

# Programmatic pathways to child survival: results of a multi-country evaluation of Integrated Management of Childhood Illness

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*Objective:* To summarize the expectations held by World Health Organization programme personnel about how the introduction of the Integrated Management of Childhood Illness (IMCI) strategy would lead to improvements in child health and nutrition, to compare these expectations with what was learned from the Multi-Country Evaluation of IMCI Effectiveness, Cost and Impact (MCE-IMCI), and to discuss the implications of these findings for child survival policies and programmes.

*Design:* The MCE-IMCI study designs were based on an impact model developed in 1999–2000 to define how IMCI would be implemented at country level and below, and the outcomes and impact it would have on child health and survival. MCE-IMCI studies included: feasibility assessments documenting IMCI implementation in 12 countries (1999–2001); in-depth studies using compatible designs in Bangladesh, Brazil, Peru, Tanzania and Uganda; and cross-site analyses addressing the effectiveness of specific subsets of IMCI activities.

*Results:* The IMCI strategy was successfully introduced in the great majority of countries with moderate to high levels of child mortality in the period from 1996 to 2001. Seven years of country-based evaluation, however, indicates that some of the basic expectations underlying the development of IMCI were not met. Four of the five countries (the exception is Tanzania) had difficulties in expanding the strategy at national level while maintaining adequate intervention quality. Technical guidelines on delivering interventions at family and community levels were slow to appear, and in their absence countries stalled in their efforts to increase population coverage with essential interventions related to careseeking, nutrition, and correct care of the sick child at home. The full weight of health system limitations on IMCI implementation was not appreciated at the outset, and only now is it clear that solutions to larger problems in political commitment, human resources, financing, integrated or at least coordinated programme management, and effective decentralization are essential underpinnings of successful efforts to reduce child mortality.

*Conclusions:* This analysis highlights the need for a shift if child survival efforts are to be successful. Delivery systems that rely solely on government health facilities must be expanded to include the full range of potential channels in a setting and strong community-based approaches. The focus on process within child health programmes must change to include greater accountability for intervention coverage at population level. Global strategies that expect countries to make massive adaptations must be complemented by country-level implementation guidelines that begin with local epidemiology and rely on tools developed for specific epidemiological profiles.

**Key words:** child survival, IMCI, public health programme evaluation, child health

## Introduction

### The Integrated Management of Childhood Illness (IMCI) strategy

Integrated Management of Childhood Illness (IMCI) is a strategy for reducing mortality among children under the age of 5 years (Tulloch 1999). UNICEF, the World

Health Organization (WHO) and their technical partners developed the strategy in a stepwise fashion, seeking to address limitations identified through experience with disease-specific child health programmes, and especially those addressing diarrhoeal disease and acute respiratory infections (Claeson and Waldman 2000). Elements of the strategy were developed in a rough sequence

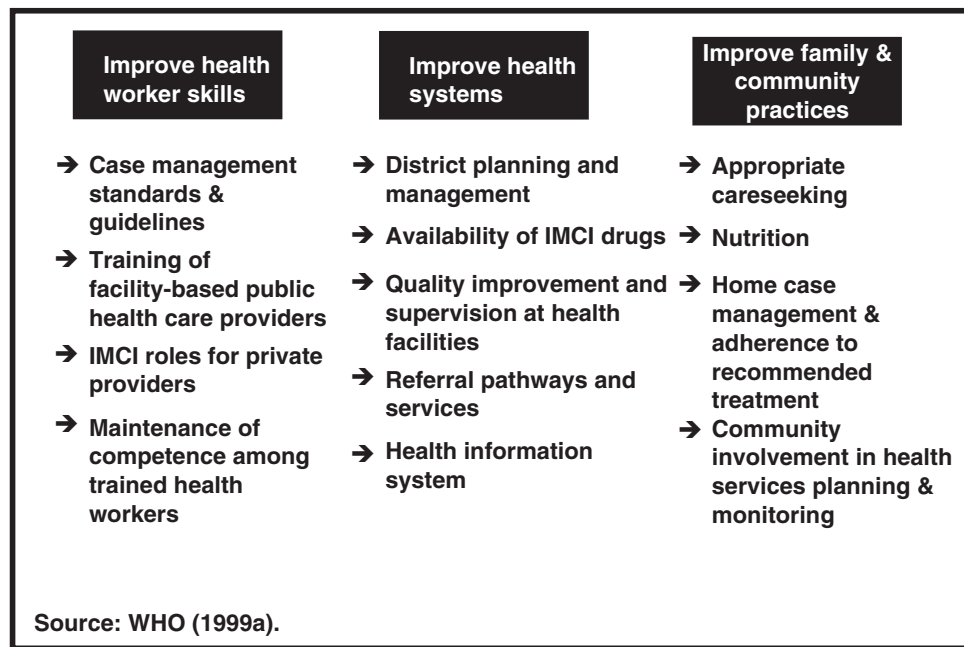


Figure 1. The three components of IMCI as presented by WHO in 1998

from: (1) evidence-based guidelines for health workers serving high-mortality populations that defined clinical case management actions to respond to common infectious diseases in childhood and the delivery of key prevention services including immunization and nutrition interventions; (2) health worker training in the guidelines based on paedological principles of supervised practice in clinical settings and follow-up of trainees to assist with the establishment of new practices; (3) attention to needed health system supports for child health and development, based on the recognition that health workers are not isolated, but work in systems that, if not strengthened, would limit their abilities to perform good work; and (4) strengthening of family practices needed to prevent disease, to stimulate appropriate utilization of health services, and to improve home care for sick children. Figure 1 presents the components of the IMCI strategy and the interventions WHO and UNICEF initially proposed for inclusion within each component (WHO 1999a).

