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A COMPARATIVE STUDY OF HEALTH DELIVERY SYSTEMS OF INDIA AND CHINA

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ABSTRACT

The medical systems which most of the developing countries have, are ad hoc adoptions inherited from their colonial masters and have met with little success in making health planning as part of their national planning. Very few countries have been able to overcome the resistance of the medical profession and the bureaucratic inertia which is a major obstacle in the transformation of this system to a broad based social service and integrating it with the process of socio-economic development planning. The adoption of this system by developing countries is a typical example of technological misfit. A cheap and labour intensive model for developing countries shall be a proper solution for the development of a health care delivery system for the masses. A solution to this problem is a mix or hybrid of the traditional and modern medicines which very recently have been exploited both in India and China. How far India and China have been successful and what is needed to be done is the subject matter of this paper.

Medicine in Western countries is concentrated on personal health care and is firmly based on individual doctor-patient relationship, *i.e.* on individual care by a highly trained physician or a small team under the direction of a physician. The Western model of health care though it has been widely adopted, appears to be of little relevance to the conditions and goals of the developing countries. It is also concerned with diseases which are comparatively of less importance to the developing countries.

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The medical systems, which most of the developing countries have, are *ad hoc* adoptions inherited from their colonial masters and have met with little success in making health planning as part of their national planning. In developing countries as opposed to industrialised countries, no clinically decisive treatments have yet been discovered for many of the prevalent diseases. There is, thus, an urgent need for preventive as opposed to curative medicine because numerous communicable diseases require primary emphasis to be placed on environmental control. The adoption of this system by developing countries is a typical example of technological misfit. A cheap and labour-intensive model for developing countries shall be a proper solution for the development of a health care delivery system for the masses. A solution to this problem is a mix or hybrid of the traditional and modern medicines which very recently have been exploited both in India and China.

India

In India first efforts to institutionalise Ayurvedic and Unani medicines were made in 1827 when classes were opened at Government Sanskrit College, Calcutta for Ayurvedic and at Madrassah for Unani. These efforts, however, got a blow again when East India Company in 1833 stopped these classes and instead set up Calcutta Medical College for Western medicine. In 1917, Government of Madras appointed Dr. Koman Commission to make investigation into indigenous system of medicine. After this, the Indian National Congress at its Nagpur session in 1920 adopted a resolution which reads,"This conference is of the opinion that having regard to the widely prevalent and generally accepted utility of the Ayurvedic and Unani systems of medicine in India, earnest and definite efforts should be made to further popularise schools, colleges and hospitals for instruction and treatment in accordance with indigenous systems"1. With this, the indigenous system of medicine got impetus and at the time of independence, there were 50 institutions of indigenous medicine. In 1946, the Conference of Health Ministers adopted a resolution which reads, "In accordance with the recommendations of the National Planning Committee, the Conference resolved that adequate provisions should be made in the Centre and Provinces for:

A. research in and application of scientific methods for the investigation of the indigenous systems;

B. starting colleges and schools for training for diploma and degree courses in indigenous systems of medicine; and

C. post-graduate courses in Indian medicine for graduates in Western medicine, 1.

Since then, there have been many efforts to give scientific basis to indigenous system and to integrate it with the Western system of medicine. There are many systems of medicine which have been inherited and are operating in the country. Prominent among them are Ayurveda, Sidha, Yoga and Unani-Tibb. At present, there are about 100 institutions for training indigenous practitioners. The indigenous practitioners work both through governmental setup (nearly 200 hospitals and 8,000 dispensaries) and through their own arrangements mostly in the rural areas. There are some 62,000 institutionally qualified practitioners, nearly 2, 00,000 registered practitioners on the basis of experience and a few hundred thousand of untrained practitioners. In a door-to-door survey of the indigenous practitioners in 10,000 sampled population of a rural development block of more than 1,00,000 population, it was found that ratio of registered to unregistered practitioners was 1:24 and further they treated 1 to 8 diseases 2. Most of them worked on part-time basis. Through local healers the indigenous medicines were equally available to both the rural and urban masses.

The Western system of medicine as has been developed is not integrated with the traditional systems of medicine but on the other hand has undermined their very existence. As a result, the urban rich have benefitted from the Western medicine. It. also received overwhelming official support of the government. Most of the rural masses are consequently deprived of adequate medical care, except the availability of only a few indigenous healers who are usually not properly trained. Thus, the major problem is the provision of primary health care service in the rural areas.

Bhore Committee: Various efforts have been done through various levels since independence in order to meet primary health needs of the rural masses. The concept of primary health services itself dates back to the Bhore Committee's recommendations in 1946 when the term "primary health centres" (PHCs) was first coined. This Committee suggested

Integration of preventive and curative services at the Centre, State and district levels. Delivery of comprehensive health care in rural areas was visualised through primary and secondary health centres. As a follow up, the training of undergraduates in preventive and social medicine was introduced. The implementation started in 1952 and has continued through successive Five Year Plans.

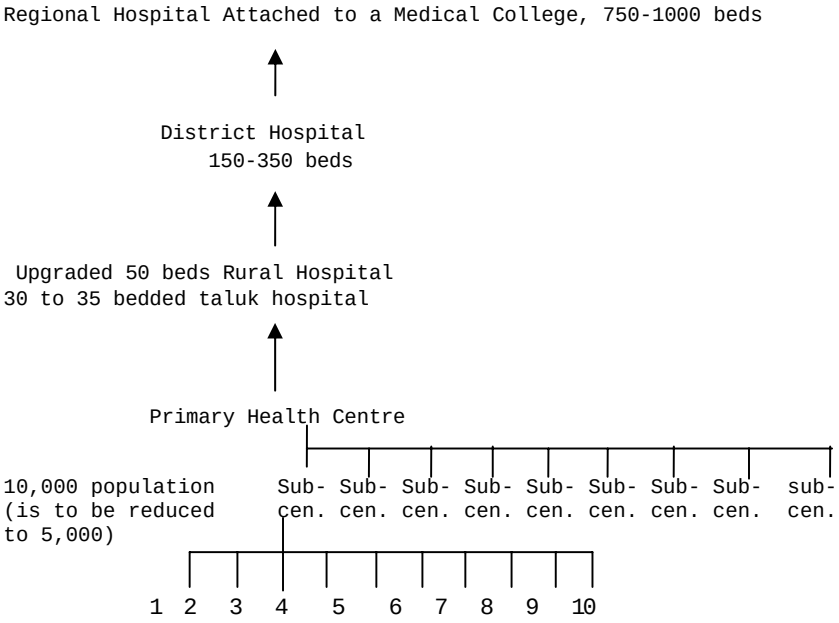
Primary Health Centres: The Community Development Programme was launched in 1952 as a major plank of rural development strategy. The primary health centre programme was implemented by the Ministry of Health and Family Welfare, Government of India. There were 5,400 Community Development Blocks. It was planned to set up one PHC in each block. The PHCs were conceived as nuclei from which primary health care services would radiate, through sub-centres, over the countryside. Thus, operational responsibilities would cover medical care, control of communicable diseases, maternal and. child health including nutrition and family welfare, environ-* mental sanitation, school health, health education and collection of vital and health statistics. The PHCs function as the first anchor against disease and ill health in rural areas. Medical relief in PHCs is designed as an institutional service. The out-patient departments give diagnostic and therapeutic services for minor and moderate ailments. Four to six beds attached to each PHC are used for observation and emergency services. PHCs are neither equipped nor expected to treat cases requiring sophisticated diagnostic facilities, surgical procedures, or a long period hospitalization. The PHCs are not completely self-sufficient. They are organically linked to institutions at higher levels, which function as referral centres. These include Tehsil/Taluq district hospitals or centres where laboratory, X-ray and specialist services are available. The structural linkages of PHCs are shown in figure No. 3.

Mudaliar Committee: Mudaliar Committee on Health Survey and Planning appointed in 1961'studied the functioning of PHCs and the progress made by them. To improve the operation of PHCs, the Committee recommended a reduction in the population coverage of each PHC, expansion and strengthening of district hospitals and introduction of mobile teams of specialists to provide necessary supervisory and consultant facilities at the periphery.

As many as 5,380 PHCs and more than 38,000 sub-centres have been set up in the country covering, in principle, almost the whole rural population in 5,247 Community Development Blocks 3. Though, PHCs have been established throughout the length and breadth of the country, yet they have not been able to effectively cover the whole population under their jurisdiction. The sphere of service of the PHCs has not by and large, extended beyond 2-5 mile radius. Also the establishment of referral hospitals has not made much progress. Whatever hospitals were opened or upgraded were mostly situated in the urban areas. This was perhaps due to the fact that the first preference in the development of medical care facilities had gone to the urban sector because of historical background and logistic advantages. This has resulted in heavy concentration of health services and manpower in urban areas. It has, therefore, been decided that one out of every four PHCs would be upgraded to a 30-bedded rural hospitals to provide both generalised, as well as, specialised services in medicine, surgery, anaesthesia, obstetrics and gynaecology.

FIGURE 3

RURAL HEALTH SCHEME WITH REFERRAL SERVICES (1977)



Ten villages' 1000 population each.

Non-availability of trained staff has become a challenge in implementing the primary health care scheme effectively. This is due to the PHCs being located in the interior, where communication facilities and basic amenities such as living quarters, water supply, sanitary and recreational facilities etc. are inadequate. In addition, a good number of persons posted at these PHCs are not oriented and attuned to the situation prevailing in rural areas and thus, fail to fulfil the needs of the rural community. There exists an interface between the health workers and the villagers with no agency to provide an effective linkage between these two partners of the society. A number of health programmes whose success depend on such an understanding have, thus, consequently failed to penetrate into rural areas.

