

Multi-Country Evaluation of IMCI
Effectiveness, Cost and Impact (MCE)

PROGRESS REPORT

May 2002 – April 2003



MCE Sites

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DEPARTMENT OF CHILD AND ADOLESCENT HEALTH AND DEVELOPMENT
WORLD HEALTH ORGANIZATION

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Preface

This has been a remarkable and challenging year for the multi-country evaluation of IMCI effectiveness, cost and impact (MCE). Preliminary data continued to come in, and continued to reinforce earlier messages:

- IMCI training for health workers managing children in first-level health facilities can lead to rapid and even sustained improvements in their performance; and
- efforts to implement interventions at family and community levels have been too slow and too widely dispersed to achieve even minimal coverage.

These are important messages. Much of this year has been spent in reviewing the data, conducting secondary analyses, and talking to public health personnel at MCE sites and districts, and at national, regional and global levels, about these findings and their implications for the future of child health and survival.

We have focused this year's report on the design and methods of MCE, and highlighted changes that have occurred as a result of providing feedback on the preliminary findings of the evaluation. MCE has been successful in raising awareness about child health – in part as a stimulus and in part because other global events provided timely opportunities for the presentation of MCE results. In some ways, the response has been highly positive – generating interest, concern and further action. In other ways the response reflects a community of child health planners, donors and even researchers with little experience in how to understand and build on the results of effectiveness evaluation, which like the real world are usually complex, multi-faceted, and open to alternative interpretations. The results reported here illustrate that effectiveness evaluation is sorely needed, and that its results will require active participation and interpretation by coalitions of programme managers and researchers to ensure that they are used fully and applied appropriately to improve child health programmes.

On behalf of all the MCE staff, investigators and advisers, we thank the families, communities and district health staff who have participated in this effort to date – not through data collection alone, but increasingly through the review and discussion of preliminary findings and participation in their interpretation. We also extend our sincere thanks to the Bill and Melinda Gates Foundation, the United States Agency for International Development, and the Rockefeller Foundation for their continued commitment to the MCE process and their understanding of the time and effort needed to fully analyse, understand, and disseminate these important results. Finally, we should like to acknowledge the contribution of the Department of Child and Adolescent Health and Development of the World Health Organization in Geneva in serving as the home base for the MCE.

Jennifer Bryce
WHO Responsible Officer, MCE

Cesar Victora
MCE Senior Technical Adviser



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Introduction

Integrated management of childhood illness (IMCI) is a strategy for improving child health and development through the combined delivery of essential child health interventions. IMCI began with a set of case management guidelines for the management of a sick child in a first-level health facility; the guidelines were designed for adaptation at country level and below. Over time the strategy expanded to include a range of guidelines for delivering child survival interventions at household, community and referral levels.

The multi-country evaluation of the integrated management of childhood illness (MCE-IMCI) includes studies of the effectiveness, cost and impact of the IMCI strategy in Bangladesh, Brazil, Peru, Tanzania and Uganda. MCE-IMCI applied standard criteria in selecting these sites, criteria that referred *inter alia* to the current and expected strength of IMCI implementation. Site-visit teams consisting of MCE-IMCI technical advisers, WHO staff members, and ministry of health staff conducted 24 visits to 12 countries (Bangladesh, Bolivia, Brazil, Cambodia, Kazakhstan, Kyrgyzstan, Morocco, Niger, Peru, Tanzania, Uganda and Zambia) between August 1998 and February 2002. Five of the 12 countries were judged by the site team and MCE-IMCI technical advisers to be likely to implement IMCI at sufficient coverage and quality to achieve a sizeable reduction in child mortality within the subsequent three to five years.

This report summarizes the work of the MCE between 1 May 2002 and 30 April 2003. Two earlier reports covering periods since 1 May 2000 are available from the Department of Child and Adolescent Health and Development of the World Health Organization in Geneva. Details of the topics covered here are available in MCE publications (Annex 1) or from the MCE website (<http://www.who.int/imci-mce>).

The report is in five parts. Part I presents a summary of some of the most important methodological contributions of the MCE to date. In Part II, we summarize new MCE findings from the MCE in 2002–2003. Part III highlights the importance of feedback within the MCE, and provides examples of how that feedback has stimulated or contributed to new thinking about how to increase child survival and improve child health and development. In Part IV we look to the future and the challenges that remain for the MCE. Finally, Part V presents the publications, presentations and reports that have resulted from the MCE during this project period. In addition, we have provided abstracts of publications arising from the MCE in a set of boxes throughout the report, and provided details about how to obtain further information.



METHODOLOGICAL ADVANCES

“The MCE is a truly original and outstanding piece of work. It is not just relevant to child health, but to the whole issue of how we conduct scientifically rigorous evaluations of public health interventions.

As such, I believe it represents a real breakthrough in thinking.”

(Prof. Betty Kirkwood, London School of Hygiene and Tropical Medicine, Co-Chairperson 2003, Technical Steering Committee, Department of Child and Adolescent Health and Development, World Health Organization).

Progress in how to design large-scale public health evaluation

Work on designing the MCE led to critical thinking on methods of public health evaluation. The gold standard for evaluation in the biomedical field is the randomized controlled trial (RCT), in which some units of observation (individuals, health facilities, districts, etc) are allocated to receive an intervention, while other units make up a comparison group. The intervention is then delivered, usually in an intense way and under the control of the researchers, and outcomes are measured in due time.

Early in the process of MCE design, much discussion was devoted to how much public health evaluation should follow guidelines set by clinical researchers, and in particular whether RCT designs were desirable. The MCE Technical Advisers believed that it would be useful to have one site where IMCI services would be delivered under ideal circumstances at a set of randomly selected health facilities – an efficacy study – for evaluation purposes. Such a randomized **efficacy** study is taking place in Bangladesh. They reckoned, however, that the most relevant findings for policy-makers would come from settings where IMCI was routinely implemented – **effectiveness** evaluation using non-randomized or observational designs.

The MCE Technical Advisers and members of the MCE Central Team held intense discussions on the pros and cons of evaluation of efficacy as distinct from that of effectiveness, and of experimental or observational designs. These methodological developments have been summarized in a scientific paper to be published in March 2004 (Box 1).

Box 1

Evidence-based public health: moving beyond randomized trials

Victoria CG, Habicht JP, Bryce J. *American Journal of Public Health*, March 2004 (in press).

Abstract. Randomized controlled trials (RCTs) are essential for evaluating the efficacy of clinical interventions, where the causal chain between the agent and the outcome is relatively short and simple, and results may be safely extrapolated to other settings. However, causal chains in public health interventions are complex, making RCT results subject to effect modification in different populations. In addition, under RCT conditions, programmes are typically implemented under intense, artificial conditions. Both the internal and external validity of RCT findings can be greatly enhanced by observational studies using adequacy or plausibility designs. For evaluating large-scale interventions, studies with plausibility designs are often the only feasible option, and may provide valid evidence of impact. There is an urgent need to develop evaluation standards and protocols for use in circumstances where RCTs are not appropriate.

The MCE was designed to overcome the limitations of RCTs for evaluating large-scale interventions being implemented under real life conditions, while at the same time preserving a high level of internal study validity. A journal paper was accepted for publication in 2003 with the aim of making the main characteristics of the MCE design available to a wider scientific audience (Box 2).

Box 2

The Multi-Country Evaluation of the Integrated Management of Childhood Illness Strategy

Bryce J, Victora CG, Habicht JP, Vaughan JP, Black RE. *American Journal of Public Health*, March 2004 (in press).

Abstract. The Multi-Country Evaluation of the Integrated Management of Childhood Illness (IMCI) includes studies of the effectiveness, cost and impact of the IMCI strategy in Bangladesh, Brazil, Peru, Tanzania and Uganda. Six questions were addressed when designing the evaluation: who would be in charge, through what mechanisms could IMCI affect child health, whether the evaluation would focus on efficacy or effectiveness, what indicators would be measured, what types of inference would be made, and how to incorporate costs? This paper describes how these questions were answered, the challenges encountered in implementing the evaluation, and the five study designs. The methodological insights gained through this study can improve the design and implementation of future evaluation of the effectiveness of public health programmes.

