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TECHNICAL DISCUSSIONS

"WATER, SANITATION AND HEALTH"

CONTENTS LIST

WATER, SANITATION AND HEALTH: TECHNICAL DISCUSSIONS FOR THE 32nd SESSION OF THE REGIONAL COMMITTEE FOR THE EASTERN MEDITERRANEAN

ABSTRACT There is overwhelming experience and evidence which together show that safe and adequate water supply and sanitation are essential prerequisites for the maintenance of good health. Ministries of health, therefore, have a vested interest in the provision of water and sanitation services since the presence of these facilities will do much to prevent the transmission of faecal-oral disease.

Data gathered from the countries of the Eastern Mediterranean Region further reinforce the existing knowledge. These data show a distinct trend in the decline of infant mortality as coverage with water supply and excreta disposal service increases. A similar trend is evident as literacy rates increase. Reduction in infant mortality appears to be more sensitive to female literacy than to male literacy - a relationship that emphasizes the responsibilities of women for the care of infants. The relationship of infant mortality to literacy is interpreted as an indication of the importance of health education with respect to hygienic use of water and sanitation facilities.

One further aspect of the Regional data that has been considered is the relationship between Gross National Product (GNP) and the provision of services. It is obvious that wealthier countries are more able to provide a full range of social services than are the less affluent countries; there are several of the latter in the Region and most of them have relatively large populations. This situation emphasizes the need for utilization of low-cost and appropriate technologies and for the involvement of people in the development of their own water supply and sanitation facilities. Another outstanding feature of the data is that rural services continue to lag behind urban services; there is striking need to increase efforts to meet the requirements of rural dwellers.

Primary Health Care (PHC) is seen as an appropriate vehicle for the general improvement of health conditions in general and water supply and sanitation conditions in particular. While this does not imply that the PHC programme should be responsible for water supply construction it suggests that community health workers can be a powerful force for the transmission of information and education for health. Similarly, they can promote the organization, involvement and participation of communities and can enhance the coordination of inputs from other sectors at the local level. This is not to deny the need for the establishment at the central level of mechanisms that will encourage and foster intra- and intersectoral coordination through, for example, national action committees.

The WHO strategy for the International Drinking Water Supply and Sanitation Decade (IDWSSD) is to promote the Decade and its objectives, to cooperate with countries in the development of appropriate technologies, to seek additional sources of financial support, to encourage improved practices of operation and maintenance of water and sanitation facilities and to help countries in the design and implementation of community participation approaches and health education programmes.

In order to accelerate sector development it is necessary that:

- the health authorities recognize the importance of water-supply-cum waste disposal as a basic necessity to maintain public health;

- long-term sector development plans be established to ensure the availability of financial and other resources;

- health authorities define their role in sector development and prepare their own action plans, especially in the fields of water quality control, health education, community participation and household and community hygiene;

- more attention be paid to rehabilitation of existing systems, and to maintenance and operation programmes, and that the imbalance between urban and rural developments be overcome;

- focal points for "Decade" activities be established in each Ministry of Health;

- the WHO EM Regional Committee considers the establishment of a "Decade Advisory Committee" whose membership would include Decade focal points as identified by the ministries of health and who should submit progress report to the Regional Committee. This course of action will largely overcome current constraints regarding interministerial cooperation.

WATER, SANITATION AND HEALTH

1. INTRODUCTION

Writing more than a hundred years ago in "the Scientific American", the journal's medical and surgical reporter stated:

> "It has been calculated by statistical hygienists that of the cases of disease now current in civilized communities, about one third could have been prevented by intelligent sanitation, personal or general. In our opinion this estimate is too low, rather than too high; but take it at one third."

While that article from 1884 does not precisely define what the reporter meant by "intelligent" sanitation the meaning of sanitation a hundred years ago included the sanitary disposal of human and domestic wastes, the supply of uncontaminated drinking water and the practice of personal and domestic hygiene, especially hand washing after defaecation and before handling food.

The opinion that "the estimate (of one third) is too low" was probably quite correct. The year 1884, it will be recalled, was the year that Koch announced his discovery of the *Vibrio cholerae* bacterium. Bacteriology was still in its infancy; the germ theory of disease was less than a hundred years old and not widely believed outside the scientific community. Much knowledge has been gained since that time concerning the relationships between and among water, sanitation and health. The faecal-oral transmission of certain diseases has been scientifically proven. Health professionals recognize the dangers when food, water and the environment become faecally contaminated, and thus recognize the need for sanitary disposal of excreta. Some 50 diseases - viral, bacterial, protozoal and helminthic - can be almost totally prevented when "intelligent sanitation" is universally practised.

The importance of various disease control interventions with respect to some major water and sanitation diseases is shown in Annex III[1]. This annex further shows the importance of multiple interventions for control of some diseases. Several diseases transmitted by flying insects which spend part of their life cycles in water have been included in the annex to show that important diseases such as malaria and onchocerciasis are virtually unrelated to water supply and sanitation.

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[1] A detailed account of all water-borne diseases can be found in Annex V.

The practice of intelligent sanitation requires, first of all, that safe water in adequate quantities be reliably available near all households and places where people congregate. Together with water supply, facilities are needed for the sanitary disposal of excreta, wastewater and domestic wastes. But the mere provision of water supply and waste disposal facilities is not enough. The facilities must be used in a hygienic way; they must be properly operated and maintained so that they are always available for use, and they must be enlarged, expanded and extended to accommodate increasing populations and heightened aspirations of users.

There have been many studies in many countries which have attempted to quantify the benefits to health which result from water and/or sanitation improvements. However, few of these studies are conclusive; many of them lack sufficient control of interventions and results are further distorted by confounding factors. Studies have generally been made on relatively small populations and, with few exceptions, have covered only a limited period of time. Different studies also dealt with different diseases and different interventions; also, different rates (incidence, prevalence) were used. Thus, although many studies have been done, there are no precise conclusions to aid decisions-makers in the allocation of scarce resources.

This is unfortunate since economic planners ask the question: "How much investment in water supply and sanitation will yield how much benefit to health?" This then gives rise to the related question: "Could a smaller investment in another intervention yield equal or even greater benefits to health?"

Over the years, WHO has made several attempts to study and analyse the impact of water supply and sanitation projects. One such study was carried out in connection with the WHO EMRO Blue Nile Health Project implemented in cooperation with the Government of Sudan. It is probably due to methodological and statistical difficulties that the studies revealed contradictory results. Major problems associated with studies of this nature are: lack of control groups; health indicator definition; "natural" long-term fluctuations of health indicators; confusion with regard to interventions; interdependency of variables; disregard of behavioural variables; and others.

The World Bank, in 1975, convened a panel of experts in medical epidemiology, sanitary engineering and economics to address these and some related questions. The panel concluded that, other things being equal, a safe and adequate water supply is generally associated with a healthier population, but given the current state of knowledge, attempts at a rigorous quantification of the health benefits of water supply projects are likely to be futile. It should be sufficient to accept the universally recognized fact that the provision of an adequate quantity of safe water is a basic necessity for the maintenance of good health and productivity.

If one accepts the conclusions of the World Bank panel, the possibilities of establishing a firm cause/effect relationship between water, sanitation and health seem slim indeed. Perhaps more reliable relationships might be forthcoming from national and/or regional data, such as the Health For All Baseline Data.

2. REGIONAL SITUATION[2]

The total population in the Eastern Mediterranean Region of WHO is approximately 262 million (1980). Of these, 100 million may be classified as urban, and 165 million as rural. In Annex IV a graph indicates the coverage with water and sanitation in the Region, in 1980 and, projected, in 1990. Whilst coverage with water in urban and rural areas is 84% and 34% respectively, coverage with sanitation is only 56% in urban areas while no reliable figures are available for sanitation in rural areas; coverage may be as low as 10%.

The per caput GNP varies between US$227 and $31 600, the literacy rate between 6% and 93%, and infant mortality between 182 and 17 (per 1000 live births). The average weighted infant mortality in the Region is in the order of 110 per mille which is far beyond the WHO proposed target of 50 per mille.

As will be explained in the next chapter, infant mortality can feasibly be brought down permanently only by the provision of clean water and safe disposal systems for excreta. It is true that mortality due to diarrhoeal diseases can theoretically be reduced by a massive and continual supply of oral rehydration salts to the affected communities [1] and its strict administration. But the misery of young children suffering from diarrhoeas can only be overcome by better environmental health conditions.

3. INFANT MORTALITY

The relationships between infant mortality and such factors as coverage with water, coverage with waste disposal, adult literacy, and per caput GNP have been plotted on the graphs in Annex II.

In all cases, an inverse relationship between infant mortality and any of the factors mentioned has been demonstrated, in the sense that an increase in the magnitude of the factors (e.g. coverage with water supply) is accompanied by a decrease in infant mortality. The decrease is strongest close to the origin of the curve and tapers off where the factor reaches 100 percent.

