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This article addresses social inequalities in health within low- and middle-income countries. It reviews recent developments in the documentation and monitoring of inequalities, and the evaluation of health and related programmes from an equity standpoint.

Inequalities in health are everywhere

The term ‘inequality’ is used to refer to systematic differences between population groups, defined in terms of gender, race, wealth or other characteristics. ‘Inequities’ are inequalities judged to be unfair and unjust, and therefore theoretically preventable.\(^1\)

The documentation of social inequalities in health has a long tradition. Nevertheless, wide inequalities persist and in many cases seem to be on the increase – for example, the gap in the mortality of children aged under 5 years between developing and developed countries increased from 10-fold in 1990 to 14-fold in 2000.\(^2\) Within-country differences are also important – for most low- and middle-income countries, mortality among the poor is 2–3 times higher than for the better-off.\(^3\)

Until recently, however, addressing health inequalities was nowhere near the top of the agenda for international agencies such as the World Health Organization, UNICEF or the World Bank. There seemed to be the tacit assumption that, by focusing on diseases of the poor, such as tuberculosis, malaria, diarrhoea and acute respiratory infections, international health programmes would automatically reach the poorest. However, existing data from recent Demographic and Health Surveys\(^3\) carried out in 45 countries do not support such complacency. For example, child survival interventions that were largely disseminated in the 1980s – such as vaccines, antibiotics for pneumonia or malaria treatment – show higher coverage among the rich than among the poor in virtually all countries.\(^4\)

Consistent methods for stratifying populations by wealth were developed

Measuring socioeconomic status in a consistent way throughout less developed countries is not an easy task. Data on income or expenditure, for example, may be difficult to collect and have limited validity, particularly in rural areas. Educational achievement alone is easier to measure, but variability may be low in many settings. An alternative to such traditional indicators is to make use of data on household assets, which are often collected in surveys. Such information may be combined with data on education, land tenure or occupation, in order to rank families in terms of their relative wealth. A variety of statistical procedures may
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be used to derive a single item out of such indicators. Most often, principal components analysis has been used. The appropriate items to be included in a wealth index will vary according to the local availability of household items. In rural Tanzania, for example, the wealth index included ownership of a tin roof, the household head having an income apart from farming, ownership of mosquito nets, renting a house, ownership of a bicycle or radio and the mother having an income apart from farming. In urban Brazil, the number of bedrooms in the house, presence of a flush toilet, and ownership of a refrigerator, television set or motorcycle might be more relevant.

Indices derived through principal component analyses are continuous, and thus allow the sample to be stratified in several equal-sized strata. Typically, quintiles have been used, but fewer or more groups may be analysed. Because groupings depend on the distribution of the local sample, they may not be compared across countries in absolute terms. For example, the lower quintile in Tanzania will be poorer than that in Brazil. Nevertheless, they allow the study of within-sample inequalities in a consistent way.

Wealth indices are not devoid of problems. The choice of assets to be included in the analyses, and whether or not non-asset variables – such as education or employment – should also be included, are open to debate. However, systematic analyses of datasets from many countries show that such wealth quintiles are consistently able to detect important differentials in poverty-related health outcomes, such as child mortality and stunting prevalence.

How to assess the equity performance of programmes?

Given that surveys provide data on health and wealth, the next issue is how to relate both sets of indicators. In the health field, a common approach is to compare the bottom and top quintiles in the study sample, by calculating ratios or differences.

The economic literature on distribution, on the other hand, often relies on more sophisticated approaches that make full use of data from the whole distribution instead of using only the extreme quintiles. A common summary measure is a concentration index, that ranges from -1 (complete inequality, pro-rich), through 0 (complete equality), to +1 (complete inequality, pro-poor). Concentration indices seem to be becoming more popular in the health literature, but they are more difficult to interpret and to explain to the non-initiated than ratios or differences.

When evaluating the performance of a given programme, in health as well as in other sectors, economists are increasingly using ‘benefit incidence’ analysis. These analyses show what proportions of the programme benefits reach different population strata. For example, a social marketing initiative in two rural Tanzanian districts included the distribution of low-cost, insecticide treated mosquito nets to reduce malaria transmission. The ‘benefit’ consists of the net. A population survey showed that 17% of the nets distributed through the programme ended up in the homes of the poorest quintile of the population in the districts. The ‘incidence’ of the benefit for the poorest, therefore, was 17%. (It is somewhat unfortunate that the economic literature uses the term incidence in a very different context to its epidemiological usage.)

A concept that is closely related to benefit incidence is that of ‘focus’, which has been proposed for evaluating nutrition programmes. Focus is defined as the proportion, among participants receiving an intervention, who actually need the intervention.

Figure 1 depicts a graph in which coverage among the poorest quintile in the population is shown in the y-axis, while benefit incidence or focus is on the x-axis. The oval shapes show some of the possible combinations of benefit incidence and coverage among the poorest. Ideally, an effective programme would reach high coverage among the poorest, being placed near the top of the chart. Regarding benefit incidence, a pro-poor programme would be located on the right hand side, indicating that a high share of its benefit is reaching the poor. If a programme is neutral in terms of benefit incidence, that is, neither pro-poor nor pro-rich, then 20% of the resources will be spent on the poorest quintile. The red vertical line in the graph shows this mark.

Programmes in the upper right hand side of the chart would have both high coverage among the poorest and also high benefit incidence, that is, pro-poor performance. Such
programmes would constitute excellent examples of well-targeted interventions.

In contrast, programmes aimed at reaching universal coverage in a population – for example, an eradication programme for a vaccine-preventable disease such as polio or measles – would also need to reach high coverage, but would not necessarily be pro-poor. If all vaccines were supplied by the public sector, an eradication programme would have a 20% benefit incidence for the poorest quintile, being located on top of the red line in Figure 1. Two other types of programmes are shown on the bottom part of Figure 2. On the left are pro-rich programmes, with benefit incidence below 20% and low coverage among the poorest. On the right are pro-poor programmes, with high benefit incidence, but nevertheless unable to achieve high coverage among the poorest.

Are pro-poor programmes reaching the poorest?

Given the framework presented in Figure 1, one may attempt to answer the question in the title of this paper. Ideally, this answer should be based on a systematic review of the published literature on health programmes in low- and middle-income countries. However, programme evaluations are often disseminated as limited-circulation reports commissioned by the programme sponsors, and results are seldom reported for different social groups. Also, benefit incidence results are seldom provided. For studying the performance of programmes in different settings, we took advantage of a recent initiative – the Reaching the Poor Programme – that encouraged researchers from low- and middle-income countries to evaluate local programmes using benefit incidence analysis. Over 150 spontaneous applications were received from all over the world, and 18 projects were funded. These results, as well as approximately 30 other evaluations, were presented at a conference in early 2004.

In Figure 2, all programmes or interventions presented in the conference that provided data on how well programmes were reaching different wealth quintiles, are summarized. Each programme is represented by a red dot. When data on benefit incidence were not presented directly, this was estimated from the coverage figures for each quintile. The estimates presented in Figure 2 allow us to highlight different types of pro-poor performance.

First, most programmes that were evaluated were somewhat pro-poor, with a median benefit incidence around 30%. Also, the median programme coverage among the poorest was close to 50%. However, judging all programmes by the same standards may not be a good idea.

For example, programmes on the upper left corner included health sector interventions aimed at reaching universal coverage, such as immunization against measles in Zambia and distribution of iron tablets during pregnancy in Malawi. The Tanzanian KINET programme for social marketing of mosquito nets reached a remarkably high coverage in all social groups and thus achieved high coverage among the poorest, despite low benefit incidence. None of these programmes were specifically targeted at the poorest.

On the bottom right hand corner of Figure 2, the Argentinean feeding centre programme is a clear outlier. It had the highest benefit incidence of all programmes evaluated, but very low coverage among the poorest. This programme provides free meals for children at centres located in public schools in poor neighbourhoods. Both the physical location of these centres, and the possible social stigma associated with their utilization, may contribute to the combination of low coverage and high benefit incidence.

There are no programmes in the upper right corner of the chart, where perfectly targeted, high coverage interventions should be located. The Mexican PROGRESA programme – the provision of cash transfers to families conditional on their use of health and educational services – was the one closest to achieving this combination. Within programme areas, PROGRESA reached 80% coverage among the poorest and near 60% benefit incidence. Such impressive performance was reached through a combination of geographical and family-level targeting.

Finally, programmes and interventions in the bottom left corner had mediocre performance on both coverage and benefit incidence. An example is delivery by trained midwives in Bangladeshi public-sector health centres, for which both coverage and benefit incidence were equal to 11%. The compelling message from Figure 2 is that most of these programmes and interventions still have a long way to go in terms of reaching the poorest. Also, the figure shows that interpretation of benefit incidence should take into account the programme objectives, whether it is universal coverage – for which low benefit incidence may be expected – or whether the programme is targeted to the poorest, in which case benefit incidence should be high.