The IMCI case management guidelines for the integrated management of sick children in a first-level health facility were designed to address the major causes of child mortality in countries with infant mortality rates of 40 per 1000 live births or greater (Gove 1997; WHO 1998a). Undernutrition, an underlying cause contributing to over 50% of deaths in children between the ages of 1 month and 5 years (Pelletier et al. 1995; Caulfield et al. 2004), was also a major target. Interventions in the generic IMCI guidelines therefore included the provision of antibiotics for pneumonia and dysentery, antimalarials for fever in settings where malaria was endemic, oral rehydration therapy for the prevention and treatment of dehydration due to diarrhoea, and the use of Vitamin A

as a treatment for measles (Gove 1997). Undernutrition was addressed by having health workers counsel caretakers about appropriate feeding, including breastfeeding. The guidelines were adapted in each country (WHO 1998b), resulting in a set of tasks to be performed by the health worker(s) including a full assessment and classification of the child's condition leading to a determination of treatment, and counselling of the caretaker on administration of medicines, appropriate home care, and the conditions under which the child should be brought back to the facility. The guidelines also recommend the use of the illness episode as an opportunity for the delivery of preventive interventions, including vaccines and nutritional counselling.

The generic IMCI training course was developed based on these guidelines, and emphasized supervised clinical practice (Gove 1997). In addition, the IMCI training approach recommends that each participant receive a follow-up visit from their trainer within 4 to 6 weeks after the initial training in order to help them implement their new skills (WHO 1999a).

IMCI programme developers incorporated the need for specific health system supports into the strategy itself (see Figure 1), an important step forward from the disease-oriented programmes of the past. The expectation was that introducing IMCI would contribute to these needed health systems changes, strengthening existing systems for supervision, drug supply and health information.

The vision for the strategy also included the need to deliver interventions at the community level aimed at improving family practices – such as appropriate

careseeking and home management of illnesses – that would act synergistically with improving health worker skills at the facility level. WHO and UNICEF defined a set of 12 key family and community practices and commissioned a synthesis of evidence supporting their importance relative to child health and survival (Hill et al. 2004).

### Implementation of the IMCI strategy

IMCI was first introduced at country level in 1996 by Tanzania and Uganda. In the 9 years since then, over 100 additional countries across all geographic regions have adopted the strategy and gained significant experience in its implementation (WHO 2005a).

The global planning guidelines for use by countries in implementing IMCI recommended three stages (WHO 1999b). In the *introductory phase*, countries conducted orientation meetings, trained key decision makers in IMCI, defined a management structure for preparing for IMCI, planning and early implementation, and built government commitment to move forward with the IMCI strategy. In the *early implementation phase*, countries gained experience while implementing IMCI in limited geographic areas. They developed their national strategy and plan, adapted the IMCI guidelines to their national context, developed management and training capacity in a limited number of districts, and started implementing and monitoring IMCI. The end of this phase was marked by a review meeting with the objective of synthesizing early implementation experience and planning for expansion. In the *expansion phase*, countries increased both the range of IMCI interventions and IMCI coverage. An important challenge emphasized in planning for the expansion phase was maintaining quality while expanding coverage.

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

The MCE-IMCI includes studies of the effectiveness, cost, and impact of the IMCI strategy in Bangladesh, Brazil, Peru, Tanzania and Uganda (Bryce et al. 2004). In-depth studies assessing the feasibility of conducting a large-scale impact evaluation like the MCE-IMCI were conducted in seven additional countries. Planning for the MCE-IMCI began in 1997, just as the first countries were adapting the IMCI strategy and moving into the early implementation phase. The evaluation objectives were to assess the behavioural, nutritional and mortality impact of IMCI, as well as to document the effect of IMCI interventions on health worker performance, health systems and family behaviour. The MCE-IMCI was planned as one part of a larger research agenda that included efficacy evaluations of the individual interventions within IMCI, as well as qualitative and operations research. Details about the development, design and implementation of the MCE-IMCI are available elsewhere (Bryce et al. 2004). A key focus of the MCE-IMCI was the implementation of the IMCI strategy in the hands of

governments, and the results therefore have relevance to efforts to improve the delivery and utilization of a broad range of public health interventions (Bryce et al. 2003; Victora et al. 2004).

