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Methodological Issues in
Assessing the Health and
Demographic Consequences
of Development Projects

by

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First let me say that I feel somewhat presumptuous, as a social scientist, in addressing an audience of tropical disease specialists such as yourselves on a topic which seems to be of primary interest to social scientists. However, the methodological issues which I discuss in my presentation do, I feel, cut across a range of social science and health concerns, with regard to assessing the impact of development programs and other interventions on demographic and health behaviour.

The data which I use for this presentation are drawn from three projects which IDRC supported in the past 4 years, since I feel that periodic reviews of what has been learned from our funding experience are useful building blocks for future strategies. These studies all involve primary data collection and do not rely upon secondary data to any large extent. Hence, I will not discuss the problems of examining this topic using secondary, and usually aggregate, data, although I would be pleased to mention some of these later if time and interest permit.

I have selected three studies - in Thailand, Kenya and the Philippines, all of which examine the impact of a development program or intervention upon health or demographic consequences at the community and household levels, each by means of a somewhat different methodological approach. Taking the three as case studies I will try to demonstrate some of the problems

involved in relying on classical scientific methods such as experimental-control or before-after designs in seeking to derive reliable conclusions about social and health-related behaviour. I further argue that a combination of methods, including both quantitative and qualitative data, as well as the use of a "quasi-experimental" approach, where possible, yields more meaningful and useful results.

In arguing for the superiority of certain approaches, it should be emphasized that no criticisms are intended of the particular studies. In fact, among the reasons for selecting these projects was their high quality and scientific rigour. The point is rather to argue that even though all approaches have certain merits, some have comparative advantages for this kind of impact analysis.

As is well known, in simple experiments some subjects (units) receive a treatment while others are in a "no treatment" or control condition. The treatment may be, for example, rural electrification or irrigation, if the units are villages or clusters of villages. Bringing areas under reforestation is another example of the application of a treatment, and this was chosen by the Thai researchers at Mahidol University for a study of the impact of a large reforestation program on social, economic, health and demographic behaviour.

Thailand's reforestation program, with which many of you may be familiar, is one of the most important development projects in the country. In order to make way for agricultural expansion, rapid deforestation took place over the past two decades, creating a precarious environmental situation in terms of ecological balance, climatic conditions and water resources. In order to address this problem the Thai Government introduced a reforestation program during its first national economic and social development plan of 1961-1966, and this program has continued to the present time. It sets targets to be met by each Five-Year Plan, aimed at reforesting a designated area through the establishment of national forest parks and "reforestation villages".

The reforestation program aimed to settle rural inhabitants and shifting cultivators in certain areas to prevent further clearing of land; to provide a ready supply of labour for forest improvement activities; to improve the economic, health, and social conditions of the inhabitants through the provision of water supply, electricity and roads, social services including health care, family planning and education, and wage employment opportunities related to forest activities; and to encourage the inhabitants to grow crops both for subsistence and for additional cash income, and to this end, to provide each family with a plot of land.

Given the nature of the forest village scheme (provision of land, employment opportunities, amenities and social services), it was hypothesized that significant economic and social benefits such as greater household income, better health and higher educational levels, would result. It was also expected that the changes in economic and social development would have important demographic implications, especially with respect to infant mortality, a very sensitive indicator of the level of socio-economic development.

The study was conducted in Northern and Northeastern Thailand, where problems of deforestation were most severe. The methodology consisted of the selection of a two-stage stratified sample, including 90 villages and 60 households per village, representing 30 reforestation villages, 30 adjacent villages which were affected by the reforestation program insofar as their residents obtained employment in the reforestation activities, and 30 distant "control" villages not involved in or influenced by the program. The methodology consisted of a cross-sectional survey, and included interviews with village chiefs, community leaders, household heads and wives of household heads. Data were collected from 5,360 households, about 2/3 of which were located in the North region, and 1/3 in the Northeast. The data were analyzed by means of cross-tabulations, multiple regression and path analysis.

