and

charts. In mothers, inadequate food gives rise to anaemia, loss of fertility, abortion, premature births, prolonged labour and still births. Regarding foetus and child, underweight babies and susceptibility to disorders are the features of undernutrition.

Growth of foetus

The different stages of growth the foetus will have to go through are depicted in the second array of models. Here an attempt has been made to present the various stages of growth of the foetus in the mother's womb i.e. from a minute speck to a big size baby and the part played by nutrients in the process of growth.



Models and charts explaining the importance of general nutrition.

Skeletal growth; Skeletons of a child, a boy, and an adult are found placed side by side. The fact calcium helps build bones is impressed on the visitors with the help of these exhibits. Calcium rich foods like milk and some greens (Rich in Calcium) are placed by the side of the skeletons such that, at least this idea i.e. calcium rich foods are important for the growth and strength of the bones can be retained by the visitors.

Hand Pound Rice

Located in the centre, between two lengthy sections of exhibits is the section where advantages of hand pound rice are explained and identification with the help of some chemical tests are being attempted. By using hand pound rice instead of milled rice we get 10% saving of grains besides retaining valuable nutrients especially Vitamin B1. Broken grains are almost nil. Another thing attracting your attention in this section is a big size wooden model of a paddy grain. Open up the husks (which are provided with hinges) and what you see inside is a hand pound rice intact with the germ and outerlayer. Remove the layer of the rice and see the milled rice, without the germ and without its nutritious layer but of course with its polished white surface!

C. Balanced Diet for different groups.

In the third part of our stall, charts and diagrams explaining balanced diet for different groups are found arranged. You find some Rats kept in cages. These animals are used for experiments to study the effect of balanced diet and other diet. Those that receive a balanced diet are sturdier and more vigorous and healthy than the other set which do not get the balanced diet. The caloric and nutritional requirements vary from person to person according to the group he or she belongs. For instance pregnant mothers and growing children require a more nutritious diet than others. Labourers need more calorie yielding foods than say office assistants and other such persons.



Exhibits on Balanced Diet.

Home Management: The adjacent part in this section helps explain the number of ways to conserve the nutrients in foodstuffs during the process of cooking. Here an attempt is made to depict how we can get more value for the money we spend on food and how to improve our nutrition at no extra cost. The following methods to conserve the nutrients in foodstuffs during the process of cooking are demonstrated here.

Earthen vessels are hygienic.

Cut the vegetables in big slices and add them gradually in the boiling water (Minimum amount of water) in a closed cooker.

Avoid using baking soda.

The water in which the food stuffs are cooked contains rich mineral salts and vitamin B and C and so it should not be wasted after cooking. It can be used with the advantage in soups and sauces and other culinary.

Over cooking should be avoided.

Epidemic Report.

The incidence of Cholera, Smallpox and plague in the state, during the week ending 3 - 2 - 62 is as follows:—

Name of the District	Week ending 3 - 2 - 1962						From week ending 6 - 1 - 62 to the week ending 27 - 1 - 62.					
	Cholera		Smallpox		Plague		Cholera		Smallpox		Plague	
	Attacks	Deaths	Attacks	Deaths	Attacks	Deaths	Attacks	Deaths	Attacks	Deaths	Attacks	Deaths
Chingleput :			...	1					5	...		
South Arcot :			12	1					31	5		
Tiruchirapalli :			28	11					19	9		
Thanjavur :			9	6					38	12		
Madurai :			40	11					50	11		
Ramanathapuram :			...	1					41	9		
Tirunelveli :			23	4					51	27		
North Arcot :			2	1					40	20		
Salem :			...	...					42	15		
Coimbatore :			52	12					40	15		
The Nilgiris :			...	...					...	...		
Kanyakumari :			10	3					46	29		
Madras City :			78	14					186	34		
Total :			254	65					589	186		

CHOLERA : During the week under review the State including Madras city was free from Cholera infection.

SMALLPOX : Sporadic cases of smallpox were reported from a few districts. The Districts of Salem and the Nilgiris were free from infection. Special instructions have been issued to all the Health Officers to intensify the control measures and to see that the infection is brought under control. Madras city reported 78 Attacks and 14 deaths as against 60 attacks and 14 Deaths reported during the previous week.

PLAGUE: During the week under review the State was free from Plague :

Activities of Part Time T. B. Clinic, Poonamallee .

In the part-time Tuberculosis clinic functioning at the Health Unit, Poonamallee, 162 cases attended the clinics conducted during the month of January, 1962.

The particulars of Tuberculosis cases according to the extent of the disease are as follows :—

Minimal	...	54
Moderately advanced	...	80
Far advanced	...	124
Glandular	...	4
		<u>262</u>

According to Age Group :

0-5 years	...	14
6-14 „	...	19
15-24 „	...	66
25-34 „	...	83
35-44 „	...	47
45 & above	...	33
		<u>262</u>

According to sex :

Males	...	154
Females	...	108
		<u>262</u>

Out of the 60 sputum examinations carried out during the month of January, 1962, 4 proved positives. 40 x-ray pictures were also taken during the period under report.

Contacts particulars :

	Adults Old & New	Children under 16 years Old & New	Total Old & New
	354	389	743
Examined so far }	320	352	672

According to sex :

Males	...	421
Females	...	322
		<u>743</u>

According to age group :

0-5 years	...	160
6-14 "	...	229
15-24 "	...	70
25-34 "	...	126
35-44 "	...	96
45 and above	...	62
		<u>743</u>

During the month of January, 1962, 150 persons were mass x-rayed. Out of the 20 suspected cases detected 8 proved negative and 12 cases are awaiting examination.

P. P. D. test particulars :

Number of tests conducted during January, 1962.	Nagatives	Positive	BCG Vaccinated Nagatives
20	8	12	8

Material Section of the Health Education Bureau

A brief synopsis of some of the films available from the Health Education Bureau, Office of the D.P.H., 81, Mount Road, Madras-6.

1. **Title: Infant care.** (10 minutes) English, Tamil 16 m.m. Sound.

This short film in cartoon and colour depicts the need for nutritious food expecting woman should take and also the different stages of a baby's life and the need for proper and regular feeding.

2. **Title: —Arrest Leprosy.** (10 minutes) Tamil 16 m.m. Sound

This documentary shows that with modern drugs and suitable precautions leprosy is curable and preventable. Emphasising the need for revising our social outlook towards these sufferers, the film dramatises the struggle of two patients with the disease. Instead of treating a patient as an outcast and subjecting him to humiliations, a way to ameliorate his condition is shown.

- *3. **Title: —Food for Health.** (20 minutes) Tamil 16 m.m. Sound.

This short film gives an interesting account of the various types of food, their nutritive values and usefulness of a balanced diet.

4. **Title: —Your Baby.** (20 minutes) Tamil 16 m.m. Sound.

Practical suggestions for Baby care are given in this film. A useful guide for mothers giving them practical hints for pre-natal care. The film emphasises the need for both parents to share in the care and upbringing of the child.

NOTE :

1. All categories of films are for hire.
2. The hire charges per reel of film, per week are Rs. 2/.
3. Packing, transportation and incidental charges are extra.
4. Indents must be placed at least two weeks in advance.
5. The period of requirement may be stated.
6. The particulars of the nearest Railway Station must be furnished in Block Letters.

* Film bearing the title 'Food for Health' will be available free of hire charge.

MADRAS HEALTH

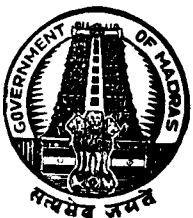
HEALTH REVIEW MONTHLY

Vol. I]

FEBRUARY 1962

[No. 2

W. H. O. SMALLPOX SEMINAR SPECIAL NUMBER



With the best Compliments from :—

Madras State Health Education Bureau, Office of the
Director of Public Health, 81, Mount Road, Madras-6.

ISSUED BY THE DIRECTOR OF PUBLIC HEALTH, MADRAS.

CONTENTS

1. **Editorial**
2. **W. H. O. Inter-Regional Seminar on Smallpox**
3. **Smallpox in Madras State**
By The Director of Public Health, Madras.
4. **Clinical aspects of Smallpox**
By Dr. A. Ramachandra Rao, Superintendent, Infectious Diseases Hospital, Tondiarpet, Madras.
5. **Diagnosis and differential diagnosis of Smallpox** ,,
6. **Epidemiology and control of Smallpox** ,,
7. **Vaccination - Factors influencing people's acceptance**
Research Cum Action Project.

Cover Photo:- The secretary, E & P.H. department and the Director of Public Health with the delegates to the seminar

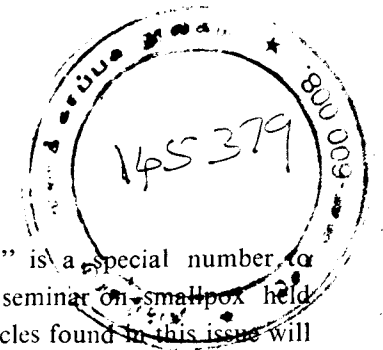
EDITORIAL

The second issue of "MADRAS HEALTH" is a special number to mark the occasion of the W.H.O. Inter-regional seminar on smallpox held in the City during February. The papers and articles found in this issue will it is hoped be found very valuable to all health workers, especially to those of our personnel who will be participating in the State wide Smallpox Eradication Programme due to be launched shortly.

Dr. Ramachandra Rao, Superintendent, Infectious Diseases Hospital, Tondiarpet, with his extensive experience of having seen 20,000 cases in Infectious Diseases Hospital, Tondiarpet and conducting researches with International Professors is a big resource in the field in our State. Lectures delivered by him during the seminar will undoubtedly facilitate us to understand the varying facets of this problem in their proper perspective. Clear elucidation of facts for diagnosis and management of cases of smallpox will be particularly useful to workers in the mofussil.

We are much obliged to Dr. Ramachandra Rao for his generous permission to incorporate his lectures in this publication.

Messrs. G. K. Vale & Co., Messrs. Klein & Peyrl and Messrs. Kubera Press deserve special mention for their invaluable assistance in bringing out this special number in its glowing colours.



W. H. O. Inter-Regional Seminar on Smallpox

Dr. Zahra's welcome :

The W.H.O. Inter-Regional Seminar on Smallpox was inaugurated at the Madras Medical College Common Hall at 10-30 a.m. on the 16th February by Dr. P. V. Cherian, the Chairman, Madras Legislative Council, with Dr. Zahra, the Regional Adviser on Communicable Diseases, South East Asia Regional Office, W.H.O. in the Chair. The function was attended by a large number of Medical dignitaries in the City. After welcoming the delegates and guests and explaining the efforts being made by the World Health Organisation in eradicating the disease of smallpox from the various countries, Dr. Zahra spoke about the purpose of the Seminar. The countries of the West Pacific Region are almost free from smallpox for several years and there is every possibility, at any time of infection accidentally getting imported into those countries due to rapid travel facilities and hence they felt those officers who are directly concerned with ports and quarantine stations should know how to diagnose cases of smallpox both clinically as well as with laboratory aids. And this was the reason for arranging this Seminar. He thanked the Government of India and the State of Madras and the Corporation of Madras for their permission to hold the Seminar here in Madras and for all the arrangements they have made for holding the Seminar.

Inauguration by Dr. Cherian :

Dr. Cherian, inaugurating the Seminar, spoke about the problem of Smallpox in the City and the various factors responsible for the continued prevalence of the disease, and the peculiar difficulties we face in tackling the problem. He stressed on the role a general practitioner has to play in the eradication of the disease and appealed to the Medical profession to co-operate with the authorities in the campaign. He was very happy that the Hospital has become a Research Centre for smallpox.

Health Secretary's opinion :

Speaking next, Sri Srinivasan, the Secretary to the Government of Madras Education and Public Health Department, posed two questions. Firstly, why smallpox is still prevalent even in those areas where nearly 80% of the population was protected during the recent Eradication Campaign in the Pilot Projects? Secondly, has this vaccination to be repeated periodically to prevent further flare up in spite of the mass vaccination in this three years' eradication programme?

The Director of Public Health :

The Director of Public Health to the Government of Madras, Dr. N. Parthasarathy next spoke on "the problem of Smallpox in the Madras State". He explained the trend of the disease during the last few decades and said the disease is definitely on the decline. He next dwelt with some details of the pilot project's work done by the Government and explained the various difficulties faced by the staff on the field.

Health Officer of the Corporation :

Dr. B. V. Sundarababu, the Health Officer, Corporation of Madras, next speaking, explained the situation of smallpox in the City and the various measures being taken by the Corporation of Madras to control the disease and he also spoke about the failings and the various difficulties encountered on the field. He hinted that for the conditions existing in the country perhaps freeze-dried lymph may be more suitable than the glyserolated lymph, which we are using. He also referred to the work done at the Infectious Diseases Hospital in the recent years and the World Health Organisation sanctioned projects for the current year.

Many of the delegates have not seen a case of smallpox :

Dr. Huggins, the Regional Adviser for Communicable Diseases for the West Pacific Regional Office of the World Health Organization, Manila, replying to the welcome by the Chairman, stated that many of the participants have not even seen a single case of Smallpox and he then thanked the Central and State Governments and the Corporation of Madras for their willingness to have the Seminar here in the City and they are looking forward to a good week's programme.

Proposing a vote of thanks, the Director, King Institute, Guindy, Dr. Govindarajan, thanked the Chairman, Dr. Zahra, Dr. Cherian, and all the delegates who graced the occasion. Replying on behalf of the delegates from the foreign countries, Dr. Redshaw, the Assistant Director General of Health Services, Commonwealth Government of Australia, thanked the W.P.R.O., W.H.O. and the Government of India and the State of Madras and the Corporation of Madras for the arrangements they have made for the Seminar.