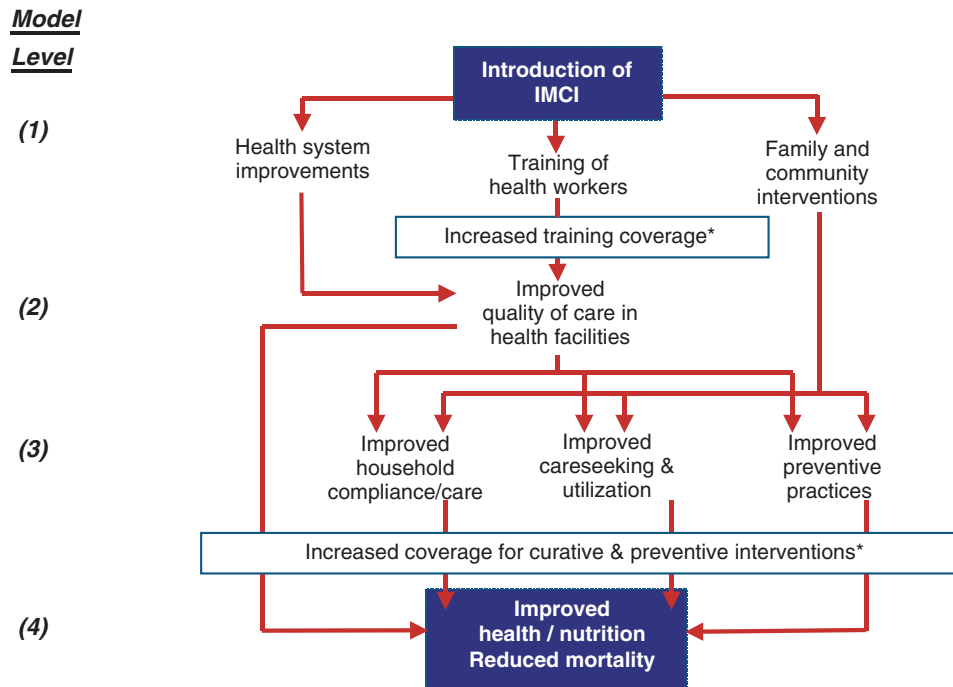
### The IMCI impact model

The MCE-IMCI Technical Advisory Group was created in 1998, and included experienced researchers and evaluators in the fields of child survival, economics and health policy. Advisors worked closely with IMCI developers from WHO and UNICEF to develop an impact model for IMCI. This model was needed as a basis for defining the specific types and magnitude of changes expected from the introduction of IMCI, for choosing indicators and for calculating sample sizes. Parts of this model were then computerized using an approach that was similar to that of Becker and Black (1996) and used to estimate the magnitude of mortality reduction that could be expected from introducing IMCI in different settings.

Figure 2 presents a greatly simplified version of the model; the full model is available for review at [<http://www.who.int/imci-mce/>]. Each of the arrows in Figure 2 reflects an expectation among WHO programme staff in the late 1990s about the pathways through which the introduction of IMCI at country level would lead to improvements in child survival and nutrition. Important exceptions are the boxes on coverage, which were added only in 2004 based on the MCE-IMCI findings.

The temporal dimension of the model moves from level 1 to level 4. The first level defines the planning steps and inputs needed to initiate IMCI-related activities. The second level outlines how these activities were expected to lead to implementation of the IMCI interventions. The third and fourth levels specify the pathways through which these IMCI interventions were expected to lead to intermediate behavioural outcomes and to impact on health status, respectively.

The objective of this paper is to compare the findings of the MCE-IMCI relative to the programme expectations reflected in the IMCI impact model. We review five of the most important programme expectations from the impact model and describe the extent to which each was realized in IMCI implementation among countries participating in the MCE-IMCI. These expectations are: (1) The generic IMCI guidelines could and should be adapted and implemented in developing countries with an infant mortality of more than 40/1000 live births (WHO 1998a); (2) IMCI case management training would lead to improved quality of care at first-level health facilities; (3) The introduction and implementation of IMCI would contribute to strengthening health system supports; (4) Families would respond to improved quality of care in government health facilities, leading to increases in utilization and reductions in child mortality; and (5) All three components of the IMCI strategy could be implemented in a coordinated fashion at country level within a time frame of 3 to 5 years. In our conclusions we



\*added later as a result of MCE-IMCI findings.

**Figure 2.** A simplified version of the IMCI impact model developed in 1999–2000

summarize what has been learned from the MCE-IMCI about effective child survival programmes and highlight implications for other public health initiatives.

## Methods

### Design

The MCE-IMCI consisted of a series of independent studies with compatible designs, each tailored to the stage and characteristics of IMCI implementation in the participating country (Bryce et al. 2004). The set of site-specific studies included prospective, retrospective and mixed designs. They reflected a continuum from efficacy to effectiveness, with variable degrees of influence from the evaluation team on programme implementation. Each study addressed the need to document the plausibility of an effect of IMCI on intermediate steps defined in the impact model. All studies measured an identical set of indicators and, with few exceptions, used identical data collection tools. Observation-based surveys were used to assess the quality of child health care provided in health facilities. Cost data were collected at the household, health facility, district and national levels. Household surveys assessed preventive practices and family responses to illness. All tools were adapted to respond to local characteristics and questions, and in some sites the variables necessary to assess equity were added.

### Data sources

The MCE-IMCI includes three different types of studies, each of which provides important findings relative to the impact model:

- (1) **The 12-country assessment of IMCI implementation.** The country selection process for the MCE-IMCI included visits by teams of MCE-IMCI Advisors and WHO staff to countries selected by WHO as representing the best examples of IMCI implementation at that time. All countries in each of the six WHO regions were evaluated against a set of criteria that included the probability that the government would be successful in implementing all three components of the IMCI strategy over the subsequent 5 years. Further information on eligibility criteria are presented elsewhere (Bryce et al. 2004). Based on this review, in each region one or two countries judged most likely to meet the criteria were selected for assessment visits. The assessment protocol included in-depth reviews of country-level plans and progress in child health activities, including but not limited to IMCI. More than one assessment visit was made to several countries in which small studies were commissioned to evaluate the potential for successful IMCI implementation. Although the countries visited had been implementing IMCI for varying periods of time, the search was restricted to those likely to implement IMCI fully, in large geographical areas, within the 2 years after the

assessment visit, allowing an impact evaluation period of 2 to 3 years within the time frame of the MCE-IMCI. Bangladesh was included as a site even though IMCI implementation had not yet begun, to serve as an efficacy study in which the investigators could collaborate with the Government in implementing the strategy under relatively ideal conditions. Findings from the 12-country assessment provide important information on the validity of those parts of the IMCI impact model related to planning and implementing activities across the three model components (WHO 1999b); some of their implications have been reviewed and discussed elsewhere (Victora et al., in press).