Multi-purpose Workers Scheme: An attempt was made to integrate various health programmes in 1973 as recommended by Kartar Singh Committee by a progressive reorientation of uni-purpose workers into multipurpose workers*. The multipurpose workers scheme attempts to reduce the traditional stratification found at administrative and operational levels of various health programmes. Speedy implementation of the multi-purpose workers scheme and introduction of a three-tier plan for the health care of the villagers, with the community health workers (CHWs), later on called community health volunteers (CHVs), in the villages providing the base was

Strongly recommended in 1975 4. It also proposed a plan for reorienting medical education towards the needs of the country with emphasis being placed on community care rather than hospital care.

Rural Health Scheme: In line with this, Rural Health Scheme was launched in 1977. The scheme began with the training of CHVs in 777 selected PHCs spread over the country. Based on the philosophy of "placing people's health in the people's hands", the scheme envisages the provision of one CHV for every village or community with a population of 1,000. However, when the population of village is less than

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*These are workers functioning under various national health programmes introduced in the country. These programmes are being run vertically and implemented at the field level by staff deployed for each programme.

1,000, two or three neighboring villages may be grouped. If the villages are far away, one community health worker may be selected from each village even if the population is less than 1,000. India has 5, 80,000 villages served by 5,380 PHCs. The scheme is programmed to train 5,80,000 community health workers selected by respective villages by 1981. The objective of the scheme is to make preventive primary health care facilities, available to every villager and promote health education 3. The criteria for selection of the CHVs are: acceptability to the community, motivation, leadership qualities, basic education of the person (grade VI-VIII) and permanency of the residence in the village. The male candidate must have a regular source of income and should be above 30 years and willing to serve at least for three years[5]. The training of a CHV is arranged at the PHCs. In each PHC, a third medical officer is to be appointed preferably from traditional systems of medicine.

The Rural Health Scheme starts with the community health volunteer who is from his own village, selected by the community, willing to serve it and enjoying its confidence. This volunteer trainee during his three months training period is taught of the basic elements of health care and family welfare. He is trained in both modern and traditional medicine popular in the local region. After completing the training, each community health volunteer is provided with a kit containing simple medicines and remedies and also educational aids. He also carries a work manual available in English and in regional language. By June 1978, about 45,000 CHVs had been trained. Traditional systems of medicine, thus, are being given some place in the evolution of the health care pattern in the country.

This scheme has been evaluated in 1978 and 1979 by a number of institutions. The general conclusions of these evaluations are: (i) It has been mostly welcomed by the villagers, (ii) Misgivings do exist amongst the medical profession about the success of the scheme, (iii) The CHV has emerged as a vital carrier for the family welfare programme, and (iv) It suggested the more intensive training and higher salaries for CHVs 6.

But a recent study done by the Ministry of Health on the working of the scheme has revealed some of its inherent weaknesses. One of the major finding is that while the new tribe

of "barefoot doctors" enjoys greater degree of recognition and acceptance within the rural community; their assistance is most commonly sought for minor ailments and first aid needs. Here too a sample survey of community demand on the health workers and their activities shows that their usefulness in the field is limited. It also points out that while 85 per cent of poorly trained cadres of medical workers were approached by the villagers for medical treatment, but only 4.4 per cent of the villagers admitted to having had their need satisfied by the CHVs[7].

Western System of Medicine: In spite of all these efforts, the Western system of medicine has come to stay in urban India but it has not been absorbed in the rural culture due to the following reasons:

i. It is hospital based and disease-oriented.

ii. It is entirely dependent on borrowed foreign technology, leading to over-sophistication, thus making them ill-suited to the needs of the community.

iii. Attitudes, skills and approaches of trained personnel are entirely unrealistic.

iv. Health services are viewed as an end in themselves.

v. It is inaccessible to a large part of the population in physical, social, cultural and financial terms.

vi. There is a lack of community participation in health activities and the system is impervious to consumer influence.

In terms of institutional development and trained manpower the Western system of medicine has overwhelmed all the indigenous systems. The main features of the Western system that emerge are in direct conflict with the socio-economic strategy of development. Firstly, this system is urban oriented and the benefits are largely derived by the urban rich. Though millions of rupees are being spent on allopathy, about 90 per cent of the people who are living in villages are not able to get advantage out of it 8. It has been reported that since 1945, only 20 per cent beds had been provided in rural areas while 80 per cent were allotted to

urban population 9. Thus, the health services in India have not kept pace with the changing needs of the population either in quantity or in quality. Secondly, it is capital-intensive. It depends heavily on a large supply of expensively trained personnel and easy access to them. It requires expensive and extensive medical educational system, sophisticated equipment and a literate population with some know -ledge of diseases. The developing countries being economically poor and having large population are not in a position to deliver the health needs to the masses with the sole Western system of medicine. Thirdly, in the poor countries morbidity is generally related to lack of nutrients, sanitation and housing. The health programmes are not linked with environmental conditions. Fourthly, the traditional empirical knowledge of the indigenous medical system could not be made use of by effectively integrating with the Western technology. The advantages of this integration would be (a) replacement of synthetic drugs which have many undesirable effects by the drugs of the Ayurvedic and Unani systems which are obtained from natural products and do not have side-effects; and (b) use of the technological aids developed in the Western system for diagnostic and therapeutic purposes could be of great help. Finally, the Western system has been exaggerated by the growth of chemical industry which is also responsible in mushrooming the drugs of inferior quality in the market. This has been mainly done through capitalistic market forces and through the emphasis on the development of chemical industry based on profit.

China

The People's Republic of China has made enormous efforts to embark on developing an innovative and labour intensive model of health services especially adopted to the needs of the rural populace. In 1949, China was a country with infant mortality ranged upto 200 deaths in the first year of life per 1,000 live births, 307 of children died before the age of 5. The ratio of people to hospital beds in urban areas was 6550:1 with the number increasing to three times in the rural areas. Estimates of the numbers of doctors graduated from schools of Western medicine varied from 10,000 to 40,000 but even the higher figure would mean. That there were more than 10 times as many people per doctor as compared to the industrialised countries. Concentration in the cities meant that modern medical care was virtually unattainable in the

Rural areas where over 80 per cent of the people lived lO. Traditional Chinese medicine had often been neglected in the early part of the twentieth century pushing traditional medical practitioners in the background 11. After the liberation; the government decided on an strategy that placed preventive medicine first and mobilised the people to carry out the preventive work themselves, and rapidly expanded medical resources available by utilizing indigenous practitioners and medicament. The four guiding principles laid down by the First and Second National Health Conference in 1950 and 1951 were:

A. serves the workers, peasants and soldiers (in the Chinese idiom gong-nong-bing);

B. put the emphasis on prevention;

C. stress cooperation between doctors of Western and traditional medicines; and

D. rely on mass movements for carrying out health work.

In the initial years, however, the medical education and training was based on the Russian model. The number of conventionally trained doctors graduating each year increased from 1,391 in 1949-50 to 5,393 in 1957-58. One report indicates that there were 70,000 doctors in 1957 [12]. Intermediate medical manpower like medical assistants, nurses, midwives, junior pharmacists and laboratory technicians trained in secondary medical schools slowly increased in number from an original 1,40,000 in 1949 to about 15,000 each year upto 1956 10. The basic institution for medical care was the hospital and this was extended so as to provide one in each Hsien (country). Beyond this there were some clinics and public health stations but private practice was common. It is reported that between 1949 and 1957, 860 new hospitals were built, averaging 350 beds. A total of 3, 00,000 beds were created in eight years 12.

This pattern was broken by Great Leap Forward. Communes were set up for the first time. Each commune was supposed to establish and finance its own medical clinic. Medical courses were shortened to provide large number of medically trained persons quickly, and more medical teams were sent out to staff rural clinics. The emphasis was on preventive

Medicine. Numerous reports were brought out on availability of health facilities at commune level during the years 1958-60. The extent to which these rural health programmes have succeeded could not be evaluated because of the non-avail-ability of relevant information of that period. With the change in political hierarchy in 1960 there was a return to a more conventional approach of curative medicine. The number of commune health centres is claimed to have declined between 1960-1963 from 2, 90, and 000 to 70,000 and there was a widespread return to private practice 10. At the same time, as in the rest of the educational system, entrance standards for medical schools were raised, medical courses lengthened and stress was put on professionalism and the number of those graduating each year decreased. The policy of 'Prevention first' was resisted as the practical difficulties arose in a number of agricultural programmes and there was a resurgence of professional elitism in the Health Ministry. The doctors were not willing to go to the countryside. The return to private practice also made it difficult to implement preventive medicine as doctors were concerned about losses and, since profits could only be reaped through medical treatment. The doctors were reluctant to go to the countryside and doubts were raised about the usefulness of this practice in relation to the cost involved.

In 1965, once again there was change in policies with the erruption of Cultural Revolution (CR). Traditional practices and the mass line in preventive medicine were re-emphasised. Mao in his "June 26 Directive" instructed that the "Central gravity of health work be shifted to the countryside". Resources were to be transferred immediately from the diseases of the urban privileged to the diseases commonly occurring among the rural 85 per cent of population. Mao called for a number of changes like shortening of medical courses and transfer of one-half of urban medical personnel out to the countryside. Two major developments occurred as a result of this directive. Firstly, the widespread training, for new style medical workers known as "barefoot doctors" who should be drawn from the villages, was started. They received training in the treatment and prevention of common rural diseases and remained in their own villages to practice and work among their fellow peasants. Secondly, it gave the impetus to press ahead a decentralised locally financed cooperative health care system based on commune. Traditional practitioners were also deployed to develop and expand the

Health system. The three major features of Chinese delivery system of health care are:

Mass Line: The "mass line", on the basis of experience gained in 1952 health campaign, was specifically introduced as the fourth cordinal principle of health work enlist the broad masses of the people and active participation of health workers in the health campaign with them. All health workers were urged to forge link with the masses. Since the onset of cultural revolution the "mass line" has been developed with intermittent resistance. "Patriotic Health Movement" was used as an instrument to mobilise the masses for the Improvement of public health. The campaigns which continue throughout the year were usually nationwide. The main vehicle for preventive activity was not the medical work force but the people themselves. Stress was laid on labour-intensive methods as intermediate medical technology. However, the results could not be totally successful because in 1972, four years after the target date for the elimination of pests, the "four pests campaign" continued as energetically as everlO.