The findings of this study were much as expected in relation to anticipated economic benefits. Incomes and employment were higher in the reforestation villages than in the other communities. Those in the surrounding non-reforestation villages were also positively affected in terms of employment, additional income and better communication links.

However, the social, health and demographic effects of the reforestation program were much less straightforward and appeared to be, in many cases, negative. For example, crude death rates and infant mortality were highest in the reforestation villages and lowest in the distant villages. Malnutrition was also slightly higher in the reforestation villages. Among the causes of morbidity, influenza ranked highest in all areas, followed by malaria, eye ailments (tracoma) and dysentery. Fertility also appeared to be somewhat higher in the reforestation villages.

Several possible explanations for these unexpected findings were provided by the researchers, but, because of their reliance on survey findings alone, they were unable to confirm these interpretations. For example, the higher prevalence of mortality and morbidity in the reforestation villages was no doubt partially due to the newness of the communities and the lack of adequate medical services and community infrastructure, both physical and social. For example, only 31% of the reforestation villages had a health station, compared to 40% of those in the

distant villages; only 15% had a malaria unit, compared to 40% of the distant villages. However, trained health personnel such as doctors and nurses were very scarce in all areas, and there was considerable reliance upon village doctors and indigenous midwives.

The second study selected for this comparison is a survey of the effectiveness of a malaria control program in rural Kenya, conducted by a researcher at the University of Nairobi (now at KEMRI). The study did not attempt an experimental design but rather examined differences in the treatment population concerning its knowledge, attitudes and practice in relation to malaria. The setting for the study, Karateng sublocation of Kisumu District, was selected because its climatic and physical conditions made it favourable for the breeding of mosquitos, and two species (*gambiae*, *fenestus*) of *anopheles* mosquitos which are the main agents for malaria transmission in Kenya, abound in the area. Also, several Trial 4 control programs had been carried out in the area, making it relevant to study the impact of these programs on peoples' knowledge, attitudes and practices.

The study was conducted during the rainy season (May-August), 1983, because it was considered more useful to interview people during a period of heavy mosquito infestation and parasitic infection.

Since the study was intended to be largely exploratory and descriptive, the researcher did not formulate specific hypotheses, but worked within the broad proposition that the success of malaria control programs depends upon both indigenous beliefs and scientific knowledge about the disease, as well as people's attitudes and behaviour with respect to control measures. Transect area sampling was used and a total of 200 sample households were interviewed using questionnaires. In addition, participant observation of daily behaviour was utilized, especially with respect to malaria-relevant factors. The data was analyzed by means of cross-tabulations and content analysis.

The study yielded a rich body of important insights, only some which can be mentioned here. Perhaps the most important finding (which may not, however, surprise this audience) was that although all the respondents were aware of malaria and could identify it by one symptom or other, the majority know neither the cause nor the mode of transmission of the disease. Only 14 out of 200 knew that malaria was caused and transmitted by the mosquito. The causes mentioned were primarily rain, cold weather and the chewing of the maize-stalk, all of which are indeed associated with periods of heavy mosquito infestation. The main reason, according to the researcher, for the failure of the respondents to link malaria to the mosquito was the time lag

between the mosquito bite and the onset of symptoms. People therefore found a mosquito-malaria cause and effect relationship a difficult perceptual problem.

Malaria was not seen as a killer disease but rather as something which cleared by itself and was, like the common cold, relatively harmless in the long term. Nearly half the respondents (46%) therefore reported doing nothing about an attack whereas the other half (48%) went to the hospital. Thus, the researcher noted that with such a large number of people not seeking treatment, malaria cannot be combatted even if other control methods are used, because the reservoir of infection is continually present.

Those who did seek treatment preferred the injection to pills for a number of reasons which I am sure are well known to this audience. Among the tablet-users only 10% reported taking the drugs as prescribed by their doctors, the rest stopping the treatment when the symptoms cleared. They also complained about the difficulty of following the timing of the drug regimen for four days, as most of the respondents did not have watches and found it difficult to estimate time.