A highly effective characteristic of the MCE is its use of a stepwise design. The number and nature of steps have been tailored to each site, but in general the following steps are included:

- The strength of IMCI implementation (training coverage, geographical spread, etc) and health systems characteristics (accessibility, utilization rates, etc) are assessed at national level;
- If necessary, a baseline survey of mortality, nutrition and coverage of key interventions is carried out;
- Health facility surveys are performed, to compare the quality of care provided by IMCI-trained and by other health workers. Also, information on health facility costs is collected;
- Information is obtained on health systems support for IMCI (drugs, supervision, etc) and on the coverage of community and household interventions – either from specially designed household surveys or from secondary sources. Costs at national, district and household level are also ascertained;
- On the basis of results from the previous steps, a decision is made about whether IMCI implementation is sufficiently strong for a likely impact on mortality and nutrition;
- Implementation, including costs, continues to be monitored for two or more years, to allow sufficient time for an impact on mortality to be measurable;
- A household survey investigates whether coverage with key child-survival interventions is adequate and child nutritional status has improved. Costs at the household level are measured again;
- Changes in mortality are assessed by a demographic survey or from results obtained from mortality surveillance.

As of early 2003, most countries in the MCE are at steps 4 or 5. Tanzania, the most advanced country in the study, is now at step 8.

The stepwise approach allows the evaluation to be stopped if adequate progress is not being made, thus saving precious resources. For example, among the 12 countries initially considered for the MCE, only five passed step 1. In all others, one or two country visits sufficed to establish that IMCI implementation was still at too early a stage to produce population-level impact within the coming three to four years. In Uganda, the evaluation was temporarily stopped at step 4, mainly because utilisation rates for key IMCI interventions were low. The stepwise design turned out to be one of the most effective aspects of the MCE, and lessons learned regarding barriers to full IMCI implementation have been extremely useful (Part III).

Progress in methodological tools for evaluation

This section of the report highlights specific MCE work on evaluation methods, and the progress made over the past 12 months. Topics include the measurement of quality of care in first-level health facilities, the methods of economic and financial analyses within the MCE, and the further development of the overall plan of analysis for the evaluation.

Quality of care

As part of the MCE, health facility surveys were carried out in Bangladesh, Brazil, Tanzania and Uganda. Each survey allowed the calculation of dozens of indicators of health worker performance. Comparing such a large number of indicators among IMCI-trained and untrained health workers, or across different countries, is clearly unwieldy. Six indices had been developed by an interagency working group on IMCI monitoring and evaluation to measure two underlying constructs: health worker performance and facility readiness to deliver care.

Over the past 12 months, the MCE has evaluated the validity and reliability of these indices, leading to improved measurement approaches. Box 3 summarizes the full report of this development process, which will be submitted for publication in a peer-reviewed journal in 2003.

Box 3

Developing summary measures of the quality of child health care at first-level facilities

Gouws E, Bryce J, Pariyo G, Armstrong Schellenberg J, Amaral J, Habicht JP.

Over 10 million children under five die each year, 99% in low-income countries, and most from causes that can be addressed through effective and inexpensive interventions. Integrated Management of Childhood Illness (IMCI) is a strategy designed, among other effects, to improve the quality of care received by sick children who are brought to primary health facilities for care. This paper reports on efforts to develop summary measures of the quality of facility-based under-five care in developing countries. Six indices were developed on the basis of expert judgement to measure two underlying constructs: health worker performance and the extent to which the health facility was ready to deliver care. We used data from the multi-country evaluation of IMCI collected in three countries to assess the validity and reliability of these indices. Principal components analysis and item analysis were used to assess and alter index construction and improve both validity and reliability. A revised set of indices is recommended, as well as further analysis to develop valid measures of correct treatment and counselling for sick children in low-income countries. Measurement approaches used in the social and behavioural sciences can make important contributions to public health research and evaluation. This is especially important because these studies are often used immediately to guide programme and policy decisions.

Economic and financial analyses

Costing has been an integral part of the MCE design from the outset, and cost data have been collected at all sites. This year saw further advances in costing methods and the completion of the first analyses. The full report of the MCE economic methodology was completed (Box 4) and will be used in 2003–2004 as the basis for the preparation of publications.

Box 4

Methods for the Economic Evaluation of IMCI

Adam T, Bishai D, Khan M and Evans DB

The costing component of the Multi-Country Evaluation (MCE) of the Integrated Management of Childhood Illnesses (IMCI) has two main goals: to determine from evidence whether IMCI is of high, moderate, or low cost-effectiveness compared with other ways of using scarce health resources; and to communicate the outcome to health planners and donors, informing them also of the financial costs incurred in introducing and maintaining IMCI.

Costing studies using the MCE economic methodology are being conducted in Tanzania, Brazil and Bangladesh. This methodology uses the ingredient approach (collecting and reporting quantities separately from prices) to promote transferability and extrapolation of results to other countries and help in interpreting variations in costs within countries. The detailed description of the methods of analysis has helped ensure that the analysis is done in a comparable way across MCE countries. The document has been an essential reference for MCE investigators.

The full protocol for cost-data collection and analysis has been successfully implemented in three of the five MCE countries (an alternative analysis plan is being used in Uganda, and in Peru the study design meant that cost data were primarily collected at only the district level). This has provided a wealth of comparable information as well as experience in costing intervention packages concurrently with their implementation. Detailed information on the major cost elements such as staff time and drug costs was collected by use of elaborate methods of data collection and analysis such as time-and-motion studies and econometric analysis. Initial results have been presented at several international meetings, including the Multilateral Initiative on Malaria Conference, held at Arusha, Tanzania in November 2002. In addition, several meetings have been held with MoH personnel and MCE counterparts in Tanzania to determine how the MCE costing results can be used to strengthen district planning activities.

Cost-effectiveness analysis

Most data on costs and effectiveness were collected separately throughout the MCE, and the two sets of data must be linked to ascertain cost-effectiveness. The MCE made substantial progress in this area over the past year. It was agreed that the MCE should produce both the *average cost-effectiveness ratio* (the ratio of total costs to total benefits of under-five care, in both IMCI and non-IMCI districts) and the *incremental cost-effectiveness ratio* (the ratio of additional costs to benefits of IMCI, compared with routine care for under-fives). Both types of cost-effectiveness analysis will be useful for MCE reporting: average cost-effectiveness for comparison with other interventions, within and across countries; and incremental cost-effectiveness to set priorities within the country concerned.

The following indicators will be used for IMCI cost-effectiveness: mortality (cost per death averted or years of life saved; cost per DALY averted); nutrition (cost per case of malnutrition – stunting, wasting, and underweight – prevented); malaria (cost per one per cent reduction in parasitaemia prevalence); anaemia (cost per one per cent reduction in anaemia prevalence); and quality of care (cost per child managed correctly in a health facility).

Overall MCE plan of analysis

Data from several sources were collected in the MCE with different tools. These included household coverage surveys, health facility surveys, mortality surveillance or demographic surveys, costing studies, documentation of IMCI implementation, and monitoring of contextual variables. Analytical plans had been developed previously for estimating key indicators from each of these tools. In 2002, efforts concentrated on developing a plan of analysis for pooling these indicator data to address broader analytic questions. The major objectives of the overall plan of analysis are to:

- Determine whether IMCI implementation has led to changes at health facility level (health worker performance, systems support for IMCI, utilization rates, etc.) and household level (coverage of child survival interventions);
- Assess the impact of IMCI implementation on malnutrition and mortality rates;
- Investigate the extent to which the observed changes can be explained by contextual factors;
- Elucidate pathways through which IMCI implementation might lead to impact on health, by studying associations between changes in mediating variables (indicators of health services provision, utilization and coverage) and in impact indicators (mortality, nutritional status); and
- Relate costs to effectiveness data.

On the basis of a generic plan of analysis developed by the central team, each country team produced a site-specific plan that will be used to guide the final analyses.



NEW MCE RESULTS FROM 2002-2003

In the MCE Annual Report for 2001-2002, we highlighted preliminary findings about IMCI and the performance of health workers, the challenges facing countries as they attempted to scale up IMCI, and the difficulties of implementing interventions to improve family practices at reasonable levels of coverage. This year we focus on the five MCE sites and report findings related to their continuing efforts to implement IMCI at high and sustained levels of coverage.

IMCI improves health worker performance

Results from MCE health facility surveys have shown substantial improvements in health worker performance in Tanzania (Box 5), Uganda and Brazil.

The use of health facility surveys in different countries with precisely the same methodology allows cross-site analyses to be carried out within the MCE. In one such analysis, IMCI training was associated with improved prescription of antibiotics and enhanced maternal compliance (Figure 1 and Box 6). Given rising levels of antimicrobial resistance due in large part to inappropriate prescription of antibiotics, these results are very encouraging.