Whether or not the programmes reviewed in this paper are typical of those being implemented in low- and middle-income countries cannot be ascertained for sure. As mentioned, many programme evaluations are sponsored by implementing...
agencies, and may either end up in the grey literature or – if results are perceived as negative – may not be disseminated at all. Nevertheless, the studies featured here resulted from a broad, open request for research proposals on this topic, and most investigators had no links with the programmes they assessed, so the likelihood of dissemination bias is low.

Conclusions

There is a need to mainstream equity considerations. New programmes and interventions should be required to include an explicit statement of their expected impact on equity. Routinely collected statistics, for example in the health and education sectors, should be broken down by socioeconomic status. Programme evaluations should, in addition to overall impact, show how different social groups have benefited. Equity analyses should not be an afterthought, but an essential component of planning, monitoring and evaluating programmes.

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Cesar G Victora is Professor of Epidemiology at the Federal University of Pelotas in Brazil, which he joined in 1977 after obtaining his MD from the Federal University of Rio Grande do Sul (1976). In 1983, he obtained a PhD in Health Care Epidemiology at the London School of Hygiene and Tropical Medicine. He has conducted extensive research in the fields of maternal and child health and nutrition, equity issues and the evaluation of health services. He has worked closely with UNICEF and with the World Health Organization (WHO), where he is the Senior Technical Advisor to the Multi-Country Evaluation of the Integrated Management of Childhood Illness Strategy, and a member of the Advisory Committee on Health Research. Since 1996, his unit was designated as a WHO Collaborating Centre in Maternal Health and Nutrition. He is also an Honorary Professor at the London School of Hygiene and Tropical Medicine.

Figure 2 Reprinted from Lancet, Vol 365, Authors: Gwatkin DR, Bhuuya A, Victora CG, Title: Making health systems more equitable, Pages 1273-80, Copyright 2004, with permission from Elsevier.

References

Making health research more pro-poor

Article by Abbas Bhuiya

Good health is not only an end in itself, but also a means of achieving individual and social development goals. ‘Health is wealth’ is part of the indigenous knowledge of any society, however, it is only recently that health and health research has been put at the centre of the development agenda.1-4

The average life expectancy at birth in the developing world has increased from a mere 40 years in 1950 to about 65 years at present.5 Globally the progress is about 4 months each year.6 This improvement has been due to both socioeconomic development and effective public health advances, but it seems that the latter has played a larger role.7 Tragically, the overall improvement in health has also been accompanied by phenomenal and ever-growing inequities in health between the populations of various nations and subgroups of populations within nations.8 The ones at the bottom of the scale are mostly the developing countries and socioeconomically disadvantaged groups within a country. These groups have poor access to modern health knowledge and health services – a situation quite similar to that of past famines in which lack of access rather than availability of food in the famine-stricken country was the main factor responsible in many cases.9 This is an undesirable phenomenon with myriad consequences, which is likely to continue unless effective means are found and put in place to confront it.

Research in general played a vital role in finding solutions for major health threats faced by humankind and also in taking the solutions to the people. Nonetheless, reducing the lag between a discovery and the deriving of benefit from it by those in need irrespective of nationality and socioeconomic status is a daunting task. An examination of successful public health programmes clearly reveals that discovery of a solution is only a part of the final resolution. Taking the benefit to the masses is a step that is at least halfway if not more of the way toward the solution.10 At present the available knowledge to improve health is not commensurate with the state of health in the poor nations in general and the state of health in the poor nations in general and the health of the poor in particular. This clearly indicates a need for realignment of the health research agenda – the focus, the way research is done, and the way success is monitored and evaluated. It is in this context that the present article is written with the hope of generating discussion to make health research more useful for the poor.

Poverty and poor health: strong nexus, weak actions
Poverty and poor health are almost synonymous and are related in a bi-directional way – the way malnutrition and infections are. Children of a mother from a poor family are most likely to be undernourished to begin with and vulnerable throughout their lives. The adverse effects of undernourishment continue. Poor health also increases vulnerability to financial loss, and poverty also limits access to modern services, be they health or developmental. Thus continues the never-ending cycle of poverty and poor health.

In the recent past health gain in countries like Bangladesh has been substantial and the gain has been quite large among the poor.11 However, resistance has been encountered on many fronts including neonatal survival and maternal health, especially around pregnancy and childbirth. Currently, maternal health and the utilization of safe delivery services in poor nations are highly inequitable.12 An examination of the situation leading to maternal death can provide useful guidance in identifying areas of knowledge generation for reducing inequities between nations and among various socioeconomic groups within a nation. The case narrative in Box 1 is one of the 17 maternal deaths that took place in a population of 150,000 in a rural area of Bangladesh during 2002–2004. Of the deaths, 14 were in households whose income earners were day-labourers or engaged in similar professions for livelihood. The proportion of such households in the community is only 46%, meaning that 82% of maternal deaths have been shared by 46% of the households – a highly inequitable situation.

The situation outlined also depicts an extreme scenario of the cycle of poverty and poor health, which can be typical of poor settings. As highlighted in the case narrative, the situation leading to the death of the woman illustrates the difficult conditions under which the woman and her family lived. She was from a poor family with no education, lack of financial resources, absence of social support and perhaps undernourished. She began reproduction at an earlier than ideal age with frequent pregnancies, had no control over her life, lacked a favourable environment during pregnancy, did not know what measures to take in what conditions, was
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The ability to apply oral rehydration therapy using mothers at home with common household ingredients in poor settings was empowering for the mothers and was instrumental in saving millions of lives. This is an example of a pro-poor solution to a health problem faced by the poor, in poor settings.

Research: less in poor settings even less for poor

The health research agenda must be broad in scope. Solutions to health problems require innovation through biomedical research, field-testing through epidemiological studies, and scaling up through social science and operations research. Effective public health interventions must have the advantage of research on all fronts in addition to financial support from a range of sponsors.

Discovery of oral rehydration therapy (ORT) is an example of a solution for the health problems of the poor. Its invention was backed by sophisticated biomedical research and its distribution to millions of people was aided by social science and operations research for promotional activities to benefit the world’s poor. The ability to apply the solution using mothers at home with common household ingredients in poor settings was empowering for the mothers and was instrumental in saving millions of lives. This is an example of a pro-poor solution to a health problem faced by the poor, in poor settings.

Pro-poor research topics: prevention vs cure

Prevention is always better than a cure, although this is truer for the poor than the rich. Once a person becomes sick, he or she loses work days and must resort to curative services. On both accounts it is more costly for the poor in a developing country situation because they are not covered by insurance and they do not have an employer to pay them during illness. Thus, illness can be more devastating for the poor than the rich. One could conclude that the poor can simply not afford to be sick. Immunization and health education are two preventive tools at hand, and the utilization of free immunization is found to be equitable at a high level of coverage. Health education should also equip the poor to prevent sickness, however, equity in its acceptance and benefit has not been common in the literature. Thus, there is a need to test the efficacy of health education in improving the health and economic condition of the poor.

Reaching the poor: what do we need to know and do?

Bringing a solution to the poor is not an easy task. A

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Box 1 | Poverty and maternal mortality

The following is a case narrative on one of the 17 maternal deaths that took place in the Chakaria field site of ICDDR,B during 2002–2004. (The name of the woman has been changed to maintain anonymity).

Begum (18 years old) was an inhabitant of a village in Chakaria in the south-eastern part of Bangladesh. Her husband (35 years old) was a rickshaw puller. He is originally from another district and came to Begum’s village about 1.5 years ago and married Begum. Begum herself was not from a well-off family. Her father was a day labourer and could barely maintain his family of six with his income. He did not have any cultivable land of his own. Begum’s father did not know much about her husband and his family before the marriage, but still agreed to the marriage because he did not have to pay any dowry for Begum. He knew that if he wanted to get his daughter married to a local person then he would have to pay a heavy dowry, which he was not capable of.

