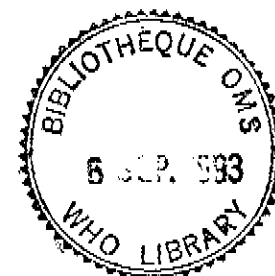




Report of the

WHO CONSULTATION ON EFFICACY AND EFFECTIVENESS
OF THE INTEGRATED PROGRAMME FOR COMMUNITY
HEALTH IN NONCOMMUNICABLE DISEASES

Geneva, 14-16 December 1987



CONTENTS

	<u>Page</u>
I. Introduction	2
II. Evidence of efficacy and effectiveness	3
III. Modelling	6
IV. Informatics support	8
Recommendations	9
References	14
 ANNEXES:	
1. List of participants	17
2. Modelling (forecasting and health systems)	19
3. List of available material	21
4. Core information to be collected by Interhealth Demonstration Projects	23

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I. INTRODUCTION

Many of the major noncommunicable causes of disease and death in the world have common risk factors. For example, cardiovascular diseases, cerebrovascular diseases, and respiratory diseases have risk factors associated with an individual's age, environmental exposure, and behaviour such as diet, avocations, smoking patterns. As a result, the concept of an integrated programme for prevention and control of these "noncommunicable diseases" has evolved over the last decade at WHO. Through a series of consultations and meetings the feasibility of an integrated health programme has been examined, the formulation of such a programme discussed, and potentially successful interventions summarized. A statement regarding this programme is contained in "WHO Integrated Programme for Community Health in Noncommunicable Diseases (Interhealth)" (Shigan, 1987). A brief history of the evolutionary process of this noncommunicable disease programme which details the consultations and meetings is presented in "The Report of Consultation on Risk Modelling for Noncommunicable Diseases for an Integrated Approach for the Prevention and Control of Noncommunicable Diseases" (NCD/OND 19 June 1984).

Upon the recommendation of these consultations, WHO created a steering committee for an integrated health programme. This committee formulated the definition of the integrated programme as follows:

An integrated programme for the prevention and control of noncommunicable diseases combines, in an operationally feasible manner, resources and approaches currently being devoted to the prevention and control of selected noncommunicable diseases and related conditions, and it permits the managerial unification of a set of preventive and other control activities that should lead to the prevention and control of major noncommunicable disease and to the promotion of health in total communities (ibid).

Using this definition as a guiding principle, the Division of Noncommunicable Diseases held a consultation in March 1984 (NCD/OND 19 June 1984) to examine aspects of risk modelling as a method for assessing the potential positive effects of an intervention control programme. The report of this consultation (referenced above) made (amongst others) the following recommendations:

1. That an inventory of risk models be compiled and that a critical review be made of their mathematical structures and properties and of their relevance to an integrated NCD approach. Dr K. Manton agreed to produce a first draft to be circulated to Drs Davis, Williams, Deev, Prochorskas, Shestov, Bailey, Mulder and Yashin and appropriate WHO staff. It was proposed that this be accomplished by October 1984.
2. In view of IIASA's interest and expertise in multifactorial modelling of population health dynamics, that mechanisms for their continued interaction with the integrated approach to the prevention and control of NCD and with the centres mentioned above be explored.
3. That international efforts for the consolidation of modelling activities appropriate to the integrated approach be promoted. A first step in the development of such collaboration might be the joint efforts of WHO; IIASA Population Programme; WHO Collaborating Centre for the Prevention and Control of NCD at the University of North Carolina; Kaunas Medical Institute; Rotterdam Health Department; Centre for Demographic Studies, Duke University; Institute of Experimental Medicine, Leningrad; and the Institute of Preventive Cardiology of the All-Union Research Centre of Cardiology, Moscow; in developing models of risk dynamics on the available data.
4. That coordinated analyses of multiple, appropriately selected data sets be conducted.
5. That collaboration with other working groups within WHO involved in related or similar activities, e.g., the MONICA statistical group for NCD/CVD, the health trend projection group in HST and EURO, and the Aging Programme C.A.P. project in HEE/COPENHAGEN be explored. It was requested that Mr J.E. Dowd, HST/ESM, establish liaison with these groups.

6. That mechanisms for future periodic meetings and other appropriate mechanisms for collaboration (e.g. collaborating centres) be explored.

In response to the last recommendation in this list, a consultation was held by the Division of Noncommunicable Diseases in December, 1987, in Geneva, Switzerland. Based upon the work undertaken since the 1984 consultation and additional programme evaluation needs identified since the 1984 meeting the current consultation was charged with the following objectives:

1. To review quantitative evidence of efficacy and effectiveness of the existing NCD intervention programmes.
2. To review existing models and scenarios in developing NCD programmes.
3. To elaborate recommendations for the development of methodological tools for evaluating efficacy and effectiveness of the Integrated Programme for Community Health in Noncommunicable Diseases.

This report summarizes this consultation. Objective 1 is discussed in section II, objective 2 is discussed in sections III and IV, and the recommendations, objective 3, are given in section V.

