PNEUMONIA

THE FORGOTTEN KILLER OF CHILDREN

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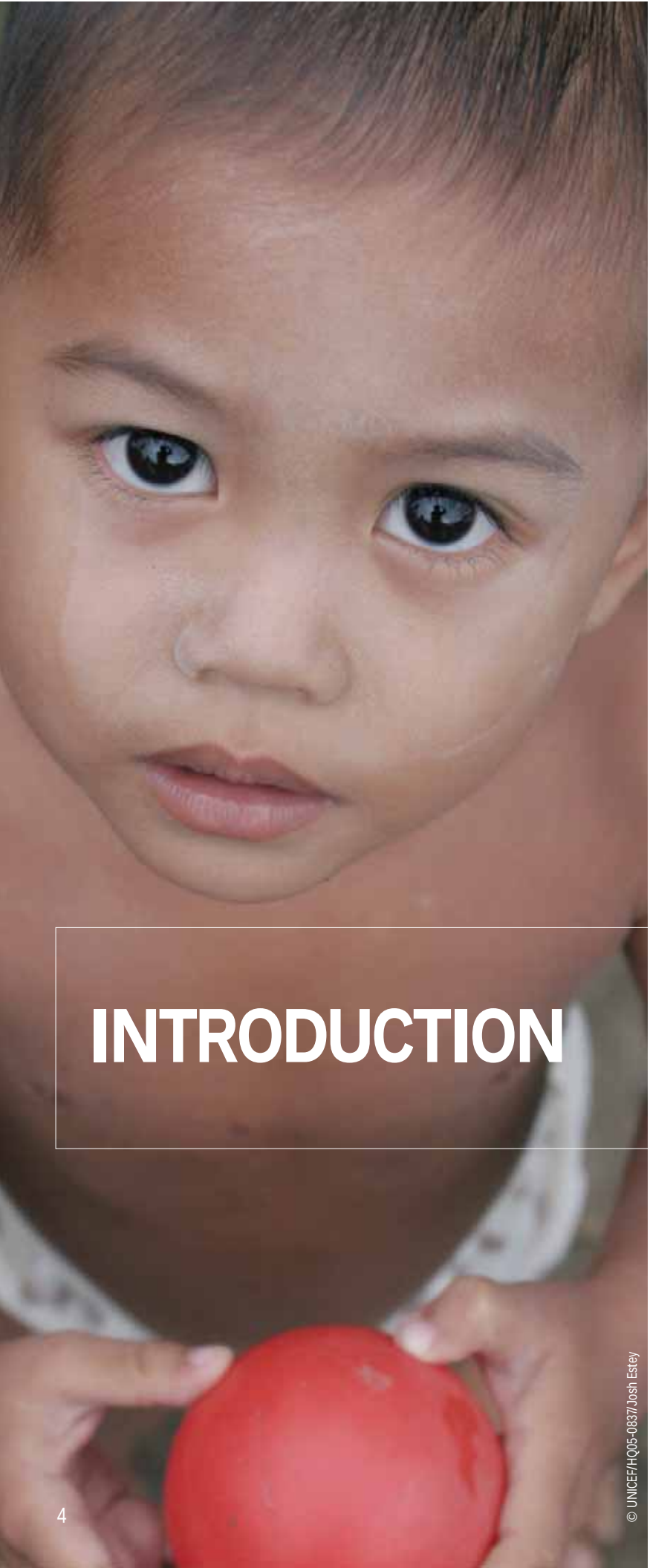


INTRODUCTION

PNEUMONIA KILLS MORE CHILDREN THAN ANY OTHER ILLNESS – MORE THAN AIDS, MALARIA AND MEASLES *COMBINED*. OVER 2 MILLION CHILDREN DIE FROM PNEUMONIA EACH YEAR, ACCOUNTING FOR ALMOST 1 IN 5 UNDER-FIVE DEATHS WORLDWIDE. YET, LITTLE ATTENTION IS PAID TO THIS DISEASE.

This report examines the epidemiological evidence on the burden and distribution of pneumonia and assesses current levels of treatment and prevention. The results are sobering: Only about 1 in 5 caregivers knows the danger signs of pneumonia; only about half of children sick with pneumonia receive appropriate medical care; and, according to the limited data available, less than 20 per cent of children with pneumonia received antibiotics, the recommended treatment.