It is reasonable to assume that there is an interdependence between the various factors involved and that a single factor acting alone would probably not result in the relationship shown, at least the effect would not be as pronounced. However, the data are not sufficient to permit analysis of the contribution of each individual factor.

While some of the factors, e.g. water supply coverage, are known to have a direct effect on health, others, such as GNP or literacy rate, will of course not by themselves bring about better health, their action being indirect.

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[2] All figures given are estimates.

Due to the paucity of data and their relatively low accuracy and reliability the curves shown are not strictly mathematical but serve only to indicate trends.

The effect of the factor "literacy rate" on infant mortality operates in two ways: firstly, it may be a surrogate indicator of the relative wealth of a community which, in turn, is an indicator of coverage with water and sanitation; secondly, as an indicator of the level of education of a community, it may be expected to have a direct bearing on the health situation in that community (personal hygiene etc). It may be worth noting that the effect of female literacy on infant mortality is greater than that of male literacy, which of course is to be expected (see Annex II, Fig. 7).

4. URBAN/RURAL DISPARITIES

The data available concerning percentage coverage with water services in urban and rural areas show that, in general, urban coverage is higher than rural. Major exceptions to this generality are in countries reporting 100% coverage nationwide. The situation is similar for sanitation, although only half of countries report with sufficient completeness to confirm this general conclusion. Only four countries report urban/rural infant mortalities and, for these, rural infant mortalities are 1.2 to 1.45 times the rates in urban areas. Such differences are consistent with the difference in water and sanitation services as well as with the probable differences in the concentration and quality of other health-promoting services. No data are available in concerning either GNP or literacy levels in urban and rural settings. One can speculate that, for both of these indicators, rural dwellers are at a disadvantage when compared with their urban counterparts.

5. COMPLEMENTARITY OF WATER SUPPLY AND SANITATION

There is an abundance of evidence which confirms that faecal/oral diseases can be transmitted along several transmission routes. Water, food, fingers, flies and fomites are all capable of conveying pathogens from faeces to the mouth. Thus, disease control requires that excreta be disposed of in a sanitary way, that water supplies be free of pathogens, and that personal practices of cleanliness be followed, especially with regard to food handling. The technical task of installing water supplies and sanitation facilities is relatively easy, provided that resources are available. The task of encouraging hygienic practices in the use of the provided water and sanitation facilities is much more complex and is an aspect to which much attention needs to be given. Without hygienic practices, the full health benefits of water and sanitation cannot be realized.

6. IMPLICATIONS FOR PRIMARY HEALTH CARE

The foregoing sections indicate clearly that water supply, sanitation and knowledge can combine to reduce infant mortality and improve health status. Although the data are less than complete, there are indications that urban areas are better served than rural areas.

Particularly in those countries where infant mortality exceeds the Regional HFA goal's figure of 50 per 1000 live births, it seems likely that rapid improvement could be brought about by the application of oral rehydration therapy [1]. However it should be borne in mind that, while oral rehydration therapy should reduce mortality from diarrhoeal disease, it will not significantly reduce morbidity. HFA has the objective of improving health, not only the reduction of mortality. Consequently, the lasting improvement of health ultimately requires the provision of adequate water and waste disposal facilities, reinforced by appropriate health education to encourage hygienic use of those facilities.

In most countries of the Region, government agencies have been established and charged with responsibility for the development of water supplies. Sometimes the same agencies have the responsibility for sewerage or waste disposal. This institutional arrangement is satisfactory for urban areas where economies of scale can be achieved, and where energy, transport, communications, supplies and personnel are readily available. Further, the level of technical sophistication used in urban settings tends to attract the most competent personnel. Operating within a cash economy, such agencies can often be financially successful, generating enough income to pay all operating costs including capital recovery.

Water agencies are less well suited for operation in rural and urban fringe areas. A large number of small rural systems utilizing simple technologies present management problems that do not appeal to the central agency. Particular problems are the organization of local communities and the provision of training which would permit local people to perform many of the day-to-day tasks of operation, maintenance, billing, collecting and accounting. Additionally, central water or sewerage agencies rarely consider hygiene education and information to be their responsibility.

Ministries of health are usually in a position to provide services to rural communities, particularly if a primary health care (PHC) programme has been established. The same can be said for departments of rural development and ministries of agriculture whose responsibilities mainly concern rural areas and small communities.

PHC programmes are able to promote and carry out many of the activities associated with rural water supply and sanitation. Their major constraint is shortage of financial, material and technical resources - especially where natural conditions are such that highly technical interventions are necessary, e.g. where deep wells are the only reliable water source. Nevertheless, a PHC programme is able to:

(a) promote community organization and involvement for water, sanitation and health improvement;

(b) provide technical support for water supply and sanitation improvements, utilizing appropriate and affordable technologies;

(c) provide information and education concerning health;

(d) assess and discuss locally perceived needs with local community members;

(e) encourage behavioural changes necessary for the practice of "intelligent sanitation";

(f) guide and advise in the operation and maintenance of water supply and sanitation facilities;

(g) assist in the surveillance and control of water quality.

While much responsibility rests with the community health worker for the delivery of programme activities at the local level, substantial support is required from higher levels of the programme. For water supply, support may also be required from agencies of government other than the Ministry of Health.

The coordination of resource inputs is of special importance. The Regional data reviewed earlier highlight the strong impacts that education, water and sanitation have on health. Thus, a substantial responsibility falls on the Ministry of Health to ensure that health education becomes a component of water supply and sanitation projects, regardless of which ministry or agency has the responsibility for provision of water and sanitation.

7. INTERSECTORAL COLLABORATION

Much of the responsibility for the provision of water supplies rests with ministries other than the Ministry of Health. Sewerage and waste disposal, too, are often the responsibility of some other agency or ministry, especially in urban settings. However, the provision of information and health education concerning personal and domestic hygienic behaviour vis-à-vis the available water supply and waste disposal facilities is clearly a task for health ministries. In general, and with a few notable exceptions, programmes of information and health education are weak, understaffed, unimaginative and provided with an insufficient operating budget. Further, they are often implemented in isolation from other health-promotion activities and are not programmed as part of a total PHC package.

In most countries of the Region, water supply is the responsibility of special agencies usually supervised by a ministry other than that of health. Responsibility for sanitation is not always clearly defined. In cities it is usually a municipal affair while, in some countries, a central authority is in charge. Sanitation in rural areas is often left as a concern for ministries of health.

If intersectoral cooperation, as urged by WHO, is to be effective, then obviously collaboration between the ministries of health and the specialized bodies or other ministries is of crucial importance [2]. Resolutions of WHO Regional Committees pertaining to environmental health matters do not always penetrate to the actual specialized bodies concerned and often, therefore, remain unheeded. In addition, delegations to those committees rarely have the mandate to speak on behalf of such specialized bodies. To bridge this communication gap, which hampers interministerial cooperation, the constitution of a "WHO Eastern Mediterranean Region Sub-committee on Decade Affairs" may be considered, its members to be drawn from the technical sectors concerned.

8. COMMUNITY INVOLVEMENT

The water supply service, unlike power and telephone services, is usually set up to serve only one community and can be operated independently of other communities. Sanitation in rural areas and small communities is similarly unique to the community served and, for on-site disposal, may also be individual to each family unit. Consequently, the families and the community should be actively involved in the process of deciding what type of system will meet their perceived needs. Correspondingly, they would also have a responsibility for contributing to the construction of the system they decide on and for helping to defray the cost of its operation and maintenance. For many communities guidance will be required, including an explanation of the possible options, the cost implications of each option, the training needs for management and operation of the system and the extent of external support that can be anticipated.

This process of community participation in water supply and sanitation projects has been highly successful in many parts of the world; this includes some projects in the Eastern Mediterranean Region. It requires commitment on the part of the government to rally community participation; it also demands the services of dedicated and patient staff who can and will work with the communities in project development. It may be a time consuming process and this leads to difficulties in the scheduling of design and construction activities. However, experience has shown that the benefits exceed the inconveniences and that systems developed in this way are more successful than those which do not permit involvement of the people.

9. SECTOR STRATEGIES

9.1. General

WHO has reaffirmed that IDWSSD efforts will contribute to Health for All[3]. To this end, a number of activities should be instituted to strengthen national support programmes while accelerating sector programmes for water supply and sanitation coverage to achieve Decade objectives.

Through national Decade conferences, sector reviews could be carried out and realistic targets and strategies set, leading to development of national Decade plans. National action committees or similar mechanisms should be formed for effective intersectoral coordination; this would be further enhanced through strengthening of health agencies to provide the necessary linkages between water supply and sanitation activities and those of PHC. Attention must be given to strengthening sector agencies and reducing sector fragmentation by consolidating the many national agencies that exist in some countries. Consideration should be given to decentralization and development of community-managed institutions which would be capable, among other things, of effectively operating and maintaining water supply and sanitation systems and of management of drinking water. There is also a need for development of an adequate data base and information system for appropriate sector management.