After 4 months of marriage Begum was pregnant. Unfortunately, 2 months following conception she had a miscarriage. She conceived again 2 months after this incident. In the first trimester she began vomiting and could not eat properly. Her husband brought medicines for her from a pharmacy in the nearby town. From the fifth month of pregnancy Begum developed oedema. This time her husband consulted a village doctor and brought medicines for her. A few days later, her husband left her without informing anyone or leaving a clue as to where he would be. Without her husband’s support Begum suffered great hardship. She was struggling to get enough food for herself during the pregnancy. In time she developed severe oedema. Her parents went to a traditional healer and he treated her with amulets, spiritual water and oil. Her parents were forced to spend approximately Tk. 210 (US$4) for this treatment, and it did not improve her condition in any way. Her parents also brought some homeopathic medicine for her. Still her condition continued to deteriorate day by day. A month before her delivery she was having problems urinating. She was urinating only 1 or 2 times a day. Her mother consulted a village doctor for this problem. The medicines that the doctor prescribed did not improve her condition. During this time she also ate very little food, which exacerbated her weak condition. She went into labour on the morning 17 November 2003 and delivered a baby boy at 10pm with the help of a traditional birth attendant (TBA). Sadly, it was a stillbirth. After conducting the delivery the TBA inserted her hand into the uterus and pulled out the placenta. At this time Begum had a fever and was bleeding severely. The day after the delivery her body became more oedematous. Her mother called in the same village doctor who was contacted earlier. The doctor examined her and found that she had severe anaemia. He gave her medicines to control her anaemic condition. He also suggested that her parents take her to a private clinic to give her blood. From the evening of 19 November 2003 she became very restless. She began having difficulty breathing. The next morning her parents again called in the village doctor. Begum had a high fever by this time. The doctor examined her and gave her an injection. He then waited 15 minutes before giving her a second injection. Begum felt a little better after this and rested for a while. In the evening of the same day she became restless again and the troubled breathing worsened. Her mother gave her the medicine that she already had already been given by the village doctor. None of these medicines had any effect and eventually she died at approximately 9.30pm that night.

Reasons for Begum’s untimely death as identified by her mother and neighbours: As Begum’s parents were poor and could not afford to pay the dowry, she had to marry someone who they did not know. Her husband left her when she was ill. Begum did not get any proper health care due to their poor economic status and lack of awareness. All these factors led to the tragic end of her life.

The issue of targeting the poor vs targeting everybody in a society has often been argued on the grounds of efficiency. It was also observed that the benefit of a new service is first derived by the better off and later by the poor.27 The question is whether for reasons of so-called efficiency and the hope of a trickle-down effect, one should wait or go forward and launch targeted programmes. Evidence has been accumulating showing that development and health programmes that are tailored to be sensitive to the life situation of the poor have been helpful in reducing inequities in education, income and health.21,22 Policy-makers and programme designers should look for equity-achieving evidence and researchers should come forward to generate such findings.

Lessons from successful programmes within and outside health sectors should be extracted and adopted in health and development programmes. Discovery of appropriate strategies to reach the poor is urgent and will not happen without adequate attention from researchers. Examples exist in the health sector where services have benefited the poor and rich both equitably and inequitably, for example, immunization services with a very high level of coverage have been egalitarian, and the safe delivery of services with low coverage have been very inequitable.11 Education and socioeconomic development programmes sensitive to the life
situation of the poor can benefit the poor more than what could otherwise be achieved. Systematic investigations in finding ways to reach the poor must be pursued. The question of efficiency is quite often raised when it comes to targeting the poor. Indeed, improving the condition of the poor may be expensive according to some criteria; however, the research community has failed to develop methods to do the calculation correctly by valuing the gain achieved by improving the health of the poor and reducing poverty. Economic efficiency in the context of the improvement of the condition of the poor has almost become a language of a different social class and certainly not of those who are excluded from the benefits. This notion of efficiency should be countered by objective information.

**Monitoring progress: average vs disaggregation**

The nations of the world have committed to achieving certain goals by 2015 as outlined in the Millennium Development Goals (MDG) documents. However, the targets can be achieved without making much of an impact on the lives of the world’s poor. This can be true for any health or development programme, which is often judged by average improvement. Countering such false complacency will require development of equity-sensitive monitoring and evaluation tools and ways of adopting them. The Millennium Project Task Force on Child Health and Maternal Health has thus recommended monitoring of the MDGs, not only on aggregate terms, but for each group in the population.

Institutionalization of an equity-sensitive system is another challenge. The routine Management Information System (MIS) data especially in the developing world are quite often inadequate in terms of quality and scope. Some tailoring in the system has to be done to make MIS data useful to programme managers in identifying shortfalls in equity gain at the lowest levels of health service. It may also be of use to have complementary independent evaluation and monitoring systems in place. The EPI cluster method of survey has been very effective for the EPI managers to monitor progress; however, its application at the lowest health work area level has not been very effective for the EPI managers to monitor progress; however, it may also be of use to have complementary independent evaluation and monitoring systems in place. The EPI cluster method of survey has been very effective for the EPI managers to monitor progress; however, its application at the lowest health work area level makes it quite an endeavour. Therefore, there is a need to have more rapid and easy-to-use techniques for monitoring programme performance at the community level with equity focus. In the recent past, benefit incident analysis has been used at the facility level to monitor utilization by the poor. Lot Quality Acceptance Sampling (LQAS) has also been used in many instances to classify work areas as adequate or inadequate by using much smaller sample sizes. There is potential with LQAS to use it at the community and at facility level to monitor utilization of services by the poor. Researchers should really concentrate on finding simple and rapid techniques for monitoring programme performance with a focus on equity. Improvement of health almost always requires modification in individual and/or group behaviour. Monitoring of programme performance by the community provides an opportunity for community members to participate. This exercise not only informs the beneficiaries of programme potential, but also initiates modifiable actions where necessary and establishes mutual accountability. This in effect provides a mechanism whereby the programme beneficiaries take responsibility for their own well-being and thus make programmes more effective than what could be achieved through monitoring by external agents only. Despite the use of participatory methods on many occasions their institutionalization in the health system has not been very satisfactory. One of the reasons for low utilization of participatory methods in programme monitoring could be due to the lack of know-how for adopting these methods on a large scale. It will be useful to try out methods of institutionalization of Participatory Rural Appraisal (PRA) techniques in the health system.

**Conclusion**

Improving the health of the poor would need intelligent information generated through appropriate research. Thus, an understanding of the context in which poverty and poor health is perpetuated is a prerequisite for deciding on topics for investigation. It should not be forgotten that health problems may be biomedical in nature but their long-term solution may in fact lie outside the biomedical and/or health field. Challenges for health research therefore lie not only in finding solutions for the health problems of the poor but also finding ways to work together with other sectors for lasting improvement of the health of the poor and the eradication of poverty.

Institutionalization of Participatory Rural Appraisal (PRA) techniques in the health system.

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Abbas Bhumiy, PhD, is Head of the Social and Behavioural Sciences Unit and Poverty and Health Programme of ICDDR,B: Centre for Health and Population Research. Dr Bhumiy has been engaged in health equity related research and activities for the last 25 years.
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A great part of the diseases that affect the majority of the world population are the product of conditions of poverty in which the families who suffer those illnesses live. Poverty produces some precarious environmental conditions and malnutrition in people, which facilitates the transmission of diseases or their development in weakened bodies, impeding them from working, developing their capacities and being productive for themselves and for society. They are diseases of poverty that produce more poverty.

Development prevents diseases

Historically we know that when an important level of social progress has been achieved in countries, regions or their social sectors, and people have had the opportunity to extricate themselves from poverty, above all extreme poverty, diseases have radically decreased. And this occurs because with development the material conditions of life of those people are modified and the transformation also provokes a change in their mentality, in the confidence that they have in themselves and in their capacity to prevent diseases that may be avoided as well as their awareness of the right to a healthy and free life.

This has occurred with many diseases. When sewers or septic tanks were built and human excrement ceased to be thrown in the rivers, schistosomiasis disappeared from endemic zones. The same occurred with the incidence of Chagas’ disease when houses were improved and with malaria in zones where economic progress led to an increase of production and population of cattle, because the vectors began to bite the animals and not people.

The urbanization process also contributed to reducing the transmission of many diseases, because this meant an important change in the living conditions of people. Certainly, the rapid process of urbanization that occurred in Latin America or Africa did not mean the onset of development, as it was thought would occur in time, because in contrast with Europe it was not accompanied by industrialisation or improvement in the distribution of wealth. Nevertheless, cities helped to prevent many ailments of the countryside because they represented an important change in the conditions of rural life. But poverty persisted in the cities, acquired a new face, and the lack of basic services such as water and the need to store it for domestic use offered the conditions for other diseases such as dengue to prosper in the urban environment and become the threat that they are today in many places on the planet.

The effort to control diseases

In spite of this evidence, a great part of the effort that governments make is exclusively oriented to controlling diseases or curing patients, without altering the conditions of backwardness and poverty that produce them. Health ministries concentrate on disease control measures that allow eliminating by chemical means the presence of the vector insects of the disease and of host snails, but not to modifying the reasons for which human faeces reach those rivers. When the houses are full of triatomine bugs that transmit Chagas’ disease, they have been fumigated or painted with pesticides, but the walls or roofs that allow insects to continue to live there have not been modified.

Health ministries have been efficient in placing larvicides in the precarious deposits of potable water of the slums of the cities, to avoid the reproduction of the Aedes aegypti mosquito which is the transmitter of dengue, but we have not been able to provide regular water to families to make it unnecessary to store it.

Snail poisons, insecticides or larvicides prevent the disease. Those measures are efficient and ministries have applied them in good faith. But we know that they have temporary success because they temporarily reduce the risk of transmission of diseases, but do not modify the causes that permit their existence, and they do not alter the material and social conditions at the origin of the disease. They are measures dedicated to controlling the diseases of poverty, without altering the conditions of poverty.