II. EVIDENCE OF EFFICACY AND EFFECTIVENESS

A. Introduction

In order to review the evidence on efficacy and effectiveness, these last two terms had to be defined. The consultation group took as the meaning of 'effectiveness' the definition given in the document "Health Programme Evaluation; Guiding Principles", 1981 WHO publication. Explicitly, effectiveness is based upon outcome measures, usually related to a targeted effect, such as a reduction in morbidity, disability and mortality rates in defined populations. The meaning of 'efficacy' was less clear. Although the group did not explicitly rest upon an operational definition of 'efficacy', it appears, implicitly, at least, that efficacy refers to measures of success in the intervention process, rather than in the final outcome. For example, the ability of a project to convey to the intervention group the message that, say, diet and health are related and to achieve desired dietary changes in the intervention group would be a measure of efficacy. A second example would be the conclusion that the intervention or study is scientifically sound, and that the results, though indicating that a particular intervention was not effective as regards specific health outcomes can still be informative as regards the risk factor and intervention process by demonstrating that the intervention was responsible for changing risk factor levels in all or part of the targeted population.

It was concluded that there is an extensive activity outside WHO regarding the measurement of efficacy and efficiency. The discussion therefore focused on the specific Interhealth programmes within WHO. In a recent study (WHO/HST/86.2) the evaluation techniques of WHO health intervention programmes at the country level were examined. The results of this study were mixed. Although many programmes appeared to have some formal method of evaluating efficacy, effectiveness or both, others did not. The two reasons given for not having an appropriate evaluation programme were:

1. participants in the programme did not fully understand the evaluation guidelines for measuring programme effectiveness,
2. participants knew how but lacked the operational measures and/or methodology at the country level.

In programmes where an evaluation programme was under way, such an evaluation system was often formed by establishing some form of surveillance system to monitor the attainment of programme

targets over time. Such systems often used either sentinel health indicators or proxy measures of health effects. When feasible direct population based measures of morbidity, disability, and mortality were used.

The consultation group felt that many of the problems in setting up an evaluation programme for integrated programmes in noncommunicable disease could be resolved by following the recommendations in either the Interhealth core protocol (WHO NCD/87.2, 1987) or in the textbook by Campbell and Stanley (1963). With regard to integrated community intervention programmes, the consultation group concluded that the conceptualization of the evaluation process has three dimensions that must be recognized. Each of these, in turn, has three different levels to be considered. These dimensions and levels are:

1. time dimension:

immediate
interim and
long-term outcomes with regard to the objectives of the programme.

2. scope dimension:

demonstration project (within country)
intended application to broader geographical areas (within country)
international comparison (between country).

3. operational dimension:

design
measurements
outcomes

Each of these dimensions and levels requires appropriate evaluation at predefined levels. Although there is a difference between developed and developing countries, especially with regard to migration, social dynamics, economic developments and community acceptability or intervention measures, the general approaches recommended above relate to all countries.

B. Specific Evidence of Intervention Effects

The group reviewed six intervention studies, three very briefly and three in greater depth. Those studies discussed briefly were the North Karelia Study (Puska, et al, 1981), the "Comprehensive Cardiovascular Community Control Programmes" (Puska 1988) and the Integrated Programme for Community Health in Noncommunicable Diseases (Interhealth) (WHO unpublished document, 1987). Although these studies are in different stages of progress, they all point clearly to the fact that careful follow up and evaluation of community interventions is essential for determining what kind of effects that can be obtained "in actual community programmes". Appendix 4 core evaluation data to be collected for Interhealth demonstration projects (WHO, 1987). Data available from these studies confirm the hypothesis that modification of risk factors can, indeed, be made in a community with a resulting change in morbidity/mortality outcome. Without such programmes, estimates of the magnitude of effects obtainable cannot be made. Lacking estimates of the temporal effects of the interventions, it is not possible to quantitatively model other potential interventions.

The three studies considered in depth were the Stanford Five Cities Project (Farquhar et al, 1985), CINDI (Leparski and Nüssel, 1987), and an integrated programme for primary care of diabetes in India (Bajaj and Modan, 1986). The Stanford study is a 13 year field trial of the community control of cardiovascular disease. The design contains a nonrandom selection of two intervention and three reference communities in northern California. Each of the selected cities has a population in excess of 30,000 with the total population in the five cities greater than 300,000. Beginning in 1980, a six year intervention programme, consisting of a community wide education was initiated at the two intervention sites. The

aims of this intervention are to target multiple risk factors and to achieve specific targeted changes in the intervention communities relative to the three reference communities. The target for these changes were;

1. 20 per cent reduction in overall risk of CVD in persons aged 12-74. Specifically, to achieve:
 - a) 9% reduction in cigarettes smoked per day
 - b) 2% reduction in relative weight
 - c) 7% reduction in systolic blood pressure
 - d) 4% reduction in total plasma cholesterol

2. Greater decline in cardiovascular disease morbidity and mortality in persons aged 30-74.

Several different methods are employed for evaluating the summative, outcome effects of the intervention:

- 1) Four independent cross-sectional risk factor surveys of randomly selected households (two education and two reference communities)
2. Four repeated surveys of a cohort (two education and two reference communities)
3. Long-term morbidity and mortality surveillance (two education and three reference communities)

The main effects of the risk factor changes on the health outcomes in the communities are not yet available, but will be published in 1988.