- (2) ***In-depth studies in five sites.*** Based on the findings of the 12 country assessments described above, Bangladesh, Brazil, Peru, Tanzania and Uganda were selected as in-depth study sites. In Peru, IMCI had already been taken to scale and implemented nationwide, so the evaluation used a fully retrospective design and relied heavily on routine data sources. IMCI implementation was in the expansion phase in Brazil, Tanzania and Uganda, and each design represented a mixture of retrospective and prospective elements. In Bangladesh, as explained above, a fully prospective design was possible because IMCI implementation had not yet begun at national level. In both Bangladesh and Tanzania, MCE-IMCI investigators are participating actively in the Government's plans for IMCI implementation. Table 1 presents a summary of characteristics and MCE-IMCI data collection activities in the five in-depth sites. Full descriptions of the methods and results for each study site are available at [<http://www.who.int/imci-mce/>].
- (3) ***Cross-site analyses.*** The use of standard indicators and analysis plans permitted comparisons across the five MCE-IMCI study sites. Topics addressed to date include the effect of IMCI in improving care quality in first-level health facilities (Gouws et al. 2004), health system barriers to scaling-up (Victora et al. 2004), and the importance of context-specific delivery mechanisms (Bryce et al. 2003), as well as methodological issues (Bryce et al. 2004; Bryce and Victora 2005; Gouws et al. 2005).

In addition, other documentation and research efforts related to IMCI were reviewed carefully and the findings were taken into account in interpreting MCE-IMCI results.

### Analytic approaches

The analytic approach used in the MCE-IMCI varied among countries. As shown in Table 1, all evaluations entailed a comparison, either between areas with and without IMCI (Bangladesh, Brazil and Tanzania) or among areas with variable degrees of implementation (Peru and Uganda). Details of the analytical approaches are available in the country-specific publications from Bangladesh (Arifeen et al. 2005), Brazil (Amaral et al.

**Table 1.** Characteristics of in-depth study sites in the Multi-Country Evaluation of IMCI, 2000

	Bangladesh	Brazil	Peru	Tanzania	Uganda
Demographic*					
Total population (1000)	124 774	165 851	24 797	32 102	20 554
Baseline under-5 mortality	96	70	58	160–180	141
GNP per capita (2000 US\$)	360	4790	2610	210	330
Total adult literacy rate	38	83	88	69	62
MCE-IMCI					
Design	Randomized trial of 10 health facilities with IMCI and 10 without IMCI	Comparison of 32 IMCI and 64 non-IMCI municipalities	Comparison of 25 departments with different levels of IMCI implementation	Pre-post comparison of 2 IMCI and 2 non-IMCI districts	Comparison of 10 districts with different levels of IMCI implementation
Mortality assessment	Demographic surveillance + survey	Surveys	Vital statistics	Demographic surveillance	Surveys
Household coverage surveys	2000 (baseline); 2007 (planned)	None	None	1999 (baseline) 2004	2000 (baseline) 2001 & 2002 in catchment areas of 10 study districts
Health facility assessments	2000 (baseline)	2002 (midway)	1999 (pilot study in selected departments)	2000 (midway)	Ongoing rolling sample
Cost assessments	Included in survey tools	Included in survey tools	Not included	Included in survey tools	Included in survey tools
Randomization	Yes (2001)	None	None	None	None
Type of inference	Probability	Plausibility	Plausibility	Plausibility	Plausibility
Malaria	None	None	Variable	Yes	Yes

\*Source of demographic estimates: UNICEF (2000).

2004), Peru (Huicho et al. 2005), Tanzania (Armstrong Schellenberg et al. 2004a) and Uganda (Pariyo et al. 2005).

## Results

### **Expectation 1: The generic IMCI guidelines could and should be adapted and implemented in developing countries where infant mortality is higher than 40 per 1000 live births**

Although the original target for the IMCI case management guidelines was countries with infant mortality rates of at least 40 per 1000 (WHO 1998a), other countries or specific geographic areas within countries found the concept of integration attractive and moved to adapt and adopt them as well. For example, the Pan American Health Organization '...urges all countries to incorporate IMCI as a basic standard for child care' (PAHO, undated). There was an expectation in the early years of IMCI introduction that the generic guidelines could and would be adapted by any country or area to reflect their specific epidemiological profile and health system characteristics. WHO therefore worked in the late 1990s to develop guidelines for the country adaptation process, including evidence for intervention choices, models for how to incorporate additional diseases and conditions into the training materials, and how to conduct local studies to identify terminology and local foods (WHO 1998b). Cadres of 'IMCI adaptation consultants' were trained at regional and global levels.