The perspective of equity

Poverty and inequality have increased in many regions of the world. This has occurred either because with the growth of...
the population an increase has been produced in the absolute number of poor people—although in some cases their relative percentage may have diminished—or because the improvement of some social sectors, like the urban populations of China and India, increases the distance that separates them from the rural populations that remain in their traditional poverty. In Latin America at the beginning of the 1980s there were 136 million urban poor and 73 million rural poor; 20 years later the poor had increased to 221 million in the cities and to 75 million in the rural areas, and that is the population that suffers from malaria, schistosomiasis, Chagas’ disease or dengue.

In the health sector we have carried out a great deal of research on parasites and vectors, but not on why the conditions of poverty-disease persist among that population, on what the cultural variables are that detain the effort for improvement and social advance or on what the objective and external factors are that foment the disease. We know that poverty produces these diseases, but we do not investigate why poverty persists, nor what we must do to be able to overcome it in a context of democracy and freedom. We simply take poverty as an immutable reality and we dedicate ourselves to curing the sick or killing the bugs that find their mode of living in poverty. We investigate the consequences, not the causes and therefore we are only trained to intervene with regard to the consequences and not the causes.

When equity is important in research

In research and control programmes it is not known what may be done differently. The people who work on these programmes learned a mode of investigation or of killing insects and continue to do the same. They do not know what other strategies can be used, they do not manage to locate themselves in a broader perspective than their specific programme goals. The door that can lead them to new paths of investigation on health and social transformation is tightly shut. The locks that keep the door shut stem from the fear of the unfamiliar (or new), to interdisciplinary work, to the loss of security of the known. Opening the door is difficult, however, it is looked for under the street lamp, because the area around it is illuminated, instead of looking for it eagerly under the only street lamp that exists in that area. The key was not lost there but on another part of the road, however, it is looked for under the street lamp, because the area around it is illuminated, instead of looking for it in the darkness.

Technological efficiency and social progress

If we have to be in the dark on the road that we do not know, the idea of equity and development must serve as our guide. Let us take the example of Chagas’ disease, a terrible illness that affects close to 18 million people in South and Meso-America. A parasite (Trypanosoma cruzi) produces this disease which is introduced in people when it is deposited in the faeces of a vector insect that defecates, while it sucks the blood of the inhabitants of poor houses in rural Latin America. The parasite can provoke an acute illness in a few days that can lead to death, or remain in a silent phase for up to 15, 20 or 30 years; it manifests itself in cardiac or digestive damage and may cause a sudden death that is very difficult to associate with the parasite and the vector. The insects live in the houses and feed on the blood of the families and can be counted in the dozens or thousands, depending on the place and the conditions of the house. If houses did not have palm roofs, unplastered walls or earth floors, crops and hens inside, this type of transmission would be almost impossible. The disease has no cure; there is a controversial treatment that is supplied in acute cases, but in regard to which there is no agreement for application in chronic cases, which make up the great majority.

On repeated occasions the need and aspiration to obtain a vaccine that impedes these people from being able to acquire the disease if they are bitten by an insect infected with the parasite has been proposed. To develop a vaccine requires important research efforts and financing to sustain it. Let us
suppose that that effort is successful and a vaccine is obtained that provides protection to the rural population. This would be an important advance that would fascinate our minds and would fill those who achieve this objective with glory, and science would be rewarded for its effort. But the problem does not end here. Let us moreover suppose that vaccines can be industrially produced in an abundant manner and at a modest price that the countries where this disease is endemic can afford to pay. Let us suppose further, that the vaccine can be applied simply, a single dose with lifetime protection and that the health services of the countries manage to efficiently apply it to the whole population at risk. Nothing that has been stated is simple or guaranteed, but let’s be positive and give a vote of confidence to all of the previous processes. What would we have at the end? We would find a rural population that continues to live in the same unplastered houses and with palm or straw roofs, cohabiting with up to 7,000–11,000 insects who suck their blood, but cannot give them the disease because they are protected with a high technology vaccine. Is this the health that we are seeking? Is this fair and equitable?

Equity obliges us to think in terms of health and of overcoming the conditions of poverty that provoke the disease, not only of controlling diseases and leaving the population living in the same poverty. The way forward through this new perspective is not simple, but it needs to be introduced with great effort and enthusiasm. The Spanish poet described the situation aptly when he said: ‘walker, there are no paths; a path is made by walking through’ (caminante no hay caminos, se hace camino al andar).

Roberto Briceno-Leon is a Professor of Sociology at the Central University of Venezuela, and the Director of the Laboratorio de Ciencias Sociales (Social Science Laboratory – LACSO). He is a member of the WHO Expert Advisory Panel on Parasitic Diseases and the TDR/WHO Steering Committee in Social, Economic and Behavioural Research. He served as Global Secretary of the International Forum for Social Science and Health (IFSSH) and was director for Latin America of the TDR/WHO Small Grants Programme. He has published 18 books and more than 90 articles and chapters in academic volumes.

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The gross inequalities in health that we see within and between countries present a challenge to the world. That there should be a spread of life expectancy of 48 years among countries and 20 years or more within countries is not inevitable. A burgeoning volume of research identifies social factors at the root of much of these inequalities in health. Social determinants are relevant to communicable and noncommunicable-disease alike. Health status, therefore, should be of concern to policy-makers in every sector, not solely those involved in health policy. As a response to this global challenge, WHO is launching a Commission on Social Determinants of Health, which will review the evidence, raise societal debate and recommend policies with the goal of improving the health of the world’s most vulnerable people. A major thrust of the Commission is turning public-health knowledge into political action.

There are gross inequalities in health between countries. Life expectancy at birth, to take one measure, ranges from 34 years in Sierra Leone to 81.9 years in Japan. Within countries, too, there are large inequalities – a 20-year gap in life expectancy between the most and least advantaged populations in the United States, for example. One welcome response to these health inequalities is to put more effort into the control of major diseases that kill and to improve health systems. A second belated response is to deal with poverty. This issue is the thrust of the Millennium Development Goals. These goals challenge the world community to tackle poverty in the world’s poorest countries. Included in these goals is reduction of child mortality, the health outcome most sensitive to the effects of absolute material deprivation.

To reduce inequalities in health across the world there is need for a third major thrust that is complementary to development of health systems and relief of poverty: to take action on the social determinants of health. Such action will include relief of poverty, but it will have the broader aim of improving the circumstances in which people live and work. It will, therefore, address not only the major infectious diseases linked with poverty of material conditions but also non-communicable diseases – both physical and mental – and violent deaths that form the major burden of disease and death in every region of the world outside Africa and add substantially to the burden of communicable disease in sub-Saharan Africa.

The Commission will not only review existing knowledge, but also raise societal debate and promote uptake of policies that will reduce inequalities in health within and between countries. The Commission’s aim is, within 3 years, to set solid foundations for its vision: the societal relations and factors that influence health and health systems will be visible, understood and recognized as important. On this basis, the opportunities for policy and action and the costs of not acting on these social dimensions will be widely known and debated. Success will be achieved if institutions working in health at local, national, and global level will be using this knowledge to set and implement relevant public policy affecting health. The Commission will contribute to a long-term process of incorporating social determinants of health into planning, policy and technical work at WHO.

To understand the social determinants of health, how they operate, and how they can be changed to improve health and reduce health inequalities, WHO is setting up an independent Commission on Social Determinants of Health, with the mission to link knowledge with action (Box 1). Public policy – both national and global – should change to take into account the evidence on social determinants of health and interventions and policies that will address them. This introduction to the Commission’s task lays out the problems of inequalities in health that the Commission will address and the approach that it will take. This report will argue that health status should be of concern to all policy makers, not merely those within the health sector. If health of a population suffers it is an indicator that the set of social arrangements needs to change. Simply, the Commission will seek to have public policy based on a vision of the world where people matter and social justice is paramount.

Inequalities in health between and within countries: poverty and inequality
A catastrophe on the scale of the Indian Ocean tsunami rightly focuses attention on the susceptibility of poor and
vulnerable populations to natural disasters. It is no less important to keep on the agenda the more enduring problem of inequalities in health among countries.

**Children**

Under-5 mortality varies from 316 per 1,000 livebirths in Sierra Leone to 3 per 1,000 livebirths in Iceland, 4 per 1,000 livebirths in Finland and 5 per 1,000 livebirths in Japan. In 16 countries (12 in Africa), child mortality rose in the 1990s by 43% in Zimbabwe, 52% in Botswana and 75% in Iraq. Figure 1 shows under-5 mortality rates for four countries with households classified according to socioeconomic quintile. Child mortality varies among countries. Within countries, not only is child mortality highest among the poorest households, but also there is a social gradient: the higher the socioeconomic level of the household, the lower the mortality rate.