The Countrywide Integrated Noncommunicable Diseases Intervention or CINDI programme represents an intervention programme with a different structure. The main objectives of this programme is to simultaneously reduce the common risk factors of major noncommunicable diseases with priority given to smoking, unhealthy nutrition, alcohol abuse, physical inactivity, and psychosocial stress. Participating countries are Austria, Bulgaria, Czechoslovakia, Finland, Federal Republic of Germany, Hungary, Iceland, Malta, Portugal, USSR (6 different National Republics), and Yugoslavia. For each nation, a detailed plan of action for implementing an intervention is constructed. The targeted effects are country specific. Evaluation follows the steps outlined above, with modification according to the situation within the country. The monograph by Leparski and Nüssel (1987) explains the management and evaluation methods in detail. Whereas the consultation recognized that the different country specific objectives makes the evaluation of CINDI more complex, the project potentially represents a multinational source of follow up data involving interventions. Although no data on measured intervention effects were available, the programme can be a source of important data for assessing potential effects of like interventions in other countries.

The third intervention study involves diabetes among pregnant women in specific regions in India. The intervention is treatment of pregnant diabetic women with insulin to reduce the infant mortality rate of children born to these women. Although the intervention here differs from the classical risk factors often targeted in noncommunicable diseases interventions, this project was enlightening because it illustrated the systematic nature with which intervention effects must be planned and implemented to be of use, particularly in developing countries. For example, problems in manpower were mentioned where a disproportionately small number of medical support staff are available to help already overworked physicians in caring for patients. The study pointed out that community resources outside the health sector such as local school teachers can be effective at conveying the content of health programmes to the local population, and thus in planning interventions should be considered a useful resource. The project also illustrated the need to identify the administrative as well as the community situation before an intervention is begun.

Cohort or population studies perform a pivotal role in evaluating the effects of an intervention. Assessing the evidence for the potential efficacy and effectiveness of interventions in other geographic areas must extrapolate the results of these cohort studies to communities where the risk factor and mortality profiles differ. It is essential that in such cases a measure of these different profiles be available. The consultation found that large multinational data sets like ERICA (ERICA Research Group, 1988) which are designed to provide a risk factor "map" of much of Europe is fundamental to assessing the potential effects of future interventions. Other sources of data such as the Seven Country Study (Pekkanen, 1987), national mortality statistics, administrative statistics, and potentially national health care reimbursement records are required before the results of follow up studies can be extrapolated to other regions.

III. MODELLING

A. Introduction

Chronic disease modelling has attracted much interest in recent years and as a result many statistical models of disease have been put forward. These models relate various risk factors and disease states with morbidity, disability, or mortality outcomes. In addition to these specific disease models, there are currently available many statistical and mathematical tools that can be used to construct health models. A review of the currently available chronic disease process models and their applications is given in a recent publication by Manton and Stallard (1987). Since it is easy to become confused by the mere number of tools and models available some model typologies were suggested. As a means of organizing the process of developing a "holistic" model that would provide the evaluation of various intervention scenarios, the consultation group attempted to classify model components. The particular typology for each component dictates the flexibility and strengths of the resulting model. Given these typologies the consultation considered the expertise and data needs for model building. The consultation then considered a family of discrete state Markov models as a basis for model building for intervention effects.

B. Typologies

The consultation considered the following set of typologies for model classification and building:

1. Temporal capabilities. Models either provide descriptions of static relationships or some form of dynamic or time dependent process. A static model may, for example, describe relationships between the environment or behaviours of an individual, the risk factors the individual is exposed to as a result of these, the morbidity/mortality process resulting from this exposure, and probable mortality outcome resulting from the morbidity/mortality process. A dynamic model, on the other hand, examines the relationships of the static model over time as the various dynamics of the epidemiological and demographic risk factors come into play. It is generally accepted that morbidity and mortality are processes and not single random events. Therefore, a meaningful model must include some form of dynamics to be of use in forecasting intervention effects.

2. Demographic/resource focus. The second typology classifies models according to their focus. Some models examine or forecast demographic and epidemiological characteristics of defined population groups and their relationship to health status or outcomes under certain health care systems, while other models assume the demographic and epidemiologic status and focus on the examination of health services resources. In each case, the other component is usually considered to be an exogenous factor in the model from which input will eventually be needed. An example of the former approach is seen in Manton and Stallard (1987) while the latter approach is typified by the approaches to health systems modelling developed at IIASA, e.g. Shigan et al (1979).

3. Decision process. This typology specifies how the model is used in reaching a decision. Optimization of the limited health services resources can take many forms. For

example, optimizing the "hi-tech" expenditure, increasing the length of life, increasing the length of non-frail life, or decreasing infant mortality rate are different criteria for optimization.

4. Simulation scenarios. This typology characterizes the model according to the type of intervention it simulates, or the type of forecasts it produces. Since evaluation is a multilevel process, this typology is extremely important to gain a broader view of the potential utility of modelling in making health policy choices.

C. Model Needs

With the above typology of models, it became clear that through the expertise and data requirements for any single component may be modest, developing a holistic model where all typology components are explicitly included in the modelling effort requires extensive data and considerable expertise. To solve these problems, the consultation considered two major points. First was the need for such model building to be done as a team effort. Teams would need members with clinical expertise, mathematical and statistical modelling and computational skills, and health economic experience. The building of a model would be an interactive process, often requiring several iterations to reach a clinically acceptable, economically reliable, statistical model.