***Integration of Traditional and Western Medicines*:** In 1949, there were about 5,00,000 traditional practitioners or about one for every 7,100 of the estimated 540 million population at that time. There were about 20,000 doctors trained in Western system of medicine 12. Resources were used to deal with the common diseases of the majority of the people living in the countryside rather than for the treatment of and research into the diseases of the urban elite. Emphasis was laid on integration of Western and traditional systems. In accordance with this general policy, cooperation between the doctors of Western and traditional medicines was considered as one of the four principles on which medical work was to proceed. The stress on the intrinsic value of traditional medicine was greatly increased at the time of Great Leap Forward and was reinforced by the "mass line" - which the people through self-reliance (and thus through local remedies) could do far better than the experts. The Chinese Communist Party instructed that training classes should be established wherever conditions permitted for doctors trained along Western lines to study Chinese traditional medicine, and later on traditional medicine were introduced into all medical courses. However, as the original policy for medical personnel had not worked and that the medical personnel were still badly needed, new schools of traditional medicine were

opened and the "disciple" or apprenticeship system of training by individual practitioners was reintroduced. In 1958, 3,200 college students and 52,000 apprentices were undergoing training. However, the number of students in traditional medicines could not be increased in the late sixties lO.

Again during 1960 to 1965 there was some slipping back toward professional elitism. However, it is clear from the reports that integration between the two types of medicine in many areas is being carried out successfully, *e.g.* specta-cular success of acupuncutre anesthesia in combination with modern surgery and more modest advances such as combined modern and traditional treatment for schistosomiasis; acute abdominal conditions; kidney stones and gallstones and the use of X-rays in fracture cases for diagnosis and willow-splinting for treatmentl0,13.

Barefoot Doctors: The concept of the barefoot doctors (BFD) emerged during the Cultural Revolution. The BFD is neither a paramedical nore doctor's auxiliary. But he is a part-time worker and a part-time doctor and is trained to diagnose and treat the common diseases without the assistance of professional doctors. BFDs are choosen by the fellow peasants having junior or middle school education and are trained for 2-3 years in work - study medical schools sponsored by commune clinics, or - country hospitals. The specific content of training courses is determined by local health conditions and disease patterns. They study full time during the slack season and return to their villages during the busy months to work in the field. In the first year, they learn to prescribe 40 drugs and 50 acupuncture points for common local diseases. At the end of their training BDFs are expected to, at least, be able to treat about 100 diseases, apply 30 clinical techniques such as blood transfusion and acupuncture and prescribe 80-90 kinds of traditional and Western medicines 14.

They are also responsible for vaccination programmes, compiling medical histories, health campaigns and sanitation work. To maintain their supplies of certain medicines, they must collect medicinal herbs and promote the planting of herbs around the village. They are also instructed not to use Western medicine where the traditional medicine is available. The BFDs are paid on the basis of work point system which is determined by the load of work.

At present there are about 2 million BFDs in communes and countryside l5. Each commune has a hospital staffed by one or more BFDs. They are capable of responding to emergencies and of identifying and prescribing common diseases like gastroenteritis, influenza, headache, skin ailments, sprains etc. Cases requiring more sophisticated treatment or operation are referred to country hospitals or even larger hospitals.

It is not easy to assess the clinical standards of BFDs or their acceptability to their patients but their clinical success has been claimed in Chinese publications quite often. On the contrary, however, there are no reports of over-crowding in country hospitals attributed to reluctance by peasants to consult the barefoot doctors 10. A survey of Chinese Medical Journal clearly brings out that at present no stress is being given to barefoot doctors*.

According to the recent reports Chinese have apparently succeeded in bringing basic health services to rural areas and lower income urban neighborhood. China has been able to develop more health care facilities as compared to India in terms of physicians and number of beds in the hospitals (Table 1). In terms of infant mortality rate China has 11 per thousand in 1977 while India's figure was 11 times more in 1971. But both these figures are far below the industrialized countries.

TABLE 1

HEALTH SERVICES IN SELECTED COUNTRIES

Country	Year	Physicians per 10,000 Population	Population per physician	Total Number of beds	Population per bed
China	1978	4.0	2,510	-	1,111
India	1976	2.5	3,960	473,221	1,289
USSR	1976	33.7	300	3,009,200	85
USA	1976	16.8	600	1,401,624	152

Source: World Health Statistics, Geneva, WHO, 1979.

Conclusions

Looking at the health care system in India and China one comes to the conclusion that both have tried their utmost in solving their rural health problems but through different approaches. Both faced with large population and similar problems opted quite similar health delivery systems. India and China have been victims of Western system of medicine which led to the neglect of their traditional systems of medicine in the early colonial period. The Western system mainly benefitted the urban population which formed only 20 per cent of the total population and bypassed the huge rural mass. The rural health scheme started in India in 1977 has yielded considerable good results. The community health volunteers who form the front line are being accepted by the rural masses. Although a number of difficulties are being felt, but a determined effort is being made to provide hygienic and good sanitary conditions and thus, preventing the occurrence of a number of common diseases. As these volunteers receive short period training, it is best to utilise them for dispensing preventive advice and disseminating family planning counsel and services. They can also provide a link between the professional doctors (whether trained in Western or traditional medicine) and local people who often fall into the trap of quacks. China has been able to develop more health care facilities as compared to India in terms of physicians and number of beds in the hospitals. The efforts to implement the rural health care were taken up during the Great Leap Forward (GLF) and then in Cultural Revolution (CR) when a large number of professional doctors were forced to go to the countryside. In consequence a large number of medical schools and institutions of higher learning were closed. The barefoot doctors were choosen as the front line to cope up with the needs of the 700 million people living in the rural areas. Although the Chinese have been partially successful in implementing the rural health scheme, they have achieved this by using force and at the cost of damaging the professional medicine, the after effects of which are being recognised now. In India, there is need to further strengthening the efforts for integrating the Western and traditional systems of medicine. This requires more investment in research and development in the traditional systems of medicines like Unani and Ayurvedic.

REFERENCES

1. KURUP, P. N. V. (1977) Bird's-eye-view on indigenous systems of medicine in India. New Delhi, Ministry of Health and Family Welfare, p. 10 & 11.

2. MARWAH, S.M. (1979) Role of general practitioners and indigenous health workers in community health care in rural areas in Searo region. *Indian Journal of Preventive & Social Medicine.* 10:20.

3. KRISHNAMURTHI, C.R., GHOSAL, B.C. (1979) Primary health care in India. New Delhi, Ministry of Health and Family Welfare, p. 9, p. 10.

4. GOVERNMENT OF INDIA, MINISTRY OF HEALTH AND FAMILY WELFARE (19 78) Rural health scheme completes a year. *Centre Calling.* 13: 2.

5. GOVERNMENT OF INDIA, MINISTRY OF HEALTH AND FAMILY WELFARE (1979) Guidelines for selection of community health volunteer. *Centre Calling. 14* : 12.

6. GOVERNMENT OF INDIA, MINISTRY OF HEALTH AND FAMILY WELFARE (1979) Two years of community health scheme. *Centre Calling. 14* : 2, 6-9.

7. RURAL HEALTH CARE (EDITORIAL)(1980) *Hindustan Times.* April 10, p. 7.

8. GOVERNMENT OF INDIA, MINISTRY OF HEALTH AND FAMILY WELFARE (1977) Every system of medicine should get its due recognition. *Centre Calling. 12*: 3.

9. GOVERNMENT OF INDIA, MINISTRY OF HEALTH AND FAMILY WELFARE (1977) A vital role to be played by indigenous system. *Centre Calling.* 12:5.

10. WILENSKI, PETER (1976) The delivery of health services in the People's Republic of China. Ottawa: IDRC, p. 7, 11, 12, 35, 37, 46.

11. KAO, F.F., RAO, J.J. (1975) Traditional and modern medicine in China. *Impact of Science on Society.* 25: 261.

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THE PROBLEM OF RABIES IN INDIA

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ABSTRACT

This paper deals with rabies as an important public health problem in India because of its epidemic and endemic nature. The author deals with various studies conducted on the prevalence of rabies in India and states that the basic philoso-phy regulating Rabies Control Programmes in man and animals includes a systematic reduction of 'Vector population and enhancement of their immune status by vaccination backed by strict surveillance and reinforced regulation of quarantine of imports. 'Vector' population density and turnover are, therefore$_s$ the key points of attack in this approach. The author, therefore, identifies and discusses operational measures for the successful implementation of Rabies Control Programme in India.*

Rabies poses an important public health problem in India, as in several South-East Asian countries. The disease presents a complex epidemiological picture and is endemic in this country. It affects man, domestic and wild animals. Several species of animals act as reserviors of the virus of rabies.