**Adults**

Differences in adult mortality among countries are large and growing. Figure 2 shows probability of death between age 15 and 60 years by region of the world between 1970 and 2002. Mortality rose in Africa and in the countries of central and eastern Europe whereas it declined in the world as a whole. By 2002, for example, men in the high mortality countries of Europe had more than 40% probability of death between age 15 and 60 years compared to a 25% probability in southeast Asia. These data are for regions. Among countries, the differences are even more dramatic. The probability of a man dying between age 15 and 60 years is 8.3% in Sweden, 82.1% in Zimbabwe and 90.2% in Lesotho.

A particularly telling example of health inequalities within countries is the 20-year gap in life expectancy between Australian Aboriginal and Torres Strait Islander peoples – life expectancy is 56.3 years for men and 62.8 years for women – and the Australian average. The men in this population would look unhealthy in India (male life expectancy 60.1 years) whereas Australian life expectancy is among the highest in the world, marginally behind Iceland, Sweden and Japan. The poor health of Aboriginal and Torres Strait Islander peoples is not the result of a high rate of child deaths. Infant mortality is 12.7 per 1,000 livebirths. This figure is high by Australian standards, but on a scale from Iceland to Sierra Leone, where infant mortality is 9.4 per 1,000 livebirths. The differences in mortality are much higher in Aboriginal and Torres Strait Islander peoples than among Aboriginal and Torres Strait Islander peoples results from the joint effects of poverty, social exclusion and other factors that affect the life chances of individuals. The gradient in mortality is quite remarkable. Within rich countries, with strikingly
different material conditions from Bangladesh, there is a social gradient in mortality prompting consideration of the causal links between status and health. Whether the social gradient in poor countries can be attributed to the same causal pathways is an urgent task for review. It is especially important because, in many countries, inequalities in health have been increasing. In Russia for example, where life expectancy is low, social inequalities have grown (Figure 4).

Mortality statistics are readily available. They should not, however, lead to ignorance of the burden of nonfatal disease.

**Box 2 | The solid facts**

Because the causes of the causes are not obvious, the WHO Regional Office for Europe asked a group at University College London to summarize the evidence on the social determinants of health, published as The Solid Facts. It had 10 messages on the social determinants of health based on:
- the social gradient
- stress
- early life
- social exclusion
- work
- unemployment
- social support
- addiction
- food
- transport

As an indication that there was a ready audience for these messages, in the first 12 months after publication of the second edition it was downloaded from the internet 218,000 times.

The Solid Facts reviewed evidence from Europe, aimed mainly at reducing inequalities in health within countries. The task of the Commission will be to review evidence on the social determinants of health that are relevant to global health: inequalities among countries and within.

In particular, mental illness causes much suffering but its effect is not clear by inspection of mortality data. Worldwide, the second highest cause of disease burden among adults age 15–59 years is unipolar depressive disorder.

**The ageing of the world’s population**

It is convenient, but quite wrong, to think that the greying of the world’s population is an issue only for rich countries. Figure 5 shows the projected increase between 2000–2030 in the population older than 65 years in selected countries. The fastest rates of increase are in countries at an intermediate level of human development, starting from a low base. The social determinants of the health of older people claim attention alongside those of health at younger ages.

**Social determinants: poverty, inequality and the causes of the causes**

In consulting widely in developing the plan for the Commission on Social Determinants of Health, a common question was: ‘What’s new? We know that poverty is bad for health. Does that need a Commission?’

It is not difficult to understand how poverty in the form of material deprivation – dirty water, poor nutrition – allied to lack of quality medical care can account for the tragically foreshortened lives of people in Sierra Leone. Such understanding is insufficient in two important ways. First, it fails properly to take into account that relief of such material deprivation is not simply a technical matter of providing clean water or better medical care. Who gets these resources is socially determined. Second, and related, international policies have not been pursued as if they had people’s basic needs in mind. The critics of the policies pursued by the International Monetary Fund in the global South have argued eloquently that the economic policies pursued under structural adjustment have not benefited disadvantaged people in poor countries. Recognising the health effects of poverty is one thing. Taking action to relieve its effects entails a richer understanding of the health effects of social and economic policies.
Dirty water, lack of calories, and poor antenatal care cannot account for the 20-year deficit in life expectancy of Australian Aboriginal and Torres Strait Islander peoples. On a world scale, their infant mortality rate, at 12.7 per 1,000 livebirths, is low. Their high rate of adult mortality is from cardiovascular diseases, cancers, endocrine nutritional and metabolic diseases (including diabetes), external causes (violence), respiratory disorders and digestive diseases. This fact is not to deny that poverty is important. But the form that poverty takes and its health consequences are quite different when considering chronic disease and violent deaths in adults, compared to deaths from infectious disease in children. It entails a richer understanding of the social determinants of health.

The health experience of Aboriginal and Torres Strait Islander peoples has relevance for the health of disadvantaged people worldwide. While in Africa the major contributor to premature mortality is communicable disease, in every other region of the world it is non-communicable disease. Careful analysis of the global burden of disease has pointed to the importance of risk factors, such as being overweight, smoking, alcohol, and poor diet. These are indeed potent causes. But would it be helpful to go into a deprived Australian Aboriginal population and point out that they should really take better care of themselves – that their smoking and obesity were killing them; and if they must drink, please do so in moderation? Unlikely. To borrow Geoffrey Rose’s term, we need to examine the causes of the causes: the social conditions that give rise to high risk of noncommunicable disease, whether acting through unhealthy behaviours or through the effects of impossibly stressful lives.

A further answer to the what’s new question: although it might be obvious that poverty is at the root of much of the problem of infectious disease, and needs to be solved, it is less obvious how to break the link between poverty and disease. Income poverty provides, at best, an incomplete explanation of differences in mortality among countries or among subgroups within countries. It is well known that among rich countries, there is little correlation between gross national product (GNP) per person and life expectancy. Greece for example, with a GNP at purchasing power parities of just more than US$17,000, has a life expectancy of 78.1 years; the United States, with a GNP of more than $34,000, has a life expectancy of 76.9 years. Costa Rica and Cuba stand out as countries with GNPs less than $10,000 and yet life expectancies of 77.9 years and 76.5 years.

There are many examples of relatively poor populations with similar incomes but strikingly different health records. Kerala and China, famously, have good health, despite low incomes. The social processes that lead to this beneficial state of health need not wait for the world order to be changed to relieve poverty in the worst-off countries. A social determinants perspective is crucial. It is also important to enquire whether the action that is taking place to relieve poverty is having the desired effect not only on average incomes, but also on income distribution and hence on the poorest people.

The social gradient in health is a particular challenge. Where material deprivation is severe, a social gradient in mortality could arise from degrees of absolute deprivation. In rich countries with low levels of material deprivation the gradient changes the focus from absolute to relative deprivation. Relative deprivation relates to a broader approach to social functioning and meeting of human needs – capabilities in the words of Amartya Sen, spiritual resources to use Robert Fogel’s term. It is likely that both material or physical needs and capability, spiritual, or psychosocial needs are important to the gradient in health, which will, therefore, be an important focus.

A focus on material conditions and control of infectious disease must not be to the exclusion of social determinants. The circumstances in which people live and work are as important for communicable as they are for non-communicable disease. Social conditions powerfully...
influence both the onset and response to treatment of the major infectious diseases that kill.24,25

The Commission on Social Determinants of Health will need to have in its sights poverty of the sub-Saharan African sort and the social determinants that account for Bolivia having 14 fewer years of life expectancy than Costa Rica or Aboriginal and Torres Strait Islander peoples having 20 years fewer than other Australians. As these examples illustrate, it will examine inequalities in health between countries and inequalities within.

Action is possible and necessary

A review of policies in European countries identified several that took action on the social determinants of health.26 Although the reason for the policies was not necessarily to improve health they were nevertheless relevant to health: taxation and tax credits, old-age pensions, sickness or rehabilitation benefits, maternity or child benefits, unemployment benefits, housing policies, labour markets, communities and care facilities.

In Sweden, the new strategy for public health is ‘to create social conditions that will ensure good health for the entire population’.27 Of 11 policy domains, five relate to social determinants: participation in society, economic and social security, conditions in childhood and adolescence, healthier working life and environment and products. These are in addition to health promoting medical care and the usual health behaviours. The UK set reduction of health inequalities as a key aim of health policy. It assembled evidence and expert judgments on areas suitable for policy development.28 These then formed the basis of a plan of action to reduce health inequalities.29

These are examples from rich countries. There are further encouraging examples. Familias en Accion in Colombia transfers cash to poor families. To qualify, families must ensure their children receive preventive health care, enrol in school and attend classes. The results are encouraging: favourable growth of children and fewer episodes of diarrhoea.30 The Oportunidades programme in Mexico had somewhat similar aims with similarly encouraging results.31

Meeting human needs

Two linked themes provide the rationale for the Commission on Social Determinants of Health. First, there is no choice. If the major determinants of health are social, so must be the remedies. Treating existing disease is urgent and will always receive high priority, but should not be to the exclusion of taking action on the underlying social determinants of health. Disease control, properly planned and directed, has a good history, but so too does social and economic development in combating major disease and improving population health. Wider social policy will be crucial to reduction of inequalities in health.