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[3] Resolution WHA34.25 (May 1981).

A crucial activity is development of human resources, indeed, it is indispensable for institution-strengthening. For this reason, orientation on proper techniques and approaches should be acquired, prior to development of a national, sector, human resource development plan for all categories of personnel necessary for sector management.

Optimum utilization of national resources dictates the adoption of simple, appropriate technologies, as far as this is possible. The newly established Regional Centre for Environmental Health Activities (CEHA) will be instrumental in disseminating information on low cost, appropriate technologies for water supply and sanitation.

Identification of Decade-related projects for possible external funding is also an important activity. Through its Project and Programmme Information System, WHO could assist in bringing these projects to the attention of financing agencies and by organizing donors' meetings.

9.2. Promotion of the decade

Although this activity involves all levels, national and international, its main thrust is directed towards national planners with the aim of mobilizing additional finance and more effective use of available funds.

Typical activities are:

(a) holding Decade conferences;

(b) development of national Decade plans;

(c) training of high-level staff in planning and management;

(d) participation in international Decade meetings, committees, etc.

9.3. Institutional development

In only a few countries do there exist central agencies with overall responsibility for water and sanitation. A previous trend toward centralization has given way, in many countries to a "decentralization" and/or "regionalization" of planning authority. As a result, priorities in a country may differ between regions thus rendering the even development of the water and sanitation sector increasingly difficult. WHO has recommended the formation of national committees to ensure the overall coordination of water and sanitation activities and to improve intersectoral cooperation. Only few countries, however, have responded to this; there seems to be a need to review this particular strategy. WHO's traditional cooperation with the ministries of health acts as a constraint in respect of strengthening other Decade-involved institutions, especially those managed by the regions or communities. Nevertheless, the strengthening of the ministries of health themselves with regard to their participation in the Decade remains an overriding strategy.

9.4. Development of human resources

Because of the lack of trained personnel available for the development of the sector, human resource development is the most important of all strategies in any of the member countries. It is, therefore, not surprising that a special "Human Resources Development" document has been published by WHO, giving the various steps towards the establishment of an infrastructure for development of human resources, [6] stressing that training ranks high among all of WHO's cooperative activities.

As the approach advocated in this document requires a highly organized and centralized sector it may be necessary to modify such an approach in accordance with prevailing national situations.

9.5. Information exchange and technology development

The scarcity of financial resources in many of the member countries requires the development of low-cost, appropriate technologies. Although WHO is not a primary source of new technologies it is concerned to make information on such technologies available wherever it is needed. For that purpose, WHO is assisting countries in developing information systems for the collection and dissemination of information on technologies and other relevant data. The transfer of technological knowledge is effected by means of seminars, workshops and similar meetings.

9.6. Financial resources

Through its contacts with bilateral and multilateral donor agencies, WHO is supporting governments in seeking additional sources of technical and capital assistance.

9.7. Operation and maintenance

Operation and maintenance of rural water supplies is not usually given appropriate attention; many systems, therefore, fall into a state of disrepair or dysfunction. Poor operation and management may also result in deterioration of water quality which in turn may result in complete negation of the health benefits of the investments made. (See section 8 above).

As far as most rural water supply and sanitation systems are concerned, operation and maintenance are genuinely community-based responsibilities.

For very small systems the water operator may be employed by the community on a part-time basis. For larger systems one or more full time jobs may be created. Standard staffing schedules are available for water supplies, depending on their size.

The provision of spare parts is a problem which often requires some central logistic assistance unless parts are available on the local market.

WHO document ETS/83.9 [7] provides a useful guide for the development of an operation and maintenance programme.

10. RECOMMENDATIONS

10.1. Disease prevention

The provision of adequate quantities of safe water and the hygienic disposal of excreta and waste are basic necessities for the promotion and maintenance of good health and should therefore enjoy high priority in national health development programming.

10.2. Role of ministries of health

Whilst physical construction of water and sanitary facilities in most cases is the responsibility of technical government agencies, health authorities have an important role to play in the areas of health education, water quality control, community participation, technology transfer, data collection, and intra- and intersectoral coordination. In this context health authorities should clearly accept their role and responsibilities.

10.3. Planning

To ascertain the financial support necessary for the sector, long-term water supply and sanitation development plans should be established which may form part of the country's official overall development plan. The health authorities may play a leading role in this respect through interministerial coordinating bodies.

10.4. Rural development

The national health authorities have a definite part to play in the development of rural communities and, in the context of improving water and sanitation in rural areas, should become actively involved, together with other ministries such as agriculture, finance, and planning, in the process of national rural development planning.

10.5. Resources mobilization

Reliability on indigenous resources is an important factor in sector development, especially in the light of the present global economic situation. In this context training and mobilization of local manpower, promotion of community participation, low-cost technologies, and water wastage control need to be given greater attention and, the possibility of mobilizing funds from regional financial institutions should be taken into account.

10.6. Primary Health Care (PHC)

In order that PHC programmes may provide the necessary support to the development of water and sanitation in rural areas, the curricula for the

village health worker should incorporate all relevant subjects of water supply and waste disposal to the extent necessary for the participants to understand the relationship between these services and the health of the community.

10.7. Focal Points

The existence of a focal point for the IDWSSD in each Ministry of Health would be highly desirable to form a personal link between national and international agencies concerned in the Decade on the one hand and national health authorities on the other. The establishment of such focal points may be given urgent consideration.

10.8. Workshop

WHO may undertake to organize, as soon as practicable, an orientation workshop for focal points of the ministries of health as recommended under item 10.7 above. Participants would be familiarized with all aspects of the Decade, especially as regards the expected roles of the ministries of health.

10.9. Action plans

The national health authorities, in cooperation with water and sewerage agencies, ministries of planning, finance, and agriculture, may consider the peparation of action plans on the basis or in the context of national sectoral development plans. These would greatly facilitate international cooperative assistance.

Public health aspects related to water supply and sanitation should be emphasized through appropriate media campaigns, particularly at community level, as well as in schools and in religous and social institutions.

10.10. Decade Advisory Committee

To overcome some of the present difficulties concerning interministerial coordination and cooperation, it is recommended that the ministries of health identify focal points from amongst the water supply and sanitation sector agencies/ministries for Decade promotional activities in their respective countries. These focal points should form part of the Regional Committee delegation, meet two days before the Regional Committee meeting and submit a progress report to the Regional Committee for its consideration and follow-up. This group of focal points may be designated as "Decade Advisory Committee". Such a step would not only bring about intersectoral coordination within the countries through focal points at the national level but would also further promote regional exchange of experience and information. The national focal points would be assigned the tasks of coordinating amongst the various agencies responsible for Decade work as well as following up on monitoring of progress in the light of governments' strategies and plans of action as endorsed by the Regional Committee.

10.11. Environmental health units

Where not already existing, the health authorities may consider the establishment of ministerial environmental health units. Such units are believed to greatly facilitate the implementation of the authorities' commitments towards the IDWSSD.

11. REFERENCES

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[3] Evaluating the Strategies for Health for All By the Year 2000. WHO DGO/84.1 - January 1984.

[4] Potable Water and Village Health. Is Primary Prevention Affordable? Public Health Reports, Vol.85 (1980) No.3, p.291.

[5] Regional Strategy for the Promotion of IDWSSD Objectives. EM/RC30(83)8, July 1983.

[6] Basic Strategy Document on Human Resources Development. WHO, Geneva, EHE/82.35, April 1982.

[7] Rural Water Supply Operation and Maintenance. WHO, Geneva, ETS/83.9.

[8] Health Benefits of Environmental Sanitation. WHO, Geneva, 29 March 1985 (Draft).

[9] Wastes and Human Health. F. Eugene McJunkin. Second edition, March 1983.

ANNEXES

ANNEX I

BASIC INDICES [a]

Country	Infant mortality per 1000 live births	Water supply (per cent coverage)	Waste disposal (per cent coverage)	Adult literacy (per cent) Total	Male	Female	GNP per caput
Afghanistan	182	10	minimal	20	33	6	227
Yemen	174	30	12	9	18	2	460
Somalia	170	30	-	6	11	3	280
Democratic Yemen	152	44	33	31	48	16	460
Sudan	140	(46)	(25)	25	38	15	300
Pakistan	120	38	16	26	35	16	350
Djibouti	120	45	39	17	-	-	480
Oman	111	15	-	30	47	12	4 134
Iran, Islamic Republic of	104	50	60	36	48	24	735
Saudi Arabia	103	91	76	25	35	12	12 600
Tunisia	85	72	46	43	61	34	1 300
Iraq	82	74	-	43	63	23	2 410
Egypt	80	75	69	47	56	28	650
Jordan	65	89	76	67	81	52	1 997
Syrian Arab Republic	57	71	45	66	78	53	1 446
b)							
Lebanon	48	92	-	77	85	68	1 200
Bahrain	34.6	100	100	73	79	64	5 138
Libyan Arab Jamahiriya	32.8	90	70	57	76	39	8 450
Qatar	30	95	35		-	-	31 600
United Arab Emirates	23.8	100	75	68	70	63	24 660
Kuwait	22.8	100	100	71	76	64	20 900
Cyprus	17.2	100	100	93	98	88	3 339

a) Source: EMRO Baseline Data 1984

b) WHO target for IMR is 50; - No data available; () Derived value

Explanatory Notes

Information assembled by WHO EMRO (1984) provides a basis for review of the Regional situation as well as confirming the relationships of water and sanitation with health. Annex I lists selected data from the countries of the Region. It is recognized that these data may not be completely accurate; the compiling of health statistics can never be perfect. The data must therefore be considered as the best available approximations of actual conditions.