Effective interventions to reduce pneumonia deaths are available, but reach too few children. Scaling up treatment coverage is possible, and at relatively low cost. Estimates suggest that if antibiotic treatment were universally delivered to children with pneumonia, around 600,000 lives could be saved each year, at a cost of $600 million.[1] Furthermore, the number of lives saved could more than double to 1.3 million if both prevention and treatment interventions to reduce pneumonia deaths were universally delivered.

Our hope is that this report will raise awareness about this neglected disease and will serve as a call to action to reduce child deaths from pneumonia.

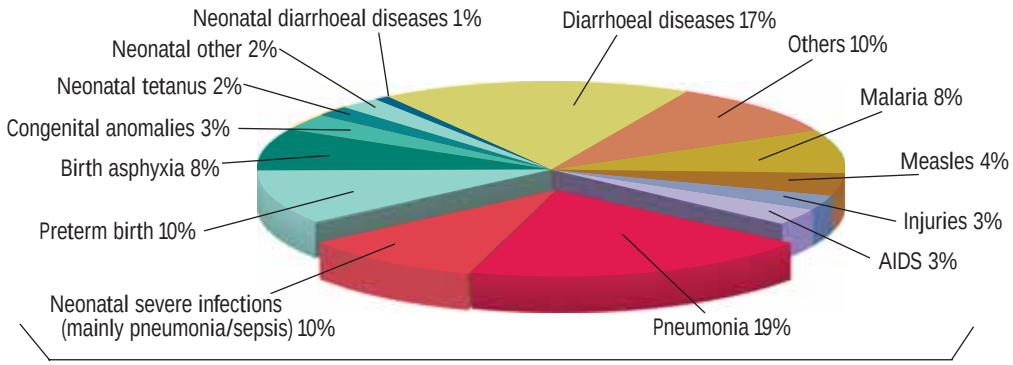
COUNTING UNDER-FIVE DEATHS FROM PNEUMONIA

Figure 1 presents the global distribution of the primary causes of all under-five deaths and shows that pneumonia kills more children than any other illness – accounting for 19 per cent of all under-five deaths (*see the Appendix for more detailed information on these estimates of cause-specific mortality*).

This figure, however, does not include deaths due to pneumonia during the first four weeks of life, the neonatal period. It has been estimated that 26 per cent of neonatal deaths, or 10 per cent of all under-five deaths, are caused by severe infections during the neonatal period. And a significant proportion of these infections is caused by pneumonia/sepsis (sepsis is a serious blood-borne bacterial infection that is also treated with antibiotics). If these deaths were included in the overall estimate, pneumonia would account for up to 3 million, or as many as one third (29 per cent), of under-five deaths each year.

FIGURE 1
PNEUMONIA IS THE LEADING KILLER OF CHILDREN WORLDWIDE

Global distribution of cause-specific mortality among children under five, 2004



Undernutrition is implicated in 53% of all deaths among children under five.

BOX 1

GLOBAL GOALS AND TARGETS FOR REDUCING CHILD MORTALITY AND PNEUMONIA DEATHS

Reducing child mortality is one of the eight Millennium Development Goals (MDGs), which are the world's time-bound targets for reducing poverty in its various dimensions by 2015. Specifically, Goal 4 calls for reducing under-five mortality by two thirds between 1990 and 2015. Achieving the MDG on child mortality will require urgent action to reduce childhood pneumonia deaths, which account for 19 per cent of all under-five deaths.