Magnitude of the Problem

The economic and social impact of rabies in India has been brought out in several reports 1-10, in almost all of them however, the estimates are rather crude and arbitrary due to the incompleteness of available data. Still, the available data indicates the magnitude of the problem and the necessity for allocating priority for its control. It has been generally observed that in India, about 3,000,000 people undergo anti-rabies treatment annually. The cost per series of complete human prophylactic vaccinations is Rs.102.00 (Beran, unpublished) including the cost of vaccine and excluding working losses incurred due to deaths which

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has been reported to be around 15,000 to 20,000 annually. Yet, another survey of 41 teaching hospitals shows the average incidence of rabies as one per 2,000 admissions of all kinds, while in some, it was as high as one per 500 admissions. The data collected on 18,451 persons bitten by infective, rabid or presumably rabid animals when analysed showed an overall death rate of 0.39 per cent. Beran has observed that 3/4th of all human rabies cases occur in villages and the incidence is about five times more in males than in females.

As per world survey of rabies in a study of several thousand persons who received anti-rabies treatment at Pasteur Institute, Coonoor and Central Institute, Kasauli it was found that nearly 96 per cent were exposed to dog bites. This proves that dogs constitute important animal reservoirs transmitting rabies to man in India. The impact of an excessively high dog population on the epidemiology and control of rabies can be understood by analysing the dog to man ratio. An estimated dog to man ratio in a study shows as 1:35 in an urban area and obviously still less in rural areasl. The dog population of the country has been estimated at 5 crores which would mean an overall ratio of 1:12. Even healthy dogs can be carriers of rabies virus. Studies indicate, however, that these dogs are not regular excreters of the virus and do not show neutralising anti-bodies in their sera. There has, however, been report of death in a boy presumably after the bite of an apparently healthy dogl2.

Among the wild animals, the jackal appears to be the most important. In 1943, an epidemic of rabies in jackals occurred in Nilgiries district. In the next few months the population of jackals decreased in that area. It again increased in 1956 when another epidemic occurred^. In a study conducted by Pasteur Institute, Coonoor on the data for the years 1908 to 1974, the jackal bites accounted for 86 per cent of all wild animal bites. Some of the other wild animals which are present in India and often incriminated are a variety of felidae (Wild cats, leopards and tigers) and Canidae (Wolves, Jackals, Foxes, etc.).

Mongoose bites reported to have caused deaths due to rabies. In 1958 a man died of rabies in Tanjore after he was bitten by a mongoose. There were 32 cases of mongoose bites recorded in Kasauli in 1922-31[15-16]. Two of them died due to

rabies. The WHO identifies mongoose as potential carriers of rabies in North India and 203 persons received anti-rabies treatment.

The rabies was first reported by Veeraghavan in a Railway worker in 195417. However, studies conducted in Calcutta did not give evidence to the presence of rabies virus in bats (Beran).

In one case, human rabies death due to bandicoot bites was reported in Madras in 1968. However, a survey of 330 bandicoots trapped in Madras failed to show rabies negribodies[18].

As far as Rabies in animal is concerned, it has been roughly estimated as about 100 times that in man (Beran). In a study reported by Kathuria in the year 1967, deaths due to Rabies in animals accounted for 374 distributed as 150 in dogs, 2 in cats, 116 in cattle, 6 in horses and 18 in others. Among the 313 specimens received at IVRI for diagnosis of Rabies, 144 were found positive and included 86 from dogs, 3 from cats, 21 from horses and donkeys, 19 from cattle, 12 from buffaloes, 2 from camels and one from mongoose19.

Crux of the Problem

The basic philosophy on which Rabies Control Programmes in man and animals are built up includes a systematic reduction of 'vector' population and enhancement of their immune status by vaccination backed by strict surveillance and reinforced regulation of quarantine of imports. 'Vector' population density and turnover are, therefore, the key points of attack in this approach. Having fully realised the, significant 'vector' role of dogs in the dissemination of rabies in India, several programme have been developed in this country from time to time for Rabies control in man and animals. These programmes, however, are limited in extent, inconsistent and lacked a system coordinated on a national basis and hence provide an insignificant impact on reducing the prevalence of this disease. Nevertheless the experience accrued affords means to identify important, operational aspects.

Operational Aspects: Coordination

Rabies control is a multi-sectorial approach requiring active and close cooperation among physicians, veterinarians, public health administrators, lab. diagnosticians, producers of human and animal vaccines, health educators and local authorities at all levels namely, national, state, district, municipal, block, village, etc. This, therefore, requires a high level body at the national level to coordinate the activities of various agencies and ministries and also to keep liaison with International agencies such as the World Health Organisation (WHO), the International Office for Epizootics (IOE) and the Food and Agriculture Organisation (FAO) in addition to zoonoses centres and other interested national agencies like the Centre for Disease Control (CDC). With this in view the Ministry of Health has set up in the year 1978 a National Committee on Zoonoses Control in India with members drawn from Ministries of Health and Agriculture at the central and state levels. This committee has further constituted a sub-committee for canine rabies control which is entrusted with the responsibility of providing guidelines for developing a coordinated national programme of rabies control.

The directives of this Committee must be binding on the operational programmes taken up by state departments. In order to form an effective and functional link between this Committee and the state departments, it has been suggested in various forums that this responsibility should be vested with a senior veterinary public health officer attached to the department of public health with duties to co-ordinate and supervise all control activities.

Legal Support

The general strategies by the National Zoonoses Control Committee are necessarily to be backed by law and ordinances at national, state, and local levels regulating surveillance and reporting, registration and compulsory vaccination of owned dogs, elimination of stray dogs and restrictions on the inter-state movement of animals. Some states of the country such as Tamil Nadu have enacted such ordinances. The municipal laws in many instances do provide clauses incorporating legal support for rabies control activities for effective implementation.

Health Education

In a country like India where religious, cultural and socio-economic factors restrict the application of control efforts, health education is of paramount importance. Unless public cooperation is enlisted and liberally forthcoming no control programme can be effectively implemented. Emphasis must be placed more on cooperation rather than coercion. This, therefore, implies optimal utilisation of mass communication channels and media for dissemination of information on control strategies, surveillance data, implementational procedures and above all the basic citizenship training with strict observance of regulatory laws, registration and vaccination of owned dogs, cooperation with the administration in the elimination of stray dogs, restraint of dogs in public places, prompt notification of cases, etc.

Vaccination

Control programmes in operation in other countries have shown that substantial reduction of cases of Rabies in man and animals can be brought about by vaccinating atleast 70 per cent of the dog population. If this goal is to be reached in India where there is an estimated 50 million dog population of which 2 per cent are presumably owned, there is an immediate need for one million doses of vaccine for dog prophylaxis alone besides vaccines for post exposure therapy in man and animals. Therefore, ensuring an adequate supply of anti-rabic vaccine of proven potency and efficacy is essential to the operation of control programme. Implied in this is the identification and organisation of research and production components with a view to cope up with the national demands.

The technological advances in this area have been quite impressive and the conventional Sample vaccine of nervous tissue origin has since largely been replaced by the live attenuated Flury vaccine for dog vaccination in view of the latter's efficacy and economics. Similarly, the necessity for pre-exposure vaccination of the vulnerable human population comprising veterinarians, laboratory workers, animal handlers and persons likely to be exposed to animal bites has been fully realised and highly modernised vaccine in cell culture systems such as the human deploid cell culture vaccine and the suckling mouse brains vaccine have come into

vogue. However, the high cost-impact of these researches restrict their application in this country. Still some of these new areas can be looked into, particularly, the deployment of cell cultures for vaccine production for animals and human use. An operational problem in this area is concerned with feasibility studies and cost-benefit analysis in respect of the newer vaccines for animal and human prophylaxis.

Post exposure administration of vaccine depends upon the identification of rabies in the biting animal, the endemic nature of the disease in the area, the site and severity of the bite and above all the discretion of the attending physician. Guidelines provided by WHO Expert Committees on rabies clearly indicate the course of treatment. Hyperimmune sera, if available, are recommended depending upon the severity of the case.

Administration of vaccine is generally done by vaccination teams with a swift action to ensure satisfactory coverage within a minimum possible time. Much attention is required particularly on the implementation of control programmes in rural areas, in delineating areas for vaccination, number of vaccination teams, transportation, storage and administration of vaccine. All these are to be examined at the local level for effective implementation.

Registration and Licensing

Vaccinated dogs need to be registered and licensed with strict instructions to the owners for compliance with already enunciated tenets of rabies prevention and control. The infrastructure facilities in this connection include provision of registration cards, staff, ordinances and facilities for the campaign.

Catching and Elimination of Stray Dogs

Several methods have been tried and applied for the identification, catching and elimination of stray dogs. Each method poses locally identifiable operational problems (resistance to dog squads, unacceptance of killing methods for removal in public places like shooting and strychnine poisoning etc.). A problem of greater magnitude in this regard is the difficulty encountered for the disposal of dogs under this programme. Some recent developments in India have

clearly indicated the potential use of tanned dog skin and carcase products such as meat meal, wax etc. These developments, however, are to be examined very critically for large scale application.

Diagnostic Facilities

Another dimension in the implementation of operational programmes in Rabies control is the provision of diagnostic facilities. The latest advances in this regard comprise the application of Fluorescent antibody test (FAT) for detecting rabies antigen in clinical cases and on post-mortem in man and animals. Again the high cost of Fluorescent microscope, the necessity for trained personnel for interpretation of results and the need for conjugated antibodies and other biological, restrict its large scale utility. All said and done if, we are to keep up with the latest trends and advances in other countries, these operational problems have to be overcome keeping in view the enormous advantages which will accrue as a result of their application. Diagnostic laboratories have, therefore, to be identified and strengthened for this purpose. For facilitating field operations proper provision for shipment of diagnostic specimens to the laboratories must be made.