The first column shows the reported rates of infant mortality per 1000 live births. This statistic can be used as a surrogate indicator of health status with respect to diseases

related to water and sanitation. When infant mortality exceeds 100 per 1000 live births, one third of the deaths are due to diarrhoeal disease. Where water and sanitation are deficient, diarrhoeal diseases will be common. While diarrhoeal morbidity would be a much better health status indicator, this condition is so grossly underreported that no credence could be placed on reported values.

The second and third columns show the percentage coverage with water supply and sanitation for all countries in the Region. Water supply data are complete and include the urban/rural coverage for all except one country. Data on waste disposal lack any estimate of coverage for five countries; information on urban/rural coverages is available for only twelve countries. These data ignore, however, the level of service and the quality of the service available. For example, water service coverage refers to systems that have been installed at some time in the past, may now be out of operation, or are providing only intermittent service.

The fourth column lists the percentage of literate adults in the countries of the Region. Total adult literacy percentages are available for all except one country; the data are further broken down into percentage literacy for males and females. Most of these data refer to literacy at age fifteen years and older; however, for a few entries, the age of ten is the cut-off point while a few others do not provide an age base. Literacy can be used as a surrogate measure of the ability to learn, to understand how disease can be transmitted and what can be done to inhibit disease transmission. Literacy is an imprecise measure of social development but it is the only one available. Its greatest weakness is that, even if considered as a reliable surrogate for knowledge and understanding, it does not guarantee that hygienic behaviour will result. This same problem occurs with the knowledge-attitude-practices sequence (KAP) on which much health education is based. Knowledge and attitudes (concerning health-promoting behaviour) do not ensure that the indicated behaviour will be practised.

The final column in the table is the GNP per caput. This statistic is indicative of the ability of people (or governments) to pay for services such as health services, water supply, sanitation and social services including education. GNP is an important statistic. When it is low it is suggestive of a subsistence economy where mere survival is the paramount objective. Higher GNPs suggest that better services of all kinds should be possible with the expectation that the quality of life (literacy, life expectancy, health services, etc.) will be correspondingly high. The Eastern Mediterranean Region is, perhaps, unique among WHO regions in that the highest national GNP is 140 times greater than the lowest.

Using infant mortality as a health indicator is is interesting to seek correlations with the variables; percentage coverage with water supply, percentage coverage with wastes disposal, percentage adult literacy and national GNP per caput.