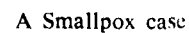
SCIENTIFIC SESSIONS

The regular scientific sessions started in the afternoon of the 16th at 2-30 p.m. at the Infectious Diseases Hospital, Welcoming the participants Dr. Ramachandra Rao, the Superintendent of the Hospital, gave a short history of the Hospital and the working of Institution. As regards the disease in particular, he stressed on the need for a correct diagnosis of the case both from the Clinician's point of view as well as that of the Preventive Medical Officers'. He said however much one may be experienced, still in about 5% to 10% of the cases one may need a laboratory to confirm his diagnosis. It is all the more necessary for the Officers in charge of Ports and Quarantine Stations, especially in those countries, where there is no smallpox, to know the methods of diagnosis of the cases both clinically and with some easy laboratory aids.

Discussions, Lectures, and Demonstrations :

Dr. Govindarajan speaking next explained the various methods of collection of samples of specimens for the laboratory diagnosis of smallpox. He then demonstrated the collection of scrapings of the base of lesions for demonstration of the Elementary Bodies of smallpox and also the vesicular and pustular contents of the lesions for the demonstration of the antigen by culture on the chick-embryo.

On the 19th during the morning session at the Infectious Diseases Hospital, Dr. Rao dealt with the diagnosis of the disease, and discussed the differential diagnosis. He demonstrated the various types of the disease that are likely to be confused for smallpox and explained how they could be diagnosed. After a discussion, he dealt with the treatment of smallpox. He not only explained the regular treatment as followed in the Hospital, but also dealt with the recent drugs and antibiotics that have been reported to have some beneficial effect on the viruses of vaccinia and variola by some Russian and British workers. He also dealt with the various complications as are met with in this Hospital and discussed their treatment. In the afternoon session at King Institute, Guindy, the participants were shown the harvesting of the inoculated eggs and the various types of lesions that occur on the chorio-allantois of the developing chick-embryo with diseases like Vaccinia, Herpes Simplex, Fowl-pox besides the smallpox.

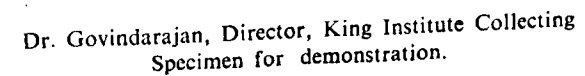


On the 20th morning continuing the subject, Dr. Rao dealt with the Epidemiology of smallpox and presented the statistical data regarding the age, sex distribution of the disease as it occurs here in the City with reference to the vaccinal status. Besides discussing the various environmental factors that have a bearing on the occurrence of the epidemic, he discussed

In the afternoon session at K. I. P. M., Guindy, the Director discussed the various other methods of the laboratory diagnosis of the smallpox.

**Visit to the Health Unit, R. C. A. P. and Orientation Training Centre
Poonamallee :**

On the 21st morning, the participants were taken to the Poonamallee Health Unit, by Dr. Rao and there they spent nearly 4 hours in studying the various activities of the unit, the Orientation Training Centre and Research-cum Action Project. Dr. Ranganathan, Health Officer of the Health Unit, and Dr. Gokhale, Administrative Officer, Orientation Training Centre explained the various aspects of the work done there. The delegates were very much impressed with the work being done at the Orientation Training Centre and the Research-cum Action Project. In the afternoon the delegates visited the Upgraded Institute of Venereology, Madras Medical College, and the Chemo-therapy Centre for Tuberculosis, Chetpet.



Field Visit :

On the 22nd morning again the delegates met at the Infectious Diseases Hospital, where the Health Officer of the Corporation of Madras, Dr. B. V. Sundarababu explained to the delegates the various problems connected with the Vaccination Programmes, as well as the Eradication of Smallpox in the City. Later the delegates were then taken round an infected area in a slum in Pudupet, where the range Health Officer, Dr. Marar and the divisional Sanitary Inspector explained the various measures taken to control the spread of the infection. The delegates expressed their appreciation at the efficient way the problem is being tackled in spite of several practical diffi-

culties and problems existing in such areas. In the afternoon the delegates were given a practical demonstration of the various serological diagnostic methods at the K.I.P.M., Guindy by Dr. Govindarajan.

At Madras Harbour :

On 23rd morning, the delegates were taken to the Harbour, where they were received by Dr. Choudry, the Assistant Director-General of Health Services (International Health), Government of India, and the Port Health Officer, Madras Port, Dr. Sen. The delegates were taken round one passenger shed and were explained the various procedures followed to see that infection is not exported from the port to other countries. Later they were taken round the ship S. S. Rajula which was scheduled to sail that evening.

In the afternoon, the delegates met at the Infectious Diseases Hospital, when a final discussion was held in general, over the whole subject dealt with during the Seminar.



Smallpox In Madras State

An Excerpt from the lecture delivered by the Director of Public Health, Madras, during the Seminar on Smallpox.

An examination of the recorded mortality rates from smallpox in Madras State during the period 1911 to 1960 shows that on an average nearly 70 out of 1,00,000 population died of smallpox in the decade 1911-1920. This rate has steadily decreased to 10 per 1,00,000 during 1951-1960. The incidence of the disease has, therefore, very much decreased as compared with the early decades of the present century. It is, however, seen that the disease flares up in a severe epidemic form once in 5 or 6 years. It is also seen that there has been a definite seasonal trend each year. The maximum incidence is generally recorded during the first quarter of the year. **The periodic appearance of the disease in an epidemic form has been attributed to several factors, viz. accumulation of susceptibles, as a result of faulty registration of births leading to non-vaccination of unregistered births, indifferent and faulty technique of vaccination, waning immunity of primary vaccination, and absence of a definite programme of revaccination.**

Preventive Measures

As already pointed out, vaccination is the only preventive measure against smallpox. It is, therefore, a matter for serious consideration why the disease should still persist in spite of large vaccination staff employed in the State. One reason for this continued persistence of the disease is that many do not fully realise that unprotected persons form a potential danger to the community and do not co-operate with the health authorities in this matter of vaccination. Secondly, the first occurrence of a smallpox case is not reported to the nearest health official promptly, with the result that the infection is well established in the area before preventive and control measures could be initiated therein. Thirdly, information regarding births must be made available to the vaccination staff so that they could carry out primary vaccination of all children born in an area. But this information is incomplete as a good proportion of infants born are not registered. These children therefore remain unprotected and constitute a potential danger to outbreaks of smallpox epidemics.

Fourthly, the supervision of vaccination work is not effective both in municipal and rural areas. Till now, the work of the vaccination staff in rural areas was supervised by Health Inspector whose jurisdiction extended over a vast unwieldy area. Many municipalities do not have Health Officers at present and consequently the vaccination work is practically uncontrolled and unsupervised as the Commissioners pay scant attention to checking of the work of the vaccinators in the midst of their other multifarious duties.

Laws Relating to Smallpox and Vaccination

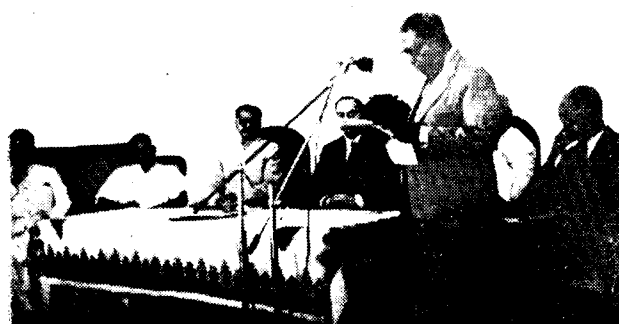
In this State, smallpox is a notifiable infectious disease under the provisions of the Madras Public Health Act. It is required that heads of families should report these cases to the Health Inspector or Health Officer concerned and those who fail to report are liable for prosecution. It is,

however seen that people do not generally report such cases to the health authorities promptly.

Vaccination and revaccination are compulsory in all municipal areas including City of Madras, and also in the rural areas till recently. After the passing of the Madras Panchayats Act, 1958, Primary vaccination is compulsory and revaccination may be enforced in such manner as may be prescribed by rules by Government. The rules for the purpose are being framed. In this connection, it may be pointed out that revaccination may be made compulsory in rural areas as hitherto.

Measures Taken to Control and Eradicate the Disease

In most western countries occurrence of smallpox is rare. The question therefore arises as to whether it is not possible to eliminate the disease from this country also. The answer is in the affirmative provided efficient and universal vaccination programme on a country-wide basis is undertaken.



Director of Public Health delivering his talk.

The Government of India and the several States in India have been seized with this problem and a Central Expert Committee with the representatives of the States was constituted to suggest ways and means for eradicating the disease from this country. In order to achieve this objective pilot projects were conducted in the various States. In this State a pilot project was conducted in Chingleput district in 1960-61 with a view to estimate the approximate requirements of the eradication programme in respect of man-power, finance, transport, vaccine, equipment, materials and various other factors necessary for the successful implementation of the scheme in this State in the third plan period. A special mass vaccination programme in Madras City was also undertaken under the scheme.

The mass vaccination programme in North Arcot District will be presently launched and the preliminary work in this connection has already been undertaken.

It has been observed from the recorded statistics that there is a periodicity of occurrence of smallpox epidemic once in 5 or 6 years and there is an annual seasonal variation also. In view of this knowledge, it is necessary that the people should be completely protected by vaccination just before the season in each year and before the epidemic year.



Director of Public Health with the delegates to the conference

It is suggested by the Central Expert Committee that the nation-wide smallpox eradication programme should be conducted and completed in two years. As the immunity conferred by vaccination lasts for a period of about 5 years, and as the cyclic period of smallpox epidemic is six years, it is for consideration whether the programme of mass vaccination should be so timed that it is taken up just two or three years before the expected cyclic year.

I am sure the Inter-Regional Seminar on Smallpox of the World Health Organisation will consider this and various other matters during its deliberations. I am hopeful that a concerted and co-ordinated action by the various States simultaneously will help to eradicate the disease from this Country.



Clinical Aspects of Small-Pox.

By Dr. A. Ramachandra Rao

Introduction

All of you, I am sure will be familiar with what I propose to say; it will be more or less a recapitulation of what you might have read in the books, but I will add some of my observations which I have made during my experience with the disease in this Hospital during the last 20 years. Of course, you will be surprised to know if I say that I have seen nearly 20,000 cases of Small-Pox during this period. But I was able to do some special study of the disease and collect some data of about 7,000 cases.

Clinical Features

Though it is usual to consider a person suffering from a disease only from the day he presents the signs and symptoms of the disease, for our purposes we will take him as diseased from the day he is infected, and not from the day he presents the symptoms. We can conveniently describe the disease process under the following heads:

- (a) Stage of Invasion and Incubation
- (b) Stage of the prodromata
- (c) Stage of Eruption
- (d) The Clinical Course
- (e) The Convalescence
- (f) The Complications.

(a) *Stage of Invasion and Incubation*: It is almost universally believed that the portal of entry for the Variola Virus in the natural occurrence of the disease, is through the naso-pharynx *by inhalation* through the nose or through the mouth. But from here, the path taken by the virus, is not known definitely. According to some, the virus, after the entry, passes through the pharyngeal mucosa to the sub-pharyngeal lymphoid tissue, and from where it enters the blood stream. Whereas others believe that the virus after the entry through the Naso-pharynx, goes down the bronchial tree, and passing through the mucous membranes enters the peribronchial lymphoid tissue, and from there enters the blood stream. So whatever be the site of invasion, it is certain that the virus enters the blood stream within about 24 to 48 hours after the infection. During this primary viremia stage which is very transient, there will not be any signs or symptoms at all. From the blood stream the virus is said to disappear in a matter of a few hours, and get localised in the Reticulo-Endothelial system of the various organs of the host. There it multiplies in large numbers, during the incubation period which is usually 12 days, the range being 6 to 21 days. At the end of the incubation period, the virus almost over-flows into the blood-stream again. This secondary viremia, where lots of virus circulates, produces the characteristic signs and symptoms of the next stage of the disease, viz. the stage of prodromata.

(b) *Stage of Prodromata*: The stage of the prodromata in Small Pox is so characteristic that great stress is laid on eliciting the history of these prodromal symptoms for the diagnostic purposes and it helps to a very great extent in arriving at fairly accurate diagnosis in majority of instances.

With the entry of the virus into the blood stream, the temperature invariably rises in all cases. The fever may be variable both in the intensity as well as in the duration, and it has not got much relationship with the clinical variety that is to follow. Of course, a highly toxic prodromal stage is usually followed by a severe attack. The onset of the fever is sudden, and in 60% of the adults, is associated with rigor, and in 10% of children, with convulsions. Head-ache, either frontal or occipital, in nearly 85% and severe back-ache, especially in the lumbar region with pain all over the body in about 75%, are the most frequent symptoms associated with prodromal fever of Small-Pox. 50% of adults and 25% of the children have vomiting. Diarrhoea is less common and occurs only in 13% of the cases. Contrary to the usual impression, nearly 16% of the cases complain of catarrhal symptoms, especially the sore-throat and dry cough. One rarely finds running of the nose and watering of the eyes and photophobia as are found in the case of Measles.



Dr. Ramachandra Rao examining a smallpox patient

During the prodromal stage, one may find in a few instances a transient rash, which has nothing to do with the focal rash that will appear later. The prodromal rash has characteristics and distribution quite different from the focal lesions and it disappears as soon as the regular lesions appear. This may take any form, erythematous, urticarial, morbilliform, scarlatiniform or in rare instances petechial. This rash is mostly confined to the trunk and that too in the areas like the groins and that is why their distribution is described as the 'bathing drawyer' type of distribution. These rashes are rarely seen by us since majority of cases come after the focal lesions appear. But these prodromal rashes are of great importance, especially in the fulminating cases of the Haemorrhagic variety which will be discussed later.

Irrespective of the type that follows, in about 20% to 30% of the cases the prodromal stage is associated with delirium and in a small percentage of cases, the patients are drowsy even without the involvement of the C. N. S. and they become alert mentally as soon as the focal rash appears.

This prodromal stage usually lasts for 2 to 4 days in the non-Haemorrhagic types and 4 to 7 days in the Haemorrhagic type. The virus that is circulating in the blood in large numbers during the prodromal stage disappears from the blood by third day and gets localised on the mucous membranes and the skin, and simultaneously there is a marked abatement of all the prodromata and the fever comes down to near-normal and the patient feels better in all cases excepting those that will become the Haemorrhagic, and Confluent flat varieties. The prodromal stage thus leads on to the next stage on or about the 4th day, the stage of Eruption.