Box 5

Health care for under-fives in rural Tanzania: effect of Integrated Management of Childhood Illness on observed quality of care

Tanzania IMCI multi-country evaluation health-facility-survey study group. *Health Policy and Planning* (in press).

Abstract. The Multi-Country Evaluation of IMCI Effectiveness, Cost and Impact (IMCI-MCE) is a global evaluation to determine the impact of IMCI on health outcomes and its cost-effectiveness. In Tanzania, the MCE included a survey conducted in August 2000 in stratified random samples of government health facilities to compare the quality of case-management and health systems support in IMCI and comparison districts. The results indicate that children in IMCI districts received better care than children in comparison districts: their health problems were more thoroughly assessed, they were more likely to be diagnosed and treated correctly as determined through a gold-standard re-examination, and the caretakers of the children were more likely to receive appropriate counselling and reported higher levels of knowledge about how to care for their sick children. Few differences were found between IMCI and comparison districts in the level of health system supports for child health services at facility level. This study suggests that IMCI, in the presence of a decentralized health system with practical health-system planning tools, is feasible for implementation in resource-poor countries and can lead to rapid gains in the quality of case management. IMCI is likely therefore to lead to rapid gains in child survival, health and development if adequate coverage levels can be achieved and maintained.

Barriers to IMCI delivery

In the 2001-2002 MCE progress report, Chapter 3 summarized the main barriers to IMCI delivery that were identified in visits to 12 countries initially considered for inclusion in the MCE. Health-system issues were found to severely limit the potential impact of IMCI. These included infrequent supervision, staff turnover, low morale of health workers, conflict between IMCI requirements and previously existing regulations, difficulties in scaling-up, and the low utilization of government health services in some countries. The community component – intended to act synergistically with the improvements in health services – had limited and spotty coverage in most countries.

Box 6

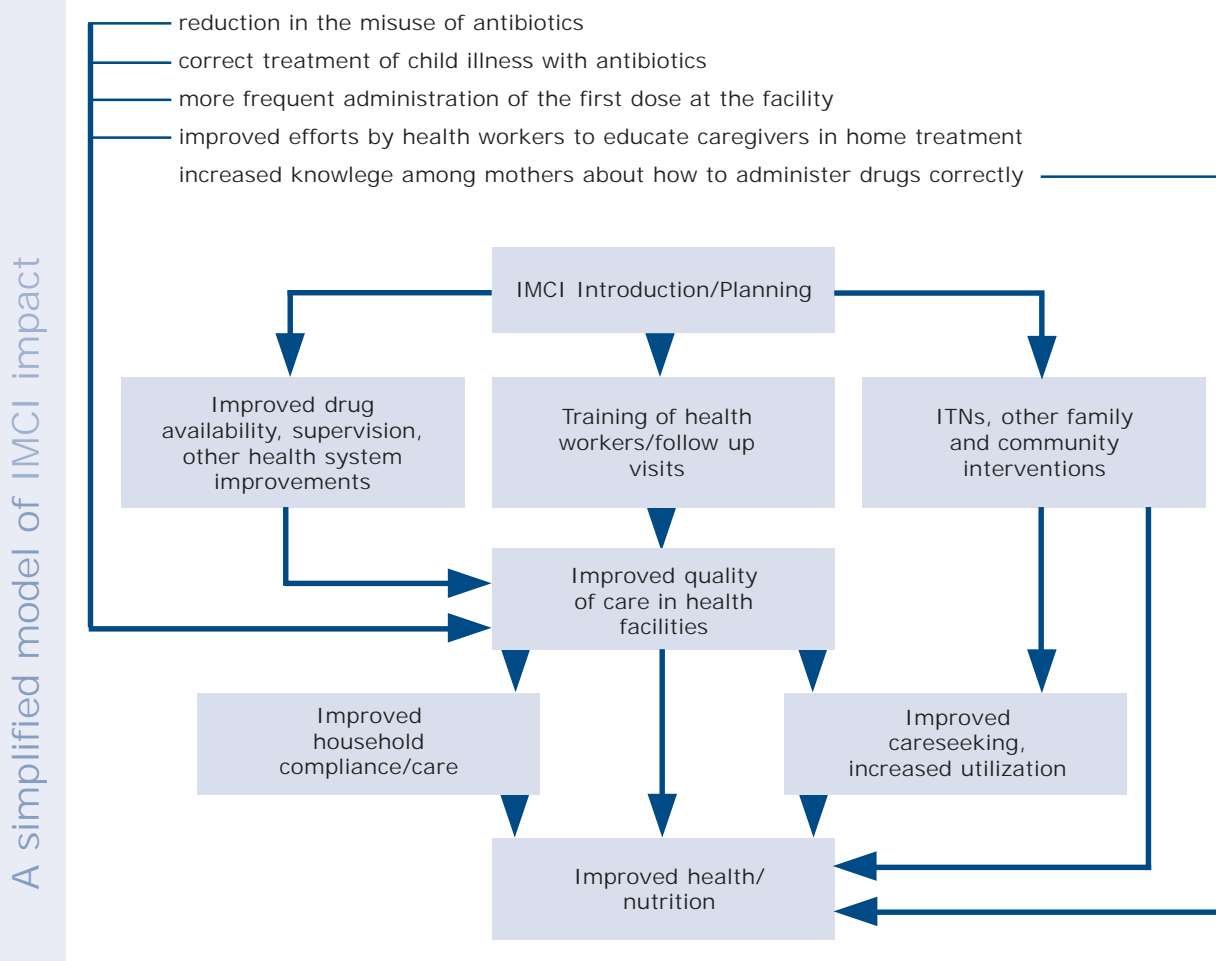
Improving the use of antimicrobials through IMCI case-management training

Gouws E, Bryce J, Habicht JP, Amaral J, Pariyo G, Armstrong Schellenberg J, Fontaine O. Submitted for publication, 2003

Abstract. Antimicrobial drugs, including antibiotics and antimalarials, are an essential child survival intervention. Ensuring that children under five who need these drugs receive them promptly and correctly can save their lives. Ensuring that these drugs are not prescribed unnecessarily and that those who receive them complete the full course can slow the development of antimicrobial resistance. Integrated management of childhood illness (IMCI) is a strategy for reducing child mortality and improving child health and development. One component of the strategy is to improve the skills of health care workers in first-level health facilities. Locally adapted guidelines on the management of child illness provide the performance standards, and health care workers are trained to apply them and where possible are supported through supervision and feedback. Analysis of data collected through observation-based surveys at randomly selected first-level health facilities in Tanzania, Uganda and Brazil shows that children receiving care from health workers trained in IMCI are significantly more likely than those receiving care from workers not yet trained in IMCI to receive correct prescriptions for antimicrobial drugs, to receive the first dose of the drug before leaving the health facility, to have their caregivers advised on how to administer the drug, and to have caregivers who are able to describe correctly how to give the drug at home as they leave the health facility. IMCI training is an effective intervention to improve the rational use of antimicrobial drugs for sick children visiting first-level health facilities in low- and middle-income countries.

Figure 1

In outpatient facilities in Tanzania, Uganda and Brazil, IMCI introduction was significantly associated with



A particular challenge came to light in our visits to two of these 12 countries – Cambodia and Niger. They had very high levels of under-five mortality, and thus the greatest need for IMCI, but they also had the weakest health systems and low utilization rates, and were therefore the least likely to implement IMCI successfully. Paradoxically, countries with the least need for IMCI were also those most likely to implement it successfully, owing to the presence of strong health systems.

During 2002, further results related to health system limitations were obtained from the five countries that had been selected for MCE because it was believed that an impact on mortality was likely to be observed.