Millennium Development Goals

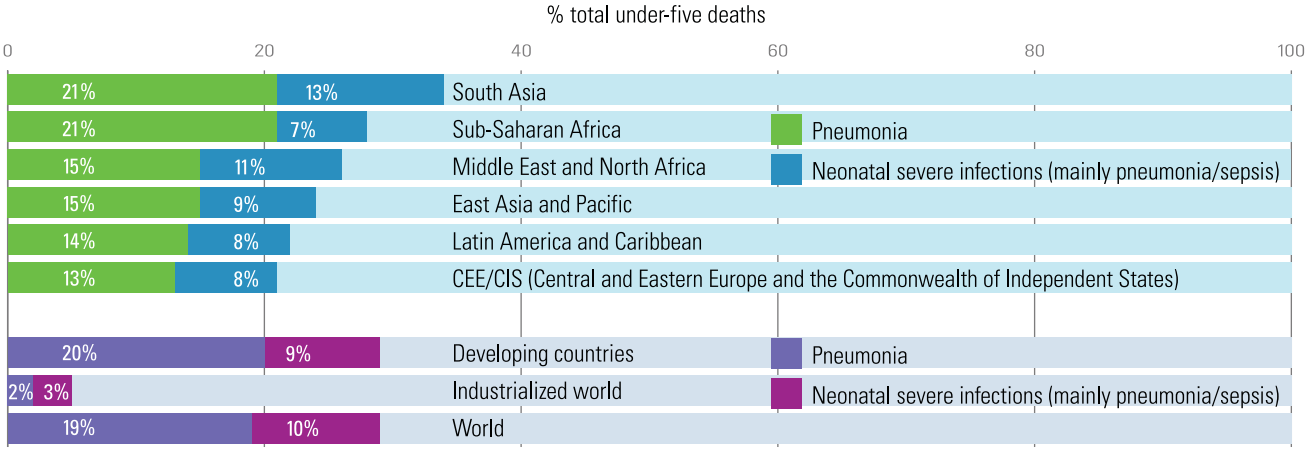
- Goal 4: Reduce child mortality
  Reduce by two thirds, between 1990 and 2015, the under-five mortality rate.

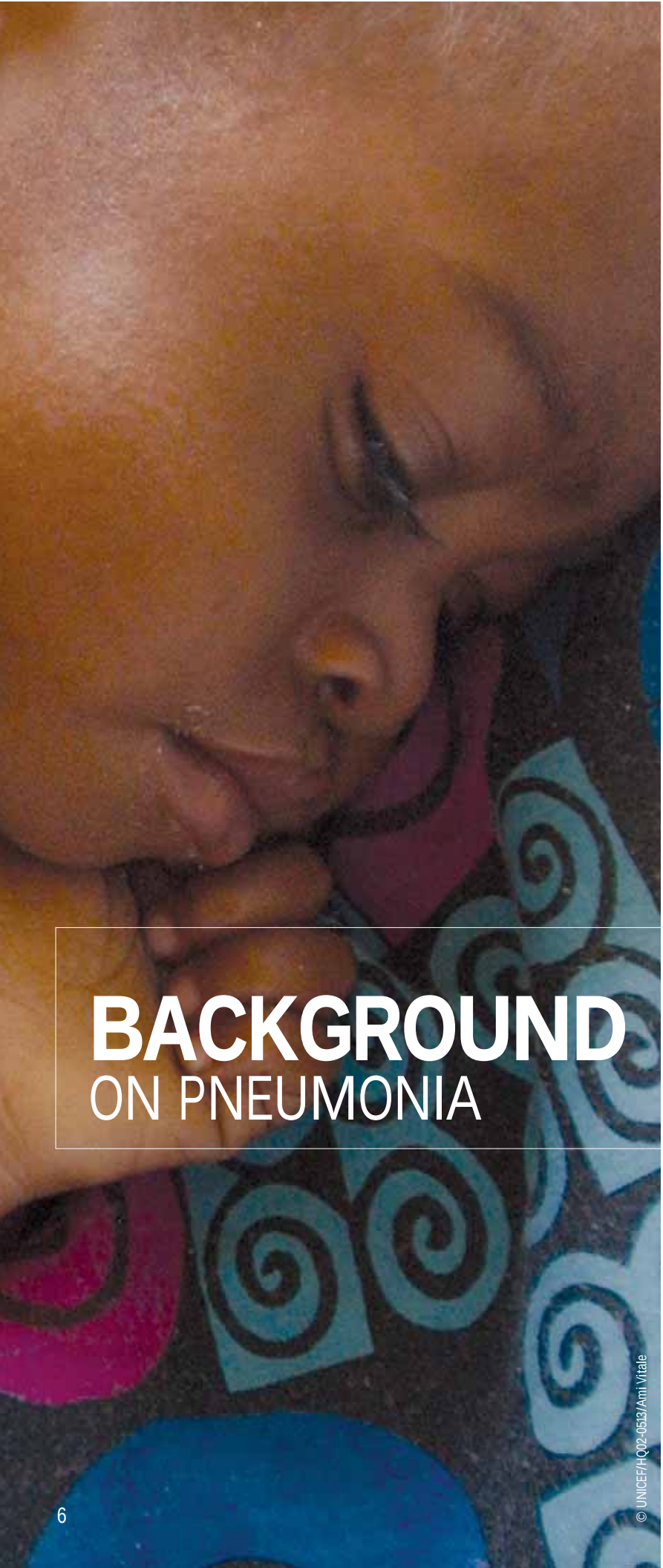
A World Fit for Children – Plan of Action: Goals, Strategies and Actions