(c) *The Stage of Eruption*: Some people call this stage as the *stage of the Exanthem*; but the former name is more apt. Depending on the type of the lesions and the severity of the rash that occurs now, the disease has been classified into several varieties. We cannot always say that the less the immunity of an individual the greater the likelihood of his developing a severe attack, but the converse may be true, the greater the immunity, the less severe is the attack. There are several other factors that influence the degree of severity, like the degree of the intensity of exposure, the dose of infection besides the immunity status of the person.

Mainly there are two clinical varieties (1) the Haemorrhagic and (2) the non-haemorrhagic. The non-haemorrhagic variety can be divided into the following types:—

- (i) The Variola Sine Eruptione—where there is no rash on the skin.
- (ii) The Discrete—where the lesions are discrete especially on the face and are separated by healthy skin.
- (iii) The Confluent—where the lesions especially on the face are so dense that they merge together leaving no healthy skin in between.
- (iv) The Semi-Confluent—an intermediary between the Discrete and the Confluent, where the lesions are Confluent on the face and Discrete on the body.
- (v) The Flat—where in all the three types described above with the Exanthem, instead of the lesions, coming up over the skin nicely and prominently, they become flat and appear as though they are buried in the skin and contain very little fluid.
- (vi) The Modified—where there is some modification either in the onset or in the number of lesions or in the characteristics of the lesions and their evolution.

This classification may be arbitrary, yet it may help in gauging the prognosis of the case.

Clinical types of Small pox

(i) *The Variola* Sine Eruptione*: It is better termed the Variola Sine Exanthema. It is also known as Variola Febrilis. This variety occurs in well immune persons, who are in close contact of a severe case. Though they are immune, if the dose and intensity of infection is high, they develop the characteristic prodromal symptoms but no rash on the skin. This occurs in 5% to 10% of the close contacts especially in mothers who nurse their Small-Pox babies. A good percentage of these may have the Enanthem in the mouth, if carefully examined, and they almost complain of sore-throat. But even those who do not have lesions on the mucous membranes, are classed under this category, since some authors were able to isolate the virus from the blood of these cases during the viremia stage. These cases go through the same process as the other cases except when the virus enters the blood. Probably it is neutralised by their immune bodies. It is presumed by some that these cases have immunity to prevent dissemination but not to prevent invasion by the virus. During a study made in this Hospital in 1960, Downie and others in their work on the virus content of mouth washings in active phase of Small-Pox, have reported that out of their 119 cases, 17 had this typical prodromata but no rash on the skin. In their study they were not able to isolate virus even in a single throat washing of these 17 cases, but as the authors admit 'Only a small portion of the washing collected at any time was examined for the presence of the virus, this probably accounts for the fact that from many of our specimens virus could not be recovered'. No blood specimen in any of these cases was examined either for the virus content or the rise in the anti-body titer. From the epidemiological point of view, such of those cases who have lesions in the mouth are infective and there is a good percentage of them in this group.

In the other types, irrespective of the type of the attack, the rash of Small-Pox has some definite characteristics which are important in the clinical diagnosis of a case. The Exanthem is best described under the following heads:—

1. The order of appearance of the rash
2. The Distribution of the Rash
3. The Characteristics of the lesions
4. The Evolution of the Rash,

1: *The Order of the Appearance of the Rash*: The earliest focal lesions to appear are those that occur upon the buccal, faucial and pharyngeal mucous membranes and is known as the Enanthem. Not in all cases, these lesions are actually visible, but the sore throat, and dry cough are evidences of the occurrence of the lesions. Frank lesions are notified only in 40% of the cases, and these are invariably seen in severe cases. The intensity of these lesions have no bearing on the severity of the Exanthem. The Enanthem on the tongue is so severe in a few cases that the whole surface of the tongue appears as one sheet of rash and they ulcerate and separate as one sloughing mass as the disease progresses.

* Variola—Small Pox.

As regards the focal lesions on the skin, the Exanthem, the lesions mostly appears on the face first, that too over the forehead. Only in about 10% of the cases, the history may be, that they have noticed first on the forearms and the wrists. Then the rash appears on the upper extremities, the trunk, and then the lower extremities, in that order. But the whole rash may take about 24 hours to 36 hours to appear. Though it is usually said that the rash of Small-Pox does not appear in crops yet one may find within the first 24 to 36 hours a few papules over the face and still macules appearing on other parts of the body. That is why it is rather difficult to gauge the type of the attack during the first 24 to 36 hours. But when once the whole rash has become papular there will not be any more crops.

2. *The Distribution of the Lesions*: The distribution of the rash of Small-Pox is so typical in majority of cases that a close study of this helps a great deal in the diagnosis of a case, though one should not solely depend on this aspect alone.

It is customary to describe the general distribution of the lesions as Centrifugal, that is the rash tends to be more dense on the extremities and the face rather than on the trunk. The virus tends to settle more on the peripheral and distal parts of the body than on the central and the proximal parts. It should not be forgotten, however that this distribution has exceptions and in our experience here, one in every ten cases is an exception, where the distribution was not so typical.

If particular regions of the body are examined, there too one finds some typical arrangements in the lesions.

In the upper extremities the forearms and palms, in the lower extremities, the legs and the feet are more involved than the arms and the thighs. Similarly the extensors surfaces are more densely involved than the flexor or volar surfaces. The convexities and prominences are more involved than the concavities and the hollows, hence one finds less rash in the axillae, cubital fossae and groins than on the shoulder, over the olecranon process and gluteal region and the patella. But this is all only relative density.

Barring a few mild cases and very severe Confluent cases usually this distribution is constantly observed.

On the trunk, there is a greater density over the back, than on the front, and over the front the rash is more on the chest than on the abdomen and over the abdomen the upper half is more involved than the lower, which is called the Gaspirini's sign. This sign is positive in 50% of the cases.

Because of the Centrifugal and distal distribution, the palms and soles are more frequently involved even in the mildest cases of Small-Pox but it is not true that all cases where there are lesions in the palms and soles are all Small-Pox. Several chicken-pox cases do have such lesions.

3. *The Characteristics of the Lesions*: One of the most important characteristics of the lesions of the Small-Pox is that (1) they are *deep set in the skin* and it is very helpful in the diagnosis. The exceptions to this are the

modified forms and the flat varieties about which we will discuss later. (2) Secondly the lesions are *more circular and round* in their pattern and not elliptical as is found in Chicken-pox. (3) Thirdly the lesions are multilocular, though it is not so significant, yet it sometimes helps in the diagnosis. (4) Fourthly, the lesions during the vesicular stage show the phenomenon of umbilication, i.e., a dimpling in the apex with a black spot. This is supposed to be due to the loss of fluid tension and also perhaps due to the pulling in of the apex by the fibrinous strands which make the vesicle multilocular. This umbilication usually disappears, as the pustules form and ripen, probably due to the fact at this stage all the septa break as necrosis sets in. (5) Lastly some authors describe the presence of an erythematous areola around the lesions in the early stages till the vesicular stage lasts. But from our experience, invariably this areola is characteristically absent in any stage of Small-Pox and we use this phenomenon for differentiating them from Chicken-pox where one finds this areola during all the stages and even after the scabbing has started. Only in 5% of the cases did we find this erythema in Small-pox and that too in those where we find a typical lesions as in the modified varieties.

4. *The Evolution of the Rash*: In a typical unmodified attack, the following description holds good. After the prodromal stage, the rash appears on the fourth day of the fever, starting as macules on the size of a pinhead, not raised over the skin, disappearing on pressure. Within 24 hours, usually it spreads all over the body and the macules become raised and papular by the sixth day. In these papules, fluid collects and within 24 to 36 hours they become vesicular, i.e. by the 8th day. These vesicles are plump, well filled up, Opaline in appearance, gradually increase in size, present umbilication and by the 10th day become pustular. From 10th to 14th day, these pustules mature or ripen, lose their umbilication, and from 15th day retrocession starts. In uncomplicated cases during the next week, they shrink, become flatter, and crust forms in the center which dries and gets separated leaving a scar which is deep like a pit or foveation.

Depending on the type of the attack and the immune status of the individual, the course of the disease as well as the evolution of the rash vary.

(d) *The Clinical Course*: It is better now to describe the course with reference to different types.

i. *The Discrete*: With the onset of rash on the skin after the prodromal stage, there is amelioration in the general symptoms of the prodromata, the fever comes down to normal, the evolution of the rash is rapid, and there is no secondary rise of fever and the scabbing starts early by about 10th day and the scabs too may separate off very quickly. But this may not be the case of all the discrete cases especially in the case of the unvaccinated or those with little immunity where there may be secondary fever as well as some complications.

ii. *The Confluent and the Semi-Confluent*: In these cases at the end of the prodromal stage, though there is a general abatement of the constitutional symptoms and the fever may come down to near normal, yet as the rash becomes vesicular, the temperature tends to rise again and it is prominent when the rash becomes

pustular. The skin becomes thick and edematous. The Secondary rise of fever is associated with constitutional symptoms. Delirium may set in, and the patient may be toxic and invariably there will be varying degree of involvement of respiratory system. Whether all this is due to secondary infection of the lesions and consequential absorption of toxins or bacteremia it is difficult to say. It is more likely that this secondary rise of fever is due to absorption of toxins as a result of extensive tissue destruction rather than due to the septicemia. This secondary fever remains high upto 15 day in uncomplicated cases and with the retrocession of rash, the fever comes down by lysis and becomes normal by 21st day and remains so thereafter.

(e) *The Flat Types*: Whether Discrete, Semi-Confluent, or Confluent, the lesions instead of becoming round and well raised over the skin, they may become flat in a certain percentage of the cases especially in the unvaccinated. This variety accounts for nearly 15% of the total unvaccinated cases. In most of these cases the prodromata are always severe and the constitutional symptoms persist even after the appearance of the focal rash. Even in the papular stage, one can see the flattening tendency of the lesions. As the rash progresses into the vesicular stage, the lesions do not come up prominently over the skin, but appear buried in the skin. They contain very little fluid and invariably contain blood and that is why they look black in the centre, which is quite different from the umbilication. These cases, if they survive scab quickly and especially in the Confluent, when the skin peels off like one sheet, it is not uncommon to find a sheet of clot underneath. Further the lesions are not deep set and may be surrounded by erythema and therefore the scars formed after such attacks are superficial. These may not have any Haemorrhages other than that into the lesions. In several cases all the lesions will not be flat, some will be ordinary especially on the extremities. In general, these have a bad prognosis. The flat types may be associated with any of the types and so it is suffixed to the particular type.

(f) *The Modified Small Pox*: Modified type occurs in the individuals who have certain degree of immunity. Though the virus is the same, it is because of the host immunity, the disease takes a milder form. Modification may be of several types.

It may be,

- (i) *In the prodromal stage*: Though there may be the prodromal stage, it may not be so typical, with all the characteristics or the duration may be shorter.
- (ii) *In the Number of Lesions*: The prodromata may be typical, yet there may not be any rash at all, as in the case of Variola Sine Eruptione or there may be only a few lesions especially on the face.
- (iii) *In the Evolution of the Lesions*: The patient may develop the typical attack with the prodromata and the lesions may be dense yet the lesions may not be deep set, and may not evolve

in the classical manner but may scab off even during the vesicular stage itself.

Thus in various ways, the modification may occur and therefore we qualify the type by prefixing the word 'Modified', as 'Modified Discrete', as 'Modified Confluent,' etc.

(e) *The Convalescent Stage*: The scabbing usually completed roughly by the 20th to 25th day in the case of Confluent attacks, 10th to 14th day in the Discrete attacks and 8th to 10th day in the Modified forms. The scabs separate off from the body easily in a few days, but in the palms and soles, they have to be removed with a knife or scissors. The patient has to remain till the last scab falls off which will take about 35 to 45 days in the Confluent, 20 to 25 days in the Discrete, and 10 to 14 days in the Modified attacks. In uncomplicated cases the convalescence is uneventful, though the Confluent cases are very badly debilitated.

The incident of the several types in any epidemic depends upon several factors and may vary from place to place and also on the immunity status of the population. The following however is the general trend here in Madras, irrespective of the vaccinal status:

Modified	... 13 %
Discrete	... 44 %
Semi-Confluent	... 13 %
Confluent	... 22 %
Flat types	... 6 %
Haemorrhagic	... 2 %

So far we have considered the Non-Haemorrhagic variety and now let us see about the other clinical entity, *Haemorrhagic*.

Such of those cases of Small-Pox, where Haemorrhages occur during the course of the disease are grouped under this category. This particular group has several things different from the Non-Haemorrhagic, both clinically as well as epidemiologically. Further they are the most fatal forms of the disease. Mainly there are two types under this group, classification based on the stage of the diseases when the haemorrhages develop.

They are :

- (a) **Variola Purpurica** also known as
Haemorrhagic early,
Primary Haemorrhagic.

This is the most toxic and invariably fatal form of Small-Pox. Fortunately the incidence of this type is very low accounting for only 1% of the total cases. Of 7,160 cases treated during the last 34 months we had only 73 cases and all of them died.

The prodromata in this type are very severe. The cases that are to become Haemorrhagic, are highly toxic, delirious, restless and complain of severe back-ache, and pain in the loins. They also complain of severe oppression in the chest and precordial distress. Some of these cases, if seen early, may present a petechial type of the prodromal rash in the groins. The most important characteristic feature of this type is that the duration of the prodromal stage is unusually prolonged. In the case of the non-haemorrhagic variety, usually the rash sets in on the 3rd or 4th day of the fever, but in these cases no rash is seen even upto 6th or 7th day and sometimes it is seen just before death. Haemorrhages occur into the skin right from the 3rd or 4th day of the disease and the whole body presents a typical flushed appearance and in fair skinned persons they appear pink, but in the course of 24 to 48 hours the skin assumes a bluish black appearance, and feels velvety to touch. Simultaneously, Haemorrhages occur through all or any of the mucous membranes. Purple bleeding spots may be seen on the buccal mucous membrane and on the palate. If the patient survives longer, he or she may bleed into the conjunctivae, nose, from the gums, they may develop hemoptysis, hemetemeses, hematuria and melena. In women, bleeding occur per vagina. 95% of the cases have haemorrhages into the skin, 68% into the Conjunctivae, 34% hematuria, 20% hemoptysis and 20% melena, 18% bleeding from gums, 5% epistaxis and about 1% hemetemeses. 75% of the female cases have severe vaginal bleeding.