The second point regards data. The data required for extensive models must include risk factor profiles, intervention effects, resource allocation data, and so forth. Naturally, the best of all worlds would have one or more large scale extensive follow up studies where all data was available. Lacking this, the model must be built on data from multiple sources. However, pulling together data from different sources is problematic for several reasons. First, the definitions of the disease states may be different. Second, the quality of the data may vary greatly from source to source. Third, the peculiarities of a study are not always well documented, and use of the data without knowledge of these can lead to unreasonable results. Fourth, studies carried out at different times and on different age groups may introduce both period and cohort effects which may mask intervention effects. Fifth, when several sources of data are used, the notion of standard error and measure of uncertainty is not clearly developed.

D. Discrete Markov Models

One class of models considered by the consultation which seems to provide a foundation on which the various typologies considered above can be implemented is a special case of the discrete state Markov models, or compartment models.

Methods of assessing intervention effects often first stratify the population or cohort by relevant concomitant variables such as easily identified risk factors. Then, general increment decrement methods are employed to account for a shift of individuals from one risk factor state to another as a result of an intervention. Such a model is represented schematically as a compartment model (Figure 1) and can be viewed as a generalization of the life table. These different states represent death, disability, or increased (decreased) risk factor status related to health care and mortality. Transitions are indicated by arrows and associated transition rates. Explicit adjustment of actuarial functions, cost functions, or outcomes for specific risk factors is then effected by adding incremental modifications to existing life tables which reflect increased (or decreased) risk of mortality based upon specific medical studies (see e.g. Singer and Levenson, 1976). Whereas this method will account for changes in the distribution of risk factors across the population due to demographic shifts and differential mortality, interventions affecting transitions from one state to another must be explicitly modelled by altering these transitions.

Conceptually, the effects of a change in risk factors can be measured by modelling the general health status of a population as a large interconnected network or compartment model with nodes (compartments) representing the various (discrete) levels of the risk factors. This is an expansion of the general increment-decrement model used in disability and retirement studies. A change in risk factors of the cohort due, say, to an active community

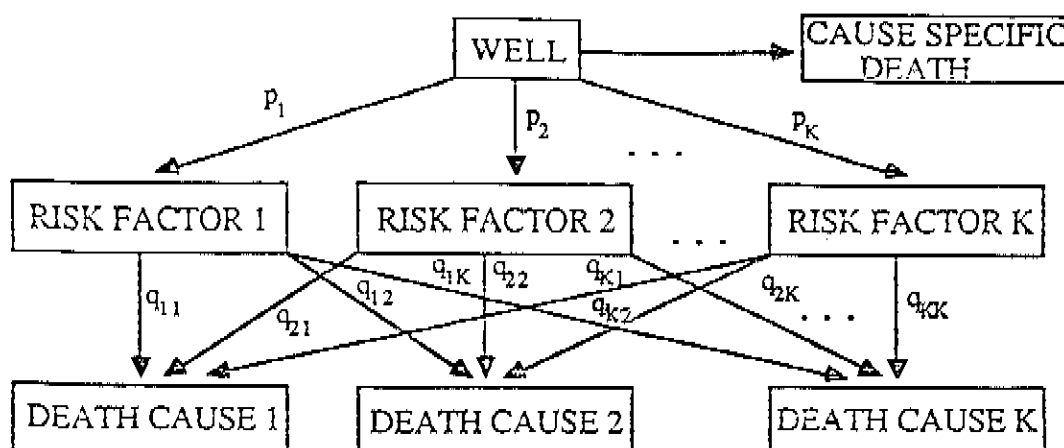


Figure 1. Schematic depicting compartment model representation of morbidity (risk factor) death process

programme of risk factor management, results in a distributional shift in the number of individuals assigned to each risk factor compartment (see e.g. Tolley, et al, 1984). Costs are then assessed by applying standard accounting or actuarial techniques to the compartment model (see e.g. Weinstein, et al, 1987). Such sophisticated increment-decrement models have been used in employment studies but have proven to be computationally involved. Additionally, because of lack of parameterization of the relationships between different risk factor compartments this approach requires extensive data (see e.g. Hoem, 1977).

To estimate the parameters associated with each arrow, one can use either simple descriptive methods, such as logistic regression, or model the entire system using likelihood methods.

One advantage of the compartment model is that the output is a string of counts which simulate the number of individuals entering or leaving the various states. Consequently, health utilization and resource planning models which require these types of data can simply be built "on top of" the compartment model. A second advantage is that the simple model is of pedagogical value while at the same time allowing extension to more complex models by simply adding states (boxes). Naturally more states entail a larger data requirement. The model is easily extended to include parameterized relationships between risk factor boxes (see Woodbury and Manton, 1983) and to fuzzy memberships. It can also be extended to allow for a limited semi-Markov property.

IV. INFORMATICS SUPPORT

In NCD, informatics plays an important, if ancillary, role. In order to best serve and support computationally intensive components of NCD, that is, (a) mathematical modelling, (b) the data management and analysis of evaluation, measure, outcome and study design efforts, and the eventual transfer of this technology to (c) health delivery systems, it is important to allocate informatics resources with regard to performance and cost effectiveness. The consultation emphasized that the planning and implementation of an informatics support infrastructure must acknowledge the heterogeneity of the potential users in terms of both the level of technical sophistication and their requirements, and the rapid evolution of the technology itself.