- In Brazil, the MCE design required identifying 32 municipalities in four states that were leaders in IMCI implementation. The municipalities were required to have had at least 60% of health workers trained in IMCI since the year 2000. Of about 800 municipalities in the four states, fewer than 10 were found to qualify. When the minimal training coverage level was lowered to 50%, 25 eligible municipalities were identified in these states. In several municipalities that previously had high rates of IMCI training coverage, these rates had sunk below 50% because of rapid staff turnover. In the leading Brazilian IMCI implementation state, Sergipe, high training coverage in 2000 dropped precipitously because all training and supervision activities were halted immediately after the review, and by early 2002 only two municipalities of over 100 qualified for inclusion in MCE, even when the lower criterion of 50% coverage was used.
- In Uganda, the Ministry of Health (MoH), WHO and other partners agreed when the MCE impact evaluation was launched in 2000 to focus their IMCI implementation efforts, especially those targeting community IMCI, in the 10 districts participating in the MCE. The evaluation time-frame called for a review of implementation by December 2002, so that the formal period of evaluation within the stepwise design could be started. In July 2002 a documentation exercise was carried out in which each of the 10 districts was visited by a team composed of MoH and MCE staff, who used a standardized protocol to assess progress in IMCI implementation. This was followed by a full data-review carried out by MCE investigators from Uganda and Johns Hopkins University with input from the MoH and the MCE Central Team in Kampala in November 2002. This meeting concluded that in the 10 participating districts IMCI had not yet reached levels of coverage that could be expected to lead to changes in nutritional status and mortality at population level (see Step 5 on page 7). The evaluation was therefore interrupted temporarily until changes could be made to strengthen implementation. USAID is launching in Uganda a major child-survival initiative that may provide an opportunity to continue the impact evaluation.
- In Peru, a leading country in IMCI implementation in the Americas, training of health workers slowed down in 2000–2001 in comparison with preceding years; national training coverage is currently around 10%. About 40% of IMCI-trained workers had already been rotated within two years of training (Box 7), and at the current rate of training it will take 45 years to reach full coverage. Training of community health workers in IMCI was not coordinated with clinical IMCI training, and the two activities mostly took place in different geographical areas.
- In Bangladesh, where an efficacy study with a randomized design is under way, IMCI is being implemented under optimal conditions with MCE funding. Nevertheless, there have been considerable delays in the study timetable owing to the need to work closely with the Ministry of Health in adapting guidelines and training materials.
- In Tanzania, early results were encouraging because health worker training definitely led to improved clinical performance. A baseline household survey, carried out in the four evaluation districts in 1999, was repeated in 2002, but results were disappointing. Box 8 summarizes the main findings of both rounds of surveys.

Box 7

Scaling up IMCI to the national level: achievements and challenges in Peru

Huicho L, Dávila M, Campos M, Drasbek C, Bryce J, Victora CG. Submitted for publication, 2003

Abstract. The Integrated Management of Childhood Illness (IMCI) strategy was introduced in Peru in 1996 and underwent early rapid expansion. The present evaluation is part of the Multi-Country Evaluation (MCE) of IMCI. The MCE is aimed at determining whether IMCI has an overall significant impact on improving child health and is cost-effective. MCE findings will also help determine how to best deliver IMCI. The results of the evaluation may pave the way for universal implementation of the strategy, and generate additional support from donors and development agencies worldwide. The Peru study included visits to the 34 health districts in the country to assess achievements as well as barriers to expansion. According to the registered information, training of health workers in IMCI increased up to 1999, but decreased in 2000 and 2001. At present, about 10% of doctors and nurses working for the Ministry of Health have been trained, but this figure may be underestimated by 30%. The highest training coverage reported in any district was 77%. In addition, 43% of trained staff had already been rotated by 2001. Training of community health workers, on the other hand, increased from 2000 onwards. Districts where clinical training was most intense, however, were not the same as those where community IMCI training was strongest. In general, national and district-level IMCI-specific planning and budgeting activities were poor. At district level there were no IMCI coordinators and IMCI ran side by side with vertical programmes – such as those for diarrhoea, acute respiratory infections and others – that addressed the same child health problems. The average annual number of supervisory visits was 0.19 per health facility, and the supply of drugs, vaccines and equipment was reportedly very good. Our findings have clear policy relevance to scaling up IMCI in Peru and in other countries. The main lessons learned included the need to institutionalize IMCI at national and district levels with adequate planning and budgeting; to sustain training activities after the initial boost; to plan and implement supervisory activities; to coordinate training in clinical and community IMCI to ensure that they reach the same communities; and to develop IMCI evaluation projects and implementation activities as complementary and closely interdependent actions.

Box 8

Limited change in household-level indicators in Tanzania

MCE Tanzania household survey team; work in progress.

Household surveys were conducted in the two intervention and two comparison districts in MCE–Tanzania in 1999 and 2002. Preliminary analyses show few significant differences between the IMCI and comparison districts or in IMCI districts over time (Figures 2 and 3). This suggests that IMCI, despite leading to substantial improvement in the quality of care delivered at health facilities, has not yet had an effect on key family practices such as careseeking and exclusive breastfeeding. Not surprisingly, then, there is also little evidence of any effect of IMCI on impact indicators related to nutritional status or anaemia.

Analyses of these data are continuing both to confirm these preliminary findings and to investigate associations between IMCI inputs and contextual factors and specific family behaviour.

Figure 2

All-cause appropriate care-seeking for child illness as reported by caretakers in four districts in Tanzania

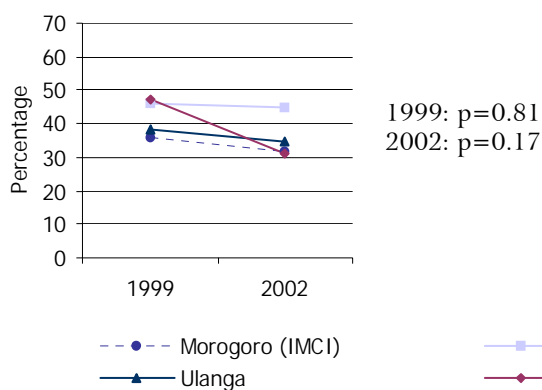
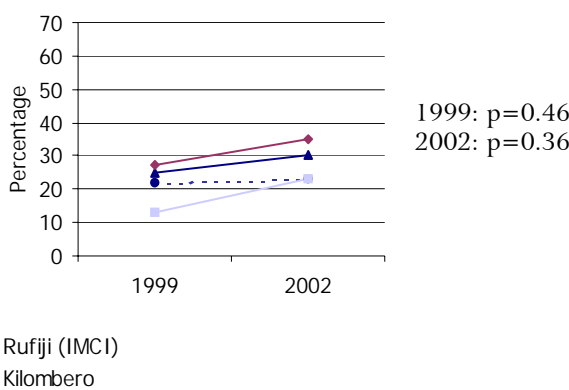


Figure 3

Exclusive breastfeeding up to four months in four districts in Tanzania

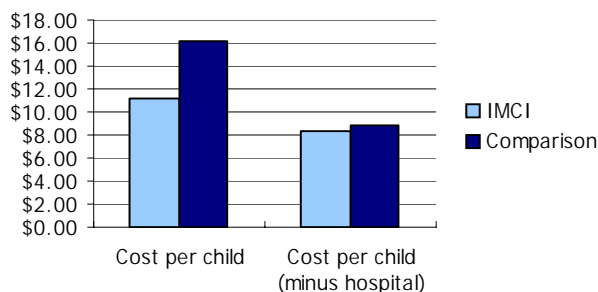


First results of study of the economic costs of IMCI implementation

Introduction of IMCI in two Tanzania districts was not associated with higher costs per child covered. Box 9 and Figure 4 summarize the main conclusions of a detailed study of costs at national, district, health facility and household levels.

Figure 4

District cost per child according to IMCI implementation, with and without hospital cost. MCE Tanzania



Marked inequities in child health found in poor rural populations

Several analyses carried out in 2002 confirmed the early results of the MCE regarding inequities in child health. Box 10 shows the main results of the MCE household survey in Tanzania, published in early 2003.

Box 9

Analysis report on the costs of IMCI in Tanzania

Adam T, Manzi F, Kakundwa C, Armstrong Schellenberg J, Mgalula L, de Savigny D, Mbuya C, Wilczynska K and the MCE Tanzania Team.

Key results. For 1999 the cost per child of caring for under-fives in IMCI districts was US \$ 11.19, or 44% lower than in the comparison districts (\$16.09). Cost differences from the comparison of costs in IMCI and comparison districts in relation to each level can be explained as follows:

- National costs were higher in IMCI districts owing to the additional costs of establishing and implementing IMCI.
- District-level costs were 50% higher in comparison districts during the survey period. This is linked to the higher costs of supervision and administration, which are likely to be independent of IMCI.
- Hospital-level costs were 2.5 times higher in comparison districts, owing to a higher number of admissions per child in these districts than in IMCI districts. Two possible explanations are: (1) improved quality of care and drug availability for under-fives at IMCI primary facilities, which prevented children from being admitted subsequently to hospital; or (2) factors other than IMCI, such as differences in the quality of, or access to, hospitals
- IMCI and comparison districts did not differ as to cost per child at government primary-facility or at household levels.
- Even after excluding the hospital component of costs, the total cost per under-five child in IMCI districts was still lower than in comparison districts (Figure 4).