The focal lesions will appear in about 20% of the cases before death, but they can be seen only by careful examination, as they appear like abortive papules and they can easily be missed. As the disease progresses, the patient becomes more and more toxic, the abdomen gets distended, and they emit a peculiar offensive odour of the breath, and the most pitiable thing is that they are conscious till the end, and they seem to know their impending death. They have a very anxious look on their face and the death is always sudden.

In a small percentage of the cases, the death may occur even without any external Haemorrhages, and in these the death usually occurs on the 3rd or 4th day of the disease. The only sign is the purpuric haemorrhages into the skin and severe toxemia and typical prodromata. Some of these develop severe pain in the loins a few hours before death, and they have a severe bout of hematuria just before death. These cases will give rise to difficulties in the diagnosis and in these instances, the laboratory only will help us but in an endemic locality one can easily diagnose if he has an eye for it and bears always this condition in his mind.

The mean duration of this fatal condition is 6.2 days the range being 3 to 8 days. It will be worthwhile to note at this stage that this type occurs maximum in the age group 15 to 40, accounting for 83% in males and 90% in the females of the total Haemorrhagic cases, As regards the sex, the incidence is in the proportion of 1 : 2.2 in males and females respectively.

(b) **Variola, Pustulosa, Haemorrhagica**, also known as

Haemorrhagic late or

Secondary Haemorrhagic Small-Pox.

These are cases where the Haemorrhages occur in the ordinary Small-Pox, during the course of the disease. It need not be during the course of the disease. It need not be during the pustular stage as the name implies. This is also highly toxic and fatal though not as fatal as the primary type. *It occurs in 1% of the cases* and we had 68 cases in the above series with 60 deaths as against 73 of primary type.

The prodromal symptoms will be more or less like those of the Confluent Flat type already described. The prodromal stage is not unusually prolonged but the constitutional symptoms persist even after the occurrence of the focal rash.

As the disease progresses, the rash is seen prominently but in the majority of the cases, right from the beginning the lesions tend to be flat. Usually as the vesicular stage sets in the Haemorrhages start to occur first into the lesions, and the lesions become flat, appear bluish black in the centres. Haemorrhages occur into the mucous membranes by this stage. With the onset of the Haemorrhages, the constitutional symptoms worsen the evolution of the rash stops, and the patient becomes worse and death occurs at any time between the 7th day and 14th day of the disease depending upon on what day the haemorrhages have set in. The mean duration of the disease is 10.1 days.

The incidence of the various Haemorrhages are as follows :

Sub-Conjunctival	... 38 %
Hemoptysis	... 30 %
Hematuria	... 26 %
Bleeding from gums	... 20 %
Melena	... 16 %
Hemetemeses	... 3 %
Into the skin	... 3 %
Into the lesions	... 100 %
Vaginal Haemorrhage in female	... 56 %

Here again the *highest incidence is in the age-group 11 to 40* being 65% in males and 77% in the females. The proportionate incidence between males and the females is 1:1.3.

(f) *The Complications* : The complications in Small-Pox may be due to the virus or due to the secondary invasion of the lesions with the bacteria and consequential septicemia and toxemia, or it may be due to the extensive destruction of the tissues and consequential absorption of the toxins. But it is difficult to say clinically the exact cause of these complications. After the advent of the antibiotic therapy there is a feeling that there is slight reduction in the incidence of certain of these complications, but how far is this real,

cannot be categorically stated unless a control study is made. Here are some of the complications that we have met within a series of 3,400 cases of Small-Pox treated and studied systematically.

1. **The Respiratory Complications:** By far this system is the most common one that is affected. Almost all the Confluent, majority of the Semi-Confluent, almost all that flat types and a few Discrete amongst the 'Unvaccinated', develop some kind of complication pertaining to the respiratory system, like Bronchitis, Broncho-pneumonia, Lobar-pneumonia, and in fatal cases terminal pulmonary edema. In 'Unvaccinated', some of these complications may be viral in origin and they are very refractory to anti-biotic therapy. We have to admit that we have not attempted to find out the causative organism in these complications, however, in a few instances just immediately after death, lung juice was aspirated and cultured on the C.A.M. of the developing Chick-embryo, with negative results, though in one Haemorrhagic case it was positive.

2. **Eye:** Next common are those affecting the eyes. 1.8% of the total cases had involvement of the eyes. 68% had the corneal ulcer, 18% diffuse keratitis, 18% had Conjunctivitis, of these very few were catarrhal. Mostly, they had simple reddening of the eyes and excessive watering. In three of these cases virus could be cultured from the tears and not attempts were made in others. Extensive corneal ulceration leading to corneal opacity and blindness in that eye occurred in 12% of the corneal complications, otherwise all others had no trouble with their vision. There is not much difference in the incidence between the Discrete and the Confluent attacks. In majority of the cases it was unilateral.

3. **Joints:** 1.3% of the cases had involvement of the joints. In 84% of the cases, it was the elbow that was affected. Shoulder in 11%, knee in 4%, Ankle in 2% and Interphalangeal joint in 2%. The incidence was almost in the children below 10 years, and amongst the affected there were only 12% adults. This complication usually occurred late in disease between 12th and 18th day of illness. In the case of the elbow it was usually bilateral, and rarely a patient had different joints involved. Only in 2 instances out of the 45 cases we had, there was multiple joint involvement. In about 20% of the cases there was complete disorganization of the joint because they were removed late to the Hospital after the complication was actually on for some time. Other cases who were under the antibiotics therapy for the disease fared better and went home without much disability.

4. **Encephalitis:** There were 6 cases of Encephalitis during this series, working out to 0.17%. Of course the criterion for the diagnosis was, coma, C.S.F. under tension culture sterile for bacteria and an increase in the cell count mostly lymphocytes. No attempts were made to isolate virus from the culture. This complication occurs early on the disease, usually about 6th or 8th day. During the prodromal stage these cases are more often drowsy than delirious, and the drowsiness slowly leads on into the coma after the rash appears. As the disease progresses, and the retrocession of the lesions starts, the mental condition improves and they become live to the surroundings and become conscious. But when they start talking we find Dysarthria more than a true aphasia. They have a toxic gait. In the beginning, they appear as though they have aphasia but very soon they start

talking and recognising the objects, but they have scanning speech in which syllables are uttered in a staccato-fashion or slurred. They regain their normal gain rather quickly within about 2 months but the speech remains slurred for a long time, and in one case followed by us he had that slurred speech for nearly 6 months. All the six cases were adults and 2 of them died. The survivals had no residuary disability.

5. **Other Minor Complications:** Diarrhoea is a very frequent complication especially in children. Similarly albuminuria is common in almost all the severe varieties, but the nephritis is rare.

Otitis media occurred in a small number of cases mostly in children.

2 cases of Orchitis, 1 of Parotitis, 1 of Polynuritis, 1 of Cancrum Oris, 1 of Osteomyelitis and 1 of Cellulitis upper lip are some minor complications noted. Bed sores in Confluent cases due to constant pressure on the back, occurred in a small percentage of the cases but careful nursing has prevented this complication to a very extent which otherwise would have occurred in a great number of cases.

In the absence of the post-mortem findings, it is difficult to say how far the Myocarditis either viral or bacterial or toxic is responsible for the deaths due to Small-Pox, especially in the 'Unvaccinated' and the Haemorrhagic types.

In addition, several other complications may occur affecting the various organs and systems, but they are not easily recognisable clinically and are not common in our experience though we have to admit that if post-mortems had been done we would have a better information about these complications and the real cause of death in Small-Pox which is still obscure.



Diagnosis and Differential Diagnosis of Small-Pox

By Dr. A. RAMACHANDRA RAO

Correct diagnosis of Small-Pox is not only essential for the Clinician, but also to the Epidemiologist and the preventive Medical Officer who is responsible to the Community from which the case has come. In this country, where Small-Pox is so prevalent, people are prone to think that it may not be necessary to have a specialist to diagnose a case of Small-Pox. It may be true in majority of cases, and in fully developed cases. But from the point of view of the preventive Medical Officer, a correct diagnosis as early as possible is essential. Nearly 10% of the cases that come to this Hospital as Small-Pox were found to be, not cases of Small-Pox, but more important than this, is that equal number or more that come to this Hospital as some other disease turn out to be Small-Pox. These facts go to show that after-all it is not quite an easy thing to diagnose a case of Small-Pox as one would imagine especially in the early stages of the disease.

Of course, if cases present typical and classical type of distribution and characteristic lesions, it is no problem, but to those who have seen thousands of cases of Small-Pox it is a known fact that in several instances the cases do not follow the text-book description. There are cases where even the most experienced Clinician, may be unable to express more than a provisional opinion. In general, it is always better that Small-Pox should be suspected in all doubtful cases till it is proved to be otherwise than the diagnosis is missed.

Careful recording of the history of the case and a systematic examination of the rash in a good light will, in majority of cases, help. The following are some important points deserving special mention and should be borne in the mind.

i. In every case one should put himself the question, 'Can this be a case of Small-Pox?' and get the answers by systematically eliciting the correct history and studying the clinical features.

ii. *Vaccinal Status* should be studied next. If a patient presents evidence of a successful recent vaccination within 2 years before the attack, one should think twice before the case is labelled as Small-Pox.

iii. *History of exposure to infection*: This may not be available always, in this country and also it should be borne in mind that at times it is not uncommon to find the infection of both Small-Pox and Chicken-Pox co-existing together in the same house.

iv. *The Prodromal History*: Even the mildest cases of Small-Pox invariably give definite and more or less a typical prodromal history of fever, head-ache, back-ache, vomiting, etc. and the rash appearing usually on the fourth day of fever. There may be very few exceptions; otherwise this history is very reliable and helpful in the diagnosis.

v. *Study of the Exanthem*: Careful systematic examination of the whole body uncovered as far as possible should be made in all cases in good light, the presence of the exanthem, the distribution of the exanthem, in various regions of the body in the majority of the instances help. Deep-set lesions, with very little *erythematous areola* around, absence of the different stages of the rash at the same time, multilocular nature, umbilication, slow and methodical evolution of the lesions will always clinch the diagnosis.

Yet there are certain types of Small-Pox that may give rise to confusion in the differential diagnosis:—

a. *Variola Sine Exanthema*: These cases are difficult to diagnose; if there are lesions on the *mucous membrane* and with the typical prodromata, it is not a problem, but if the cases have no exanthema in these, with the typical prodromata and history of severe and continuous exposure to Small-Pox infection in well immune person, one is justified in diagnosing a case as that belonging to this variety.

b. *Modified attacks*: These types present a typical lesions and the evolution of the lesions too may be abnormal and hence may give rise to problems in the diagnosis, but here again the prodromata, the history of exposure and the distribution of the exanthem would be helpful in the diagnosis.

c. *Variola Purpurica*: These cases frequently are missed unless one has an eye for and looks for it. The highly toxic and unusual prolonged prodromal stage with severe prodromal symptoms associated with haemorrhages both into the skin and several mucous membranes usually lead to a correct diagnosis. In these cases, careful examination will reveal petechial prodromal rash and later some abortive variolar papules.

With the above type of examination, and bearing in mind the possibility of the following diseases that may simulate Small-Pox one can easily differentiate Small-Pox from others and arrive at a more or less a correct diagnosis.

A. The diseases that usually require elimination are:—

i. *Chicken-Pox*: Perhaps this is the commonest of the Viral exanthematous diseases that is frequently mis-diagnosed for Small-Pox. Absence of or minimal prodromata, haphazard with a tendency to a centripital distribution of the rash in superficially set lesions with an erythematous areola around, unilocular nature of the Vesicles, occurrence of the rash crops and absence of severe constitutional symptoms are in favour of the diagnosis of Chicken-pox.

ii. *Measles*: The prodromal rashes and the early eruptive stage of the non-haemorrhagic Small-Pox, and the highly fatal Haemorrhagic types of the disease are likely some times to create problems in their diagnosis when they simulate cases of Measles. Typical prodromata of fever eye-signs, respira-

tory catarrhal symptoms, the presence of the Koplick' spots when present, the universal distribution of the focal exanthem which never goes beyond the maculopapular stage, leading to discolouration and later to desquamation are characteristics of Measles, and these in majority of cases will help in the correct diagnosis. However, one variety of measles, viz. the Haemorrhagic measles may be difficult to be differentiated from the Haemorrhagic Small-Pox. The only difference may be the Haemorrhagic Measles may have the Koplick' spots and the respiratory catarrh.

B. Bacterial Fevers With Exanthematous Rash,

i. *Scarlet Fever*: This is rarely mistaken for Small-Pox. It is not however prevalent here. The scarlatiniform prodromal rash of Small-Pox however may be mistaken for Scarlet fever. Very short prodromal fever with sore throat and other signs of streptococcal infection followed by the scarlatiniform rash with the circumoral palor, positive Schultz-charlton blanching test and absence of further evolution of the rash beyond the papular stage are the characteristics of the Scarlet fever that could help in the diagnosis.

ii. *Typhoid Fever*: The rose spots of the typhoid fever are some times confused with the maculo-papular rash of the early lesions of Small-Pox. But the typical typhoid fever with this rash occurring only in the second week of the disease, and the rash mostly confining to the abdomen and disappearing very quickly without any further progress in the lesions will definitely clinch the diagnosis.