- *Reduce by one third deaths due to acute respiratory infection between 2000 and 2010 (section III.B.1, para. 37).*

FIGURE 2
PNEUMONIA IS A MAJOR CAUSE OF CHILD DEATHS IN EVERY REGION

% under-five deaths due to pneumonia, by UNICEF region, 2004





BACKGROUND ON PNEUMONIA

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Acute respiratory infections can occur in any part of the respiratory system, from the middle ear to the nose to the lungs.[2] Pneumonia is a severe form of acute lower respiratory infection that specifically affects the lungs.

The lungs are composed of thousands of tubes (bronchi) that subdivide into smaller airways (bronchioles), which end in small sacs (alveoli). The alveoli contain capillaries where oxygen is added to the blood and carbon dioxide is removed. When a person has pneumonia, pus and fluid fill the alveoli in one or both lungs, which interferes with oxygen absorption, making breathing difficult.

Most acute respiratory infections result in mild illnesses, such as the common cold. But in vulnerable children, infections that begin with mild symptoms may sometimes lead to more severe illnesses, such as pneumonia – especially when they coincide with other illnesses like diarrhoea or malaria.

WHAT causes PNEUMONIA?

Data on the pathogen-specific causes of pneumonia are limited, and available information is often difficult to interpret. It is known that the bacterial pathogen *Streptococcus pneumoniae* is the leading cause of severe pneumonia among children across the developing world. Bacteria also contribute to non-severe pneumonia cases, but to a lesser extent, and more cases are probably of viral origin. Another major cause is the bacterial pathogen *Haemophilus influenzae* type b (Hib). Other pathogens include important viruses, less common bacteria and fungi. However, more specific information for the aetiology of childhood pneumonia is not available. Research is urgently needed to better describe the distribution of pneumonia by its causes. Knowing which pathogens lead to pneumonia is critical for guiding treatment and policies.

WHAT ARE THE symptoms OF PNEUMONIA?

Children with pneumonia may have a range of symptoms depending on their age and the cause of the infection. Bacterial pneumonia usually causes children to become severely ill with high fever and rapid breathing. Viral infections, however, often come on gradually and may worsen over time. Some common symptoms of pneumonia in children and infants include rapid or difficult breathing, cough, fever, chills, headaches, loss of appetite and wheezing. Children under five with severe cases of pneumonia may struggle to breathe, with their chests moving in or retracting during inhalation (known as 'lower chest wall indrawing'). Young infants may suffer convulsions, unconsciousness, hypothermia, lethargy and feeding problems.[3]

BOX 2

TERMINOLOGY USED IN THIS REPORT

Acute respiratory infection: This includes any infection of the upper or lower respiratory system, as defined by the International Classification of Diseases.[a] Acute lower respiratory infections affect the airways below the epiglottis and include severe infections, such as pneumonia. Pneumonia accounts for a significant proportion of the disease burden attributed to acute lower respiratory infections.