Box 10

Inequities among the very poor: health care for children in rural southern Tanzania

Armstrong Schellenberg J, Victora CG, Mushi A, de Savigny D, Schellenberg D, Mshinda H, Bryce J and the Tanzania IMCI MCE baseline household survey study group. *Lancet* 2003; **361**:561-6.

Background. We sought evidence of inequities in health care by gender and socioeconomic status for young children living in a poor rural area of southern Tanzania.

Methods. A baseline household survey in Tanzania, before implementation of Integrated Management of Childhood Illness (IMCI), covered probability samples of 2,006 children under five years in four rural districts. Questions focused on the extent to which maternal knowledge of illness, care-seeking (better termed 'care-obtaining') outside the home, and facility care were consistent with IMCI guidelines and messages. Principal components analysis was used to develop a relative index of household socioeconomic status, using weighted scores of information on income sources, education of the household head, and household assets.

Results. Over half of the children reported an illness episode in the two weeks before the survey. Of these, 415 (41%) sought care first from an appropriate provider (use of a hospital, health centre, dispensary or village health worker). There were no gender or socioeconomic-status differences in reported morbidity, and neither were there gender differentials in care-seeking behaviour. Caregivers of children from wealthier families had better knowledge about danger signs than those from poorer families, were more likely to bring their children to a health facility when ill, and were more likely to have had a shorter journey. Their children were more likely than poorer children to have received antimalarials, or antibiotics for pneumonia.

Interpretation. Care-seeking behaviour is worse among poorer families than among the relatively rich, even within a rural society that might easily be assumed to be uniformly poor.

Results from the Bangladesh MCE were also very illustrative. Figure 5 shows the percentage of sick children who were taken to an appropriate health-care provider, as assessed in the baseline survey. The Bangladesh and Tanzania results suggest that special efforts should be made to reach the poorest children when implementing IMCI, so as not to aggravate existing inequities.

Figure 5

Inequities in appropriate careseeking among sick children under age five in Bangladesh, 2000. MCE Bangladesh



MCE as a stimulus for change

MCE staff and Advisers agree that one of the most remarkable aspects of the MCE is the extent to which it has already contributed to changes in public health perspectives and practices related to child health, though the evaluation is only at its mid-point. One reason may be that feedback was an integral part of the MCE design and remains a fundamental aspect of it today. An important outcome of the first annual meeting of MCE investigators in 1999 was a framework for providing feedback on MCE results at all levels; a portion of the framework is reproduced in Figure 6.

Figure 6

Guidelines for feedback developed by MCE investigators in December 2000

Level	Feedback from:	Feedback to:	Type of Information	Given by	When
Households Communities	HH Survey:	Caregiver	referrals of ill children	Survey Team	Immediate
		Caregiver	record of key results for children examined	Survey Team	Immediate
Village authority		vote of thanks for compliance	Survey Team	On departure	
	DSS or DHS Survey	Household	general newsletters provided at each census/survey round	DSS Team	Each cycle
Health Facilities	HH Survey	Health facilities	Poster of key results returned to village by councillor (see District Level)	Survey Team via Local Councillor	Within 4 months of survey
	HF Survey	Facility in charge	Visitor book signed with general comments	Survey Team	On departure
			Check-list of reminders for IMCI good practice or standard under-five case management	Survey Team	On departure
DSS or DHS Survey	MCH Coordinator	Demographic data on facility catchment population denominators (e.g., under fives, mothers)	DSS Team	Annually	

... national and district levels ...

International Partners	All Surveys	MCE Partners	Data and Results Workshops	PIs et al	Annually
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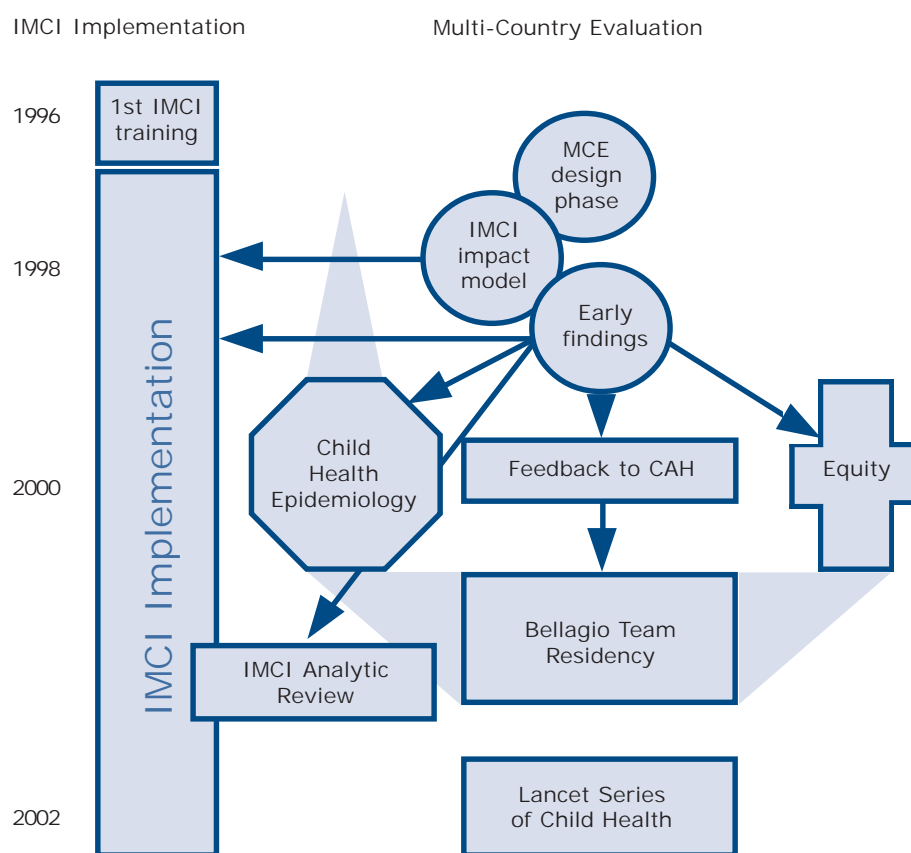
Feedback and change at global level

An overview of how MCE results were disseminated and some of the results are presented in the diagram in Figure 7. Highlights include:

- The development of the *IMCI impact model in 1998* made explicit the assumptions of those who developed it about how the introduction of the IMCI strategy would lead to intermediate outcomes and eventually to an impact on child mortality, health and nutrition. This model is now widely used as a basis for presenting IMCI in programmatic contexts as well as to guide the presentation and interpretation of MCE results.

Figure 7

MCE feedback and dissemination: a schematic overview



- At a *briefing of CAH staff on the MCE in June 2000* Professor Stan Becker of the Johns Hopkins Bloomberg School of Public Health presented a computer simulation based on the IMCI impact model. He demonstrated to WHO/CAH staff that, without rapid and enormous increases in the utilization of first-level health facilities, IMCI was unlikely to have a measurable impact on child health and nutrition in the subsequent five years.
- The results of country assessment visits were reported in the preliminary findings of the MCE. These included baseline mortality assessments, some of which were strikingly inconsistent with existing global and regional distributions of the causes of under-five deaths. These findings were used to strengthen the rationale of the formal *establishment of the Child Health Epidemiology Reference Group in 2001*. This group is coordinated by WHO, and is conducting numerous epidemiological reviews and reanalyses as the basis for improving global estimates of child deaths by cause.
- The MCE held a *feedback meeting for the WHO/CAH staff in Geneva in October 2001*. Preliminary results from the MCE were presented, showing that IMCI was leading to improvements in policy and in health-worker performance, but that broader health system issues were impeding full implementation, and that action at community level was slow. The concluding slide stated that “...we need urgently to pull together and analyse the IMCI experience in countries, as a basis for developing a *second-stage* strategy focused on scaling up and achieving impact at population level.”