There is a second theme that relates to the question of how one can tell if a population is thriving. One standard answer is to measure economic wellbeing with measures such as GNP, average income, or consumption patterns. A better answer is to measure health status.32,33 There is no difficulty in convincing medical and health personnel that health is important – that is what we do. It is more challenging, but necessary, to convince policy-makers and others that the health of the population is important precisely because it is a measure of whether, in the end, a population is benefiting as a result of a set of social arrangements.

In other words, action on the social determinants of health is necessary not only to improve health, but also because such improvement will indicate that society has moved in a direction of meeting human needs.34 There is a great deal of dogmatism dispute about the rights and wrongs of economic and social policies. People use labels – globalization, neoliberal economic policies – as badges of allegiance and terms of abuse. The Commission will have one basic dogma: policies that harm human health need to be identified and, where possible, changed. From this perspective, globalization and markets are good or bad in so far as the way they are operated affects health.

Inequities in health between and within countries are avoidable.35 There is no necessary biological reason why life expectancy should be 48 years longer in Japan than in Sierra Leone or 20 years shorter in Australian Aboriginal and Torres Strait Islander peoples than in other Australians. Reducing these social inequalities in health, and thus meeting human needs, is an issue of social justice.36

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Professor Sir Michael Marmot MBBS, MPH, PhD, FRCP, FFPHM

Director, International Institute for Society and Health, Professor of Epidemiology and Public Health, University College London, has been at the forefront of research into health inequalities for the past 20 years, as Principal Investigator of the Whitehall studies of British civil servants, investigating explanations for the striking inverse social gradient in morbidity and mortality. He chairs the Department of Health Scientific Reference Group on tackling health inequalities and chairs the NICE Research and Development Committee.

Professor Marmot also chairs the BHF Primary Prevention Committee. He was a member of the Royal Commission on Environmental Pollution for six years. He was Knighted by Her Majesty The Queen in 2000 for services to epidemiology and understanding health inequalities. Internationally acclaimed, Professor Marmot is a Vice President of the Academia Europaea; a member of the RAND Health Advisory Board; a Foreign Associate Member of the Institute of Medicine, and he chairs the WHO Commission on Social Determinants of Health. He won the Balzan Prize for Epidemiology in 2004 and will give the Harveian Oration in 2006.

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Targeting or universal coverage with vitamin A? Costs, mortality and disparity reduction

Most health planners are aware that maximizing some measure of health is not the only goal of a health system. Individuals and societies are concerned about the distribution of the benefits of a health system. But equity can never become the sole goal of a health system. Fundamentally, any inequity involves a situation where some people in the population are enjoying greater services or outcomes than others. If equity were to become the only goal then it could always be achieved through the perverse solution of systematically removing any advantages of more privileged groups.

It is frequently hoped that equalizing service availability will reduce disparities in health. Yet there is a concern that in the short-term, disparities could widen as middle income groups take disproportionate advantage of the new services, while the poorest of the poor lack the wherewithal to overcome even the newly lowered barriers to care.

Although expanded primary health care provision remains a central issue in redressing health disparities, standard public health interventions such as micronutrient supplementation, vaccination, water and sanitation are even more important. Basic improvements in public health and nutrition are credited with much of the 20th century mortality improvements around the world, and played a more important role than access to clinical services.

Furthermore, traditional public health interventions such as measles vaccination or micronutrient supplementation have been shown to narrow socioeconomic and gender disparities in health when distributed through universal outreach programmes.

In many countries sub-populations can be identified that remain unreached by basic public health services. Given the potential for tremendous health gains and the reduction of health disparities when public health interventions are universally applied, ensuring that public health measures have been fully implemented remains a high priority. Yet preventive public health interventions suffer from perennial scarcity of resources. Policy-makers looking for ways to make tight public health budgets go further, naturally consider targeting interventions to those who are most in need.

In this vein it is reasonable to consider the case of a health planner who wants to allocate resources efficiently to both maximize the level of health achieved and to achieve an improvement in the equality of health outcomes among population groups. Such a policy-maker would consider whether to target resources towards only the underprivileged or to universally distribute resources to an entire population. It is plausible that in some instances health resources applied to the underprivileged are more productive. For example, evidence suggests that measles vaccination in Bangladesh lowered mortality more for the poorest of the poor than for the less poor. Thus a universal distribution approach would rely on the natural capacity of the more disadvantaged to derive greater benefit than their more advantaged counterparts, thereby narrowing the health disparities. But from an economic standpoint, targeting resources has the advantage of reserving their use for only the disadvantaged groups in the population and could save money.

We will build on our prior studies of vitamin A distribution in Nepal to consider the economics facing a planner in Nepal who wished to decide whether to target or universally apply vitamin A supplementation strategies in order to improve child health and to narrow health disparities.

Vitamin A delivery strategies
Deciding between ‘mass treatment’ vs ‘screen then treat’ is a classic problem in public health. Students are taught to think about the following criteria:

- The degree to which morbidity and mortality are concentrated in an identifiable subgroup.
- The sensitivity and specificity of the screening procedures.
- The cost of the screening procedure.
- The cost of the treatment.

Screening (to establish a diagnosis) before treating is the essence of clinical medical practice and has distinct advantages when treatments impose health risks and side effects. Public health planners often take a divergent path to achieve dramatic success using mass treatment methods to blanket a population with low cost, low risk, high benefit treatments like vaccines, vitamins and clean water. Yet there still remains ample scope for screening strategies in public...
health, both to achieve efficiency when treatments are costly and also in order to target underserved groups who may have been victims of social inequities. When targeting disadvantaged groups the screening effort is devoted to determining the patient’s economic or social status prior to offering treatment.

Targeting vitamin A supplements towards disadvantaged subgroups is often considered. Evidence that vitamin A supplements have stronger effects on the survival of girls vs boys and of low caste vs high caste children suggests that these subgroups might deserve special targeting. Evidence of feeding practices that result in lower vitamin A intake by girls and low caste children helps to explain why vitamin A supplementation is more effective in these groups.

A potentially lower cost of reducing mortality is not the only reason to consider targeting high risk groups. Equity of opportunity and more equal health outcomes are other valid goals that could result from targeting. For instance, if there were villages or neighbourhoods with a high proportion of low caste children, health outreach workers might choose to focus their efforts in only those regions. This would reduce the expenditure on the supplement and eliminate costly trips to regions with high caste children who might benefit less. In a similar vein, one could also decide to offer vitamin A supplements to only girls, thereby cutting the expenditures on vitamin A by half.

A cost-effectiveness study in the Philippines evaluated the efficiency of targeting vitamin A strategies to just high risk children as determined by weight for age. The Philippines study concluded that universal vitamin A supplementation prevented the most deaths for the least money because the burden of initially screening children for malnutrition essentially doubled the cost of a targeted strategy. The study did not evaluate any social equity goals that may have been achieved through targeting, nor did it consider potentially lower cost targeting criteria such as child gender or area of residence.

This paper will compute the relative cost-effectiveness of both a universal strategy and a socially-targeted strategy for vitamin A delivery in Nepal, with the primary goal of saving lives for less money and the secondary goal of equalizing death rates across society.

Methods

Figure 1 depicts the four strategies we will model in this analysis. They are as follows:

**Horizontal strategy:**
A default programme which makes vitamin A supplementation available at the primary health care facility.

| DEFAULT Vitamin A prescribed at clinics if clinician diagnoses |
| Universal coverage with vitamin A supplement delivered door-to-door |
| Targeting door-to-door delivery only in villages with a high proportion of low caste children |
| Door-to-door delivery, but supplements only given to girls |

**Vertical strategy – three different programmes:**
1. **A universal vitamin A distribution campaign where vitamin A is delivered door-to-door, just as it was in the experimental trials**
2. **A door-to-door programme targeted to children who are not in highest castes**
3. **A door-to-door programme targeted to girls only**

In each case we will calculate the average cost of implementing the strategy in a population of 10,000 children treated as well as the expected child mortality rate overall and for the relevant component groups. Finally, we will compute the incremental cost per death averted (relative to the default programme) for each of the three vertical programmes.

**Estimating effects**

Estimates of mortality for each strategy were obtained by observing the mortality outcomes in various subgroups from the Nepal Nutrition Intervention Program-Sarlahi (NNIPS). This 1989 trial involved 30,000 children 6–60 months of age in 261 wards in 29 rural village development committees in Sarlahi, Nepal. Children were randomly assigned by ward to receive either a placebo capsule with 300 mg retinol equivalent (1000 IU) or a capsule containing 60,000 mg retinol equivalents (200,000 IU) of vitamin A. In prior work we used these data to identify the ability of universal vitamin A distribution to lower death rates of children age 6–60 months from 26.9 to 17.9 per thousand for girls and from 19.1 to 16.5 for boys.