Training Facilities

Training of personnel to be employed in vaccine production, diagnosis, epidemiology and control operations at various levels is an essential pre-requisite in the control programme. It is, therefore, necessary to identify the type and level of personnel to be trained and centres where such training could be provided. Advanced training facilities already exist in some veterinary and medical institutions in the country. Augmentation of facilities in other places is required for coping up with the demand for providing trained personnel in operational programmes.

REFERENCES

1. NATIONAL SEMINAR (1968)First National Seminar on Zoonosis in India and their control held at NICD, Delhi, Oct. 1968.

2. NATIONAL SEMINAR (1977) Second National Seminar on

Zoonosis in India and their control held at NICD, Delhi and IVRI, Mukteswar/lzatnagar, June, 1977.

1. NATIONAL SEMINAR (1980) Third National Seminar on Zoonosis in India and their control held at Veterinary College, Bangalore, February, 1980.

2. SEMINAR (1972) Diseases of Zoonotic importance held in the Ministry of Agriculture, Government of India, New Delhi, September, 1972.

3. WORLD HEALTH ORGANISATION (1970) WHO Regional Seminar on Veterinary Public Health held in IVRI, Mukteswar, April, 1970.

4. WORLD HEALTH ORGANISATION (1973) WHO Regional and Inter-Regional Seminar on "Methods of Epidemiological surveillance of zoonosis,foodborne infections and other communicable diseases" held in Bangkok, Oct. 1973.

5. WORLD HEALTH ORGANISATION (1974) WHO Regional and Inter-Regional Seminar on organisation of veterinary public health services held in New Delhi and IVRI, Mukteswar, Oct., 1974.

6. WORLD HEALTH ORGANISATION (1978) WHO Inter-Regional Seminar on "Veterinary Public Health - Manpower Development" held in New Delhi, February, 1978.

7. ABDUSSALAM, M. (1977) Training in Veterinary Public Health (WHO Project SE/IOP/VAPH 001), Jan. 1977.

8. RABIES DOCUMENT (1978) Rabies - Working document on the organisation of future activities - Rabies Laboratory, Division of Biological Products, IVRI, Izatnagar.

9. WHO CHRONICLE (1970) World Survey of Rabies (1959-70). *WHO Chronicle, 24,* 576.

10. ANNUAL REPORT (1970) Scientific Report of the Pasteur Institute of Southern India, Coonoor for the year 1970.

11. MADHOK (1978) Rabies control activities in the city

of Calcutta, West Bengal, India - Control of dog population. Paper presented at the WHO Inter-Regional Seminar on VPH - Manpower Development, New Delhi, February, 1978.

14. REPORT (1957) Pasteur Institute of Southern India,Coonoor 1957, Golden Jubilee Souvenir 1907-57. The Diocesan Press, Madras.

15. GREWAL, O.S. (1932) Rabies in Mongoose. *Indian Medical Gazette. 6*7: 451-453.

16. RAY, B.N. (1939) Hydrophobia from mongoose bite. *Indian Medical Gazette, 74:* 162.

17. ANNUAL REPORT (1954) Annual report of the Pasteur Institute of Southern India, Coonoor, the Diocesan Press, Madras.

18. D'SOUZA, B.A., RAMAKRISHNA RAO, J., VICTOR, D.A. & ABDUL KHADER, G. (1969) A preliminary investigation on the role of Bandikoota malabarica in the transmission of rabies among dogs in the city of Madras. *Indian Veterinary Journal,* 45: 633-638.

19. KATHURIA, B.K. (1968) Studies on Rabies - its epizoo-tology and diagnosis - Paper presented at the First National Seminar on Zoonosis and their control in India, NICD, Delhi, October, 1968.

20. PROCEEDINGS of the Inter-country Seminar for Planning of National and Regional Programme for surveillance, prevention and control of zoonosis and related food-borne disease, NICD, Delhi, 12-16 Nov., 1979.

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AWARENESS OF POPULATION PROBLEM AMONGST SCHOOL CHILDREN

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ABSTRACT

In the present study, attempts have been made to assess the awareness of population problem among high school students of Luoknow city. The population problem, as such, is net included in the curriculum of any subject in the high schools of Uttar Pradesh. The objective was to test the knowledge of students to ascertain the degree and extent of awareness amongst them.

An adequate knowledge of population dynamics was present in 38.6 per cent of students, while 8.1 per cent had very little or no knowledge. The knowledge was found to be influenced by the avail-ability of mass media, social class, education and occupation of the fathers, and size of the family. Majority of the students expressed their desire for two males and one female children in the family. Suggestions have been made to introduce the subject into the present education system utilising existing resources.

Population problem has come to assume a matter of great concern. The current pace of growth of population has created constraints for the social and economic development of our country. It has often been pointed out that health departments alone cannot effectively tackle this problem and an all-out effort is needed. It has been experienced that motivating people through education to accept the small family norm appears to be the only viable approach. It has also been brought out that motivation of persons, whose ideas and attitudes get fixed with advancing age, is a difficult process. Younger age is more amenable to accept -

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newer ideas. With this in view, it was felt that population education should form an integral part of school curriculum to minimise the efforts needed to motivate them for planned family, when they attain adulthood.

A National Seminar on Population Education was held at Bombay in 1969 and recommended introduction of population education in schools. This was followed by a National Conference on Population Education in 1971 to take vital administrative and academic decisions for implementation of population education programme in schools. The present study has been undertaken to assess the awareness of population problem amongst the senior school children of Lucknow and also to study the factors which might have influenced it.

Material and Methods

The present study included 381 school children drawn from seven schools of Lucknow city. They have selected at random. All children studying in Class X on the day of visit were included in the study. All these schools presented more or less similar educational pattern. Simple questions regarding population problem, which a student of Class X is expected to know, were asked *viz.*

i. Whether population of India is increasing/decreasing/ stationary.

ii. By what number or rate population of India increases every year - 13 million/equal to Australia's population/2.2 per cent/do not know/others.

iii. What will be the effect on population if:

a. Birth rate exceeds death rate - increases/ decreases/stationary.

b. Death rate exceeds birth rate - increases/ decreases/stationary.

c. Birth rate and death rate are equal-increases/ decreases/stationary.

A total score of 5 was assigned to the answers in respect of the above questions. These have analysed in

relation to the availability of mass media, social class, family size, education and occupation of father.

The students were also asked about the number and sex of children desirable in a family. The information thus collected has been analysed in relation to size of their families. The students who did net reply any question were excluded from that set of analysis.

Results

Of the 381 children who were put to test to assess the awareness of population probelm in terms of population dynamics, more than half (53.3%) had a knowledge score of 2 and 3. Nearly 40 per cent of children scored 4 and 5, and a small number (8.1%) had very little or no knowledge (score 0 and 1).

It was seen that more than 50 per cent of the children who had both the radio and newspapers at their home scored 4 and 5 as compared to only 20 per cent who have no access to these media (see Table 1). Also, the availability of mass media at home, showed a better influence on the awareness of children as compared to those where it was available at school only. There had been a significant association between the knowledge of population dynamics and the avail-ability of mass media (P/ 0.001).

TABLE 1

KNOWLEDGE OF POPULATION DYNAMICS IN RELATION TO AVAILABILITY OF MASS MEDIA

Mass Media	Available at	No. of Children	Percentage of children with knowledge score					
			0	1	2	3	4	5
Radio	School	72	2.8	6.9	11.1	50.0	22.2	6.9
	Home	83	-	3.6	13.2	32.5	38.6	12.0
	Both	114	—	2.6	13.2	29.8	39.5	14.9
	Not available	112	5.3	10.7	35.7	28.6	17.9	1.8
News-	School	87	1.1	8.0	16.1	42.5	26.4.	5.7
paper	Home	70	-	5.7	12.9	22.9	42.9	15.7
	Both	95	2.1	3.1	10.5	30.5	36.8	16.8
	Not available	129	3.9	6.9	31.8	36.5	19.4	1.5

Nearly 80 per cent of the children belonging to social class I scored 4 and 5 and none scored less than 3. On the other hand, of those belonging to social class V, only 16 per cent scored 4 and none could be able to achieve highest score 5 (Table 2). This difference in the knowledge of population dynamics in relation to social class was found highly significant (P / 0.001).

It was noted that nearly 50 per cent of the children belonging to smaller families (size 1-5) scored 4 and 5, as compared to only 16 per cent of those who belonged to larger families *i.e.* more than 9 members (Table 3). The difference in the knowledge of population dynamics in relation to size of family was found statistically significant (P /0.001).

More than 50 per cent of the children whose fathers were well educated (Intermediate and above) scored 4 and 5, as compared to only 20 per cent of those whose fathers were either illiterate or had only primary education (Table 4). The educational status of fathers was, thus, found to influence the knowledge of population dynamics (P / 0.001).