In spite of the lack of awareness of the connection between malaria and the mosquito, 80% of those interviewed know ways of destroying the mosquitoes (for the purpose of reducing their

nuisance). These included the clearing of bush and grass around their homes, covering pits containing stagnant water, the use of insecticide sprays, etc.

Participant observation of daily life aided greatly in the interpretation of the study's findings, and of the relationship between social behaviour and the prevalence of malaria. For example, pit latrines were found in 87% of the households visited but these were ill-kept, without pit covers and some had no doors, creating health hazards not only from mosquitoes but also from flies. Despite the fact that most respondents knew that clearing of brush destroyed mosquitoes, only about 5% had utilized this practice, explaining that the grass was required for the grazing of animals. These insights were gained only after the researchers had lived in the area for some time, since the residents tended to report their behaviour differently in the survey.

Observation of health-seeking behaviour was also revealing. Every morning at the rural health centres, before patients were attended to, health education lectures were given, including information on the prevention, causes and control of disease. However, because the patients attended the Centres for treatment and not for educational purposes, the information was not necessarily welcomed or absorbed. Patients were therefore unable

to clearly distinguish between the various diseases (malaria, cholera and tuberculosis).

The third study focused on the impact of the Green Revolution on fertility and family planning in two rural areas of Southern Mindanao, Philippines. The study, conducted by the Davao Social Research Institute (1984) used a "before-after" experimental design to measure change over a ten-year period, 1970-1980. At the time of the baseline survey in 1970 the two selected areas, Mindanao and Magsaysay, were characterized by different levels of development but both had experienced heavy in-migration over previous decades. Magsaysay was the more progressive of the two, being the first village in the area to accept miracle rice and hand tractors. Its industrious population of Ilocano in-migrants was also familiar with irrigated rice technology. Matanao, by contrast, was an hilly upland area where Cebuano in-migrants relied upon the production of corn and where the threat of soil depletion was imminent. Both the Ilocanos and the Cebuanos originated in areas of very high fertility and, as labour was in demand and the age structure of the population young, it seemed probable that rapid growth would continue for some time.

While the baseline survey found no important differences in fertility, due (seemingly) to the young age structure of the population, it was hypothesized that earlier fertility reductions

would be evident in Magsaysay than in Matanao due to its greater progressiveness and comparatively greater opportunities to better its economic circumstances.

The surveys included a sample of 2,050 households divided between the two communities. Interviews incorporated both economic and demographic variables, and covered all household members. The researcher, an anthropologist, also retained continuous contact with the region over the ten year period, giving the analysis the richness and intensity of an in-depth micro-study. The data were analyzed mainly by cross-tabulations.

Over the decade, three important government programs were introduced which seemed to make the hypothesized fertility differences between the two communities even more likely. These included land reform for rice and corn farmers, limiting their holdings to seven acres, crop production loans to rice producers and a nation-wide family planning program. Whereas for the rice producers, the loss of land was compensated for by the increased yields made possible by Green Revolution technology, there were no offsetting benefits for corn producers; similarly, crop production loans were not available to corn growers. Hence, it was hypothesized that these program interventions "would serve to hasten the differentiation of the two communities along the lines predicted." (Hackenberg, 1984:9)

The results of the research were quite surprising. Because the producers of certain crops including rice, sugar, coffee and coconut benefitted from the reforms whereas corn producers failed to do so, major shifts to other cash crops took place among the corn farmers, leaving only one-third of the farmers exclusively in corn production. Magsaysay, the rice growing area, on the other hand, maintained essentially the same cropping pattern as previously. Land reform also altered the distribution of tenure relationships in both localities because of various stipulations which made it mutually advantageous for landlords and tenants to sever their ties. For example, a labourer was entitled to a certain share of the farm operator's crop without paying any of the operating costs, whereas lessors and amortizing tenants had to pay the full costs of the farms they cultivated in order to receive title to their farms after 15 years. The landlord, on the other hand, was subject to reform only for the portion of land which was tenanted; he was therefore motivated to remove the tenants before his farm was assessed by Agrarian Reform authorities.