Comparing experimental to control groups, high caste (Brahmin or Chettri) children had death rates of 11.5 and 11.2 without and with vitamin A, respectively, while lower caste and non-caste children had corresponding death rates of 25.2 and 18.6, respectively. In other words, the survival benefits of vitamin A appeared to be larger for girls and lower caste children, so targeting these groups might be more efficient.
Estimating costs

Cost estimates are based on studies of the current Nepal National Vitamin A Program (NVAP). The programme consists primarily of distributing high-dose vitamin A capsules to all children aged 6–60 months old during twice-yearly campaigns. The campaign is complemented by ongoing treatment of clinical xerophthalmia and other acute infections in health facilities throughout the country. The capsule distribution is carried out by a network of female Community Health Volunteers. Estimates of coverage rates among targeted children range from 53–>90%. The cost of the programme ranged from $1.13–1.48 per child, with a best estimate of $1.27 per child.

In order to estimate costs we made the following assumptions:
- Target population of 10,000 children living in 10 communities (panchayats) of 1,000 households
- To target just girls, health workers would have to visit each community and call upon each household, but would only provide supplementation to girls
- To target social groups (e.g. on the basis of caste), health workers would have to visit each community and call upon each household, but would only provide supplements in households of the targeted social groups.

If these targeting policies were actually implemented, there could be social resistance to these blatantly discriminatory policies. A subtle effect could be to cast a social stigma on households or children who receive the supplements. A strong effect might be a refusal of local officials to permit discrimination in their jurisdiction. Our model is not taking these effects into account because the nature of these events cannot be predicted.

We explored whether it would be possible to save costs by targeting at the level of the entire community. Although there are no communities that could be skipped for want of girls to treat, we checked whether perhaps there might be communities in the Terai of rural Nepal where there were so few children in the less elite castes that trips to these villages could be eliminated. Based on the data from the 1989 trial in Sarlahi, the lowest number of low/other caste children in any panchayat was 58%, indicating little scope for eliminating trips to any of the communities in our model.

As no trips could be eliminated, the primary cost savings occur from reducing the cost of vitamin A pills. In the Nepal Vitamin A Program the cost of pills amounts to only 5.4% of the total cost.

Analysis

Estimates of the numbers of deaths and the total costs of each strategy were computed. Incremental cost effectiveness ratios were calculated for the universal strategy and for each targeted strategy with reference to the default of no vitamin.
A programme.

The incremental cost effectiveness ratio (ICER) is calculated as:

$$ICER = \frac{(C_{default} - C_i)}{(Deaths_{default} - Deaths_i)}$$

An analogous ICER for outcome equality can be calculated as:

$$ICER = \frac{(C_{default} - C_i)}{(RateRatio_{default} - RateRatio_i)}$$

Where $C$ denotes cost, Deaths refers to estimates of deaths per 1000. RateRatio refers to either the ratio of the death rate in girls to the death rate in boys or the death rate in higher caste to the death rate in lower caste children.

Subscript $i$ can take the values 'default', 'universal', 'girls only' and 'low caste only' to refer to the treatment algorithm under consideration as depicted in Figure 1.

Results

Table 1 displays the parameters used in this analysis and their sources. The mortality rates for ordinary care are taken from the outcomes in the NNIPS trial population who received placebo. The values for universal care are taken from the vitamin A recipients who received vitamin A supplements. In the targeted strategies, the individuals targeted derive the mortality of the vitamin A recipients in that group. Table 2 shows the expected number of deaths and the costs per death averted of the various strategies. It also shows the cost per unit change in the two health disparity indicators. These results are also displayed in Figure 2, which shows that universal coverage has similar efficiency to targeting only lower caste children with respect to dollars per life saved and dollars per unit change in caste-based mortality rate ratio. Targeting girls is a more cost-effective strategy for improving the gender-based mortality rate ratio, but this advantage may be outweighed by its poorer efficiency in saving lives.

Discussion

Since the data from the community-based trial showed that vitamin A had virtually no effect on improving survival in the highest caste children, a strategy which sought to exclude highest caste children could save pill costs and have virtually no reduction in overall mortality. As pill costs are negligible anyway, the overall cost effectiveness improvement of the
targeted strategy is unremarkable. In contrast, trial data show that vitamin A offers benefits to both boys and girls, but it offered larger benefits to Nepali girls. Excluding boys from treatment saves pill costs, but lowers overall cost-effectiveness because the advantages of saving boys is lost. The dual effects of saving girls while not saving boys offers this strategy a greater degree of cost-effectiveness with respect to lowering gender disparities, but this strategy is the least efficient way to save lives. For most decision-makers the goal of saving lives is more important than the secondary goal of lowering health disparities.

Our analysis shows roughly equivalent cost-effectiveness for universal treatment and selective treatment of lower caste children with respect to two out of three policy goals. However, in practice universal coverage with vitamin A is less prone to political obstacles and would be preferred.

David Bishai is associate professor in the Department of Population and Family Health Sciences at Johns Hopkins Bloomberg School of Public Health. He is a paediatrician and economist who has spent the last 5 years studying the effects of classical public health interventions on health disparities in lower income countries.

Hugh Waters is assistant professor in the Department of International Health at Johns Hopkins Bloomberg School of Public Health. Professor Waters is a health economist who specializes in health finances and the effects of health systems on poor populations in developing countries.

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Mexico hosted two important meetings related to the common theme of health research needed towards achieving the Millennium Development Goals (MDGs) in September 2004. Held in conjunction, the meetings were the ‘Ministerial Summit on Health Research’ and the ‘Eighth Annual Forum Meeting’ – Forum 8 of the Global Forum for Health Research. The two meetings took place in venues close to each other, and shared opening, closing and some plenary sessions. Forum 8 brought together about 700 policy-makers, researchers and representatives of governments, development agencies and research institutions. The Ministerial Summit brought together 200 participants including health ministers and leaders from the health research and development communities.

Two complementary documents emerged from the meetings. The Ministerial Summit issued the Mexico Statement on Health Research, the text of which was finalized during the meeting. The Global Forum Statement developed by the Secretariat of the Global Forum with the assistance of inputs from regional consultations and from participants at Forum 8.

The Ministerial Statement emphasized the need for higher investment in health research to be funded by governments from developed and developing countries. It also called for better management of health research, for increased efforts to be made to secure public confidence in science and its products, and for more emphasis to be made to turn knowledge into action to improve health. Based on work undertaken by a task force on health systems research prior to the meeting, the Ministerial Statement called for an enhancement of research in health systems and for increased activity in identified priority health research areas. Furthermore, the Ministerial Statement indicated that health systems research was an essential component of health and proposed creation of an inventory of clinical trials in which all institutions, both from the private and public sectors, would report all clinical trials undertaken.

The Global Forum Statement urged that collective action be taken by partners to ensure higher political commitment and shared responsibility for health research. It recognized that improving health is essential to development and that, while government leadership is crucial in this process, delivering research results is the responsibility of all constituencies. Central to its message was the realization that, beyond the ‘health specific’ MDGs, all eight MDGs are important for health and therefore all sectors – not only health – have an important role to play. The Global Forum Statement emphasized that combating hunger, low education and gender inequalities (MDGs 1, 2 and 3) were as important as controlling other causes of morbidity and mortality (MDGs 4, 5 and 6), and that the process through which this would be achieved in a sustainable manner (MDG 7) included interactions between the public and private sectors (MDG 8). The Global Forum Statement highlighted the importance of inequities based on gender, ability, race and social class, and that health research needs to be sensitive to these if the MDGs are to be achieved in a way that encompasses people from disadvantaged population groups. The Global Forum Statement called on governments to fund health research, to set priorities in a systematic and transparent ways, and to interact with civil society and other constituencies to enhance the likelihood of improving health for the vast majority of the population of the world.

Progress since the Mexico meetings
The following is a brief review of progress made in the nine months since the Mexico meetings.

World Health Assembly
Since the publication of the Ministerial Statement, the World Health Organization pursued its endorsement at the Executive Board of the World Health Assembly (WHA) in January 2005. After much debate on the document, the Executive Board approved the statement for presentation at the World Health Assembly, which discussed the document in its session on 23 May 2005. The discussion during the WHA focused more on the process for undertaking and conducting a summit than on its content. The WHA praised its content and approved the document without major modifications. This is an important milestone in the political process of health research and a welcome outcome of this measure. The challenge now is for countries to take the recommendations forward, including the steady funding of health research.