The resource-intensive efforts at country level required to adapt the generic IMCI guidelines were necessary because the specific pneumonia-diarrhoea-malaria profile underlying the generic IMCI algorithm represents countries that accounted for only about 35% of under-five deaths in 2000 (Black et al. 2003). The remaining 65% of deaths occurred in epidemiological contexts without endemic malaria, dominated by neonatal disorders or in a few countries with generalized epidemics of HIV/AIDS. The widespread uptake of the IMCI concept resulted in overextension of the guidelines to settings with disease profiles that varied widely from those for which they were developed.

The IMCI strategy as defined in 1996 applied only to children from the ages of 1 week to 5 years (Gove 1997), and did not include interventions addressing deaths in the early neonatal period. The cause structure of infant deaths was not well understood at that time, and few interventions had been fully developed and evaluated for efficacy.

The eventual expectation that a set of generic algorithms based on the global distribution of causes of death, combined with support for adaptation at country level, would be an efficient way to improve case management in all countries proved over-ambitious. With benefit of hindsight, greater technical efficiency might have been gained if lower mortality countries had been encouraged to develop, or wait for, epidemiologically driven algorithms more consistent with their cause-of-death profiles

for children under 5 years of age, and the incorporation of interventions designed to reduce deaths from causes in the neonatal period.

Another part of the expectation was that IMCI could and should be implemented fully regardless of the strength of the health service system. Again this was an implicit expectation, but was supported by the fact that virtually every developing country was approached by WHO to introduce IMCI. IMCI implementation guidelines suggested that countries with weak health systems should begin slowly with IMCI implementation, and build toward stronger health system strength and integrated programmes simultaneously and synergistically (Lambrechts et al. 1999; WHO 1999b).

### **Expectation 2: IMCI case management training would lead to improved quality of care at first-level health facilities**

One part of this assumption, that IMCI case management training would improve health worker performance and thus contribute to improved care quality, has been repeatedly borne out through MCE-IMCI findings (Amaral et al. 2004; Armstrong Schellenberg et al. 2004b; El Arifeen et al. 2004; Gouws et al. 2004). In all settings where case management training was implemented at minimum standards of quality, and where sufficient coverage of trained workers was able to be maintained at health facility level, the quality of care improved. Ill children managed by health workers trained in IMCI receive a more thorough assessment than children cared for by workers without IMCI training, and are more likely to receive correct treatment. Caretakers are more likely to receive key messages about how to continue care at home and when to return to the facility.

### **Expectation 3: The introduction and implementation of IMCI would contribute to strengthening health system supports**

Early experiences with IMCI implementation suggested that the inter-programme working groups at national level that were recommended as a mechanism to plan for IMCI, and specific planning steps such as the review and updating of child health policies and essential drug lists, would lead to activities designed to improve health system supports for child health activities (WHO 1999b). In most countries this assumption, at this level, was borne out. The introduction of IMCI led to the rationalization of child health policies and the updating of essential drug lists in most countries in Africa, for example (Lambrechts et al. 1999; WHO 2000).

In three of the 12 countries assessed, IMCI benefited from activities designed to strengthen the health system. In Tanzania, the Tanzania Essential Health Intervention Project (TEHIP) introduced basic management tools at district level (De Savigny et al. 2004) which permitted an effective use of decentralized health resources and resulted in the adoption of IMCI. Other districts with the same resources but without the TEHIP tools did not adopt

IMCI until later when MCE-IMCI results had demonstrated its efficiency. In Bangladesh, as a part of the MCE-IMCI efficacy study, record keeping and supervision were strengthened. In Brazil, routine supervision was strengthened in MCE-IMCI sites in collaboration with district health teams.

It is striking that the quality of trained IMCI workers was much better than that of the untrained workers, even if they received no supervision. Supervision systems, including a decentralized approach implemented in Tanzania designed explicitly to overcome barriers due to distance and the expense of transportation, were unable to be sustained in any of the countries. Even integrated approaches in Tanzania and Uganda that combined child health/IMCI supervision within broader training and administrative activities proved too ambitious, particularly with respect to the need to include clinical observation and feedback as a part of all supervision visits.

A second part of this expectation reflected assumptions about the structure of health systems, as opposed to their strength or level of functioning. For instance, the impact of facility-level IMCI depends on the coverage of facilities with an adequate proportion of IMCI-trained staff, which depends on staff deployment and retention policies and practice. In three of the in-depth study sites, staff turnover was a serious impediment to sustained implementation of IMCI case management in health facilities because it prevented sufficient coverage of IMCI-trained workers within the health facilities. In Brazil, 42% of health workers who participated in IMCI case management training were transferred within 1 year, in part due to competition between municipalities to meet public expectations that health workers would provide care based on IMCI guidelines. This lack of stability in coverage was seriously compounded when Brazil forbade nurses from delivering IMCI, so that only physicians could be deployed. Coverage was not explicitly included in the original impact model (Figure 1). Its addition, and more important, efforts to focus renewed child survival efforts on the need to achieve and sustain equitable coverage, represent a major step forward in thinking about how to reduce child mortality.

In assessment visits to Kyrgyzstan and Kazakhstan, the MCE-IMCI discovered that the health system challenges facing IMCI implementation were different from those faced in other countries, and related to *changing* rather than strengthening the health system.