To systematically study the information flow, the consultation felt that end users should be conceptually grouped in a hierarchy according to the functions they perform. The preparation of guidelines, based on the results of models and evaluation studies regarding risk factors, for data collection and the implementation of measures is undertaken at an international level. The national level ensures that implementation of the guidelines acknowledges indigenous cultural characteristics and collects and interprets data provided by the regional level. The regional level is concerned with the allocation of resources and the aggregation of data for planning. The local level is responsible for providing proper care and the collection of health data on a routine basis.

Of primary concern in planning informatics support to different levels of users is the assurance that information exchange between all users is fully supported. This need dictates a strong requirement for compatibility of informatics technology at the varying levels and emphasizes the importance of making accessible to less sophisticated users the results of modelling and evaluation studies. Software design and selection will, therefore, be strongly influenced by its ability to be integrated into various user environments.

The consultation stressed that as a general principle, informatics support should be provided so as to obviate the need for study and applications personnel to have expertise in computer science. Whenever possible use should be made of the existing software packages on the market for data base and statistical applications. Guidelines for the choice of the most appropriate packages should be published.

RECOMMENDATIONS

In order to better utilize the diverse expertise of the individuals in the consultation group, three subgroups were formed to consider recommendations. These groups were: i. the modelling group; ii. the design and evaluation group; and iii. the information systems group. To focus their activities, each group was given a set of questions to consider. These are included in appendix 1. During plenary, the recommendations of each group were discussed and modified as needed. At the conclusion of this exercise, the consultation group agreed that the following recommendations and suggestions be made to the Integrated Programme for Health in Noncommunicable Diseases. (Note that due to the length of some of the recommendations, the rapporteur summarized each recommendations with a single statement. The consultation agreed to the lengthier statements and not the shorter ones.)

I. The evaluation of integrated programmes on community health in noncommunicable diseases are traditionally carried out from an appropriate design built into ongoing demonstration projects, whereby changes in risk factor levels brought about by intervention strategies are measured, the impact of such risk factor changes on selected disease end-points are recorded, and the economic costs of intervention programmes are evaluated. The major disadvantage of this procedure is the time lag between the need for efficacy, effectiveness and cost data to prioritize intervention strategies and the availability of this data from the demonstration projects. These lags are due to the typical 5-10 year project life and the further 1-2 year evaluation period resulting in an overall 6-12 year delay in availability of relevant planning data. One way of overcoming this lack of timely and relevant evaluation data is to model the potential impact of health intervention strategies to help prioritize the composition of the components of a given strategy in a given national situation. This modelling effort explicitly entails specification of the basic components of risk factor levels and change, their impact on multiple disease end-points, evaluation of the costs of the intervention and of the economic and social consequences of the impact. It is recommended that appropriate models are identified using available national data and that these modelling efforts be used as interim measures of potential impact. These models will provide a useful complement to the standard demonstration evaluation methodologies.

++ Identify appropriate models to analyse available national data for interim measures of potential health programme impact.

II. A truly holistic model necessarily entails integrating a series of models, each representing a component of a multidisciplinary modelling effort. For example, demographic models, morbidity models, intervention models and health service models, linked together provide a generic integrated model resulting from a team effort. The types of models selected at each level depends upon type of data available, requisite level of model sophistication and intended use of integrated results at different levels in the decision process (e.g. by national policy-makers, regional health directors, health institution managers). Since many models may exist as potential choices for each level, it is necessary to organize the may available permutations. It is therefore recommended that the Division of Noncommunicable Diseases be instrumental in developing a series of menus as a method for organizing and building such integrated models. Such an effort explicitly requires identification of various models for menu choices, data needs for each menu option, and the pros and cons of the various model types.

++ The Division of Noncommunicable Diseases be instrumental in developing a series of menus which systematically organize options for each model component of an overall integrated model.

III. A wide range of modelling, forecasting and assessment of the efficacy and effectiveness of risk factor intervention programmes can be conducted with readily available data from health administration, epidemiological and health survey sources as well as with data from specialized demonstration projects. It is recognized that full utilization of such data can be timely and cost effective. Existing WHO data archiving programmes such as the EURO ERICA project should facilitate such efforts both by continuing their present efforts of providing data access to persons conducting quantitative modelling and by extending the scope of their data holdings to include national health survey data.

++ Continue efforts in archiving various types of morbidity, mortality and risk factor data and extend the scope of these data to include national health survey data.

IV. The ability of countries to conduct forecasts and simulations of the likely impact of their efforts at intervention in noncommunicable diseases is important for the planning of health programmes and for both short and long-term resource allocation decisions. It is recommended that the Division of Noncommunicable Diseases programme identifies groups and creates collaborating centres that could develop easily transferable health service forecasting and modelling strategies. These strategies should initially be developed on a country specific basis by the collaborating groups with the relevant health planners and policy-makers in the country. The collaborating centres should also provide technical assistance and training in the use of such models to relevant groups in each country.

++ Create WHO Collaborating Centres to provide technical assistance in transferring relevant forecasting and modelling capabilities to appropriate groups in each country.