A technical briefing was held during the WHA on the 17 May 2005 in which four Health Ministers (Manuel Dayrit, the Philippines; Julio Frenk, Mexico; Eyitayo Lambo, Nigeria; and Manto Tshabalala-Msimang, South Africa), and
poverty, social determinants and health research

four additional representatives of key actors in the health field (Sally Davies, Director of Research and Development for the Department of Health and NHS, UK; Judith Witworth, Chair of the WHO Advisory Committee on Health Research; JW Lee-Wong, Director General of WHO; and Tim Evans, Assistant General of WHO) were present. The session was chaired by Richard Horton, Editor of the Lancet. Participants in the panel of this technical meeting endorsed the outcomes of the Mexico meetings and the content of the Ministerial Statement. Members of the panel indicated the relevance of health research for their work and reflected upon their future contributions towards the health research field. Minister Frenk framed his remarks starting with the 1990 Commission on Health Research for Development and the distinct progress made since their report was published. He talked about the progress in the past 15 years, highlighting that the process of debate in health research was essential, and praised the role of WHO in embracing health research as a global public good. As the host Minister for the Mexico meetings, he reflected on the importance of having the Annual Forum meetings intercalated with Ministerial Meetings every four years to achieve the required high level policy debate.

The Minister of the Philippines proposed to have a programme in place to provide detailed insights on the way health systems research can help policy-making and provide a blueprint to facilitate the use of research findings in policy design. All recommendations given at that session were aimed at thinking beyond the Mexico Declaration and into the next meeting of Ministers on Health Research in Africa in 2008.

Health policies and systems research

It is now evident that the issue of health policies and systems research is on the table. The WHO presented in Mexico the World Report on Knowledge for Better Health: Strengthening Health Systems. An important input to the design of this document was a special issue of the Lancet with a series of articles related to overcoming health-systems constraints and an international cooperative research agenda on health systems was distributed during the meeting.

A champion in this area has been the Alliance for Health Policies and Systems Research, established in 2000 as an initiative of the Global Forum for Health Research and housed at WHO. Since its inception, the Alliance has established links with 350 research institutions in the developing countries working on this key and yet neglected area of health policies and systems research. During its April 2005 meeting, the WHO Advisory Committee in Health Research discussed the results of an informal consultation held in London in February 2005 in which plans to establish a Special Programme on Health Systems Research for Public Health Improvement were debated. These discussions led to a proposal discussed by a number of partners from developed and developing countries to create a ‘special’ or ‘partnership’ programme at WHO to promote, coordinate and enhance work on health systems research. Such an institution would be key to raising the level of advocacy and scientific output in this area of work, and it is hoped that it would attract the resources required to undertake such an ambitious agenda. With the support of donors, such a programme could focus on developing countries, enhance their demand for healthy systems research results and further decentralize this function.

There are now wider ongoing discussions about the future activities of research on health systems and this has been a very positive outcome of the Mexico meetings and their preparatory work.

Clinical trials registry

During the discussion at the WHA technical briefing there was strong endorsement of an initiative to establish a clinical trials registry. There have been efforts in the past to establish such a registry, but none has been adopted widely and in a sustained manner. The discussion focused on the design and implementation of the clinical trials registry.

During the meeting, the International Federation of Pharmaceutical Manufacturers Association (IFPMA) indicated that they welcomed clinical trial registration. IFPMA reported that they had recently opened and made functional a portal on the internet where they were mapping research projects undertaken by the pharmaceutical industry worldwide, including in developing countries. They briefly described the system and reported that the private sector will use that portal to report selected, non-confidential clinical trials.

This clearly poses a challenge to having one universal clinical trials registration system of the type advocated by WHO. A current paper by the coordinator of this initiative was published in the Lancet recently. The team started the process with a meeting in April 2005 that all major stakeholders attended including governments, pharmaceutical companies, trade associations, journal editors, registry owners and independent researchers. The project aimed at setting norms and standards, enhancing access for researchers, advocating for compliance and building capacity where needed.

To date, agreement has been reached on the definitions of clinical trials and the minimum data set required at the time of trial registration. The discussion of the disclosure of trial results and exactly where to register them, has so far not been concluded. The paper indicates that an international, unambiguous trial-identification system is necessary and that WHO will continue working towards this end. It is necessary
that all constituencies and partners agree with the process and mode of registering clinical trials, otherwise the purpose of this initiative would not be fulfilled.

**Tracking financial flows**

Both statements in Mexico highlighted the importance of increasing financial flows for health research. The Global Forum presented in Mexico a comprehensive study with its most recent analysis of global resource flows for health research. The document, highlighted by Mexico’s Minister of Health as a landmark on resource flows measurements, included an analysis of the global health research funds invested in 2001 and reported a total investment of over US$100 billion spent on health research in that year from public and private sources.

In endorsing the commitments made by governments on health research financing (2% of developing country health expenditures to be used for health research and capacity development, and 5% of developmental funds for health from developed countries to be used for the same purpose), the two statements, and subsequently the WHA, promoted the activities of tracking of financial flows for health research. Work undertaken in 2005 by the Global Forum, COHRED, the Rockefeller Foundation and country partners (governments, civil society and the private sector) have initiated country studies on financial flows for health research since the Mexico meetings. Key innovative developing countries are contributing to this effort including Brazil, South Africa and India.

Further, the Global Forum jointly with the UK Medical Research Council coorganized a meeting in London on 12–13 June 2005 to provide inputs to a meeting of the Heads of International Research Organizations of high-income countries. One of the key discussion points of the meeting was the considerable interest expressed in documenting and analysing financial flows invested in health research by the largest public sector financing institutions of the world. As a result, intensified work in this field is now under development, and is expected to be undertaken during the second half of 2005.

There is also progress with proposed studies to identify investments on health research related to MDGs 4, 5 and 6, including research on HIV/AIDS by the International AIDS Vaccine Initiative and UNAIDS. In view of the fact that this year’s world health theme is ‘Mothers and their Children’, there is renewed interest in understanding the financial investments on child and maternal health around the world. A workshop called by the Child Survival Partnership and the London School of Hygiene and Tropical Medicine in March 2005 expressed interest in evaluating projections on potential funds required to achieve MDG 4 on child health and child survival and the research required.

**Sexual and reproductive health research**

There have been some activities in the field of sexual and reproductive health (SRH) research. Having approved a resolution on reproductive health in 2004, the WHA 2005 passed two resolutions related to this field. One of them is general and related to the MDGs, and the second one calls specifically for universal coverage of maternal, newborn and child health interventions. These two resolutions are welcome as this area of work has been neglected in the past, and this is being reflected in a dramatic reduction in investments for research. One of the consequences of that neglect of research on SRH is the substantial decrease in funding of the Special Programme of Research, Development and Research Training in Human Reproduction (HRP) hosted by the World Health Organization.

During the WHA 2005 a lunch seminar was organized by COMMAT (the Commonwealth Medical Trust), the Millennium Project, and the Global Forum for Health Research. The event was attended by a dozen Ministers of Health and they talked about the relevance of SRH for their health policies and their support for more attention to this area. It is expected that this field will move further ahead with the two WHA resolutions, advocacy work and the interest generated in this field by the World Health Organization’s theme on ‘Mothers and Children’ in 2005.

**Building partnerships for health research**

Both Statements issued in Mexico emphasized the need for more collaborative action and stronger partnerships to address ongoing health challenges. One important development since the Mexico meetings has been the establishment of a Memorandum of Agreement between the Global Forum for Health Research and the Council on Health Research for Development (COHRED). Building on this formal agreement, the two organizations are engaging in a number of joint activities including publications, tracking of resources for health research at country level, studies of research capacity strengthening in collaboration with TDR, and operational collaboration in planning, administration and fundraising. These collaborative efforts are predicated on the recognition of opportunities for synergy through the interfacing of global and country-level perspectives, while their separate and unique identities enable each organization to provide a clearly articulated voice for its own concerns and constituencies.

**Conclusions**

The Mexico meetings, the Ministerial Statement on Health Research and the Forum 8 Statement are landmarks in the development of health research since the 1990 Commission
for Health Research and Development called for more attention to research. During the nine months since the Mexico meetings, substantial progress has been made to enhance and focus health research on the needs of developing countries, to contribute to the achievements of the MDGs.

Despite the progress reviewed in this document, there are important challenges still evident in promoting health research for developing country health problems. Initiatives have been launched, resolutions have been passed and programmes are being pursued. It will be only in retrospect that these efforts and initiatives will be measured in terms of their effectiveness and impact. The planned joint meeting of Ministers of Health Research and Forum 12 in Africa will review progress and define whether we lived up to the expectations that emerged from the Mexico meetings.

Andres de Francisco, Deputy Executive Director of the Global Forum for Health Research, is a Medical Doctor with post-graduate training in public health and extensive experience in the interface between research findings and health policies. He has worked on the design, implementation, and evaluation of health interventions, and the subsequent development of research knowledge into policies for health and population programmes in South America, Africa and Asia.

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