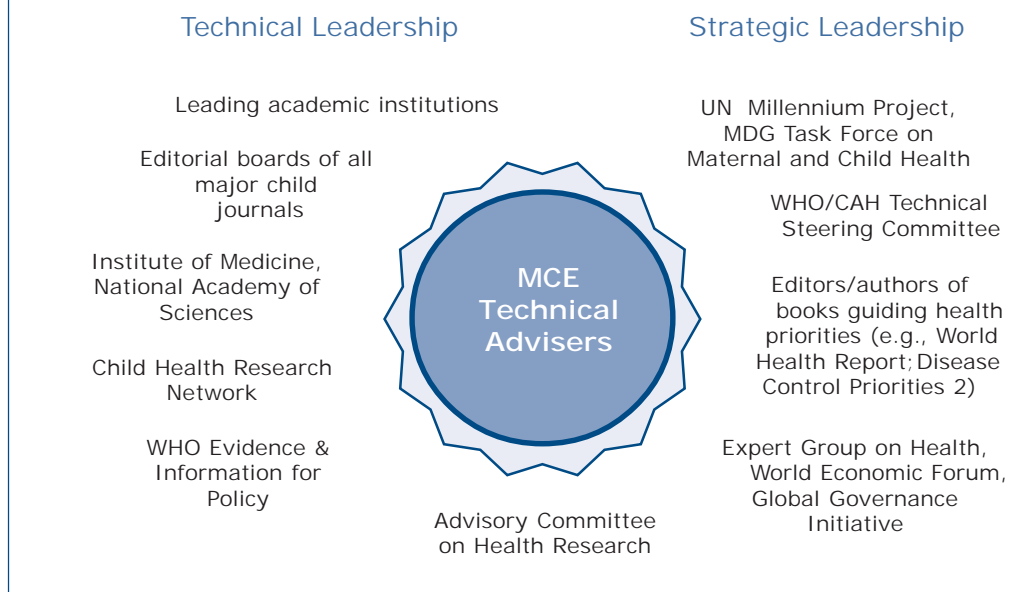
- Variables needed to carry out equity analyses were also included in the original design of the MCE. As preliminary results began to emerge, partners in the World Bank, the Rockefeller Foundation and, in the UK, the Department for International Development (DFID) were increasingly interested in collaborating with CAH and the MCE in further analyses of these data, given the unusual level of detail available on child health status and services utilization. A standard analysis plan was developed for the MCE, and early efforts at collaboration led to the development of the *WHO/World Bank Working Group on Child Health and Poverty*. This group produced several reviews and conducted a capacity-building workshop for WHO staff from four units working on aspects of child health. The MCE was directly responsible for bringing WHO into the arena of child health and equity work.
- By the end of 2001, the work of the MCE, the Child Health Epidemiology Reference Group and the Working Group on Child Health and Poverty had progressed to the point where findings from one aspect of the work were benefiting, or could benefit, from the work of the others. One of the most pressing issues was the repeated finding in MCE sites that utilization of first-level health facilities was low in most areas, and that more effective methods were needed for reaching children and families. From the equity perspective, analyses from the MCE Tanzania were showing that, even among the very poor, the poorest were less likely to have access to services, to seek appropriate care, or to receive effective child survival interventions. We therefore submitted a proposal for a *team residency at the Rockefeller Foundation's Conference Center at Bellagio, Italy*, to bring together members of the three groups, as shown in Figure 7. The proposal was successful in the competitive selection process and a 23-person Team Residency was awarded for February 2003. Highlights of the Bellagio meeting are shown in Box 11.
- Concerns sparked by the preliminary findings of the MCE also contributed to leading the Department of Child and Adolescent Development to organize an *analytic review of IMCI*, involving numerous implementation partners. In-depth interviews with key informants at all levels and field visits to six countries were conducted in late 2002 and early 2003. The qualitative findings of the analytic review confirm those of the MCE, and complement them by providing the informant interview results from child health programme managers and funding partners.
- One of the planned products of the Bellagio Team Residency was a set of manuscripts drawing together the perspectives from the MCE with those from child health epidemiology and equity studies. This came to the attention of the Editors of *The Lancet*, and with their encouragement and support a *series of five papers summarizing the conclusions of the Bellagio Team Residency are to be published in The Lancet* beginning on 28 June 2003. These papers draw on the full range of experience of the MCE, and represent an important and unusual opportunity to bring the evaluation results to the attention of the broad international readership of the journal.
- Much of the advancement in public policy takes place behind the scenes, when leading thinkers meet to discuss funding priorities, technical guidelines or future agendas. The effectiveness of the MCE as a catalyst for change derives in large part from the *outreach of the MCE Technical Advisers in their roles as international leaders in child health*. Figure 8 illustrates how members of the Technical Advisory Group, although numbering only seven individuals, extend the reach of the MCE findings into the highest-level technical and policy arenas.

Feedback and change at country level

The guidelines for feedback of MCE results shown in Figure 1 address not only international partners but also national, district and community levels. At lower levels, one function of the

Figure 8

The MCE gains impact through its Technical Advisers



Box 11

The MCE goes to Bellagio, Italy, for...

A team residency on Knowledge into action: Improving equity in child health

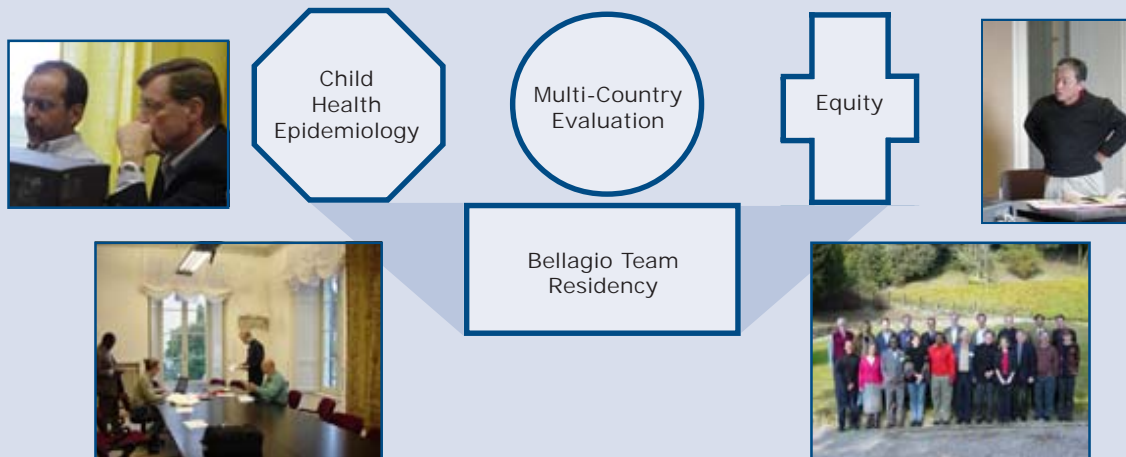
The Rockefeller Foundation awarded a team residency for 23 individuals at its Conference Center at Bellagio, Italy in February 2003. This was one of few residencies ever awarded to a group not already supported by the Foundation.

The objectives

- To review new estimates of proportional child mortality by cause that take into account multiple causes and nutritional status, and to consider their implications for intervention programmes;
- To examine new data sets that originate from poor countries and that address the effectiveness of the integrated delivery of the major child survival interventions in a variety of service delivery contexts;
- To prepare a series of manuscripts for publication in *The Lancet*, summarizing what is known about reducing child deaths, improving equity in child health, and identifying further knowledge gaps that need to be addressed.

The participants

Four groups of participants of roughly equivalent size were invited. With few exceptions, the individuals represented at least one of the following groups, and often more than one: (1) Principal Investigators or Technical Advisers working on impact studies within the Multi-Country Evaluation of IMCI Effectiveness, Cost and Impact (MCE); (2) focal points for specific causes of child mortality from the Child Health Epidemiology Reference Group; and (3) members of the WHO/World Bank working group on child health and poverty. Other participants for at least part of the residency included Richard Horton and Sarah Venis of *The Lancet*, Tomris Türmen and J.W. Lee of WHO, Gordon Perkin of The Bill and Melinda Gates Foundation, and Tim Evans of the Rockefeller Foundation.



... and the outcomes go to the pages of *The Lancet*
A special Lancet series on child survival

EDITORIAL

THE LANCET

Volume 361, Number 9351.

The world's forgotten children

This year nearly 11 million children will die before they reach the age of 5 years. More than half of these children—roughly 6 million—will die of diseases that could have been easily prevented or treated. About 2 million will die from diarrhoea, which in most cases can be treated with simple oral rehydration therapy. Another 2.1 million—more than will die this year from HIV, tuberculosis, and malaria combined—will die from pneumonia. Another million will die from malaria, children who could have been protected by such simple measures as insecticide-treated bed nets or treated with available anti-malarials. And hundreds of thousands will die from measles for which there is a cheap, effective vaccine.