V. There is a need for the Division of Noncommunicable Diseases to: a) conduct forecasts and simulations of the short and long-term health and economic impacts of different disease and risk factor intervention tools and strategies using epidemiologically and biologically motivated process models; b) to demonstrate the potential efficacy of such programmes in developing priorities for the Division of Noncommunicable Diseases activities; and c) to help inform decision-makers about necessary data collection. This will involve coordinated analyses of health status and risk factor transitions in the widest feasible range of longitudinal and national health survey data and the development of improved costs and health service impact measures. It is recommended that the existing WHO Collaborating Centre at Duke University continue their development of forecasting demographic and health simulation models, the calibration of these models in a wide range of data and the introduction of health cost and service models in these forecasts.

++ Continue the activities at the WHO Collaborating Centre at Duke University necessary to develop a range of health forecasting and simulation models.

VI. With the wide range of forecasting and evaluation efforts envisioned for the Division of Noncommunicable Diseases programme it will be necessary to have an identifiable person available for coordinating these activities for the Division of Noncommunicable Diseases. Such a person should be conversant in a number of areas including the technical aspects of forecasting and simulation models, the scope and nature of the available epidemiological and health survey data, and the nature of health planning and policy-making processes in both developed and developing countries. This person will be responsible for liaison between collaborating centres and the Division of Noncommunicable Diseases and for initiating and monitoring modelling and evaluation efforts.

++ Identify a person, suitably qualified, to initiate, monitor and coordinate the evaluation and modelling activities of the Division of Noncommunicable Diseases.

VII. In using forecasting and simulation models for decision-making and the setting of priorities it is necessary to specify utility and cost functions. The dynamic nature of chronic disease processes and the necessity of describing risk factor and disease interactions over time requires that new utility functions which appropriately weight for disease duration, progressions and severity be developed. It is recommended that the life table models of lifetime disease and service utilization impacts presented in WHO Technical Report Series 706 be evaluated and extended to produce appropriate temporally weighted programme efficacy and impact measures.

++ Extend life table based disease and utilization models to produce programme efficacy and impact measures.

VIII. The evaluation of the effectiveness of noncommunicable disease interventions has traditionally focused upon the incidence and prevalence of specific diagnosable disease events. Nevertheless noncommunicable diseases are processes evolving over long periods of time and changing drastically in their nature and severity. It is appropriate that the Division of Noncommunicable Diseases be interested in mitigating the effects of, and slowing the rate of progression of such disease processes. Hence the evaluation of the effectiveness of the Division of Noncommunicable Diseases intervention programmes should reflect primary, secondary, and tertiary prevention activities by focusing upon: a) the role of certain diseases as risk factors for further morbid states; b) reducing the disability consequences of chronic disease processes and maintaining the functional status of such affected persons; c) reducing mortality from selected causes; and d) investigating the effects of intervention in high risk and high disease prevalence populations such as the elderly or in persons with adverse environmental and occupational exposures. This emphasis will require appropriate actions in the development of forecasting and simulation models, the collection of available data for evaluation and modelling, and the setting of priorities for action.

++ Develop forecasting and simulation models for modelling effects of noncommunicable diseases intervention at different points in the morbidity process.

IX. Forecasting and simulation efforts frequently do not adequately represent the risks of specific interventions and the uncertainty of outcomes. It is suggested that such models be further developed in dealing with various sources of uncertainty, e.g. the uncertainty about the economic costs and benefits of interventions (i.e. the fiscal economic risk of proposed intervention activities) and uncertainty of health outcomes.

++ Develop measures of uncertainty, based on both economic costs and health outcomes.

X. Currently there is a large collection of software products which provide either separately or together data base handling and statistical analytic capabilities. Many of these are available for main frames, micro computers, and person computers. It is recommended that WHO and its collaborating centres make use of existing technology in the development of application software.

++ Make use of existing technology in the development and/or implementation of application software.

XI. It is foreseen that there are many types of potential end-users of the information produced by the modelling methods considered in this consultation. Many of these users will be more sophisticated than others. It is therefore recommended that WHO prepare a set of guidelines detailing various system requirements for applications level work. As it is recognized that computer software and hardware capabilities are changing nearly daily, it is recommended that WHO seek out one or more research centres having expertise in this area to provide technical assistance and to maintain a roster of recommended computational tools.

++ Create a WHO Collaborating Centre with the necessary computer expertise to develop and maintain up to date guidelines for computer modelling application work.

XII. Health planners and managers at the community and district levels must have easy access to relevant forecasts and data outputs. It is recommended that the Division of Noncommunicable Diseases identify appropriate institutions as potential WHO Collaborating Centres which can develop and/or implement computer systems which allow local personnel easy access to appropriate results.

++ Create WHO Collaborating Centres for implementing local "user friendly" access to modelling results.

XIII. The formulation of programme objectives (overall aims), targets (quantitative changes to be reached), main programme hypotheses, and the evaluation of methods to be used must be done at the outset of the programme. Consequently, the organization of an interdisciplinary team and the definition of the specific responsibilities for each member of the team must be considered before the programme even starts. To facilitate these steps, it is recommended that a review of the existing literature and of completed as well as ongoing intervention programmes with evaluation components be made. It is intended that this will build on existing knowledge and suggest more detailed recommendations regarding standardization of measurements and instruments of evaluation.

++ In order to facilitate the formulation of integrated community health programmes review existing literature and current programmes in progress which are involved in health interventions and their evaluation.