In conclusion, the expectation of improved health system support was only partially fulfilled in the areas of policy development and drug supply. IMCI drew attention to the improvement of health worker skills, but was unable to address larger human resource issues, including which cadres of staff are permitted to provide which services, policies on deployment and transfer and issues of retention, all of which are inextricably tied to the provision of health services and therefore to the implementation of a child survival strategy. Some important

aspects influencing the delivery of high impact interventions contained within IMCI, such as financing, were ignored in the model. In retrospect, the IMCI model reflected issues directly related to service delivery appropriately, but proved insufficient with respect to other aspects of the health system such as transition pathways from policy and strategy to operations, human resource issues including supportive supervision, financing and ensuring an equitable coverage of interventions. This conclusion was supported by the findings of the six-country analytic review of IMCI (DFID et al. 2003).

**Expectation 4: Families would respond to improved quality of care in government health facilities, leading to increases in utilization and reductions in child mortality**

The logic of this explanation is reflected in early IMCI documents, most of which opened with a pie chart showing the major causes of death among children under five (WHO 1997), and introduced IMCI as a strategy that could reduce mortality from these causes, and then moved directly into how to plan for the training of health workers in first-level government health facilities. Despite the conceptual framework emphasizing the need for concomitant efforts to strengthen health systems and address key family practices, the *de facto* priority was training government health workers.

Three factors contributed to the negative effect of this expectation on IMCI outcomes and impact. First, a focus on government health facilities meant that the eventual impact of the strategy depended on the extent to which such facilities were used by families for the care of their sick children. The results of the computer simulation of the IMCI impact model also indicated that measurable reductions in child mortality and improvements in nutrition would not be realized unless utilization of government health facilities was increased sharply in many countries (or alternatively, coverage rates for key interventions were increased rapidly through community-based delivery strategies). MCE-IMCI baseline studies showed that with the exception of Tanzania, where about 40% of ill children were taken first to a government health facility (Armstrong Schellenberg et al. 2004a), utilization rates for government health facilities were very low, ranging from about 8% in Uganda study districts to 13% in Bangladesh. Utilization was even lower in Niger, where a review of records by the MCE-IMCI assessment team found fewer than one contact between a child and the health care system per year.

Secondly, IMCI programme staff anticipated that low rates of utilization for public health facilities at country and district level could be increased through activities designed to improve careseeking at community level. As indicated above, these community-based activities remained patchy and largely ineffectual. Within the efficacy study in Bangladesh, where implementation of IMCI under ideal conditions included both improvements in the quality of care at health facilities and strong delivery of careseeking messages at community level, the

introduction of the strategy was associated with significant increases in utilization (El Arifeen et al. 2004).

Thirdly, there have been few efforts within IMCI to involve health care providers other than the government. This is now being done in the MCE-IMCI efficacy study in Bangladesh, where non-governmental providers deliver most child health care.

In summary, MCE-IMCI findings indicate that improving the quality of care in first-level government health facilities was not sufficient, alone, to increase low utilization levels. Where utilization was already relatively high, as in Tanzania, improved care quality was associated with reductions in under-five mortality. Early findings from the study in Bangladesh suggest that if appropriate careseeking messages can be disseminated at high levels of population coverage, they can work together with improved quality of care at facilities to increase utilization.

**Expectation 5: All three components of the IMCI strategy could be implemented in a coordinated fashion at country level within a time frame of 3 to 5 years**

Table 2 presents a qualitative summary of the MCE-IMCI findings from the MCE-IMCI assessment visits conducted between 1998 and 2002. Implementation strength is characterized for each of the three IMCI components as 'strong' (in the expansion phase), 'weak' (in the introduction or early implementation phase), or 'none'. With the exception of Bangladesh, where IMCI had not yet been introduced, all countries had begun implementation of IMCI activities to improve health worker performance. Fewer specific activities were under way to improve health system support for IMCI, or to start or expand the delivery of IMCI-compatible messages at community and family level.

The design of the MCE permitted in-depth, long-term documentation of IMCI implementation in the five study

sites. Figure 3 illustrates the wide variability in IMCI implementation among the MCE-IMCI sites by mapping onto the impact model the IMCI interventions being delivered in two of these sites at the time of the final MCE-IMCI mortality assessment: Tanzania (Figure 3a) and Peru (Figure 3b).

Programme staff at WHO and their country counterparts were confident at the outset that 3 to 5 years would allow sufficient time for the establishment of IMCI implementation, including the move from pilot experiences in a few districts as well as a good start on scaling-up the strategy. In no MCE-IMCI country was this expectation realized, and even full implementation of the training component required longer periods than expected.