TABLE 2

KNOWLEDGE OF POPULATION DYNAMICS IN RELATION TO SOCIAL CLASS

Social class	No. of Children	Percentage of children with knowledge score					
		0	1	2	3	4	5
I	15	-	-	-	20.0	33.3	46.7
II	42	-	-	7.1	23.8	40.8	28.6
III	81	-	2.5	8.6	33.3	43.2	12.3
IV	156	1.9	6.4	20.5	41.0	26.9	3.2
V	87	5.7	12.6	36.8	28.7	16.1	_
Total	381	2.1	6.0	19.4	33.9	29.7	8.9

TABLE 3

KNOWLEDGE OF POPULATION DYNAMICS IN RELATION TO SIZE OF FAMILY

Family Size	No. of Children	Percentage of children with knowledge score 0	1	2	3	4	5
1-5	117	0.8	2.6	10.3	35.9	32.5	17.9
6-9	208	0.9	5.8	21.2	34.1	31.7	6.2
10+	56	8.9	14.3	32.1	28.6	16.1	-
Total	381	2.1	6.0	19.4	33.9	29.7	8.9

TABLE 4

KNOWLEDGE OF POPULATION DYNAMICS IN RELATION TO EDUCATIONAL STATUS OF FATHER

Educational status of father	No. of children	Percentage of children with knowledge score 0	1	2	3	4	5
Illiterate	63	4.8	11.1	39.7	25.4	19.0	-
Primary	91	4.4	8.8	24.2	41.7	17.6	3.3
High School	85	1.2	4.7	16.5	36.5	36.5	4.7
Intermediate	47	-	4.2	14.9	27.7	38.3	14.9
Degree	95	-	2.1	6.3	32.6	37.9	21.1
Total	381	2.1	6.0	19.4	33.9	29,7	8.9

As shown in Table 5, a knowledge score of 4 and 5 was found in more than 80 per cent of children whose fathers were in the profession of doctors, engineers or executives and this was significantly higher as compared to only 10 per cent of those whose fathers were labourers or farmers (P L 0.001).

Majority of the children preferred two males and one female children in the family (Table 6). An increase in the desire for more children was seen among students belonging to larger families as compared to those who belonged to smaller families (P / 0.001).

TABLE 5

KNOWLEDGE OF POPULATION DYNAMICS IN RELATION TO FAMILY OCCUPATION

Family Occupation	No. of Children	Percentage of children with knowledge score						
		0	1	2	3		4	5
Labourer	37	8.1	18.9	37.8	27	0	8.1	-
Farmer	56	3.6	14.3	30.4	32	3	**10.7**	1.8
Service	173	1.7	4.0	17.9	43	3	30.0	2.9
Business	83	-	-	12.0	32	5	43.4	12.0
Professional	32	-	-	-	15	6	31.2	53.1
Total	381	2.1	6.0	19.4	33	9	**29.7**	8.9

TABLE 6

NUMBER AND SEX OF CHILDREN DESIRED IN RELATION TO FAMILY SIZE

Family size	No. of Children	Percentage of children with desire for									
		Male					Female				
		None	One	Two	Three	Four	None	One	Two	Three	Four
1-5	117	-	39.3	53.0	6.8	0.8	4.2	80.4	12.8	1.7	0.8
6-9	208	-	31.3	59.6	6.7	2.4	-	76.9	17.8	3.4	1.9
10+	56	-	**19.6**	66.1	8.9	5.3	-	62.5	**32.1**	5.4	-
Total	381	-	32.1	58.6	7.1	2.4	1.3	76.0	18.4	3.1	1.3

Discussions

The present study has revealed that nearly 40 per cent of the school children had a fairly good knowledge (score 4 and 5) regarding population problem. However, this seems to be quite low as compared to that of Rasheed *et at.* where the awareness regarding population problem on national level was found in 60 per cent of the students4.

The availability of mass media like newspaper and radio at homes as well as in schools was found to have its influence on the awareness. Though, availability of newspaper or radio in the schools was found to be beneficial in improving the awareness, it was not as effective as it would have been at home. This might be due to the fact that the children in the schools get very little time to listen the radio and that too during a limited period. On the other hand, they have a greater opportunity to listen the radio in their homes, which exerts a greater influence on their awareness. Similarly, the newspaper in the schools is often in the hands of the teachers, and students often fail to draw any meaningful benefit from them. In their study, Rasheed *et al.* observed that the awareness on population problem was more in children who were in the hobby of reading newspaper and journals as compared to those who had other hobbies^.

Awareness of population problem in the children was found influenced by educational attainments of the fathers, their occupation and socio-economic status. In the present study, the children whose fathers were well educated, had a greater awareness of population problem than those whose fathers were illiterate or less educated. A high degree of awareness on population problem has also been observed by Rasheed *et al.* in the children whose mothers were highly educated^. Similarly, the children whose fathers were in the highly paid occupations shared a better awareness than those whose fathers were farmers or labourers. The fact could be explained that better the occupation, the better will be socio-economic status which, in turn, will be responsible for better parental care and education of children. A high degree of awareness in the children belonging to better social class as compared to those who belonged to lower socio-economic status, is in confirmity with that of Rasheed *et al.* where a high degree of awareness about family planning was seen in the children belonging to upper socioeconomic groups than those belonging to social class IV and V.

In an attempt to find out the views of children regarding optimum number of children in the family, majority desired for one female and two male children. Also, those belonging to larger families preferred more children than those belonging to smaller families. This observation again reflects the role of socio-economic status. It is surprising to note that children belonging to larger families do not feel the pinch of a larger family.

Conclusions and Recommendations

The observations of this study clearly indicate that awareness of population problem amongst school children is significantly influenced by various social factors studied. The children belonging to better-off families had better awareness. It appears that the schools are not imparting population education to their students. The authors feel that this is one of important lacunae in family welfare programme and recommend that State Governments must issue instructions to schools to include population education in their curriculum without losing any further time. Population study must be made a compulsory subject at high school level examination.

REFERENCES

1. NCERT (1969) National Seminar on Population Education, National Council of Educational Research and Training, New Delhi.

2. NCERT (1971) National Conference on Population Education, National Council of Educational Research and Training, New Delhi.

3. PRASAD, B.G. (1970) Changes Proposed in Social Classification of Indian Families. *Journal of Indian Medical Association, 55*: 6.

4. RASHEED, P., KHAN, A. & ZAHEER, M. (1978) Awareness of unmarried girls regarding population problem, human reproduction and family planning. *Indian Pediatrics* 15: 735.

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MORBIDITY PATTERN IN ANDAMAN AND NICOBAR ISLANDS

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ABSTRACT

In this paper, the author elucidates the morbidity pattern in the Andaman and Nioobar Islands, situated in the Bay of Bengal, based on data derived from official records.

The author describes, the disease pattern prevalent and draws inferences on the morbidity pattern from these data.

For planning health care delivery, it is essential to know the health problems of the community, their nature, size and distribution among various population groups. Continuous recording of concurrent events and periodical collection of special information provide data to ascertain health problems. Registration of vital events such as birth and deaths, notification of infectious diseases, records of hospitals, dispensaries and primary health centres are the routine sources of information for morbidity and mortality. Periodical collection of data during census also provides some information. In India, all the above sources have many limitations and the data collected from these sources do not reveal complete picture of the disease pattern. Under these circumstances morbidity survey and special disease survey are of immense value. Surveys, however, require special arrangement with financial implications.

Disease pattern in Andaman and Nicobar Islands is not clearly known. A health survey was carried out in a localised area in Great Nicobar Islands during 1966 but sample size was so small that results could not be generalised. A special survey for Yaws was also made in 1931 in a small area of Nicobar Islands. First attempt to utilise recorded data to describe disease pattern in the Islands was, therefore, made in 1973.

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As health survey requires a long time, a large number of people and sufficient money, and hence it was decided in the present study to utilise the recorded data to describe the disease pattern in Andaman and Nicobar Islands.

Area and Population

Andaman and Nicobar, a Union Territory, consists of 321 islands, and is situated in Bay of Bengal at a longitude between 92° and 94° East and latitude between 6° and 14° North. Port Blair, capital of the Union Territory, is 1191 kms. from Madras and 1255 kms from Calcutta. The islands cover an area of 8293 sq. kms., Andamans (76%) and Nicobar (24%), of the land area and 90 per cent of the land is forest area. Climate is tropical with average rainfall of 125 inches, mean relative humidity 79 per cent, maximum and minimum temperature being 32°C and 15°C respectively.

There are two districts, four sub-divisions, seven tehsils and five community development blocks in this union territory. The only town is Port Blair and the number of inhabitated villages is 390.

Total population according to 1971 census is 1,15,133, of whom 81 per cent are living in Andamans. Tribal population is estimated to be 18,102 accounting 16 per cent of the total population. Least number is for the Andamanese whose number is only 24 and the largest group is Nicobarese whose number is 17,874. A number of other tribes are Onges 112 and Shompens 92. The exact number of Jarawas and Sentinalese is not known. In 1961, an estimated number of these two tribes was 500 and 50 respectively. It is feared that except Nicobarese, the number of all other tribes is declining. Sex ratio is 644 females per 1000 males.

Material and Methods

The present study is based on the death registration, notification records, attendance registers of hospitals, dispensaries, primary health centres, special registers maintained for National Disease Control • Programmes for the year 1978-79. The territory has 13 hospitals, 62 dispensaries and 2 primary health centres. As number of private practitioners is negligible in the islands, it is presumed that people when ill come to the existing medical care facilities.

But due to absence of diagnostic facilities, precision in diagnosis may be lacking. It is also true that many tribal people do not avail of those facilities at all and go for traditional healing practices.

Diagnosis is mostly clinical. In some diseases, diagnosis is confirmed by laboratory examination as in malaria, filariasis, pulmonary tuberculosis, intestinal helminthiasis, etc. For acute illnesses spells are taken for calculation of rates. Estimated population in 1978 is 1, 51,920.