XIV. Models contribute to the development of sound designs and monitoring strategies of an intervention programme. As a result, the type of models selected should depend on the programme's specific components. Therefore, a careful review of the available models is needed. In general, using a combination of models will promote flexibility and diversity of information. It is recommended, therefore, that the Division of Noncommunicable Diseases review existing models, considering the above recommendations and that an evaluation of the models proposed by Interhealth and other intervention programmes be undertaken so as to work out ways of incorporating noncommunicable diseases prevention and control programmes in all health care patient contact activities, particularly in primary health care.

++ Review existing models which could allow for the integration of intervention and control programmes with all patient contact health care activities.

XV. Success of a study must be measured by three types of evaluation:

Efficacy (formative)

- a: Design - Which are the target population groups of the intervention (population segmentation)
- What are the needs of these target groups (population needs)
- What are the opinions of these groups about the intervention (use of focus groups)
- Are the specific intervention measurements and their strategies feasible?

- b: Process - Monitoring the progress of the intervention and the validity and reliability of the data collection.

Effectiveness (summative) - Evaluation of the immediate, interim and long-term outcomes.

Efficiency: cost effectiveness and other related economic issues.

All three types of evaluation may have quantitative and qualitative components. Success should be additionally measured by the extent to which the programme objectives continue after the conclusion of the intervention. The report of negative and positive results are essential in order to judge the overall impact of community intervention programmes. Positive and negative experiences should be described as to ensure exchange of meaningful information.

It is recommended that NCD review and develop a catalogue of evaluation instruments and make this available to any country or investigators who wish to develop such an intervention programme.

XVI. Different study designs can be considered in intervention/quasi-experimental settings, as appropriate to the study objectives and hypotheses. Each design has its intrinsic strengths and limitations with regard to community intervention and control programmes and careful consideration of these is required before the final design decisions.

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WHO CONSULTATION ON EFFICACY AND
EFFECTIVENESS OF THE INTEGRATED
PROGRAMME FOR COMMUNITY HEALTH IN
NONCOMMUNICABLE DISEASES

14-16 December 1987, Geneva

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Modelling (Forecasting and Health Systems)

1. What are the biases associated with nondynamic models and to what extent should these models be used in forecasting health service need? To what extent is modelling the process essential?
2. What are the typologies of health care delivery system models and how can these be integrated into the forecasting models? What are the outputs such models need from forecasting?
3. How can cross sectional studies, micro-studies, national data sets, be integrated into a model keeping track of variability, bias and the differing nature of each type of data?
4. What are the requisite types of data needed to begin a forecast model?
5. What are the measures by which an optimal or an adequate health delivery system can be evaluated? E.g. utility functions.
6. What is a "holistic model" and how can such a model be developed from a team effort?

Evaluation and Study Design

1. To what extent can forecasting paradigms be used to determine the "design specs" of a study?
2. What are the major issues in setting up a design:
 - a. Where do researchers "go wrong"?
 - b. What cautions are of particular concern in developing countries?
3. How does the "team approach" to modelling get established and how is it maintained?
4. What types of questions should be asked in setting up a study for evaluation before the study is begun?
5. What are the measures that most reflect the success of an intervention? Are targets or targeting requisite?
6. What guidelines can be established (if any) so that studies with less structured evaluation criteria like CINDI will still prove successful?
7. What are measures of success of a study based on:
 - a). Formative evaluation?
 - b) Summarative evaluation?
8. Are the minimum standards for study success such that studies with only moderate or even negative results would be of interest to the scientific, managerial and administrative sectors?
9. What are the design and measurement problems in evaluating continuing programmes that are now not demonstration projects?
10. What is the proper relationship between demonstration and evaluation?
11. What is the proper mode of data dissemination?

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CVD/AN/mo. October 1987

INTEGRATED PROGRAMME FOR COMMUNITY HEALTH
IN NONCOMMUNICABLE DISEASES (INTERHEALTH)

CORE INFORMATION TO BE COLLECTED BY INTERHEALTH DEMONSTRATION PROJECTS

Indicators and their measurement

1. PROGRAMME and PROCESS

Information on programme and process indicators will be based on available local information sources. Such documentation is necessary for every demonstration project.

The PROGRAMME documentation includes the protocol including basic socio-demographic population characteristics, information on programme structure, organization, intervention activities and sub-programmes. Costs will be included (separating intervention from evaluation costs).

In addition, some of the PROCESS information will also be collected like:

- progress in programme implementation
- proportion of target population reached (data obtained by: activity log, contact cards) for:
 - individual or group counselling (number of participants)
 - health services (screening campaigns, participants)
 - mass media
- legislative action (existence of (new) laws, regulations aiming at one/several of the Integrated Programme targets)
- utilization rates (e.g. blood pressure measurement density in the population) are obtained through the health questionnaire survey.

2. EFFECT

Result evaluation refers to the objectives on (1) diseases, (2) lifestyle and (3) risk factors. Local programmes can have their additional objectives.