C. Syphilitic Rashes:

Majority of cases referred to this Hospital as Small-Pox but not really cases of Small-Pox turned out to be papular syphilides. This is one disease that mimics Small-Pox, But the absence of the typical prodromata, the universal distribution of the rash without conforming to any particular pattern, and most important the absence of evolution of the rash, will in majority of cases help. There were instances where we missed these and diagnosed them as Small-Pox and after 2 days we had to revise the diagnosis when we found that there were no evolution in the lesions. Serology may not help because a syphilitics may contract Small-Pox too. It was also found that Small-Pox cases without syphilis may give a positive wasserman in 35% of the cases which becomes negative after 6 months.

D. Skin Diseases:

Several skin diseases are usually confused for Small-Pox. Here again the absence of the prodromata, the chronicity of the disease, irregular pattern in the distribution of the lesions which rarely appear like Small-Pox lesions will rule out the possibility of Small-Pox.

E. Drug Rashes:

Several drugs produce rashes in the sensitive persons and they give rise to confusion in the diagnosis. These rashes may take any form, and simulate the rashes of Small-Pox. The maximum confusion occurs when the

history is three days fever and the rash appearing on the 4th day. Prodromal history of Small-Pox will be lacking, there will be history of administration of some drug, atypical distribution of the lesions, and a usual association with the other allergic phenomenon, will help. Further an observation for two days by withdrawing all the drugs will make the rash disappear whereas the rash of Small-Pox will progress.

F. Allergic Rashes:

Besides drugs, some persons may develop allergic rashes of several types with different foods, pollen and other proteins. The differential diagnosis is similar to that of the drug rashes.

Thus one has to bear in mind, some of these diseases and the important points of the differential diagnosis, and in majority of the cases there will not be any difficulty at all. But however in about 5% of the cases we would like confirmation by laboratory methods of the diagnosis. The Laboratory Methods mainly consist of:

a. The demonstration of the Virus either from the lesions, or blood, the throat washings or the scabs. This may be done wheather:—

- (i) by demonstrating the Elementary bodies of the virus. This could be best done by staining the smears taken from the scrapings of the lesions especially in the early stages of the disease.

OR

- (ii) by culturing the virus using any living tissue culture media. The best is the Chorio allantois membrane of a developing chick-embryo. In recent times the tissue culture lines are used for isolation of the virus as well the detection of the antigen. Of course the suitable cell line for Small-Pox is not definitely known. Monkey kidney tissue lines have been used successfully. Human amnion cells, 'L' cells, etc. are being used for experiments with the Vaccinia Virus, but we do not know their suitability for the Small-Pox virus.

b. The demonstration of the Antigen by using the known antiserum by using some of the following techniques:

- (i) for precipitins by employing the Micro agar diffusion method.
- (ii) for the C.F. antigen by the C.F. test.
- (iii) for Hemagglutinins by doing the Hemagglutination Inhibition test.
- (iv) for neutrilizing antibodies by doing the Neutralization tests.

c. The demonstration of the rise in the antibody titer in the serum of the cases by estimation of the various antibodies in paired samples of sera at various stages of the disease. These methods will not help in the diagnosis of the case in the early stages. It is more a retrospective diagnosis.

In a case clinically suggestive of Smll-Pox, presence of Elementary bodies in stained smears is almost conclusive. But the absence of the Elementary bodies not rule out Small-Pox. The culture on the C.A.M. confirms it.

Epidemiology and control of Small-Pox.

DR. A. RAMACHANDRA RAO,

Smallpox is endemic in Madras City. Every year and throughout the year we have Smallpox. From the records available for the last 50 years, it looks as though the City was never free from infection even a single year. There are several factors responsible for this continued prevalence of the disease. The endemic level of the disease is about 500 to 1000 cases a year. Barring a few cases that may escape the notice of the Health authorities, almost all cases that occurred in the City are isolated in this Hospital and so the admissions in this Hospital will give us fairly an idea of the general trend of the disease for our study of epidemiological features. In this talk whenever I use the word "incidence", it means the attacks as notified to this Hospital and not specific incidence on population basis.

In general, the various factors of that influence the occurrence of the disease can be classified into three main heads:—

- (a) Factors pertaining to the parasite.
- (b) Factors pertaining to the environments.
- (c) Factors pertaining to the host.

(a) The Parasite Factors.

This is the simplest to deal with. So far as is known there are only two strains of variola virus, viz., the Classical variola major and the Attenuated Variola Minor. The Variola Minor (which causes Alastrim), is said to be not existing in India and we have not seen any such cases in this Hospital. As such I do not propose to talk on that. As regards the Variola Major, irrespective of the variety of the disease of the type to which it belongs, the strain is supposed to be the same. Hence, there are no factors worthy of mention which have a bearing on the incidence of Smallpox.

(b) Environmental Factors.

(1) **Epidemicity:** As you all know, for the occurrence of any disease in the form of an epidemic there must be a critical level of susceptible in the population beyond which if it increases epidemic conditions prevail. Epidemiologists, in taking control measures, usually try to protect about 60 to 75 % of the population and keep the immunity of the population and keep the immunity of the community at that level. In Madras City, with nearly 70000 births a year it is found roughly about 60% of these children are protected before they attain the age of one year. Of the remaining 40%, half of them escape vaccination because they are removed outside the City without notifying the Health Officer and the remaining 20% evade the vaccination. Further, there is always an accumulation of susceptibles in higher-age-groups, because several do not get themselves revaccinated regularly and successfully. Besides, these two factors there is a lot of floating population with the result there is a free mix-up between Madras

citizens and people from surrounding areas. These three contribute to a cumulative susceptible increase and the epidemic occur as a result of this once in 3 to 4 years.

(2) Effect of Meteorological conditions on the Smallpox Incidence:

It was Rogers that first suggested that there is some relationship between the humidity and temperature of the atmosphere with the incidence of Small pox. According to him, the less the absolute humidity and the greater temperature, the greater the incidence of smallpox. Somehow this particular theory does not seem to explain the trend of Smallpox incidence in this State. In Madras City, the lowest incidence occurs in the months of June and November, and the highest in February to April. The months with maximum incidence are of course dry but they are not the hottest months of the year. Recently Murthi and others have found some relationship between the intensity of ultra-violet rays in the sunlight and the Smallpox prevalence. But even this theory does not explain completely the trend in the City.

(3) **Other Environmental Factors:** Unlike the food and water borne diseases the sanitation does not seem to have any direct effect on the incidence of smallpox. However, being an air borne and droplet infection, the disease is more prevalent in over crowded areas and in slums.

Ignorance, illiteracy and superstitious beliefs, have a great role to play on the incidence of Smallpox in this country. It requires an intensive mass-education and public health propaganda to convince the public of the efficiency of vaccination as the only control measure of Smallpox.

(c) Host Factors.

This is the most important of various epidemiological factors influencing the disease prevalence.

1. **The Age:** Half of the total number of cases occur in 11-30 years, whereas the cases under 6 years of age account for only 30%. The least incidence (10%) occur in the age-group 6-10 years. This is of course irrespective of the vaccinal status of the cases. Thus now-a-days the disease has shifted into higher age-group and we find more susceptibles in these age-groups than in children. This information should guide us in planning for the eradication that we should concentrate our efforts in a more susceptible group, the young adult. If the group below 6 years is further split up, the incidence is the least under one month where as between one month and six months, it is the same as in other sub-groups. This also shows that we cannot rely upon the so-called 'trans-placental immunity' which, if at all exist may not last more than a month or so after birth. This again is an indication that we should revise our local laws which fix the maximum age limit of 6 months for Primary Vaccination.

2. **Sex:** In general, there is a slightly less incidence in females by about 1 to 2 per cent, but along with the age there is a greater number of females in a proportion of 9:8 in the age group 6-20 years and in old persons above 51 years in the proportion of 5 to 4 between female and males. Otherwise, more males develop Smallpox than females in other age groups.

3. *Vaccination and Smallpox.* The important factor that has got a great bearing on incidence of Smallpox is the vaccinal status of the individual. For the purpose of this paper I would define the 'unvaccinated' as the one (a) who was never vaccinated, (b) who was vaccinated but not successfully, and (c) who was vaccinated for the first time during the incubation period of the disease. The 'Vaccinated' means the one who presents marks of successful vaccination done at any time of his/her life. Now let us see as per this definition how vaccination influences Smallpox.

(a) Vaccination, age and incidence

Nearly 56% of the total cases, occur amongst the 'Vaccinated'. This sounds paradoxical, but one should not forget that we should not compare the number of attacks as such but the specific case incidence with reference to the population.

Though we do not have a regular data of the distribution of the population with reference to their vaccinal status, yet roughly in a survey done in this Hospital amongst the patients admitted for all diseases, except Smallpox, it was found that there are four times more persons in the 'Vaccinated' than in the 'unvaccinated'. Similar figures were obtained by Pandit and Masilamani in a survey they had done in some municipal divisions of Madras City. Hence the high incidence of Smallpox amongst the 'Vaccinated' is apparent and not real. 28% of the total number of cases that occur in the age group below 6 years, the cases amongst the 'Vaccinated' account for only 1%. Even in the age-groups 6-10 years, the attacks are the 'unvaccinated'. But beyond 10 years, there were far greater number of attacks in the 'vaccinated' than in the 'unvaccinated'. If we consider from another aspect, of the total cases occurring amongst the 'vaccinated' 92% were in the age group above 10 years, whereas in the 'unvaccinated' 75% were below 10 years. So, roughly once vaccinated persons may be considered equivalent to having little immunity beyond the age of 10 years, as far as the attack rates are concerned. The youngest child that developed Smallpox in the 'Vaccinated' group was 8 months' old baby. This child was vaccinated on the third day after birth with only one insertion. Another child who had two insertions on the third day after birth developed Smallpox at the age of 1 year and 8 months. But both were 'modified' and 'mild attacks'. The oldest in this series was a man of 70 years, who had good six successful vaccination marks done during infancy and he was never revaccinated. This man developed Confluent Smallpox and survived. Excluding the Intra-Uterine Infection in the 'unvaccinated' the youngest child was 15 days' old, who developed symptoms on the 27th day after birth.

(b) Vaccination and Sex

It has been found that there were more female Smallpox cases than males in the 'unvaccinated' whereas amongst the 'vaccinated' proportionately there was greater incidence amongst the males. Again with reference to age grouping, there were greater number of cases in females under 3 years and again between 6-20 years only.

(c) Vaccination and type of attack

Irrespective of the age-group, the Confluent and the Semi-Confluent account to 64% of the total number of cases in the 'unvaccinated' as against

the 18% in the 'vaccinated'. Under the age of 10 years the incidence of the Confluent attack is 12% and 63% respectively in the 'vaccinated' and 'unvaccinated'. When we analysed these figures we have not classified the cases, confluent and Semi-Confluent, separately and also modified attacks of the Discrete form only were classified under 'Modified'. Hence, this explains the little high percentage of the incidence of this Confluent variety in the 'vaccinated'.

With reference to the sex, though there is not much difference in the 'unvaccinated' yet amongst the 'vaccinated' 20% of the total female cases were Confluent as against only 17% in males. With age and sex, if we compare the effects of vaccination, in the age-group 11-30 years, amongst the 'vaccinated' 19% of the female cases were Confluent as against only 12% of the male; but in the 'unvaccinated' we do not find this difference.

(d) Vaccination scar and the incidence of Smallpox

There have been only a handful of cases where there was evidence of successful revaccination and there was no case at all who developed Smallpox within two years after successful vaccination. Hence, for all practical purposes, the Primary Vaccination scars were taken as the criterion. To find out whether or not the number of scars has any thing to do with the incidence or with the type of attacks or the case fatality rate, the correct procedure would be first of all to find out the distribution of the population with reference to the number of vaccination scars. In the absence of that the attacks as such are not comparable.

Pandit and Masilamani statistically evaluated from their survey done in Madras in 1944, that the persons with four insertions of Primary Vaccinations out-numbered several times the number of those with less number of insertions in the general population of Madras.

We have to bear this in mind where we compare the attacks scar-wise. In a series of 2143 cases of Smallpox studied there were 1201 cases amongst the 'vaccinated', 12% of whom were in 1 scar group, 32% in 2 scar, 10% in 3-scar and 46% in 4-scar groups. If the number of scars have no bearing on the immunity status then we should have had far more number of cases in the 4 scar group and not just equal to the number of all the cases in the three other groups put together.

Let us see now that particular age-group below 4 years where the immunity of the primary vaccination is in the maximum. In this group there were only 11 cases in this series amongst the 'vaccinated' and of these 11, there were 7 in the 1 scar, 2 in the 2 scar and 1 each in 3 scar and 4 scar groups. Thus 90% of the cases occurred in children with less number of scars than 4: whereas in general population that group of 4 scars had several times more persons than the other groups put together.

Now as regards the severity of the disease, there does not seem to be much difference in the occurrence of Confluent attacks between the various scar-groups if we do not consider the age. If we take the particular group below 4 years of age, we find that of the 11 cases that have occurred, only 2 were Confluent and both occurred in 1 scar group. It, therefore, appears

that the number of scars has some relationship not only with the incidence but also with the severity. But their effect is the maximum only upto 4 years after the primary vaccination.

4. Some Epidemiological Aspects of Haemorrhagic Smallpox

The overall incidence of both the types of haemorrhagic variety put together, amounts to 2% of the total Smallpox cases. 63% of these cases are amongst the females. Haemorrhagic early is more common in females—accounting for 56%, where as in males it is just the reverse with 56% in Haemorrhagic late.

The age distribution of this variety is 76% of the cases in male and 84% in females occur in the age-group 11—40 years. Only 8% of the cases were in the age-group below 6 years and nearly 70% of them were Haemorrhagic late.

With reference to the vaccinal status 52% of males and 40% of females were amongst the 'unvaccinated'. If we compare the incidence with that of Confluent Smallpox for that age-group 11—40 years, the proportionate distribution between the 'unvaccinated' and the 'vaccinated' in the total Smallpox is 1:1.2 and in Haemorrhagic 1:1.4; but in females of that age-group, it is 1:2 in the Haemorrhagic as against 4:5 in Confluent.