Principal Diseases during 1978-79

TABLE 1

PRINCIPAL DISEASES DURING 1978-79

	Attack		Death		Proportion to total (per cent)	
	Spells	Rate/ 1000	Number	Rate/ 1000	Spells	Deaths
1. Diseases of respiratory system	102,200	672.72	45	0.30	29.95	14.29
2. Accidents	33,237	218.78	6	0.04	9.74	1.90
3. Diseases of skin and subcut tissue	22,000	144.81	0	0.00	6.45	0.00
4. Diarrhoea/ dysentery	21,427	141.04	21	0.14	6.28	6.67
5. Malnutrition	17,714	116.60	5	0.03	5.19	1.59
6. Helminthiasis	15,992	105.27	0	0.00	4.69	0.00
7. Anaemia	10,816	71.20	20	0.23	3.17	6.35
8. Diseases of circulatory system	6,105	40.18	53	0.35	1.79	16.83
9. Malaria	2,810	18.50	27	0.18	0.82	8.57
10. Diabetes Mellitus	1,634	10.76	3	0.02	0.48	0.95
11. Measles	660	4.38	0	0.00	0.19	0.00
12. Tuberculosis piratory system)	**617**	4.06	10	0.67	0.18	3.17
13. Whooping cough	586	3.90	2	0.01	0.17	0.63
14. S.T.D.	536	3.53	1	0.01	0.16	0.32
15. Inf. Hepatitis	433	2.85	2	0.01	0.13	0.63
16. Leprosy	370	2.4	0	0.00	0.06	0.00
17. Filariasis	209	**1.38**	0	0.00	0.06	0.00
18. Malig. Neoplasm	110	0.72	15	0.10	0.03	4.76
19. Tetanus	25	0.16	7	0.05	0.01	2.22
20. Typhoid	19	0.11	4	0.02	0.01	1.27
21. Poliomyelitis	1	0.01	0	0.00	0.0003	0.00
Total of all diseases	341,133	2245.5	315	2.07	100.00	100.00

It is seen from Table 1 that on an average each individual had more than two spells of sickness. Leading cause of morbidity in Andaman and Nicobar group of islands was respiratory illnesses, incidence rate being 672.72 per 1000. Mortality rate of these diseases was 0.30 per 1000. These diseases were responsible for 29.95 per cent of total morbidity and 14.29 per cent of total mortality. Among the different types of respiratory illnesses, commonest was acute respiratory illness (33.1%), followed by Bronchitis. Emphysema and Bronchial Asthma (21.4%).

There were 144.81 cases of skin diseases per 1000. Among 22,000 cases, 12,476 (56.71%) were due to infection.

In diarrhoeal diseases both morbidity and mortality were high. During the year, 141.04 episodes of diarrhoeal diseases per 1000 population occurred and death rate was 6.28 per 1000. These diseases contributed 6.28 per cent to the morbidity and 6.67 per cent to the mortality from all causes. High incidence of diarrhoeal diseases could be attributed to poor environmental sanitation and personal hygiene. In most of the islands, open defecation was practised. In some places, pigs acted as natural scavenger making environment more unhygienic.

Cholera was not present during the year and not endemic in these islands, but it occurred in epidemic form first in 1966. A severe outbreak of bacillary dysentery was reported during 1979 in Car Nicobar5.

Number of reported cases and deaths due to typhoid fever were 19 and 4 respectively during the year. But diagnosis of typhoid fever was generally made on the basis of clinical findings. Hence exact incidence could not be ascertained.

Infectious hepatitis cases were reported during the year among 433 persons and there were only 2 deaths due to this disease.

About 105.27 per 1000 suffered from helminthiasis. Among the helminthes, ascaris lumbricoides comprised 10.14 per cent. Other helminthes, were hookworm, teenia slim etc. Presence of schistosomes was suspected, but not confirmed,

Incidence of malaria was based on surveillance data.

From available records, it appeared that Annual Parasite Incidence was 18.50. Position of malaria with regard to morbidity was ninth, but as regards mortality, it occupied third place, comprising 8.57 per cent of the total deaths. Among 2,810 cases, 2,483 (88.36%) were due to P. Vivax, 283 (10.1%) due to P. falciparum and 44 (1.5%) due to mixed infection. Southern groups of islands viz. Car Nicobar, Chowra, Teresa, Nan cowry, Great Nicobar, Cam bell Bay, South Andaman and North Andamans were seriously affected. In Nicobar group of islands, 1,607 cases occurred, giving an API as high as 51.48.

A.Sundaicus was found to be principal vector.

During 1978-79, 209 cases received treatment in hospitals and dispensaries for filariasis. It gave a rate of 1.38 per 1000. A total of 13,712 slides were examined and 24 were positive for microfilaria, giving a microfilaria rate of 0.90 per cent.Filariasis in these islands was sub periodic in nature.

Tuberculosis was a serious problem in the islands as 4.06 per 1000 were getting treatment for pulmonary tuberculosis alone. Another 689 were treated for non pulmonary tuberculosis. Number of sputum positive cases was 135 constituting 20 per cent of total pulmonary cases.

Prevalence rate of Leprosy was found to be 2.4 per 1000. But house-to-house survey was started only in 1976 through 10 S.E.T. Centres and 2 Urban Leprosy Clinics. Number of lepromatous cases was 66 comprising 17.84 per cent of the total cases. Number of cases below 15 years was 41, giving a childhood rate of 11.09 per cent. Only 6 (1.67%) of the cases were from tribal population. Number of sexually transmitted diseases who received treatment during the year was 536. Among them 510 (95%) were gonorrhoea cases. But diagnosis of all the cases was not confirmed in the laboratory. A serological study was carried out among Onges. None out of 57 tested were positive for VDRL5. On the other hand, in Great Nicobar Island, VDRL positivity rates among Nicobarese and Shompens were 53.51 and 77.14 per cent res-pectively4. High prevalence of STD was also noted in Nicobar Island in 19733.

Yaws was not reported during the year and according to

The doctors interviewed, Yaws was not seen by any of them, although studies carried out in the past revealed high prevalence of Yawsl,2. The prevalence rate of Yaws among Nicobarese was 20 per cent and among the Sharpens it was 90 per cent and high VDKL positivity rate might be due to Yaws.

Only one case of paralytic poliomyelitis was reported during the year. But the Islands witnessed several outbreaks in the past. In an outbreak in Nicobar Islands in 1947-48, there were 1000*; cases and 300 deaths. In another outbreak, 33 paralytic cases occurred in Andaman group of islands from December 1956 to May 19576.

Measles were reported in 773 cases during the year. There was, however, no death. Measles epidemics were reported in the past from Nicobar Islands. During an epidemic in 1975, 615 cases occurred from May to August.

No case of diphtheria occurred during the year, although a few cases were reported in earlier years.

No case of human rabies was reported so far. Probably it was absent in the islands.

TABLE 2

CASES AND DEATHS DUE TO DISEASES OF CIRCULATORY SYSTEM

Cases	Deaths			
	Number	Percentage	Number	Percentage
Rheumatic heart diseases	235	3.85	1	1.89
Hypertension	744	12.19	6	11.32
Ischaemia heart diseases	22	0.35	17	32.07
Cerebrovascular diseases	7	0.11	5	9.43
Other forms of heart diseases	420	6.88	20	37.74
Diseases of arteries, arterioles and capillaries	6	0.10	4	7.55
Venous thrombosis and embolism	479	7.85	0	0.00
Other diseases of circulatory system	4,192	68.67	0	0.00
Total	6,105	100.00	53	100.00

Morbidity rate of diseases of circulatory system was 40.18 per 1000, but death rate was quite high *i.e.* 0.35 per 1000. This group of illness was responsible for largest number of deaths (16.83% of total deaths).

Other diseases of circulatory system which contributed 68.67 per cent of the total diseases of this system, were minor in nature which was evident from absence of death due to them. Among the serious diseases, hypertension was commonest as against Rheumatic Heart Disease in the mainland7. Death was very high in Ischemic heart disease which had fatality rate of 77.27 per cent. Difference in prevalence of these diseases between tribals and non-tribal's could not be ascertained because of non-availability of the data.

It was observed that 116.60 per 1000 population had some kind of nutritional disorders. Vitamin deficiencies were widespread. Anemia was very common, 71.20 per 1000 suffering from it.

Summary and Conclusion

Disease pattern in Andaman and Nicobar Island was studied on the basis of available records *vis.* notification records, attendance registers of hospitals, dispensaries, and primary health centers, special registers maintained for National Disease Control Programmes, for the year 1978-79. There were 3, 41,133 spells of illness among 15,192 people of the islands, giving a morbidity rate of 44.5 per 1000. It means that on an average one individual suffered more than twice. Infective and parasitic diseases were responsible for 1, 49,973 spells of illness, which contributed 43.96 per cent of the total illnesses. Highest morbidity was due to diseases of respiratory system, which contributed 29.95 per cent of total illnesses. Incidence of diarrhea and dysentery was also high, contributing 6.28 per cent to total morbidity and 6.67 per cent to total mortality. Diseases of skin, helminthiasis, malaria, tuberculosis were also common". Incidence of malaria was 18.50 per 1000. Tuberculosis of respiratory system was found to affect 4.06 per 1000 population. Sexually transmitted diseases, leprosy, filariasis were also present though number was not very high. There was no case of diphtheria and rabies, the latter never reported, from the island. Yaws was not present, although it was known To exist

in the past. Among the diseases of circulatory system, hypertension was unusually high, morbidity rate being 12.19 per 1000. Malnutrition was also widespread. Death rate on the basis of records came to only 2.07 per 1000. This unusually low rate is due to the fact that many fatal cases did not come to medical care facilities at all.

Many of the infective and parasitic diseases can be prevented or controlled. Immunizations will reduce occurrence of tetanus, whooping cough, measles, poliomyelitis, tuberculosis. Better case finding and early treatment are essential for control of tuberculosis, leprosy, STD etc. Needless to mention improvement in personal hygiene, environmental sanitation are essential to control many other diseases such as diarrhea and dysentery, helminthiasis. There is a need for further study to determine the prevalence of hypertension among tribal population. Study is also needed to ascertain, if Yaws is still present.