Essential indicators to be used in all demonstration projects participating in the international WHO INTERHEALTH demonstration project collaboration are as follows:

2.1 Mortality data includes total mortality and major NCD mortality. The following rates,¹ by age and sex, are reported:

- disease of the circulatory system (ICD 390-459)
 - ischaemic heart disease (410-414)
 - cerebrovascular disease (430-438)
- malignant neoplasms (ICD 140-234)
 - trachea, bronchus and lung cancer (162)
 - cancer of the cervix uteri (180)
- diabetes mellitus (ICD 250)

¹ 5 year age groups, 30-64 years old population. ICD 9th Revision.

- external causes of injury and poisoning (ICD E800-E999)
 - motor vehicle traffic accidents (ICD E810-E819)
 - suicide (ICD E950-E959)
 - respiratory diseases (ICD ...)

Total mortality

2.2 Biological risk factors, health behaviour, symptoms and subjective health. For baseline and main follow-up surveys (five year intervals recommended).

Core data on:

A. Biological risk factors

BLOOD PRESSURE : Two measurements, MONICA methods
HEIGHT/WEIGHT : MONICA methods
SERUM TOTAL CHOLESTEROL : MONICA methods

B. Health behaviour

SMOKING : MONICA methods
ALCOHOL USE : Local questions to estimate average weekly consumption in grams of abs. alcohol
PHYSICAL ACTIVITY : Leisure time CINDI (from FINMONICA)
DIETARY HABITS : Questions related to target changes

Optional indicators are as follows:

Smoking validation SCN
Alcohol use gm GT
Blood sugar: fasting, glucose tolerance
Stress: local questions
Hip and waist circumference
24 hour urinary: Na. K. ...

3. METHODS OF INFORMATION COLLECTION AND ANALYSIS

3.1 Information sources

The following basic sources of information are recommended to be used:

(a) routine administrative data:

- study area and population
- special sources:
 - FAO/OECD food balance sheets
 - police reports
 - consumption statistics (alcohol/tobacco)
 - mortality statistics

(b) special collection of PROGRAMME and PROCESS data:

- structure, activities
- implementation, integration
- costs

- target population reached
- legislative action

(c) repeated cross-sectional population surveys (see 3.2)

- attitudes
- biological risk factors
- health behaviour
- symptoms and subjective health
- utilization rates

3.2 Population surveys²

3.2.1 Numbers and timing

The core study involves making determinations for five age groups of each sex as follows:

<u>Males</u>	<u>Females</u>
(15-24)	(15-24)
25-34	25-34
35-44	35-44
45-54	45-54
55-64	55-64

To meet the minimum requirement for detectable change in risk factors, smoking habits (cholesterol) and blood pressure, two hundred subjects are needed in each age and sex group. This assumes 100% participation and the use of a simple random sampling procedure. A lower participation rate, as might be expected, and the use of other procedures like geographic cluster sampling will necessitate a larger sample size. The population samples taken at different times should be independent of each other. The surveys should treat the intervention and reference areas in strictly the same way. Coordination with the MONICA project is recommended in the countries where MONICA exists.

It is recommended that a baseline survey takes place at the beginning of the programme. The next major survey should be carried out after a five-year period, whereafter the continuation of the programme will be decided according to the experience and research obtained. A continuation for at least ten years or preferably 15 years is recommended, whenever possible.

3.2.2 Approach to population and sampling frame

The population survey may take the form of a postal questionnaire followed by a medical examination, or a telephone call or personal visit and an invitation to the examination centre. A larger population might be surveyed using a questionnaire. Representative samples from the two areas (intervention and reference) from each area: 25-64 years (optionally 15-24 years)

- in each 10-year and sex category minimum of 200 subjects
- > total 2000 subjects
- 75% participation
- > 1600 examined

3.2.3 Standardization, quality control and avoidance of bias

The difference in risk factor levels that are to be detected over a period of 5-15 years might be quite small. The chances of not detecting them or of producing spurious

² Note: in some regions, a population census might take place during the programme period. The programme evaluation should build on this, if possible

differences, will be increased by the use of poor or changing techniques of measurement over time. The study will constitute a reasonable proposition only if a very painstaking approach to quality control is adopted. This means that:

- (a) all observers should be trained and tested before starting work
- (b) they should be retested during the study and any decline in performance remedied
- (c) procedures should be rigidly adhered to and not changed either during or between successive years, e.g. procedures should be repeated at the same time of year to eliminate seasonal variation.

The surveys should be carried out using strictly standardized methods and exactly in the same way and by the same people in the two areas. (If the project area is well representative of the country, the whole country can be used as a "reference area".)

The sources for methodology for the measurement of indicators of target risk factors are as follows:

- smoking MONICA (see example of FINMONICA)
- diet: local habits (see example of FINMONICA)
- alcohol: local habits
- blood pressure: MONICA
- sugar: WHO
- serum: total cholesterol, MONICA

4. ANALYSIS OF RESULTS

In keeping with the design, the primary analysis will be for within-programme trends at all three major evaluation levels (PROGRAMME, PROCESS, RESULT).

Those demonstration projects with a reference area will be able to compare results within an experimental study design, and thus contribute to the overall inference regarding programme effectiveness.

A secondary analysis will concern inter-programme comparison over time. At this analysis level, programmes might be grouped according to some overall indicator of the degree of programme activities (more intensive programmes, with a higher proportion of the target population reached, might be expected to show more marked trend changes, etc.). At this level, some analyses using aggregate data might be useful. In contrast, data pooling might not be feasible or necessary for a considerable part of the information collected.

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