ANNEX II

GRAPHICAL RELATIONSHIPS BETWEEN INFANT MORTALITY AND OTHER INDICES

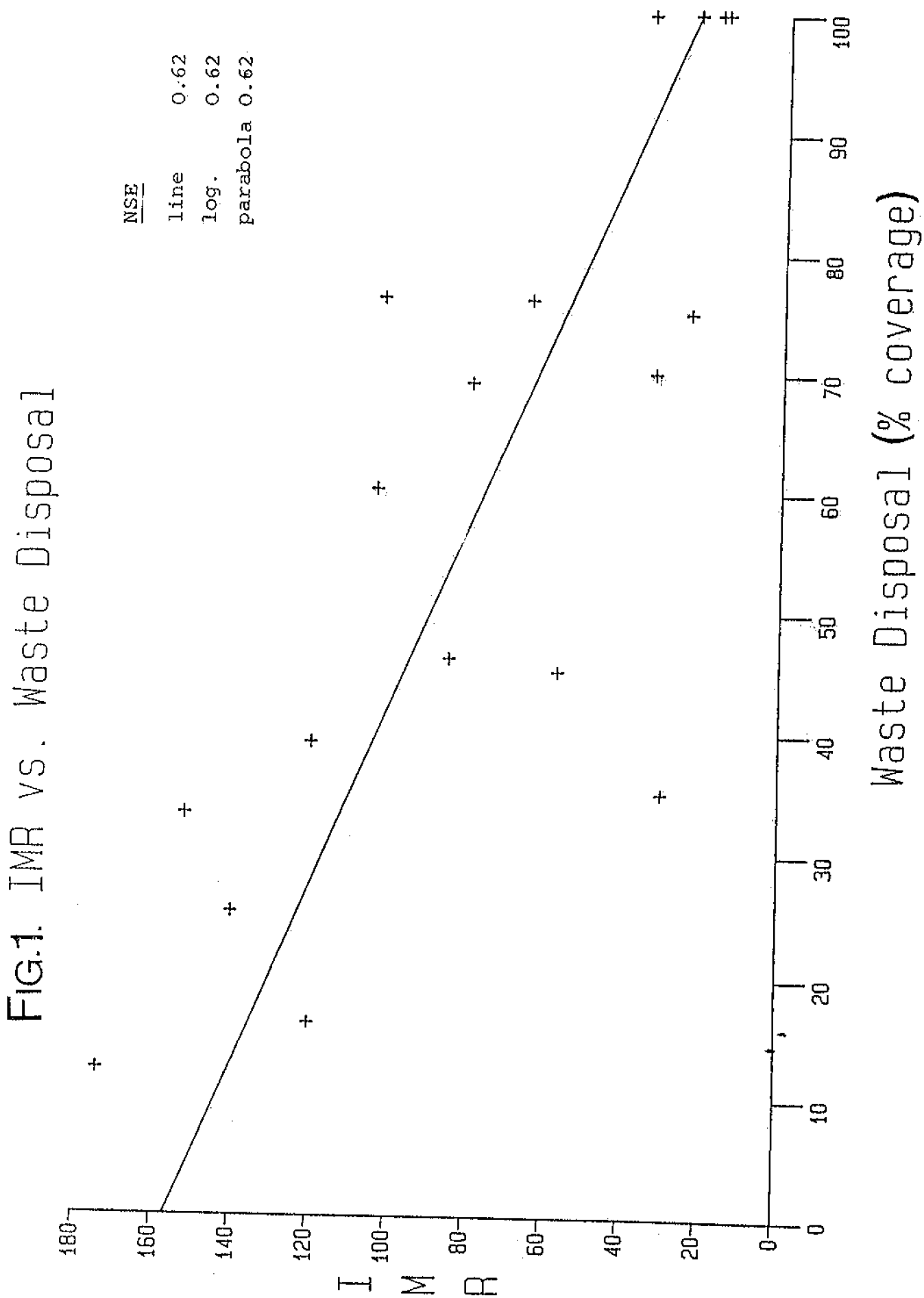


FIG.1. IMR vs. Waste Disposal

FIG. 2. IMR vs. Adult Literacy Rate

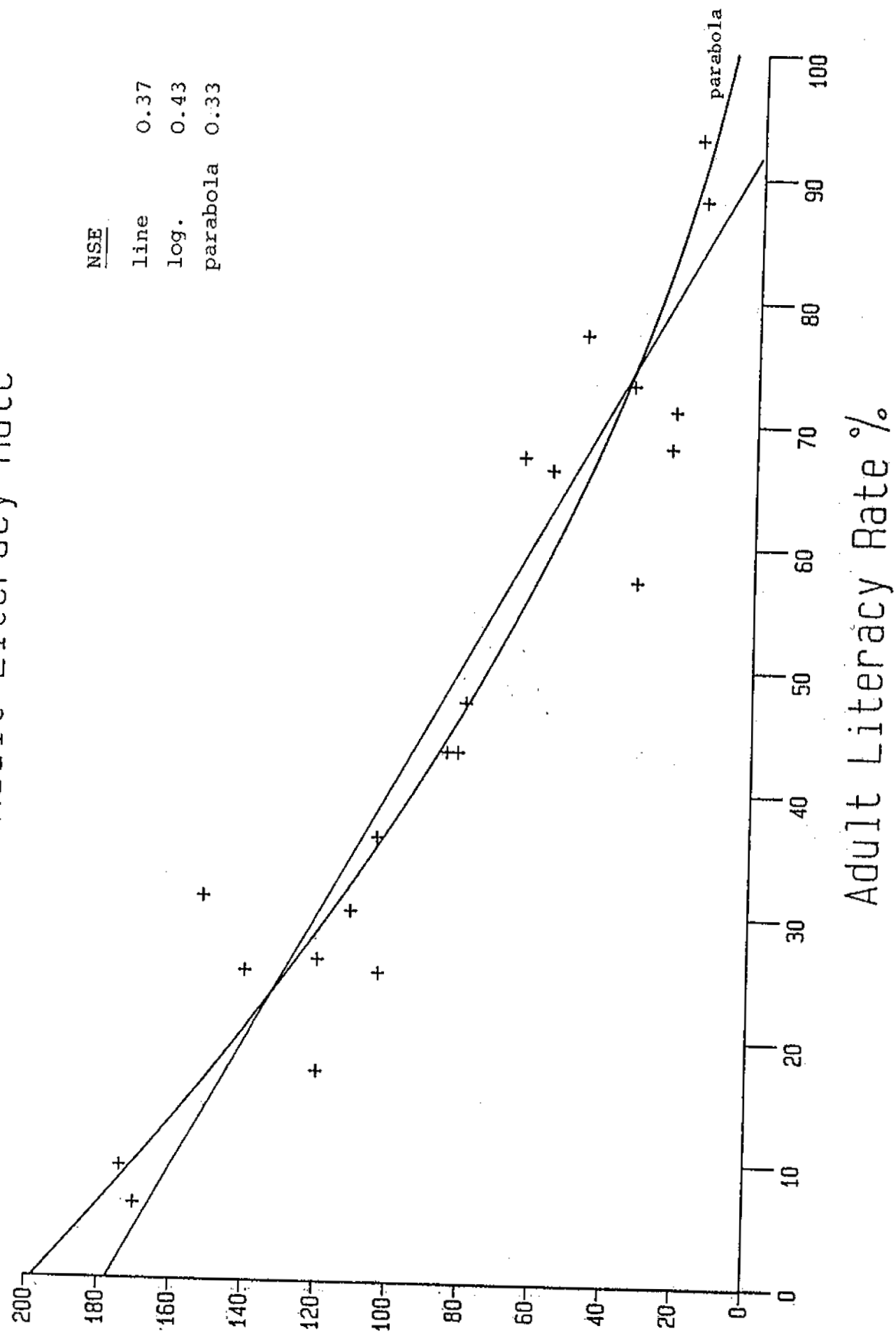


FIG.3. IMR vs Water Supply