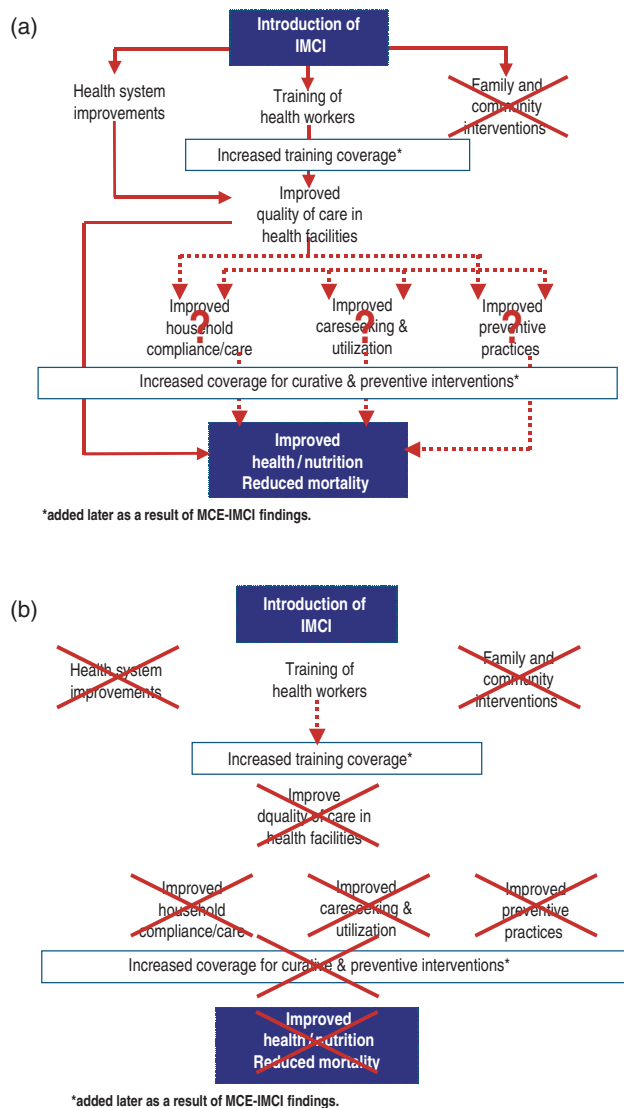
In most countries, the demands of implementing the IMCI case management training course for health workers in first-level facilities were far greater than expected, and difficult to sustain after the initial pilot period. Training facilitators, preparing materials and, in particular, conducting the follow-up visits that were included as an essential part of the training course required massive organizational skills and dedicated staff. Various short-cuts were adopted by countries to make it possible to scale-up the IMCI training – including reducing training duration, abandoning follow-up visits or incorporating IMCI content into preservice or national inservice training courses for specific cadres of workers – with potentially unfortunate effects on training quality and subsequent performance by health workers. This requires evaluation and development of feasible solutions that result in good care.

In all 12 MCE-IMCI countries, the pace of implementation was also slower than expected in the health system and community components. Some activities related to improving health system support for IMCI or family practices were implemented in some countries, but with the exception of previous interventions designed to strengthen district health management in the areas of

**Table 2.** Strength of implementation of IMCI components in 'high-performing' countries at the time of assessment for participation in the MCE-IMCI

Country	Date of last assessment visit	Component of the IMCI Strategy		
		Improving health worker performance	Improving health systems	Improving family practices
Bangladesh	2002	None	None	None
Bolivia	2000	Strong	Weak	Weak
Brazil	2001	Strong	None	Weak
Cambodia	2001	Weak	None	None
Kazakhstan	2001	Strong	None	None
Kyrgyzstan	2000	Strong	None	None
Morocco	1999	Strong	Weak	Weak
Niger	2002	Strong	None	None
Peru	2002	Strong	None	None
Tanzania	2002	Strong	Strong	None
Uganda	2001	Strong	Weak	Weak
Zambia	1999	Strong	Weak	Weak





**Figure 3.** Implementation of IMCI in two MCE-IMCI study sites as of December 2003: (a) Tanzania; (b) Peru

Tanzania taking part in the MCE (De Savigny et al. 2004), these activities were not implemented at levels of coverage sufficient to lead to measurable outcomes. Community IMCI was weak, as shown in Figure 3 for Tanzania and Peru. These findings were confirmed by the Analytical Review of IMCI, a process that took place in 2002 and consisted of a review of IMCI implementation through short visits to six countries (Zambia, Indonesia, Egypt, Mali, Kazakhstan and Peru) by a team of experts from WHO, UNICEF, DFID and USAID (DFID et al. 2003).

The MCE-IMCI also showed that in Peru and Tanzania, implementation of community activities was not coordinated with facility-based IMCI case management training. Health workers were being trained in some districts while the community component was being implemented in different districts, thus failing to achieve the intended synergism between the two components. So-called ‘community IMCI programmes’ were often restricted to the

promotion of standard interventions (e.g. breastfeeding, mosquito nets, vaccines) and failed to emphasize family practices most likely to interact synergistically with facility-based IMCI to achieve impact (i.e. careseeking, compliance and home care).

### Discussion: pathways to child survival

The achievement of population level health impact is driven to a large extent by intervention efficacy, quality of care, intervention utilization and coverage (Tugwell et al. 1985). Expectations about what IMCI would achieve in terms of impact on child mortality and undernutrition expanded incrementally as the strategy evolved, but there was no concurrent evolution of resources, staff support and other implementation prerequisites. The initial guidelines for introducing and implementing IMCI included efficacious interventions, and were designed to support the rapid introduction of IMCI in high mortality countries, and were successful in that regard. The findings presented here, however, show that many countries were unable to move beyond the introductory stage to implement IMCI fully and at levels of population coverage that would yield an impact. Although IMCI increased quality of care where implemented, countries struggled to scale-up IMCI rapidly to achieve higher levels of coverage. The lack of strategic and operational plans targeting different health system and epidemiological contexts, and execution thereof, were probably important barriers to achieving impact.