29% of Haemorrhagic cases were amongst the pregnant women and 81% of these were of primary haemorrhagic type. With reference to the period of gestation, 70% of these were in third trimester, 27% in the second and only 3% in the first. The first and the second trimester cases all ended in abortion and of the last trimester cases 33% had Live-Births, 33% had Still births and the others died before confinement. Except in one pregnant woman, no one survived even in Secondary Haemorrhagic Smallpox.

PREGNANCY AND SMALLPOX

Those who had seen epidemics of Smallpox in different countries had known for a long time that pregnant women in general fare badly with an attack of Smallpox. While working on the Shwarzman-phenomenon with different bacterial infection, Thomas and others found that Cortizone enhances the susceptibility of certain tissues to the effect of bacterial endotoxin. Further studies were made, though there was no uniformity in the conclusion of various authors; yet it was found that cortisonized animals fare badly with infections. Shwarzman himself studied the effect of cortizone on experimental polio infection and concluded that ACTH or Cortizone or Combination produces a marked acceleration of polio infection in mice and an extraordinary enhancement of susceptibility to infection in hamsters, giving rise to violent and uniformly fatal disease. These experiments seem to indicate a significant relationship with adreno-cortical function and the susceptibility of mice and hamsters to experimental polio. It was reported that in pregnant women in whom there is a greatly enhanced adreno-cortical activity showed an increase in the incidence of polio. Similarly, working on rabbits Bugbee and others found that cortizone has definite enhancing effect on vaccinia infection.

Now it is well known that in virus diseases apart from the termination of pregnancy and evil effects on the foetus pregnancy by itself makes a woman more susceptible for virus infection. Hence, the subject of "Pregnancy and Smallpox" is of great interest from different aspects.

Reviewing the literature on the subject we find according to Bull, Smallpox terminates pregnancy in 30 to 60% of cases with greater incidence in the later stages of gestation. The average foetal mortality, according to him, was 45%. Schemberg found that of 130 cases occurring in pregnant women, 65 suffered from abortion of premature delivery and 26 of the mothers subsequently died. In addition, 8 mothers died before aborting. Of the 40 mothers in whom abortion did not occur, 9 delivered at term and others discharged still carrying the foetus.

Wilkinson investigating 44 mothers suffering from Smallpox gave in detail the effect of pregnancy on the foetal and maternal mortality. Here in this Hospital we have records for 201 cases but the follow-up and other details are not completely worked out yet and I propose to give a few of the details that are available, which will be of general interest.

Of 201 pregnant women with Small-Pox studied, the proportion between the 'vaccinated' and the 'unvaccinated' is 4:1 as against 1.1:1 for all females and 1.4:1 for all males. But if we compare the incidence in that particular age-group at risk of becoming pregnant, there was not much difference in the incidence, the figures being 5:1 in all females and 4:1 in the pregnant as against 3.8:1 in the males in that age group.

As regards the severity of the disease in the age group 11—40 years in the 'unvaccinated,' 78% of males, 80% of females, 71% of pregnant women belong to Confluent and Haemorrhagic varieties as against 17.5% males, 24% females and 41% pregnant females in the 'vaccinated'. Thus there are more cases in the female than in the male and far more in pregnant females than in non-pregnant females and males, belonging to that particular age-group amongst the 'vaccinated'.

Taking into consideration only Haemorrhagic Small-Pox 19.4% pregnant females were haemorrhagic as against 2.5% in non-pregnant females and 1.9% in males in the age group 11—40 years. 16% of the 'vaccinated' and 28% of the 'unvaccinated' pregnant women were haemorrhagic.

Of the total pregnant, 9% were in the first trimester, 28% in the second trimester and 63% in the third. 60% of the 3rd trimester group and 38% of remaining had the termination of pregnancy during this attack. But in all only 50% had their termination during the attack. 38% of the first and the second trimester group ended in abortion. Whereas 40% of the third trimester group, ended in premature delivery and the remaining 60% at full term. 24% of these were Still Births.

Of these 201 pregnant with Small-Pox studied, there were 103 Discrete with no deaths, 61 Confluent with 24 deaths and 37 Haemorrhagic with 36 deaths—the total case fatality-rate amounting to 30%.

Mortality

1. *General Considerations* : Of the 2143 cases studied during the period of 12 months, beginning from 1st May 1959, more than 2000 were non-haemorrhagic and for the purpose of case fatality rate these cases were analysed and the figures are as follows. Irrespective of the vaccinal status and age and sex grouping the overall case fatality rate for this non-haemorrhagic group was 16.7%.

2. *Vaccinal Status and Mortality* : With reference to age grouping and variety, the case fatality rate for the 'unvaccinated' was 35.1% with 322 deaths out of 916 cases and against 2.3% in the 'vaccinated' with 27 deaths out of 1174 cases.

3. *Vaccination, Age & Mortality* :—With reference to age grouping among the 'unvaccinated' the maximum case fatality rate was in the age group below 6 years with 42.8 with minimum of 16.5 in the age group 11–20 years. In the case of 'vaccinated' the minimum case fatality rate was 0.3 in the age group 11–20 years. Paradoxically here too the maximum was under 6 years. If we further split that particular age group under 6 years we find the maximum case fatality rate in the 'unvaccinated' was in the age group 16–30 days with 66% and in the case of 'vaccinated' there were 27 attacks in this age group with one case under one year, one case between one and two years, 5 cases between 2 and 3 years, 4 cases between 3 and 4 years 7 cases between 4 and 5 years and 9 cases between 5 and 6 years. There were three deaths out of these 27 cases with the case fatality rate of 11. Of these 3 deaths, two deaths occurred amongst 1 insertion case and 1 death in 2 insertions case.

4. *Vaccination, Sex and Mortality* : With reference to sex, as far as the 'unvaccinated', are concerned, there seems to be not much difference between the two sexes. Both had a case fatality rate of 35; whereas in the 'vaccinated' there was a marked difference, the rates being 0.6 in the males and 2.4 in the females. In the 'unvaccinated' with reference to the sex and age grouping it is uniformly higher in females. Amongst the 'vaccinated' except the age group 6–10 years, the case fatality rate is far higher in the females than in males in all age-groups.

5. *Vaccination and the Type of rash* : In the modified form of the disease, either in the 'unvaccinated' or in the 'vaccinated' there were no deaths at all. In the Discrete, the case fatality rate in the 'unvaccinated' is 8.4. as against 0.4 in the 'vaccinated'. In the Confluent, the case fatality rate in the 'unvaccinated' is 48.7 as against 10.5 in the 'vaccinated'.

6. *Number of Vaccination Scars and the Case Fatality Rate amongst the vaccinated* :—There were 725 Discrete Small-Pox cases occurring amongst the 'vaccinated'. Nearly half of these cases were in 4 scar group. There were three deaths and they were distributed amongst the 1, 2 and 3 scar groups equally with no deaths in the 4 scar group. As far as the Confluent cases are concerned, out of 226 cases occurring amongst the 'vaccinated' 38% are in the 4 scar group. As far as deaths are concerned the overall case fatality rate for this variety amongst the 'vaccinated' was 10.5 and with reference to the scars it is 13% in 1 scar, 15.3% in 2 scars, 8% in 3 scars and 5.8% in 4 scars; irrespective of the type of the attacks, the case fatality rate

was 3.6 in 1 scar, 3.7 in 2 scar, 2.4 in 3 scar and 9 in 4 scars. 50% of the total cases occurred in 4 scars group.

Though no definite conclusions could be inferred from these yet it is evident that the 4 scars group fares far better when compared with these with less number of scars. But unfortunately there is no definite correlation between the individual number of scars group. But if we take 1 and 2 scars groups and the 3 and 4 scars group separately in every aspect, i. e. Incidence, the Incidence of Confluent and the Case fatality rate, there seems to be a definite significant reduction in the case of 3 and 4 scars group. But here again, we have to compare with the distribution of the population scar-war and all these figures should be subjected to mathematical statistical scrutiny so that we shall know for definitely whether this deduction is apparent or real.

CONCLUDING REMARKS

During the various scientific sessions we had during the Seminar, We have discussed the Clinical, Diagnostic and Epidemiological aspects of Small-Pox at great length. At the end of these deliberations, one thing we definitely find is that we do not know much about Small-Pox. Perhaps on the Clinical and Diagnostic side we might have achieved something, on which we can bank, so that we can diagnose fairly correctly. But on the epidemiological side of the disease, we have several problems to solve and the more we learn and study the newer the problems that are cropping up. **Specially in a country like India, where Small-pox is endemic and occurs periodically in epidemic waves and where the death rate is still very high the only possible way of control of this disease is by a thorough vaccination of the population with a good and potent lymph.** But here again we are faced with several questions which we are unable to answer at present, namely (1) the type of lymph (2) the number of insertions (3) the method of vaccination and (4) the age for vaccination. We have no conclusive proofs to answer these questions. All control measures are based fundamentally on two assumptions. Firstly vaccination with Vaccinia Virus is a surest method of protection against Small-Pox because the virus of vaccinia and variola are anti-genically identical. The second assumption, is that the presence of the vaccination scar is considered as an indicator for immunity. Though I do not question the validity of this assumption yet to be frank with you, who are all scientists, unless it is proved serological estimation of the antibody titers we cannot evaluate categorically the relationship of the immunity level and the number of scars. **From the statistical data I have given from my little experience, it looks as though there is some kind of relationship between the number of scars and the level of immunity.** This assumption has, far reaching effects and may create further problems in the Small-Pox Eradication Campaign in several countries. It is but fair that the World Health Organisation to take this question immediately and do a scientific study so that this question can be solved once for all. Another problem of interest which requires immediate solution is whether a person who reacts 'successfully' to vaccination is really non-immune against the variola prior to this vaccination. I have the feeling that though the vaccinia confers immunity against variola, variola may not confirm same degree of immunity against vaccinia. Though I have no statistical data for this inference, yet two types of instances which we find there had made me to doubt that variola confers immunity as much as one expects against vaccinia.

Firstly people who are working in Small-Pox Hospital and when they are exposed to infection day in and day-out and who can be taken for granted as having solid immunity against variola have been found to react 'successfully' against vaccinia virus, even on repeated vaccination with highly potent lymph. If they had not had solid immunity against Small-Pox, they should have developed Small-Pox if we believe in these 'successful' takes to mean that variola confers immunity against Vaccinia. The second series of instances that suggest this possibility is that the new born babies, born of Small-Pox mothers in this hospital and who reacted very successfully when they were vaccinated on the first day of their birth and kept in close contact with the Small-Pox patients throughout till the mother is discharged, have not developed Small-Pox. It is likely that these babies might not have developed even without this vaccination because the vaccination that was done on the first day of their birth would not have given the protection against Small-Pox. With such severe exposure to infection both intra-uterine and extra-uterine they should have developed Small-Pox if they had no immunity against this disease. These facts make me doubt that the successful vaccinia take is an indication of non-immune status of the babies. So this aspect of antigenic similarity between the vaccinia and variola viruses requires further study. Though we do not doubt that vaccinia confers immunity against variola, we are prone to think that not all 'successful' takes do not mean the absence of immunity against the variola. These two are some of the problems which require further study. Here, we have the clinical material and a fully developed virus laboratory, perhaps the best in the whole of world, in the near future, and a good Public Health administrative set up in this City and this is the best place where these problem could be solved, provided international organisations like the WORLD HEALTH ORGANISATION come forward and generously help in this task which I hope, they will do. This is a disease where there is a large scope for study from different aspects. Thanks to the World Health Organization, not only we are getting a Diagnostic Laboratory but also we are getting a new drug for trial so that we can save some more lives.

During this one week, I tried my best to impart what little I know of Small-Pox and I hope that the participants have gained something atleast in this Seminar; though not positively at least on the negative aspects that there is a lot we do not know about Small-Pox. I am sure, all of you had an enjoyable stay here in the city and 9 for one, can never forget this one week, when I had the unique opportunity of meeting all of you from different countries and I miss you all at the end of the Seminar.



Vaccination—Factors influencing people's acceptance.

A Preliminary Study of factors Influencing People's Acceptance of Smallpox-Vaccination in Chingleput District, Madras; Ideas about cause, prevention and cure of Smallpox.

I. Introduction

Smallpox vaccination work in Chingleput District has been widespread and intensive for over 25 years. In this area, it has long been recognized that if more rural people really wanted to have smallpox vaccination, two benefits would accrue: (1) A better job of vaccination could be done so that smallpox could be controlled more effectively, (2) health workers would not have to spend so much effort on seeking out unprotected persons, and this would give more time to develop other much needed health programs. It has been observed in this area that people's acceptance of vaccination is influenced by how much they know about the purpose of vaccination. It appears, therefore, that better understanding of the present state of villager's knowledge about smallpox should be helpful in the planning of more effective vaccination programs. For this reason, during a village study which was undertaken as a part of the Government of India's Research cum Action Project in Environmental Sanitation, information relating to this problem was also gathered.

II. Methods.

A systematic sample of 1254 households was selected from all the households in 25 fairly typical villages in Chingleput District. One senior person in each of these households was interviewed. The sample was also stratified by sex and caste of respondent and presence of village leader in the household. Details of this study are presented in the Poonamalle RcA Project Report on Initial Survey. The questionnaire used for each interview included, among other items, a question about whether smallpox has occurred in the village. Then, with reference to smallpox the following questions were asked and the answers were written down:

1. What do people in your village say about how one gets it?
2. What is the best way to avoid it?
3. When one has it, what does one do for cure?

III. Findings.

1. Beliefs about cause of smallpox:

As shown in Table 1, the largest proportion of people (48%) said that the cause of smallpox is unknown. The next largest group (20%) attributed the disease to supernatural causes. Most of the answers in the "supernatural" category referred to the Goddess Mariathal. About 16% of the respondents attributed the disease to contact with cases, or with households where there were cases. Only about 1% mentioned germs. Other causes cited were uncleanness, excess heat, bad food or water, and flies.

In the process of answering this question, the respondents generally showed they had an idea of the clinical picture of smallpox. A common statement was that, "Fever comes for 2 or 3 days, and then the small-pox comes."