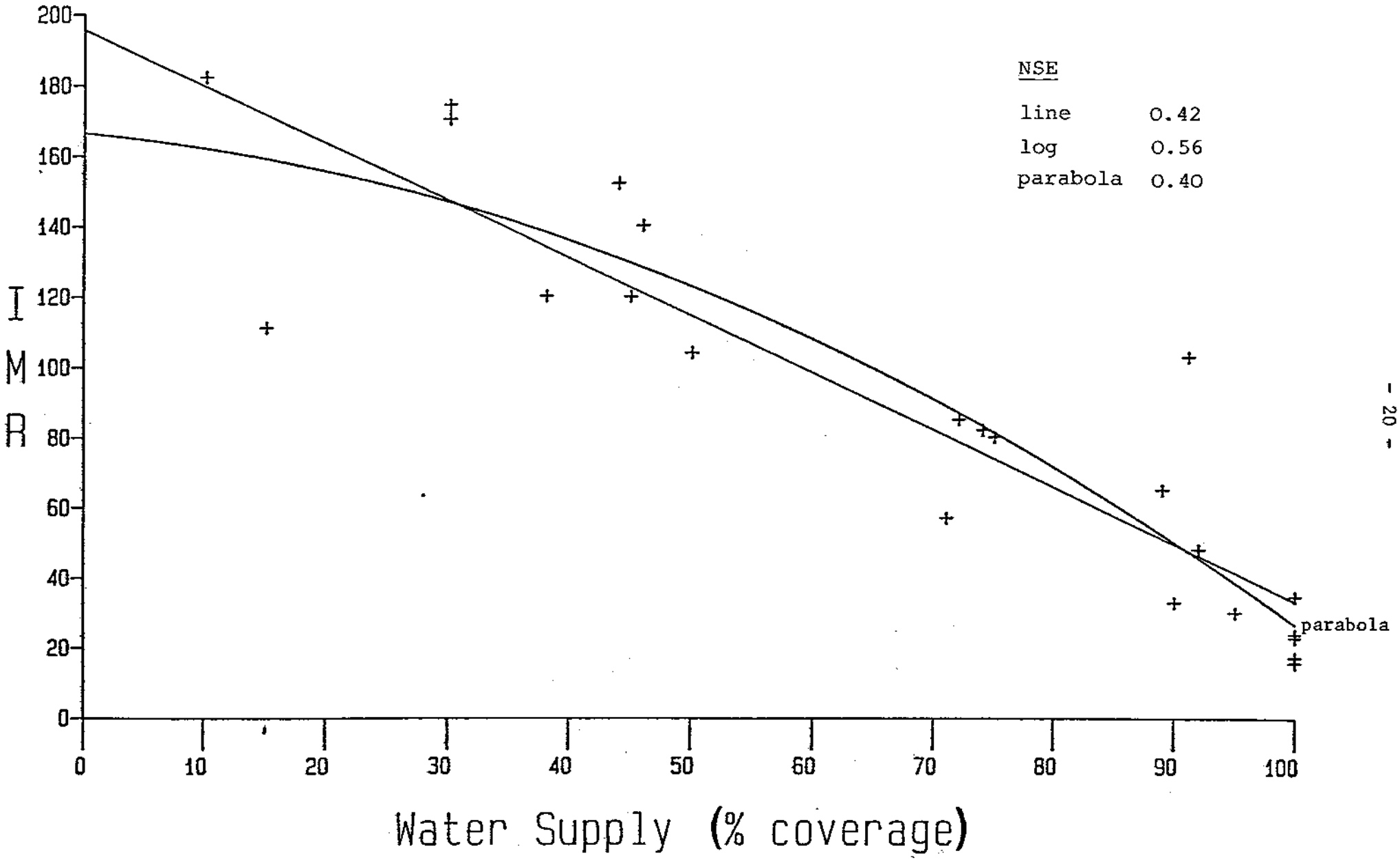


FIG. 4. IMR vs. log GNP

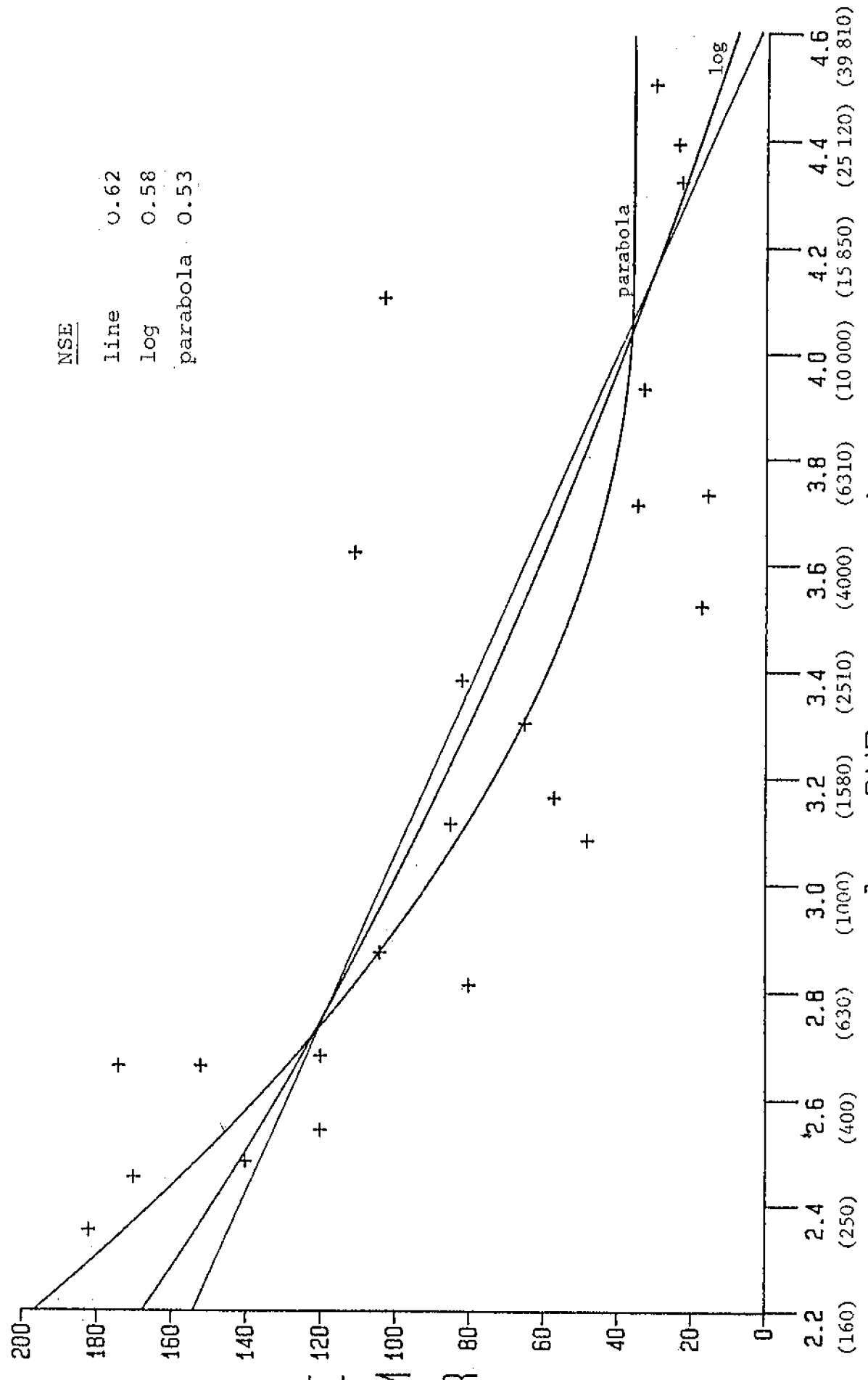
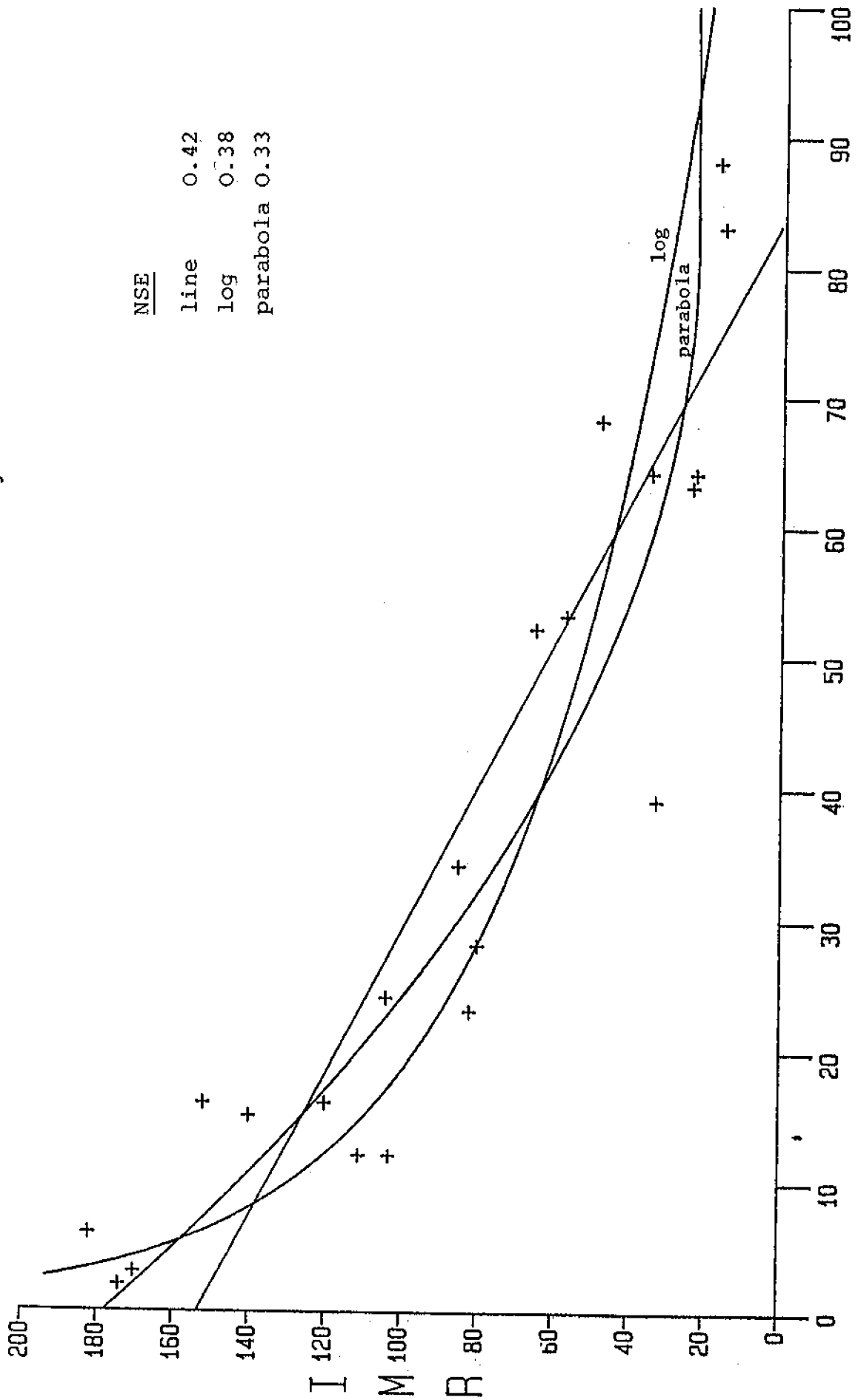


FIG. 5. IMR vs. Female Literacy Rate



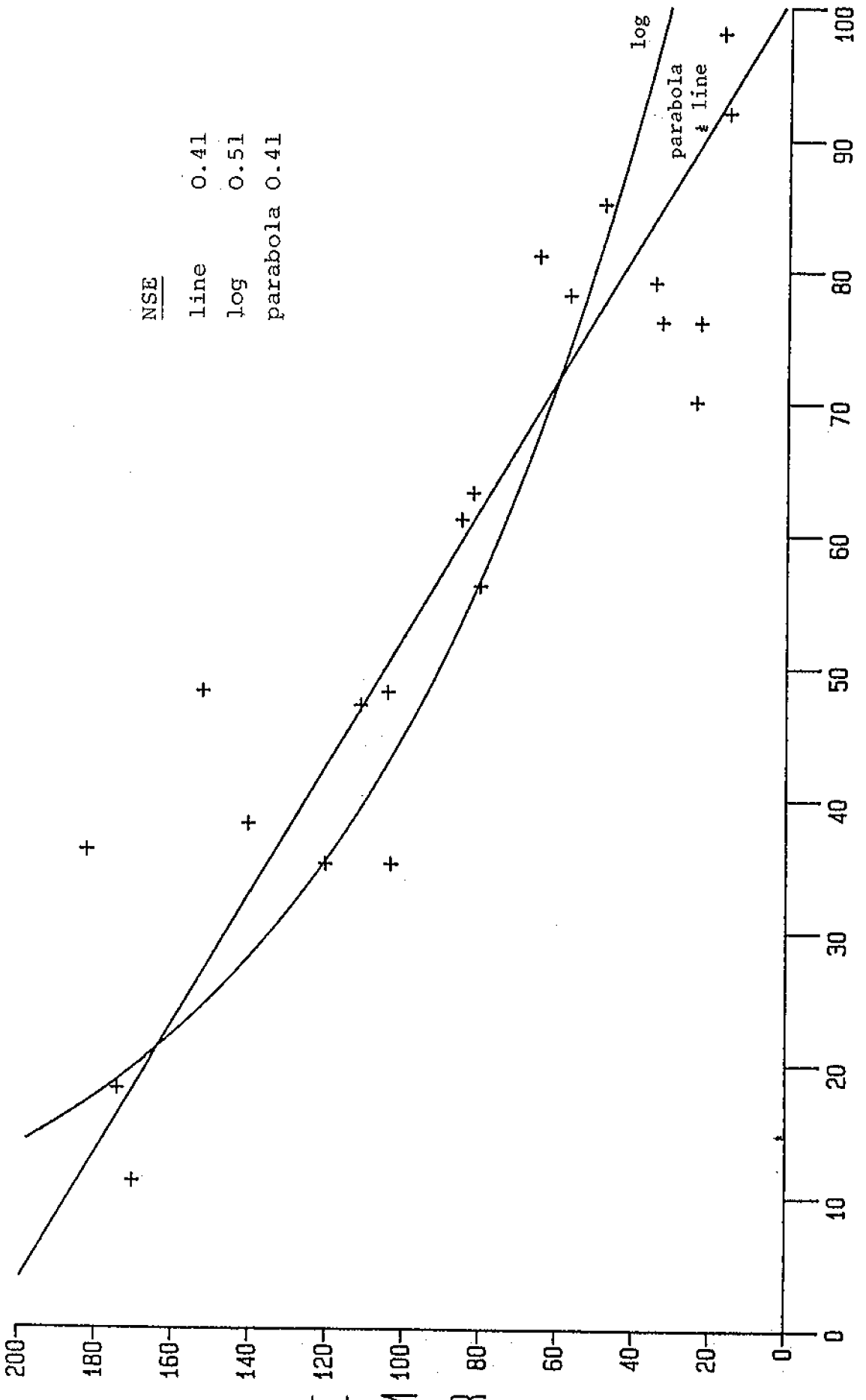
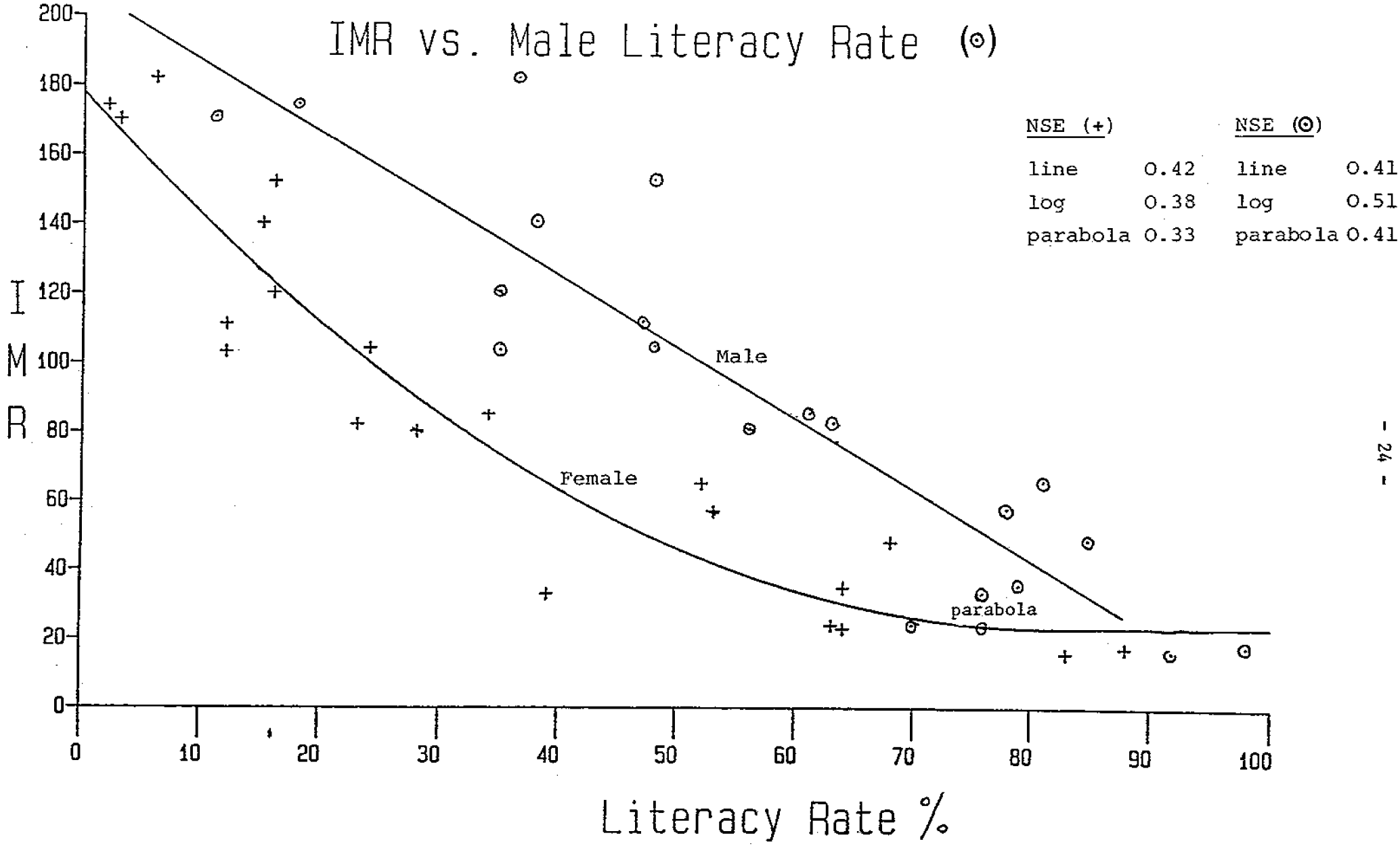