REFERENCES

1. BHATTACHARJEE, L.M. (1967) A report on the General Health Survey in Great Nicobar Island, All India Institute of Hygiene and Public Health, Calcutta.

2. D'SOUZA, A.J. (1932) Yaws in Nicobar Islands, Lecture delivered at the clinical society of Port Blair.

3. BHATTACHARJEE, B.N. (1973) Report on Health Services and Public Health Programmes in Andaman and Nicobar Islands; Directorate General of Health Services, New Delhi.

4. BHATTACHARJEE, L.M. (1967) Report of Investigation of Outbreak of Gastro-enteritis in Andaman and Nicobar Islands in 1966, All India Institute of Hygiene and Public Health, Calcutta.

5. PAL CHOUDHURY, N, C. (1979) Personal communication.

6. SEAL, S.C. (1957) A note on the outbreak of Poliomyelitis in Andaman in 1957, *Indian Journal of Public Health, 1:* 187.

7. PADMAVATI, S. (1967) *Suasth Hind, 11*: 119.

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EFFECT OF INDUCED ABORTION UPON MENSTRUAL SYMPTOMS

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ABSTRACT

A prospective study was conducted on 122 women aged 15-40 years reporting for voluntary termination at Kamla Nehru Hospital Allahabad, in order to determine the effect of induced abortion upon menstrual function. The menstrual characteristics included in the follow-up study of one-year duration were: the duration of the menses, the length of the cycle, dysmenorrheal and menorrhagia respectively. Each subject served as her own control so that possibilities of mismatching in respect of comparative studies of symptoms before and after termination were eliminated but the resulting sets of observations could not be treated as two independent samples. It was found by using !sophisticated statistical methods including • the non-parametric that after induced abortion there was a tendency to report shorter duration and shorter cycle lengths, and a tendency toward increased reporting of dysmenorrheal and menorrhagia. Thus, the conclusion is that women perceive their menses differently after termination; however, the role played by the abortees, "Psyche" remains unresolved.

The object of the present paper is to investigate the relationship, if any, between induced abortion and menstrual function. Though abortion laws have been liberalized in India in an effort to restrict population growth, yet voluntary termination is not uncommon in urban areas! Among all those having voluntary termination, virtually all except a small minority, resume menstruation. Hence, the present study

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Concerns a sizeable segment of the population and in this context a recent study in Japan deserves special mention. This Japanese experience, however, was based on a retrospective study ranging over a period of years so that the validity of the data generated by subjective recall on the part of the subjects is open to question. The present analysis for Indian women constitutes a prospective study of albeit a smaller sample, and has the advantage of availing actual follow -up data in the post-abortion period. Since all the women came for termination within twelve weeks of conception, the pre-abortion menstrual data based on subjective recall of the recent past are expected to be reliable. The paper analyses the effect of termination on the duration of the menses, the length of the cycle, the amount of bleeding and possible dysmenorrheal.

Materials and Methods

A random sample of 150 pregnant women arriving at Kamla Nehru Hospital, Allahabad, India around the period May-June, 1976 for voluntary termination was studied. In addition to the usual demographic data, information on menstrual, pregnancy and contraceptive histories were obtained through a questionnaire, and a follow-up study of one-year duration with month to month reports was planned. The present paper deals with menstrual function only for the 122 women who could be followed-up as planned. The term "induced abortion" used here simply means any conception terminated surgically by a physician in accordance with Indian law3. The methods used were either vacuum aspiration, or D & C, or a combination of both.

Evidently, each woman served as her own control because each subject reported on menstrual function before and after a specified "vital event", namely, the induced abortion. While this circumvented the problem of so-called "matching" of the subjects, the pre-termination and the post-termination menstrual data does not constitute two independent samples. The paired t-test frequently used for such data was inapplicable here since the all important normality assumption could not be made. The data on the duration of the menses and the length of the cycle although continuous, in theory, were bound to be weaker than those of an "interval scale" in the sample recordings, and therefore, it seemed sensible to ignore the magnitudes and apply the "sign test" which

Focuses attention on merely the direction of the differences of pre-termination and post-termination scores. These scores were obtained as averages over the twelve monthly records. The sample measurements on the amount of bleeding were bound to be on an "ordinal scale" and those for possible dysmenorrheal on a "nominal scale". For the analysis of these data, the continued presence of menorrhagia or dysmenorrheal for over three or more months was recorded as positive for the respective- symptoms, and a special statistical technique based on "transition counts" was used.

Observations and Results

The distribution of the 122 women undergoing abortion according to their gestation period at the point of termination is shown in Table 1 from which one finds that all women came for abortion within twelve weeks of conception. The age-wise distribution of the abortees is shown in Table 2 and one observes that the majority of the subjects came from the age group 20-30 years. The effect on various aspects of menstrual function has been dealt with separately.

Duration of Menses

Let X and Y denote the duration of the menses "before" and "after" termination respectively. The signs of the difference scores d = X - Y was considered and null hypothesis that the "median of the difference scores is zero" was tested by using the "sign test" after ignoring the time. Using large sample approximation with the correction for

TABLE 1

DISTRIBUTION OF THE ABORTEES ACCORDING TO THEIR GESTATION PERIOD

Gestation period in weeks	Number of women
2-4	1
4-6	41
7-8	67
9-12	13
TOTAL	122

MEAN = 6.9 weeks S.D. = 1.75 weeks

Continuity, a highly significant value P =.0014 was observed. Thus, the observed excess of (+) signs over (-) signs could not be explained by sampling fluctuation only, and therefore, the null hypothesis was rejected. Hence, the induced abortion appeared to reduce the duration of the menses.

Dysmenorrhoea

On the basis of the transition counts observed in the sample, the null hypothesis of no change in the state of dysmenorrhoea as a result of termination was tested by using McNemar's test with the correction for continuity. A highly significant value P .001 indicated the rejection of the null hypothesis. The maximum likelihood estimate of the transition probability matrix was found to be:

$$\mathbf{P} = \begin{matrix} P_{aa} & P_{ad} \\ P_{da} & P_{dd} \end{matrix} \quad \begin{matrix} .72 & .28 \\ .23 & .77 \end{matrix}$$

Thus, a subject with no history of dysmenorrhoea prior to abortion has 28 per cent chance to enter the dysmenorrhic state as a result of induced abortion. The corresponding chance for a transition in the reverse direction is 23 per cent.

TABLE 2

DISTRIBUTIONS OF THE ABORTEES ACCORDING TO THEIR AGE

Age In years	Number of women
15-19+	3
20-24+	46
25-29+	36
30-34+	22
35-39+	15
TOTAL	122

MEAN - 27.5 years S.D. - 5.4 years

Cycle Lengths

Attention was focused on the signs of the difference scores and it was found that 81 per cent of the abortees recorded no change while the rest seemed to perceive shorter cycle lengths after termination.

Menorrhagia

On the basis of transition counts recorded in the sample, the null hypothesis of no change in the state of menorrhagia as a result of termination was rejected (P= .001) by using McNamara's test. The probability of a transition from no history of menorrhagia prior to abortion has 42 per cent chance to enter this state as a result of termination. This tendency towards increased reporting of menorrhagia was observed earlier by Andreev in case of termination by D & C4. No conclusive evidence, however, to discriminate between the methods of vacuum aspiration and D & C in relation to the post-termination menorrhagia available in the present study.

Discussion

The observations indicate a significant relationship between induced abortion and change In post-termination menstrual function. The finding that women having termination exhibit a tendency to report shorter duration of menses is in consonance with the finding of Roht *et at.* But conclusions that are at variance have also been reported In the medical literature These studies Involved population differing in respect of culture, race, nationality, etc. and it is conceivable that the different groups have a different outlook towards the subject of induced abortion. In the present work there was some evidence for a tendency towards shorter cycle lengths after termination and this finding based on the prospective study here strengthens those of Roht *et at,* made on the basis of a retrospective study. It was also found that subjects with no prior history of menorrhagia had a 42 per cent chance to enter the menorrhagic state. Similar finding has been reported by Andreev and Baxi *et at.* Too 4, 7. There was 28 per cent chance for an abortee with no dysmenorrhoea before abortion to enter that state after termination. The corresponding chance for a transition in the reverse direction being 23 per cent. Hence, no matter whether

These disturbances are purely "physiological" or have a "psychological component" added too, there is now enough accumulated evidence signaling a relationship between induced abortion and menstrual dysfunction that no clinician can afford to ignore

REFERENCES

1. GREWEL, S. (1976) Medical Termination of Pregnancy Its Status, Achievements and Lacunae, *Journal of Indian Medical Association 66:269*.

2. ROHT, L.H, *et al.*(1977) Increased Reporting of Menstrual Symptoms among women who Used Induced Abortion. *American Journal of Obstetrics & Gynecology, 127*: 356.

3. GAZETTE (1972) Medical Termination of Pregnancy Rules, Part 2, Section 3, Government of India, New Delhi.

4. ANDREEV, D. (1970) Menstrual Disturbances After Inter-Ruption, Folia Med. (Plovdiv) 12: 263.

5. ANDOLSEK, L. (1974) the Ljubljana Abortion Study:1971-73, National Institute of Health, Center of Population Research, Bethesda, Md.

6. SUZUMURA, M. & KIKUCHI, S. (1960) Induced Abortion in Japan - Review of Literature, *J. Jpn. Obstet. Gynecol. Soc, 13*: 179.

7. BAXI, L.V., CHARI, V. & KANITKAR, S.D. (1977) Follow up of cases of induced abortion. *The Journal of Obstetric & Gynecology* 27: 40.