Given these numbers and the fact that so many lives could be saved with the implementation of such simple measures, it is surprising that child mortality has not received more attention. But while the world's attention has understandably been focused on the growing HIV/AIDS pandemic and the resurgence of such diseases as tuberculosis and malaria, progress in reducing child mortality has in many of the world's poorest countries slowed, stopped, and in some cases reversed. According to WHO figures, the world's average child mortality rate in the year 2000 was 67 deaths per 1000 livebirths—a marked improvement from 1990 when the average rate was 85 per 1000. But in Africa the child mortality rates are running at an average rate of 150 deaths per 1000 livebirths, a rate eight-times that seen in Europe. In seven African countries—Burundi, Lesotho, Madagascar, Mauritania, Nigeria, Sierra Leone, and Tanzania—there has been little or no change in child mortality rates over the past 50 years.

While HIV/AIDS is beginning to have an effect on child death rates, the cause of most of these deaths remains the same easily treated killers that have stalked poor children of the world in the past. These children are dying because—through our inaction—we are denying them access to proven, inexpensive services. Today, 26% of the world's children under 2 years go without the protection of diphtheria, pertussis, and tetanus immunisation; 28% do not

receive oral rehydration therapy as needed for diarrhoea; 40% do not receive appropriate antibiotic treatment for pneumonia; 58% do not receive exclusive breastfeeding during the crucial first 4 months of life; 52% do not receive vitamin A supplementation; 32% do not have access to iodised salt; and 25% have malnutrition—which contributes to 60% of child deaths.

Next month in Bellagio, Italy, researchers from three groups will meet for a 6-day workshop to refocus the world's attention on child mortality. One group, the Child Health Epidemiology Research Group, has been developing better ways to define the scope of the problem and its causes—very simply, to find out why children die so better interventions can be implemented. The second group, researchers in the Multi-Country Evaluation of Integrated Management of Childhood Illness, has been evaluating programmes in the developing world that emphasise the overall wellbeing of children, focusing on promoting growth and development instead of just combating disease. And the third, the WHO/World Bank/UNICEF Working Group on Child Health and Poverty, is working on ways to overcome the health effects of inequalities in income that now exist not only between countries but also within countries. The research by these three groups—and by other international health groups—shows that we already have all the tools we need to attack this problem now. What is lacking is the political commitment to provide the resources needed.

The goal of the meeting is to make child health an international health priority once again and to establish a permanent working group that will fight for the resources this problem deserves. The results of the workshop will be published in a five-part series that will appear starting May 31 in *The Lancet*, which is helping to organise the Bellagio meeting. The series will lay out what we must do to save these children. The question then will be whether we shall have the will to do what needs to be done.

The Lancet

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guidelines was to ensure that similar levels of feedback were provided across the various MCE sites: the provision of evaluation results can be an effective stimulus for change and needs to be carefully documented. Selected examples of the types of change that occurred as a result of providing feedback on preliminary MCE results include the following:

- In *Peru*, PAHO officials have participated actively in planning and carrying out the study, and in reviewing the preliminary results and manuscripts submitted for publication. The MCE findings stimulated important discussions at PAHO and in the Ministry of Health about the level of political and implementation support needed for IMCI to achieve and sustain high coverage, and to achieve improvements in child health. These discussions have led to reinvigorated efforts to implement IMCI, and to plan and implement interventions to address perinatal deaths, child abuse and accidents.
- In *Brazil* the Ministry of Health and PAHO have been involved in the MCE since the planning stage, and their inputs have resulted in substantial changes in the design of the study. Feedback continued during the data-collection phase with regular visits by the Principal Investigator to the MoH in Brasilia.

The main summary results of the HFS, particularly those related to areas in which the performance of IMCI trained workers was still inadequate, were written up for health managers and health workers. Every municipality in the IMCI group was visited, and the main results of the study were fed back to the Municipal Secretaries of Health. Feedback at State level has been restricted so far to Ceará State, where the MCE is based. Contacts with other states require the participation of the Ministry of Health for political reasons; visits are planned for the second half of 2003 but suitable dates have not yet been decided.

A web page, in Portuguese, contains the main study results; it has been disseminated at national, state and municipal levels (<http://www.geocities.com/mcebrasil>).

- In *Tanzania*, feedback of MCE results contributed, in part, to the implementation of IMCI in the comparison districts, beginning in January 2002, by which time mortality-data collection was nearing completion. Moreover, MCE findings helped to facilitate the timely change of first-line antimalarials from chloroquine to SP in the four study districts. Also, MCE results on equity and treated mosquito nets for malaria control have made a major contribution to the evolving national strategy for going to scale with this intervention.
- Feedback on the *Uganda* MCE is obtained mainly through a National IMCI workshop, quarterly meetings of the Advisory Committee (representing the investigators and Ministry of Health (MoH) and other key stakeholders and supporting agencies), and critical observations by the field team to the facility staff at the end of data collection. Actions resulting directly or indirectly from the study include accelerated plans by the MoH and its partners for home management of fever, plans by intervention districts to scale up implementation of IMCI, introduction by the MoH of a six-day course in two parts for health workers who cannot be away long from their stations, a placement programme to enable district teams to learn from one another – for instance, in sharing experiences with the IMCI community component, speeding up by the MoH of a national IMCI monitoring tool modelled on the indicators used in the MCE/Impact study but covering more extensive operational issues, and introduction by the MoH of a “referral care package” to improve compliance with referral for severe illness. The EPI Programme has used study findings to plan for revitalization and restructuring of the immunization programme – e.g., daily immunization sessions as a means of improving coverage.
- In *Bangladesh*, selected findings from the baseline surveys and follow-on continuous monitoring were shared with senior and local-level government and NGO managers on different occasions. Since the Bangladesh MCE in Matlab is one of the three first-phase pilot IMCI sites of the government, these findings were well received. They provided evidence of the challenges facing IMCI implementation but also an early indication of increase in health facility utilization. The MCE results have contributed to a decision by the government to develop and implement an expansion plan for IMCI to reach nationwide coverage by 2006. MCE findings will contribute to the

planning, in relation to, for example, anticipated drug requirements. The baseline findings on careseeking has been instrumental in the decision by the government and partner agencies (UNICEF) to produce a national community-IMCI strategy document that will guide activities to improve key family and community behaviour. This document is now in its final draft stages. The government has agreed in principle to adopt the counselling package developed for the community-based workers in the MCE study for use in other IMCI sites. MCE monitoring procedures and findings form the basis for an ongoing effort by the government and partners to develop and implement a management information system (MIS) for the Bangladesh IMCI. Finally, the government and partners are using selected MCE findings in their official presentations in different forums.



Perspectives on the future

The coming 12 months seem likely to represent a period of change for the MCE. The follow-up on activities generated by MCE findings, and particularly the follow-up on the Bellagio-Lancet project, will require continuing attention and possibly reconsideration of how to proceed at the MCE sites. MCE Technical Advisers and investigators, as well as the Central Team, are increasingly asked to make public presentations and to participate in strategic and priority-setting events. Requests for access to MCE data are increasing, as are requests for special analyses targeting questions that are important but that fall outside the original MCE plan of analysis.

Among these highly visible, demanding and to some extent unavoidable new activities, the MCE selects only those that are consistent with its original objectives. Three specific areas of work will receive the highest priority in the coming year. These are:

- *Completing the implementation, analysis and write-up of the five MCE studies in Bangladesh, Brazil, Peru, Tanzania and Uganda.* This work is the basis on which the original MCE work plan and budget were developed. Unanticipated developments and demands must not divert or disperse this essential programme of work. Support to site investigators in the analysis and publication of their results will continue, and ambitious publication plans have been developed for each site.
- *Continuing implementation of the cross-site analyses and development of analytic tools.* Data that are collected but never fully analysed and published represent not only a missed opportunity but also an unethical waste of public health resources. Within the MCE, the programme of analysis has only just begun. Some data sets are only now being cleaned and entered, and others are yet to be collected. The emphasis within the MCE Central Team in the remainder of 2003 and in 2004 will be on developing and implementing plans for analysis and publication to ensure that MCE is fully used and disseminated to improve child health and development. Special analysis workshops involving MCE investigators and Technical Advisers are planned for 2003–2004 in relation to quality of care and costing.
- *Improved methods for large-scale effectiveness evaluation, and application of lessons learned to development of routine monitoring and evaluation tools suitable for use by programme managers.* The MCE represents a wealth of learning and experience about how to design, plan and implement evaluation studies. This work must be captured in written products and disseminated to those who can make use of it to improve both the evaluation process and the routine monitoring and evaluation of public health programmes.