FIG.6. IMR vs. Male Literacy Rate

FIG. 7. IMR vs. Female Literacy Rate (+)

IMR vs. Male Literacy Rate (⊙)



Degree of Importance of Intervention: ●●● high ●● medium ● low – negligible

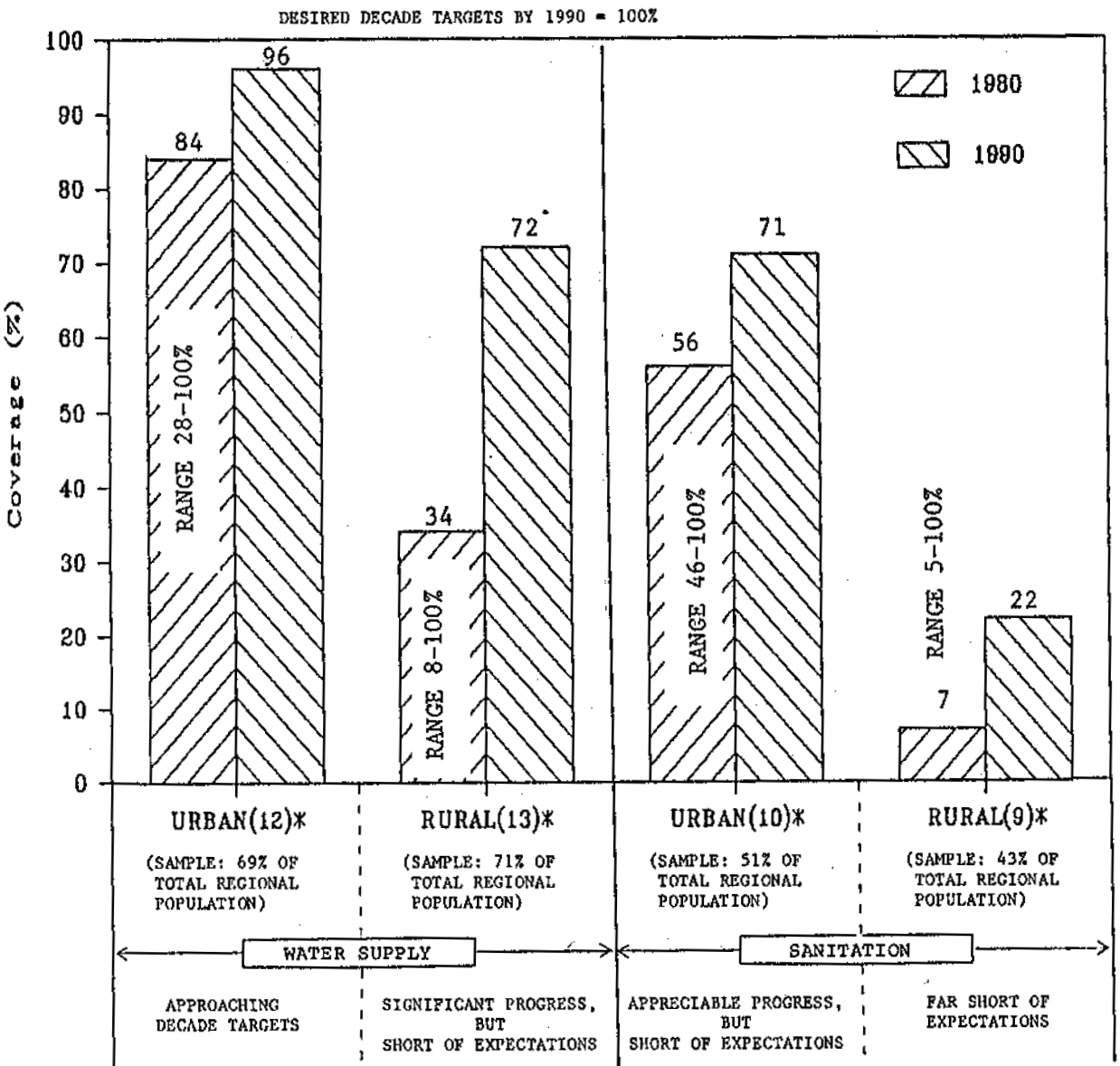
Diseases	water quality	water quantity/ convenience	personal & domestic hygiene	wastewater disposal/ drainage	excreta disposal	food sanitation
Diarrhoeas						
(a) Viral Diarrhoea	●●	●●●	●●●	–	●●	●●
(b) Bacterial "	●●●	●●●	●●●	–	●●	●●●
(c) Protozoal "	●	●●●	●●●	–	●●	●●
Poliomyelitis & Hepatitis A	●	●●●	●●●	–	●●	●●
Worm infections						
(a) Ascaris, Trichuris	●	●	●	●	●●●	●●
(b) Hookworm	●	●	●	–	●●●	–
(c) Pinworm, dwarf tapeworm	–	●●●	●●●	–	●●	●
(d) Other Tapeworms	–	●	●	–	●●●	●●●
(e) Schistosomiasis	●	●	–	●	●●●	–
(f) Guinea worm	●●●	–	–	–	–	–
(g) Other worms with aquatic hosts	–	–	–	–	●●	●●●
Skin Infections	–	●●●	●●●	–	–	–
Eye Infections	●	●●●	●●●	●	●	–
Insect transmitted						
(a) Malaria	–	–	–	●	–	–
(b) Urban Yellow Fever, Dengue	–	–	●*	●●	–	–
(c) Bancroftian Filariasis	–	–	–	●●●	●●●	–
(d) Onchocerciasis	–	–	–	–	–	–

* Vectors breed in water storage containers

ANNEX IV

WATER SUPPLY AND SANITATION

1980 COVERAGE AND 1990 TARGETS(*)



The marked difference (50 percentage points) between provision of water and of sanitation for urban and rural dwellers in 1980 should be noted, as should the low absolute figure for rural sanitation. Nor is the forecast for rural sanitation encouraging.