Strategically, the widespread adoption of IMCI by countries with under-five mortality levels lower than those for which the strategy was initially developed meant that intervention and delivery strategies required major adaptations at country level and below. Deaths in the first week of life are a major part of under-five mortality world wide (Bryce et al. 2005a), and were not addressed by the strategy. This finding from the IMCI evaluation has contributed to the establishment of a special Steering Group and activities to address these gaps (Darmstadt et al. 2005; Lawn et al. 2005).

Operationally, countries struggled to scale-up IMCI rapidly to achieve higher levels of coverage. Specific operational plans and tools to translate policies into action, to prioritize high impact interventions addressing major mortality causes, to identify the funds, human resources and delivery channels to deliver these, and to bring partners together around one implementation plan, including mechanisms for monitoring, were not available. This evolution led to a clear mismatch: countries that had the mortality level and cause profile that most required IMCI often lacked the basic health systems infrastructure and support to deliver it; on the other hand, countries with the required infrastructure and support often had cause-of-death profiles that were inconsistent with an impact of IMCI as it was defined at that time.

Some of the most basic MCE findings lend strength and urgency to existing dilemmas in child survival and public

health programming, exacerbated by continuing shortages of resources. For example, the development of the IMCI case management guidelines was both innovative and pragmatic in its time as a way to improve service quality in high-mortality countries, but like other initiatives, the strategy lacked relevance and therefore effectiveness when implemented beyond its intended focus – in this case, in countries with lower mortality rates and high proportions of deaths in the neonatal period. One implication for programmes would be to limit implementation to countries with a specific epidemiological profile, but the consequence would be to do less for large populations of children in ‘transitional’ countries with high proportions of neonatal deaths. A similar dilemma arises relative to the need for health system support; the challenges here are enormous and continue to be under-funded. Our results only begin to address questions about which aspects of health systems are most critical and mutable and how best they can be addressed. Extension of intervention delivery beyond public facility-based services as a way to increase intervention coverage is a major step, and while arguably very important, the methods for generating and implementing effective solutions to the challenges revealed by the MCE need more research and development.

There is a natural negative bias inherent in this type of retrospective analysis. Our intention was to use the findings of the MCE-IMCI to make the expectations underlying the original IMCI strategy explicit, and to assess their validity as a basis for strengthening child survival efforts in the future. Integrated case management in health facilities was visionary at the time it was developed and has proven cost-effective in improving the quality of care (Bryce et al. 2005c). Renewed efforts to improve child survival must retain facility-based IMCI, and move ahead to strengthen the delivery of child survival interventions at the community level.

## Conclusions

There are several factors that in combination make the present an opportunity to mount renewed and more effective child survival programmes. New attention to child survival, new leadership in key organizations, and a focus on achieving the Millennium Development Goal of reducing child mortality by two-thirds all provide the impetus to move quickly, forcefully and in new ways to achieve universal coverage with proven child survival interventions. What are the policy lessons from our experience with IMCI that can make these renewed efforts more effective?

First, child survival efforts must begin with local epidemiology, targeting the major causes of death within each region, country and even district (Bryce et al. 2005a).

Secondly, integrated guidelines for the case management of ill children in health facilities, supported by high-quality training and supportive supervision, are the gold standard and should continue to be implemented widely.

New evidence that IMCI is efficient (Bryce et al. 2005c) and costs less than routine care in some settings (Adam et al. 2005) is encouraging, as are more global estimates of the affordability of essential child survival interventions (Bryce et al. 2005b).

Thirdly, we must move beyond health facilities, and develop new and more effective ways of reaching children with proven interventions to prevent mortality. In most high-mortality settings, this means providing case management services at community level, as well as focusing on prevention and on reducing rates of undernutrition.

Fourthly, we must make coverage the driving force behind district, national, regional and global child survival programmes. Only by paying close attention to whether mothers and children receive interventions can we decipher whether the delivery methods are effective and equitable, and whether mortality reductions are likely. Public accountability at all levels can bring delivery bottlenecks to the attention of all, and encourage rapid action to address them.

Fifthly, we must help countries prioritize and put first those interventions known to be cost-effective in reducing under-five mortality (Jones et al. 2003; Darmstadt et al. 2005). Better tools to support policy and decision makers in estimating the costs and impact of their choices are essential. Developing management structures that increase accountability at local level (e.g. de Savigny et al. 2004) are a promising way forward. Ensuring that resources are available, not only for time-limited projects but in the longer term, is essential to allow sufficient time for planning and implementation to mature and yield impact.

Finally, we must support policy-relevant research at country level, especially studies that focus on the effectiveness of policies and strategies implemented by Ministries of Health and their partners.

It is time for a paradigm shift in child survival: from delivery systems that rely solely on government health facilities to those that include the full range of channels and strong community-based approaches; from a focus on process to greater accountability for coverage at population level; from single approaches requiring massive adaptation at country level to bottom-up approaches that begin with local epidemiology and apply tools developed for specific epidemiological profiles.

These lessons are certainly relevant beyond the field of child survival. For example, the massive 3×5 programme (WHO 2005b) for care and prevention of HIV, Stop TB for global tuberculosis control (WHO 2003) and the *Roll Back Malaria* initiative [<http://www.rbm.who.int/>] are already struggling with many of the same health systems barriers that have hindered IMCI implementation.

The remaining papers in this special issue of *Health Policy and Planning* provide greater detail on MCE-IMCI

findings in specific areas. Together, they provide concrete lessons that can help policy makers, researchers and public health professionals at all levels do a better job of delivering effective interventions to the children that need them, and improving child survival.

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