MCE publications, presentations and reports

Papers published in peer-reviewed journals

Published

Armstrong Schellenberg J, Abdulla S, Nathan R, Mukasa O, Marchant TJ, Kikumbih N, Mushi AK, Mponda H, Minja H, Mshinda H, Tanner M, Lengeler C. Effect of large-scale social marketing of insecticide-treated nets on child survival in rural Tanzania. *Lancet* 2001 Apr 21; 357(9264): 1241-7.

Schellenberg JA, Victora CG, Mushi A, de Savigny D, Schellenberg D, Mshinda H, Bryce J, for the Tanzania IMCI MCE baseline household survey study group. Inequities among the very poor: health care for children in rural southern Tanzania. *Lancet* 2003;361(9357):561-6.

In press

Tanzania IMCI multi-country evaluation health facility survey study group*. Health care for under-fives in rural Tanzania: effect of Integrated Management of Childhood Illness on observed quality of care. *Health Policy Plan*, (*Armstrong Schellenberg J, Bryce J, de Savigny D, Lambrechts T, Mbuya C, Mgalula L, Wilczynska K) (accepted January 2003).

Victora CG, Habicht JP, Bryce J. Evidence-based public health: Moving beyond randomized controlled trials. *Am J Public Health* (accepted April 2003)

Schellenberg D, Armstrong Schellenberg J, Mushi A, de Savigny D, Mgalula L, Mbuya C, Victora C. The Silent Burden of Anaemia in Tanzanian Children: a Community-based Study. *WHO Bulletin* (accepted March 2003)

Wagstaff A, Bryce J, Bustreo F, Claeson M and the WHO-World Bank Child Health and Poverty Working Group. Child health: reaching the poor. *Am J Public Health* (accepted May 2003)

Bryce JB, Victora CG, Habicht JP, Vaughan JP, Black RE. The Multi-Country Evaluation of IMCI. *Am J Public Health* (accepted May 2003)

Child Survival Series – submitted to *The Lancet* (accepted May 2003)

- Black R, Morris S, and Bryce J. Where and why are 10 million children dying every year? *Lancet* 2003; 361:2226-2234.
- Jones G, Steketee R, Bhutta Z, Morris S. and the Bellagio Child Survival Study Group. How many child deaths can we prevent this year? *Lancet* 2003; 362:65-71.
- Bryce J, El Arifeen S, Pariyo G, Lanata C, Gwatkin D, Habicht JP and the Multi-Country Evaluation of IMCI Study Group. Reducing child mortality: Can public health deliver? *Lancet* 2003; 362:159-64.
- Victora C, Wagstaff A, Armstrong Schellenberg J, Gwatkin D, Claeson M, and Habicht JP. Applying an equity lens to child health and mortality: More of the same is not enough. *Lancet* 2003; 362: 233-41

- The Bellagio Study Group on Child Survival. Knowledge into action for child survival. *Lancet* 2003; **362**: 323-27

Under review

Adiel K Mushi, Joanna RM Armstrong Schellenberg, Haji Mponda, Christian Lengeler. Targeted subsidy for malaria control with treated nets using a discount voucher system in southern Tanzania. Submitted.

Luis Huicho L, Dávila M, Campos M, Drasbek C, Bryce J, Victora C. IMCI implementation at national level in Peru: achievements and challenges. Submitted.

Gouws E, Bryce J, Amaral J, Pariyo G, Armstrong Schellenberg J. Improving the correct use of antimicrobials through IMCI case management training. 2003. Submitted.

Victora CG, Armstrong Schellenberg J, Arifeen S, César JA. Co-coverage analyses of MCE household surveys - to be posted on <http://www.who.int/imci-mce>. (2003)

In preparation

el Arifeen S et al. Differentials and equity in child health care utilization: findings from a baseline survey for evaluating IMCI.

el Arifeen S et al. Quality of under-five care in first-level health facilities in Bangladesh.

Armstrong Schellenberg J et al. Preventive health care and nutritional status in rural Tanzanian children.

Mbuya C et al. Documentation of IMCI Implementation in Tanzania

Adam T, Manzi F, Kakundwa C, Schellenberg J, Mgalula L, de Savigny D, Mbuya C, Wilczynska K and the MCE team in Tanzania. Analysis report on the costs of IMCI in Tanzania.

Uganda IMCI Impact Study Team, IMCI Programme-Ministry of Health, Uganda and Department of Child and Adolescent and Development-World Health Organization. Documentation of IMCI Implementation and Contextual Factors in Ten Districts in Uganda.

Luis Huicho L, Dávila M, Campos M, Drasbek C, Bryce J, Victora C. Multi-Country Evaluation of IMCI Impact, Cost and Effectiveness: Peru Component. Report of the ecological study of IMCI Impact, 1996–2000.

Gouws E, Bryce J, Pariyo G, Schellenberg, J, Amaral J, Habicht J.-P. Measuring the quality of child health care at first-level facilities.

Nsungwa J, Burnham G, Pariyo G. Implementing IMCI in Uganda (2003).

Black, RW and The Uganda IMCI Impact Study team. Improving health facility based care for sick children in the real world: effect of IMCI on health worker performance in Uganda. (2003)

Adam,T et al. MCE economic methodology.

Guidelines and protocols

Gouws E, Habicht, JP. Proposal for plans for the Multi-Country Evaluation cross-site analysis and analysis of dose response within sites. *February 2002*

Multicountry Evaluation for IMCI Effectiveness, Cost and Impact. *Guidelines for publication and ownership of data resulting from the Multi-Country Evaluation of IMCI Effectiveness, Cost and Impact (MCE)*. Geneva: Department of Child and Adolescent Health and Development, World Health Organization, March 2002. WHO Document No. FCH/CAH/02.04.

Victora CG and Schellenberg J. *Guidelines for Equity Analyses in MCE*. Geneva: WHO/CAH, *Multi-Country Evaluation of IMCI Effectiveness, Cost and Impact*. January 2002. Geneva: Department of Child and Adolescent Health and Development, World Health Organization, March 2002.

Papers presented at professional conferences and seminars

Mshinda H. Mosquito nets, poverty & equity in rural Southern Tanzania. Presented at the Global Consultation on Child and Adolescent Health, Stockholm, March 2002.

Victora CG. Large-scale impact evaluations: Moving beyond randomized trials. Paper presented at the annual meeting of the Brazil Epidemiological Society: March 2002.

Adam T. How to do cost-effectiveness analysis in community-based trials. London School of Hygiene and Tropical Medicine. June 2002

Victora C. The WHO Multi-Country Evaluation of IMCI. South African Paediatric Association Conference, October 2002

Armstrong Schellenberg JRM et al. Malaria, mosquito nets, poverty and equity in rural southern Tanzania, Multilateral Initiative on Malaria Pan-African Malaria Conference, Arusha, Tanzania, November 2002

Adam T, Manzi F. Costs of under-five care using IMCI in Tanzania – Preliminary Results. Multilateral Initiative on Malaria Pan-African Malaria Conference, Arusha, Tanzania, November 2002

Pariyo G et al. Monitoring progress of key community knowledge and practices for child survival in rural communities in Uganda. Operational Research Meeting, BASICS II/USAID, MoH, UNICEF, WHO and partners), November 2002.

Galiwango E et al. Health worker and community leaders perceptions on abolition of user-fees and effects of abolition of user-fees on utilization in 10 districts of Uganda. Operational Research Meeting, BASICS II/USAID, MoH, UNICEF, WHO and partners) November 2002.

Bishai D et al. What makes mothers choose government facilities for sick child care in Uganda. 2002 Pediatric Academic Societies' Meeting.

Meeting reports and other products

Multi-Country Evaluation of IMCI Effectiveness, Cost and Impact: Reports of the March 2002 meetings.

Workshop on the analysis of MCE health facility data. London School of Hygiene and Tropical Medicine, 8–11 July 2002.

The Multi-Country Evaluation of IMCI Effectiveness, Cost and Impact. *MCE progress report, May 2001-April 2002*. Geneva: Department of Child and Adolescent Health and Development, World Health Organization, May 2002. WHO Document No. WHO/FCH/CAH/02.16. Available at <http://www.who.int/imci-mce>

The Multi-Country Evaluation of IMCI Effectiveness, Cost and Impact. *Report of the 4th annual meeting of MCE Principal Investigators and Technical Advisers, Fortaleza, Brazil, December 2002.* Department of Child and Adolescent Health and Development, World Health Organization, March 2002. WHO Document No. FCH/CAH/03.01

For 80 cents more. Special report in *The Economist* (based on estimates of costs derived from MCE data), August 2002