(* Number of countries providing data is shown in parentheses, as is the percentage of the total Regional population represented by those countries.)

ANNEX V

WATER-BORNE INFECTIOUS AND PARASITIC DISEASES, AND POISONING[a,b]

PART A. WATER-BORNE INFECTIOUS DISEASES

DISEASE OR SYNDROME	ICD[c]	d	REMARKS (PATHWAYS[e], etc.)
Amoebic dysentery	006	P	Epidemics by water; endemic spread by water, food, and hand-to-mouth contact; resistant to chlorination.
Ascariasis (Giant roundworm)	127	N	Usually soil-borne but also water-borne on occasion.
Bacillary dysentery (Shigellosis)	004	B	Also by food or milk, flies and direct contact.
Balantidial dysentery (Balantidiasis)	007	P	Epidemics mainly by water. Endemic spread by water, food and flies.
Campylobacterenteritis	009	B	Only recently recognized as important cause of paediatric diarrhoea.
Cholera (classic and El Tor)	001	B	Classic water-borne disease, now pandemic. High fatality in untreated cases.
Coccidiosis		F	Rare, mild.
Diarrhoeas	009		Clinical syndromes of varied aetiology, generally unidentified, especially in LDCs[f], where frequently listed as the leading causes of death. Primarily faecal-oral.
Escherichia coli	008	B	Growing understanding of role in diarrhoea of children and of travellers.
Enteric viruses	008	V	Many are pathogenic. Role not well understood. May cause diseases of central nervous system.
Giardiasis	007	P	Receiving increasing attention. Resistant to chlorination.
Hepatitis A virus	070	V	Several transmission routes including faecal oral. 30 000 cases in 1955-56 New Delhi outbreak.
Hookworm and strongyloidosis	127	N	Normally larvae in soil penetrate bare skin, usually of foot. May also be transmitted in water.
Hydatid disease (echinococcosis)	122	C	Transmitted by ingestion of infective eggs in water and food contaminated by dog faeces.
Non-cholera vibrios	008	B	Increasingly recognized as a cause of diarrhoeal disease.
Norwalk virus infection	008	V	Apparently a significant cause of diarrhoea.

PART A. WATER-BORNE INFECTIOUS DISEASES (cont'd)

DISEASE OR SYNDROME	ICD[c]	d	REMARKS (PATHWAYS[e], etc.)
Paratyphoid fever	002	B	Direct or indirect contact with faeces or urine of patient or carrier. Indirect spread usually through food, esp. milk and shell-fish, and, occasionally, through water supplies.
Poliomyelitis	045	V	Water-borne transmission has been observed but is rare.
Rotavirus infection	008	V	Newly identified agent of infantile diarrhoea. Probably faecal-oral.
Salmonellosis	003	B	An acute gastroenteric, infectious disease usually spread by faecally contaminated food. Water-borne epidemics are known, e.g. 15 000 cases in Riverside, California, in 1966 from contamination of a public water supply.
Schistosomiasis	120	T	Water-borne transmission occurs, but skin penetration the major mode of entry.
"Travellers' diarrhoea"		B	Often due to one of many serotypes of E. coli bacteria.
Trichuriasis	127	N	Usually soil-borne but also water-borne on occasion.
Typhoid fever	002	B	Spread through contaminated water and food. Urinary carriers frequent in S. haematobium areas.
Yersinosis		B	World-wide but rarely recognized.

[a] Adopted from Ref [9].
[b] Transmitted by ingestion of contaminated drinking water.
[c] Ninth revision 1977.
[d] Infectious Agent: B = bacterium, C = cestode, F = fungus, N = nematode, T = trematode, V = virus, P = protozoon.
[e] In some faecal/oral diseases, the pathogens may also be found in urine.
[f] LDCs = Least developed of developing countries.

Part B. PARASITIC DISEASES

DISEASE OR SYNDROME	ICD[c]	d	REMARKS (PATHWAYS[e], etc.)
Anthrax	022	B	Transmission by drinking water dubious although cited by various authors.
Brucellosis	023	B	Documented but very rare.
Cysticercosis	123	C	Ingestion of eggs in food or water. Larval infection with T.Solium. Other transmission routes. A serious disease.
Gongylonaemiasis	125.6	N	Rarely, through ingestion of water containing larvae from disintegrated insect hosts.
Guinea worm disease (Dracontiasis)	125.7	N.	Complex transmission route with intermediate vector (cyclops). Not faecal-oral. Found only in LDCs[f] and transmitted only by water.
Leptospirosis	100.9	B	A zoonosis. Transmission more often by skin contact with contaminated water.
Liver fluke disease	121	T	Occasional ingestion of drinking water containing metacercariae from decomposed fish. Most infections from eating raw fish.
Sparganosis	123.5	C	Rare. South-East Asia.
Melioidosis	123	B	Ingestion of water containing cyclops infected with certain cestode larvae. Other transmission routes.
Tularaemia	021	B	Ingestion of untreated water from watersheds when infection prevails among wild animals, especially rabbits and rodents, is one of several transmission mechanisms.

[c] Ninth revision 1977.

[d] Infectious Agent: B = bacterium, C = cestode, F = fungus, N = nematode, T = trematode, V = virus, P = protozoon.

[e] In some faecal/oral diseases, the pathogens may also be found in urine.

[f] LDCs = Least developed of developing countries.

PART C. WATER POISONING

TECHNICAL AND OTHER SOURCES	DISEASES OR SYNDROME	REMARKS
Metals	Toxicoses	Intake of metals in drinking water, food and air from both natural sources and human activities. These metals include arsenic, cadmium, copper, chromium, lead, mercury, selenium, vanadium, zinc etc. Can be important on a local basis, e.g. arsenic in parts of Argentina.
Organic Chemicals	Toxicoses Cancers Mutations Birth defects	Intake of certain chemicals, including some pesticides. Also some trihalomethane byproducts of chlorination are suspect carcinogens. Not at present a high-priority problem in LCDs[f].
Radio Nuclides	Cancers	Natural and man-made radioactivity. Has become a high priority in LDCs also.
Hardness	Cardio-vascular disease	Some epidemiological evidence indicates an inverse correlation of cardiovascular water.
Other	Fluorosis	Damage to teeth and bones resulting from long-term ingestion of high concentration of naturally occurring fluorides.
	Methaemoglobinaemia	Serious, sometimes fatal poisoning of infants following ingestion of well-waters containing nitrates (NO_3) at concentrations higher than 45 mg/L.
	Endemic Goitre	Iodine-deficient water or water containing goitrogens.
	Asbestosis and Mesothaelioma	Asbestos in lungs known to cause cancer. Fate in gastrointestinal tract unknown.
	Hypertension	Sodium-restricted diets necessary for parts of population.

[f] LDCs = Least developed of developing countries.

REGIONAL COMMITTEE FOR THE EASTERN MEDITERRANEAN

EM/RC32/Tech.Disc.1

Thirty Second Session

October 1985

Agenda Item 13

Technical Discussion "Water, Sanitation and Health"

SUMMARY OF RECOMMENDATIONS

1. The provision of safe drinking water and sanitary facilities should be given high priority in national health planning.
2. The health authorities should attempt to fulfill their roles in the areas of health education, water quality control, community participation, technology transfer and intra and-inter-sectoral coordination.
3. Sectoral development plans should be actively encouraged by the health authorities as part of their function as lead agency in respect of the IDWSSD.
4. Rural water supply and sanitation should receive more attention through countries' PHC programmes and linkage with related rural development programmes.
5. Mobilization of local human and material resources need to be encouraged.
6. Curricula for primary health care workers should also contain some elements of community water supply and sanitation.
7. For the promotion of the IDWSSD "focal points" may be established in the Ministries of Health.
8. WHO may undertake to organize an orientation workshop for IDWSSD focal points.
9. Joint interministerial action plans may be of great help in promoting the IDWSSD.
10. A "Decade Advisory Committee" may be established to meet prior to each Regional Committee Meeting to review Decade progress and advise on appropriate actions.
11. Environmental Health units may be established/strengthened with appropriate staff in the Ministries of Health to facilitate national and international coordination.