TABLE 1.

Villagers' Statement about what is cause of smallpox.

Answer given.	Number of persons.	% of persons.
Don't know	611	48.7
Supernatural agencies	256	20.4
Contact with case	195	15.6
Uncleanliness	88	7.0
Excess heat	61	4.9
Bad food or water	20	1.6
Germs	16	1.3
Flies	13	1.0
Other reasons	24	1.9
Total number of respondents	1254*	100

2. Beliefs about prevention of smallpox :

It was remarkable to find as shown in Table 2, that about 38% of the respondents clearly believed that smallpox cannot be prevented, and that another 37% said they did not know whether or not it could be prevented. Only about 11% mentioned vaccination. About 7% mentioned cleanliness, 3% mentioned religious ceremonies, and a few mentioned various other ways.

Of those who said smallpox cannot be prevented, a small fraction also implied that such prevention was impossible because the Goddess' action was unavoidable. On other hand, among those who said smallpox could be prevented by various ceremonies, references were made to being able to satisfy the Goddess in order to avoid smallpox.

*(Some respondents gave more than 1 answer).

TABLE 2.

Villager's statements about how to prevent smallpox.

Answer given:	Number of persons.	% of persons.
Can't prevent	476	38.0
Don't know	461	36.8
Vaccination	135	10.6
Cleanliness	99	7.4
Religious or magic ceremonies	39	3.1
Isolation	14	1.1
Medication	12	1.0
Other answers	22	1.8
No reply	3	0.2
Total number of respondents	1254*	100.0

3. Beliefs about cure of smallpox :

It was found that religious ceremonies (relating to worship of a diety, through prayer and offerings) and magic ceremonies (other rituals) were turned to by a total of about 54% of the respondents, as shown in Table 3. A fairly large proportion of respondents (23%) said they knew of no effective treatment, often mentioning that the disease goes away by itself. Home remedies largely included use of neem or margosa leaves, in local applications or baths.

Although 5% of the respondents mentioned use of allopathic medicine, and 2 persons mentioned homeopathic medicine, no mention was made of the usual indigenous systems of medicine found in this area.

*(Some respondents gave more than 1 answer.)

TABLE 3.

Villagers' statements about how to cure smallpox.

Answer given.	Number of persons.	% of persons.
Religious ceremony	474	37.8
No treatment	290	23.1
Magic ceremony	206	16.4
Home remedies	146	11.6
Doctor of medicines, allopathic	64	5.1
Don't know	41	3.3
Quack	13	1.0
Report to local official	11	0.9
Dr. of Medicines, homeopathic	2	0.2
Other answers	140	11.2
No reply	1	0.1
Total number of respondents	1254*	100.0

IV. Discussion and Recommendations.

1. The fact that about 75% of the people interviewed either did not know how smallpox could be prevented, or clearly believed it could not be prevented, offers ample explanation for many practical difficulties encountered in carrying out the vaccination programme in this District.

2. *Positive factors which support the vaccination program* and which can be further built upon were observed. These include:

- (a) The ample evidence that the people can *learn* about the value of vaccination. There was present a solid minority of 11% who had already accepted this concept.
- (b) The widespread recognition of smallpox as a disease, and as an undesirable disease.
- (c) The large proportion of people who say they *don't* know the cause and prevention of this disease (and who can thus be expected to be more receptive to learning than if they firmly held an erroneous idea.)

*(Some respondents gave more than 1 answer).

(d) Among those who did say they know about these things, there was a strong fraction who offered naturalistic or scientific explanations. For example, 16% recognized the disease is spread through contact. A number of other environmental explanations were also given. Among these persons, other rational concepts should be relatively easy to introduce.

3. *Among factors which might hinder the program* the most important seems to be belief in supernatural causation of smallpox (20% of the respondents), with the probability that this idea is the basis for much of the belief that smallpox is unpreventable. It would seem unwise to oppose directly the strongly fixed faith in the Goddess Mariathal. However, it was also observed that some of those who believe that Mariathal causes smallpox also believe that smallpox is preventable, and that a means of prevention is by satisfying the Goddess. This suggests that vaccination is potentially acceptable by this group, and that acceptance would be facilitated if it was interpreted as satisfying the Goddess.

4. *Factors which may not hinder the program* and which might be left along, include the following:

(a) There appears to be low acceptance of the details of the germ theory of disease. However, there is a good start towards acceptance of the idea that this disease spreads through contact (16%) and that vaccination is preventive (11%). There is reason to believe acceptance of the latter 2 ideas can spread widely, with proper developments of educational aspects of the vaccination program. These ideas are themselves thoroughly scientific, and are adequate for good acceptance of vaccination. It has been found to be highly difficult to bring people in these villages to accept detailed knowledge of bacteria, viruses, etc. It would therefore seem unwise to try to push such detailed concepts when they are not necessary for intelligent action. They may be presented, of course, and can be expected to be more widely accepted later. But the end of a vaccination program is intelligent acceptance, not a great depth of scientific knowledge.

(b) For cure of smallpox, after it is contacted, there is a great turning towards religious or magical help. Education directed at this, as part of a routine vaccination program, seems probably not needed, because of several reasons. If the program is successful, there will be no cases. If cases do occur, the solace religion brings can be an important part of treatment. Also, as medical care facilities become more available, it can be expected that most cases which occur will receive proper medical attention. If there is a tendency for people to take a sick patient to a shrine, however, this is of course a problem which deserves special educational attention.

5. A point of interest to sanitation program was that about 7% of the respondents mentioned uncleanness in relation to cause and to prevention of smallpox. This suggests the presence of a general tendency to attribute diseases to uncleanness.

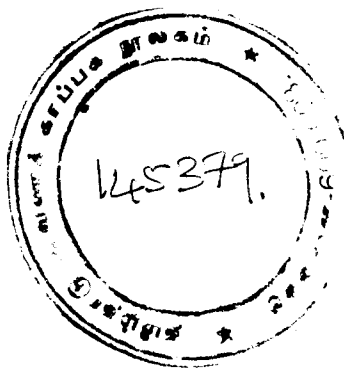
6. More study is needed on the effectiveness of the application of the lessons derived from this survey, in action programs. Also, there is need for better understanding of people's values relating to acceptance of vaccination, of channels of communication through which ideas about this

subject, can best be introduced, and of "feasibility" factors such as the months of the year when people can best be reached by the field program.

V. Summary.

During personal interviews in 1254 households in Chingleput District, Madras, it was found that about $\frac{1}{2}$ of the respondents said that they did not know how one got smallpox, and $\frac{1}{5}$ said it was caused by supernatural agencies, mostly by the Goddess Mariathal. About $\frac{1}{6}$ recognized that smallpox spreads from other cases, and $\frac{1}{6}$ cited other environmental factors, 16 persons mentioned germs. When asked how to avoid smallpox, $\frac{3}{4}$ said it was unavoidable or that they did not know how. About $\frac{1}{9}$ mentioned vaccination and the rest had various other ideas. When asked what to do for curing the disease, religious or magic ceremonies were mentioned by more than $\frac{1}{2}$ the respondents, no treatment by nearly $\frac{1}{4}$, home remedies by $\frac{1}{9}$ and allopathic doctor by $\frac{1}{20}$.

These findings confirm the impressions of health workers in this area that the level of knowledge about the usefulness of vaccination is very low. It indicates, on the other hand, that there is ample foundation for improving educational aspects of the vaccination program. Basic concepts such as the contagiousness of the smallpox and the value of vaccination are well entrenched among the people, and are ready for further spread. Evidence from this study suggests that detailed knowledge of germ-theory is not necessary for the spread of acceptance of vaccination. The findings also suggest that, although faith in the Goddess of smallpox is strongly fixed among a portion of the population, this faith can be compatible with acceptance of vaccination.



Material Section of the Health Education Bureau

—o—

A brief synopsis of the films available from the Health Education Bureau,
Office of the Director of Public Health, 81, Mount Road, Madras-6.

—o—

1. Title: **The Marked Man.** (10 minutes) Tamil 16 m.m. Sound.
In our country, thousands die from small pox. Explaining the nature and the effects of this disease, the film shows how prejudice must be fought to popularise vaccination which alone can help to stamp out this dreaded scourge.
2. Title: **Defence Against Invasion.** (10 minutes) English, Tamil 16 m.m. Sound.
This film in colour and cartoon illustrates in a novel and interesting manner how our body resists the smallpox germs after vaccination.
3. Title: **Vaccination Against Smallpox.** (10 minutes) English, Tamil 16 m.m. Sound.
This film also helps explain the importance of vaccination in fighting against smallpox.

NOTE:

1. All categories of films are for hire.
2. The hire charges per reel of film, per week are Rs. 2 -
3. Packing, transportation and incidental charges are extra.
4. Indents must be placed at least two weeks in advance.
5. The period of requirement may be stated.
6. The particulars of the nearest Railway Station must be furnished in Block Letters.



Delegates to the Conference.



With the best Compliments from :—

Madras State Health Education Bureau, Office of the
Director of Public Health, 81, Mount Road, Madras - 6.

MADRAS HEALTH

HEALTH REVIEW MONTHLY 225

Vol. I]

JUNE 1962

[No. 6

ANTI FLY WEEK SPECIAL NUMBER



ISSUED BY THE DIRECTOR OF PUBLIC HEALTH,
MADRAS.

OUR OBJECTIVES

- (a) Giving departmental information to our Officers.
- (b) Publication of readable articles on Public Health Programmes and principles.
- (c) Incorporating news items relating to the advancements and researches in the field of Public Health.
- (d) Reports on meetings, seminars, workshops etc., which have a bearing on public health.
- (e) Serving as a medium for sharing of thought and experiences among Public Health and allied personnel.

YOUR ATTENTION PLEASE

- (1) Articles or reports incorporated in this Journal can be reproduced with due acknowledgement.
- (2) The opinions expressed by the contributors are not necessarily those of the Government or this department.
- (3) Authors desirous of contributing articles and papers on health problems are requested to kindly mail their items to the "Assistant Director of Public Health (Health Education Bureau) - Office of the Director of Public Health, P.B. No. 722, Cathedral Post. MADRAS-6."
- (4) Articles should be typewritten and should ordinarily not exceed 1200 words.

CONTENTS

1. House Fly and its Control

By Sri S. Sundararaman,
B.Sc.,(AGRI) L.T., M.Sc.,(HOP).,
Chief Entomologist, Office of
the D.P.H., Madras.

2. Fly as a transmitter of Communicable diseases

By Dr. S. M. Ghosh, Prof. of
Medical Entomology,
School of Tropical Medicine,
Calcutta.

3. Flies and refuse disposal by the sanitary Landfill method

By Sri M. Susikaran, B.E., M.Sc.,
Public Health Engineer,
R.C.A. Project. Poonamallee.

The House Fly and its Control

By

Sri. S. SUNDARARAMAN, B.Sc., (AGRI) L.T., M.Sc., (HOP).,
Chief Entomologist, Office of the Director of Public Health, Madras-6.

1. The House Fly.

The common house-fly (known as *Musca domestica*) is the most common and ubiquitous insect in and about houses throughout the world. The public is becoming increasingly conscious of flies as carriers of filth and disease, and is beginning to associate lowered sanitary standards with these insects wherever they appear.

2. Fly-Borne Diseases.

The house-fly and many of its relatives are common agents in the mechanical transmission of certain infections which are often grouped under the term "fly-borne-diseases". The mouth parts, the numerous body spines (hairs), and the sticky pads on the feet have been found to carry a large number of different pathogens causing human disease. Some of these pathogens may pass unaltered through the digestive tract and may remain viable in the faeces of flies also. Among the pathogens carried mechanically by the house fly are included those causing typhoid fever, cholera, bacillary and amoebic dysentery, tuberculosis, leprosy, yaws, conjunctivitis, trachoma, gonorrhoea, abscesses and gangrene. Flies may also carry the eggs of certain parasitic worms such as *Ascaris*, whipworm and other round worms.

3. Fly Bionomics.

Flies multiply with incredible rapidity and with favourable conditions they reach astronomical numbers in a few generations. The eggs of the house fly are laid in masses of about 75 to 150. A single female is able to lay as many as 21 such batches in the month after emergence. Excrement especially that of horses is a favourite breeding material. Cattle, pig, chicken and human faeces are also used by flies for breeding. The fact that they breed in human excrement makes them especially dangerous as disease

carriers. Other suitable materials include garbage, kitchen refuse, and other decomposing vegetable and animal matter. The adult flies live for several weeks, so a constant but small source of flies may build up a large adult population around a given premise. House flies are very domiciliary, for they tend to stay within a restricted locale and to go inside buildings especially to rest there overnight in cool weather. They leave their home areas only by accident or by being forced out through competition of their own numbers.

4. Fly Control.

In control work it must always be borne in mind that flies breed freely only in the moist media furnishing a fairly substantial amount of nutrient material. Even a handful of moist rich manure, restaurant scraps or other material with a high protein or available carbohydrate content will turn out a surprising number of flies often several hundred per pound.

The control of flies is primarily one of proper sanitation, a point which must never be disregarded in the substitute usage of insecticides. Up to date efficient sanitation is still the fundamental measure for fly control. *Any insecticide can be used only as a substitute.*

To eliminate the fly breeding places is the most effective control measure by proper disposal of refuse, manure, compost and other waste. Garbage, dust bins etc. should be emptied once or twice a week. Success can be achieved only by the close co-operation of the general public and the united efforts of every individual and not by public health officers alone. Effective fly control, whether insecticidal or sanitary measures, must be based on fly habits. As flies prefer to rest on ground, kitchen racks and shelves etc., residual spraying of walls are not highly effective. Since flies rest at night and are active only in the day time, spraying their night time resting places insures the greatest contact time and heightens the control efficiency of the insecticide.