The proportion of tenants and leaseholders therefore decreased while that of labourers increased markedly. Theoretically, such structural changes would be seen as a move towards polarization, but surprisingly levels of living improved in both Matanao and Magsaysay. Income distribution also improved considerably due to overall production increases from the

high-yield varieties of rice and substantial increases in labour force opportunities.

These social and economic changes also produced significant demographic effects. For example, in contrast to the original hypothesis, but not too surprising in the light of the significant progress in living conditions over the decade, fertility fell by more than 50% in both communities. The use of effective contraceptive methods, including the pill, IUD and sterilization, was higher in the study areas than elsewhere in the Philippines, and this was attributed to the communities' general orientation towards technological innovation.

These studies are only three examples from a large body of research which I have personally reviewed on the impact of development programs on health and demographic consequences. The conclusions which can be based on them are, however, representative of this larger body of studies, especially in relation to the methodologies employed. Firstly, the limitations of survey design were apparent in the Thai study insofar as it left many questions unanswered, questions of fundamental importance for policy formulation. These perhaps could have been investigated more appropriately, or complemented by, more intensive smaller scale studies, involving longer residence in the communities, observation of daily life and closer acquaintance with the villagers. For example, the findings

regarding the negative health consequences of the reforestation program could have been explored in greater depth through micro-level research. To what extent, for example, were the residents in the reforestation villages different from those in the more settled communities, adopting, perhaps, different behaviour with respect to feeding practices and child-care? Greater understanding of the areas of origin of the reforestation settlers and the kinds of diseases and health risks prevalent there might also have assisted this analysis.

Secondly, the experimental-control design, used in both the Thai and Philippines studies, was shown to be problematic when applied to social behaviour. In the Thai study, many factors other than reforestation may have influenced the health and demographic outcomes, not all of which could be controlled even in the most carefully executed investigation. Another problem with this design is the assumption that the intervention or treatment is instantaneous or at least one that is completed quickly, which is not a realistic characterization of most development projects. Moreover, it is difficult to attribute equivalent initial characteristics, such as health status, to population groups as widely variant as those selected for the Thai study. Similarly, the experimental-control approach alone would not be adequate to explain the results of the Philippines study. In that study micro-level observation played a critical role in the understanding of the results of the longitudinal

study. The experimental-control approach, on its own, would have failed to yield easily interpretable information. For example, it was hypothesized that Matanao, the control or non-treatment area, would be less amenable to change than Magsaysay. At the end of the decade, however, such differences did not obtain due to unexpected changes in the control area. On the basis of survey data alone, the researcher would have been hard pressed to explain this finding. However, due to his continual contact with the area over the decade, he was able to enumerate the series of events which intervened. Economic adjustments to development incentives and family planning initiatives were pronounced in the control and more developed communities, due to the refusal of local farmers to stagnate under traditional productive arrangements.

The Kenya micro-study clearly indicates that a wealth of material of great importance to planners and policy-makers can be gleaned from combining quantitative and qualitative approaches. In providing a context for the survey findings, this study takes us, I feel, well beyond the tentative conclusions of the Thai project.

On the negative side, it must be admitted that the Kenya findings are limited to a relatively small area and to a small population sample, and the lack of a control "no treatment" population makes its generalizability problematic. Nonetheless,

it illustrates the importance of observation in explaining attitudes and behaviour in the selected area, and provides corroborating evidence for similar findings elsewhere. It also gives useful leads for further investigation in Kenya.

Finally I would argue that a combination of methodological approaches, such as was used in the Philippines, is most likely to yield useful information on development processes. By combining a longitudinal design and a quasi-experimental approach, quantitative surveys and micro-level observation, accurate time series data were produced, complemented by qualitative insights. These insights allowed for the interpretation of complex interrelationships, changes and unanticipated consequences. Wherever possible, then, a combination of methodologies is recommended, allowing the researcher to take advantage of the positive contributions of each approach, but also to compensate for the inevitable deficiencies created by the very nature of the data with which social scientists must work.