The control of adult houseflies by residual spray became possible with the advent of DDT and other chlorinated hydrocarbon insecticides. Unfortunately, their systematic use resulted in

the development of resistance against them. Thus there are many parts of the world where DDT and similar insecticides are ineffective against the houseflies. Resistance of houseflies to Chlorinated hydrocarbons and their derivatives such as Dieldrin, Chlordane or lindane has led to the use of organo-phosphorous compounds such as Diazinon, Malathion and Parathion. The addition of sugar additive to such organo-phosphorous formulations generally augments the efficacy of the residues, to a degree that varies with the specific toxicant involved.

For effective fly control, some of the measures recommended by the Expert Committee on Insecticides of the World Health Organisation are as follows:—

1. Spray Treatment:

At a treatment rate of 1g. per square metre (100 mg per square foot) diazinon treatments are equally effective with or without sugar but at 0.2 g per square metre (20 mg per square foot) the diazinon sugar emulsion is superior to the formulation of diazinon alone. Sugar is usually included in the formulation at a rate of 2.5 parts to one part of toxicant.

2. Diazinon impregnated cords:

2.5 mm diam. cords dipped in 25% diazinon-xylene solution and installed at the rate of 1 metre per square metre area. Impregnated strips are also used instead of cords. 7–100 gms of insecticide per strip of 100 m x 2.5 mm is applied like festoons from ceilings at about 1 m of strip for each square meter of internal surface of the ceiling or roof.

3. Poison baits:

Liquid baits. 0.1 to 0.2% toxicant and 10% attractant (sugar or treacle) Applied by watering can at 4 to 10 litres per 100 sq. m (1–3 gallons per 100 sq. foot) floor area. **Dry bait:** 1–2% toxicant plus attractant 60–120 gm/ 100 sq. m. (2–4 ozs per 100 sq. ft). Placed in plywood trays at strategic places. Bait treatments generally produce spectacular reduction of high fly densities within a few hours. However, this effectiveness is of

short duration unless further applications are made. Replenishments of the baits are usually required at intervals of 3 to 4 weeks.

4. Space sprays:

Pyrethrum 0.05 to 0.1% pyrethrum plus 0.5 to 1.0% synergist such as piperonyl butoxide gives temporary and immediate relief from fly infestations.

5. As a larvicide for use by the individual householder, paradichlorobenzene applied at the rate of 60 g or 2 ozs per garbage heap is effective for 1 to 2 week periods.

Although human excrement in privies is not normally a serious source of houseflies (*Musca domestica*), studies have indicated that dieldrin, chlordane, aldrin or BHC applications to the excreta can cause an enormous increase in house fly population. In view of the adverse effect of pesticide applications on housefly production in privies and the fact that breeding of houseflies in untreated structures is limited, treatment of privies should be avoided.

The resistance factor in fly control emphasises the need for improved environmental sanitation as fundamental to successful control. **A programme based on sanitation supplemented by chemical measures is the best approach to effective control.** On such a programme the use of insecticides can be kept minimal, thereby retarding the development of resistant populations.



Fly as a Transmitter of Communicable Diseases

Dr. S. M. GHOSH

Prof. of Medical Entomology, School of Tropical Medicine, Calcutta

AMONGST the house-invading flies commonly found in India, houseflies are the most important agents for communicating diseases and causing nuisance. These flies habitually enter the house and come in contact with the exposed food and drinks contaminating them with the pathogens they carry. Other house-frequenting flies which take a minor role in dissemination of diseases are blue bottle flies (*Chrysomya*), flesh flies (*Sarcophaga*) and stable flies (*Stomoxys*). The houseflies are two-winged non-biting insects, belonging to the entomological order Diptera. They are small or moderately-sized flies of greyish or dull black colour with abdomen yellowish and eyes dull red. The eyes are large and apposed in males and divergent in females. The mouth parts consist of a proboscis which is retractile and is tucked away inside the head when the fly is not feeding. Anteriorly on the head there is a pair of jointed antennae having a feathery arista on each. The head is joined with the thorax with a small mobile neck which allows the fly to move its head freely on any side or direction. The thorax or breast bears a pair of membranous wings on its sides anteriorly and a pair of halteres or balancers posteriorly and three pairs of joined legs ventrally. Each leg ends with a pair of claws with a pad of fat and a thick bristle in between. Besides these the thorax bears a pair of spiracles or external opening for breathing on each side. The abdomen is composed of several segments having dark bands of different sizes and shapes on its dorsal aspect. The last two segments are modified for sexual purposes. The housefly is covered with bristles and hairs all over the body and legs. The internal structures are almost the same as that of other insects with slight modification of some.

The housefly is present all over the world. It is called *Musca domestica* in European countries and America and *Musca domestica domestica* in India. There is a slight difference in the anatomical features between the two but the habits of both are the

same. Both are true house-frequenting flies and breed and remain near human habitations.

A Voracious Feeder

The housefly feeds intermittently and voraciously and is more attracted to sugar than to other types of food. It is restive and has the habit of sitting on anything filthy or clean and feeding on it. Thus, one moment it is found to be feeding on excreta, sputum, exudation of ulcers or any other noxious and de-composing material, the next moment it will be seen to feed on exposed food articles or drinks. From time to time, it regurgitates or vomits which appear as a minute droplet hanging from its mouth parts. At the same time it defecates. The deposited stool when dried keeps minute marks on the surface on which the fly sits and these are called "fly specks".

The fly usually acquires infection by walking over or sitting on infectious material when its legs, wings and the hair of the body become contaminated. The intestinal contents become charged with infection while feeding and ejected in the "fly specks" and vomit drops. It seems plausible that the fly might become infected in the larval stage by growing in infectious faecal matter and the newly emerged and unfed flies would consequently be dangerous.

A Mechanical Carrier :

Under city conditions, flies may travel about a mile in all directions. In open countries, they can fly greater distances depending on favourable currents of air. This distance may be covered with one flight or in stages. Flies stopping at an intermediate point may remain in the neighbourhood or after a short time may go to a fresh feeding place. This is how infection is spread and contamination of exposed food articles occurs from place to place.

The danger of housefly towards spreading diseases like cholera, dysenteries, diarrhoea, typhoid, helminthic infection, tuberculosis, however, anthrax and yaws has been established. It is doubtful, **leprosy**, whether it is one of the ancillary agents in disseminating poliomyelitis virus, although the virus has been isolated from the

houseflies collected from the epidemic area. The different ways by which the domestic flies can propagate disease germs are : (i) by passing ingested organisms sucked from stools, ulcers and decomposed material with faeces; (ii) by carrying them on the external surface of the body *e.g.*, on hair, bristles, wings, foot pads, proboscis etc., and (iii) by vomiting the ingested material.

There is no proof that the organisms multiply in the intestines of the fly and therefore it is called a "mechanical carrier". Besides, the fly causes a great nuisance by hovering round the house and alighting on the face and exposed parts of the body.

Removal of Breeding Sites

In prevention and control of houseflies, the foremost aim should be to eliminate the breeding sites or to make them unsuitable for deposition of eggs. The most favourite sites of fly-breeding in India are garbage, domestic, garden and stable refuse, ashpits, human and animal excreta, conservancy trenches, offal and undigested material from the stomach of ruminants, horse and pig manures and cowdung in bulk and patches. Therefore disposal of garbage and city refuse by the municipal authorities should be enforced. The householders can contribute greatly by preserving the domestic and kitchen refuse in a covered receptacle till removed by the municipality. In villages, where no municipal bodies work the refuse and the garbage should be burnt. The night soil must be disposed of in trenches and covered up with earth immediately. In rural areas, construction of bore hole latrines is the best method. The methods of control of adult flies are as follows: (i) Use of fly papers, fly traps and poison baits. The poison baits must be handled with care in households so that children may not accidentally drink them. (ii) There is a large number of proprietary fly sprays sold in the market containing different insecticides. A highly potent fly spray should contain pyrethrum extract and DDT solution in percentage of 0.2 and 5 or 2.5 respectively so that immediate knockdown and residual action will be obtained when the combined insecticide is used as space spray.

Since pyrethrum extract is expensive and does not possess residual action it cannot be used in large-scale fly

control campaign. Chlorinated hydrocarbons like DDT, Chlordane, Dieldrin, and BHC are, therefore, used. At the present moment, much difficulty is experienced due to rapid growth of resistance of flies to these chemicals and the health authorities had to take recourse to the use of organophosphorus compounds in many countries. Resistance to organophosphorus insecticides is also rapidly developing and use of newer insecticides is sought. The time has, therefore, come when control programme must be well-planned by the specialists to deal with these pests.

References

- | | |
|---------------------------------|--|
| Hermes, W.B. (1950) | Medical Entomology, MacMillan & Co., New York. |
| Roy D. N. & Brown A.W.A. (1954) | Entomology — Medical and Veterinary Excelsior Press, Calcutta, 2nd Ed. |
| Schoof H.F. (1959) | How far do flies fly. pest control. 27: 16. |
| Idem. (1959) | Resistance in arthropods of medical and veterinary importance, 1946-58, Misc. Publ. Ent. Soc. Amer. 1: 3-11. |
| Courtesy | Swasth Hind—June, 1961. |



Flies and refuse disposal by the sanitary landfill method

By

M. SUSIKARAN, B. E., M. SC.,
Public Health Engineer.
R.C. A. Project, Poonamallee.

The Corporation of Madras and the Madras Housing Unit have developed beautiful, healthy house sites from waste land, marshes and swamps, and other low-lying areas. The Nandanam Extension Housing Colony provides an excellent example of this type of real estate development. Low-lying areas, laid out for roads, parks, and play ground were raised to the required elevation by filling with refuse, which was covered with earth. Low-lying house sites were filled with earth. Other amenities like electricity, water and sewers, have been provided. The result is an excellent housing colony. **During the intermediate stages of development of such a colony, fly breeding in the proximity of the refuse dumping sites could result in a major public health hazard, since fly population is closely related to the sanitary conditions maintained during the filling operation.**

The Sanitary Landfill Method..

If the sanitary landfill - the name given to filling low-lying areas or trenches with refuse - is to be absolutely innocuous at all times, the refuse must be covered with earth every day. The depth of earth cover required may vary from 6 inches to 2 feet or more depending on the initial compaction of the refuse, the intended use of the filled area, and the quantity of earth available. In general, a minimum of 2 feet of earth cover is preferable, especially if the filled area is to be used immediately to form roads, parks, etc. The refuse cannot then be a breeding area of flies or rodents. Odour nuisance will also be eliminated.

In practice, it is difficult to organise an ideal sanitary landfill programme and the refuse may have to be left accessible to flies, or rats and vermins. However, this period of exposure

of the refuse to the insects and rodents should be reduced to the minimum possible. The face of the exposed fill should be kept as small as possible. The technique developed by Acharya and others for controlling flies in compost pits, Fire Treatment, Tarred cloth methods and spraying with insecticides, could also be advantageously adapted during this period. Field studies in this direction are likely to be useful.

Fire Treatment.

The treatment for fly control involves spreading a 6-inch layer of combustible refuse at the top of a 2 inch layer of earth and setting fire to the refuse. This treatment is said to destroy about 75% of the fly maggots and pupae. If the fire treatment is repeated after 4 days, about 95% of the fly maggots are destroyed. Odour problems may exist during the period of fire treatment. Care should be taken to prevent fire hazards.

Tarred Cloth Method.

In the tarred cloth method of fly control, a 6-inch wide plaster of dirt and cow-dung is placed along the edge of the fill. A gunny bag cloth - heavily coated on both sides with asphalt is stretched tightly over the fill so that the edges of the cloth run along the earth-dung plaster. A second layer of earth-dung plaster 6-inches wide and 3 inches thick, is then placed along the edge to seal the cloth tightly to the pit. This method is said to achieve 95% destruction of larvae originally present in the composting material. The cloth could be re-used several times. The economics of this method will have to be carefully worked out.

Spraying.

Spraying the land-fill area with insecticides recommended by entomologists after on-the-spot study can also be effective to control flies for short periods.

Conclusion.

The sanitary land-fill operation should be planned and executed as an Engineering Project. Covering the refuse with 2 feet of earth at daily intervals is the most acceptable type of proce-

ture. Every effort should be made to reduce the area and time of exposure of the refuse to insects and rodents.

There is scope for considerable field studies to reduce fly nuisance, if the ideal sanitary land-fill procedure cannot be adopted. Fire treatment and the tarred cloth method appear to be promising. Spraying with selected insecticides can be used as a temporary measure to control flies.

It is necessary to impress upon the workers, the reasons why sanitary conditions should be maintained in the proximity of the areas of fill.

References.

1. Acharya, C. N. (1950) Preparation of compost manure from town wastes, Calcutta (Indian Council of Agricultural Research, Ministry of Agriculture Bulletin No. 60).
2. Gotaas, H.B. (1956) Composting (World Health Organisation. Monograph Series No. 31).
3. University of California, Sanitary Engineering Laboratory (1952). An analysis of refuse collection and sanitary land-fill disposal, Berkeley, Calif. (Technical Bulletin No. 8.)



Material Section of the Health Education Bureau

—o—

FILM LIBRARY

A brief synopsis of films available.

1. Title: **Dirty Habits** (10 minutes) Tamil 16 m.m. Sound.

The need for an intensive drive against disease in a country where mortality rate is high can never be overstressed. This short film underlines the necessity of avoiding habits that cause disease, and makes a plea for all round cleanliness.

2. Title: **How Disease Travels.**

(10 minutes) Tamil, Colour: 16 m.m. Sound.

This animated cartoon film shows how sickness travels over entire village by polluted water supply, contact between persons, and insect carriers, and explains how sickness can be stopped at sources through sanitation measures, isolation of sick, other simple precautions etc.

3. Title: **Insects as carriers of Disease :**

(10 minutes) Tamil & English, 16 m.m. Sound.

Careless Charlie, hero of this cartoon film lives with flies, lice, and mosquitos until he learns how they make him sick. Then he becomes careful-Charlie applying simple methods of eradicating the pests.

4. Title: **War that never ends :**

(7 minutes) Tamil: 16 m.m. Sound.

This cartoon film attempts to acquaint people with preventive methods of fighting disease. It emphasises the necessity of ensuring cleanliness and countering superstition, the scourge of the mass.