Pneumonia: The term 'pneumonia' as used in this report refers to 'suspected pneumonia'. A suspected case of pneumonia is identified by its clinical symptoms, since diagnostic confirmation using radiography or laboratory tests is usually unavailable in resource-poor settings. All children under five years of age with suspected pneumonia, therefore, are defined as having cough and fast or difficult breathing. Suspected pneumonia cases are further classified as either 'severe' or 'non-severe' (*see Box 5 on page 24 for more detail about classifications*). [b, c]

FIGURE 3
PATHOGEN-SPECIFIC CAUSES OF SEVERE PNEUMONIA CASES

Pathogen	Distribution of severe pneumonia cases by cause	Discussion
Streptococcus pneumoniae (bacterium)	Leading cause	*S. pneumoniae* is the leading pathogen in almost all studies from around the world. Recent vaccine trial data indicate that in Africa it may be responsible for over 50% of severe pneumonia cases, and probably a higher proportion of fatal cases. This proportion may vary in different parts of the world.
Haemophilus influenzae (bacterium)	Major cause	Most disease is caused by type b (Hib). Vaccine studies from Bangladesh, Chile and the Gambia suggest that Hib causes around 20% of severe pneumonia cases, although the proportion may vary in different parts of the world.
Other important pathogens	Less common	These pathogens include important viruses such as respiratory synctial virus (RSV) and influenza; other bacteria, such as *Staphylococcus aureaus* and *Klebsiella pneumoniae*; and the fungus *Pneumocystis jiroveci* (PCP), which is particularly important in young children with AIDS (*see Box 3, page 8*).

BOX 3

PREVENTING HIV-RELATED PNEUMONIA IN CHILDREN

Pneumonia is a common opportunistic infection among HIV-positive children worldwide. The pneumonia that is found in people with HIV is caused by the fungal organism *P. jiroveci* and is commonly referred to as PCP. Recent evidence from Malawi, South Africa, Thailand and Zambia show that PCP causes at least 1 of every 4 deaths among HIV-positive infants under the age of one.[a] It is important to note, however, that while PCP has become an increasingly significant cause of death among HIV-positive children, it causes only about 5 per cent of pneumonia deaths among all children worldwide.[b]

WHO and UNICEF recommend cotrimoxazole prophylaxis for all HIV-positive children, as well as for infants born to HIV-infected mothers, in order to prevent them from developing pneumonia.[c] Clinical trials in Zambia show a significant and sustained reduction in hospital admission and mortality rates among sick HIV-positive infants receiving cotrimoxazole compared to those in the placebo group.[d] This intervention has been part of the routine-care package for HIV-positive children and adults in many developed countries since the early 1990s.[e]

Providing cotrimoxazole (and/or antiretroviral treatment) by 2010 to 80 per cent of children in need is one of the main objectives of UNICEF's global campaign *Unite for Children. Unite against AIDS.*

HOW IS PNEUMONIA diagnosed?

Chest X-rays and laboratory tests are used to confirm the presence of pneumonia, including the extent and location of the infection and its cause. But in resource-poor settings without access to these technologies, suspected cases of pneumonia are diagnosed by their clinical symptoms. Children and infants are presumed to have pneumonia if they exhibit a cough and fast or difficult breathing (*see detailed guidelines in Box 5, page 24*).[4] Caregivers, therefore, have an important role to play in recognizing the symptoms of pneumonia in children and seeking appropriate medical care as necessary.

HOW IS PNEUMONIA transmitted?

Pathogens causing pneumonia may reach the child's lungs through different routes. Although information on the pathogenesis of childhood pneumonia is limited, it is widely believed that common bacterial pathogens causing pneumonia are often already present in a child's nose or throat and are then inhaled into the lungs, causing infection.[5] Pathogens may also be spread through contaminated air droplets or may result from blood-borne infections. During or shortly after birth, babies are at higher risk of developing pneumonia from coming into contact with organisms in the birth canal or from contaminated substances contacted during delivery.

WHY ARE CHILDREN vulnerable?

A healthy child has many natural defences that protect its lungs from the invading pathogens that cause pneumonia. However, children and infants with compromised immune systems have weakened defences. Undernourished children, particularly those not exclusively breastfed or with inadequate zinc intake, are at higher risk of developing pneumonia. Similarly, children and infants suffering from other illnesses, such as AIDS or measles, are more likely to develop pneumonia. Environmental factors, such as living in crowded homes and exposure to parental smoking or indoor air pollution, may also have a role to play in increasing children's susceptibility to pneumonia and its severe consequences.[6]

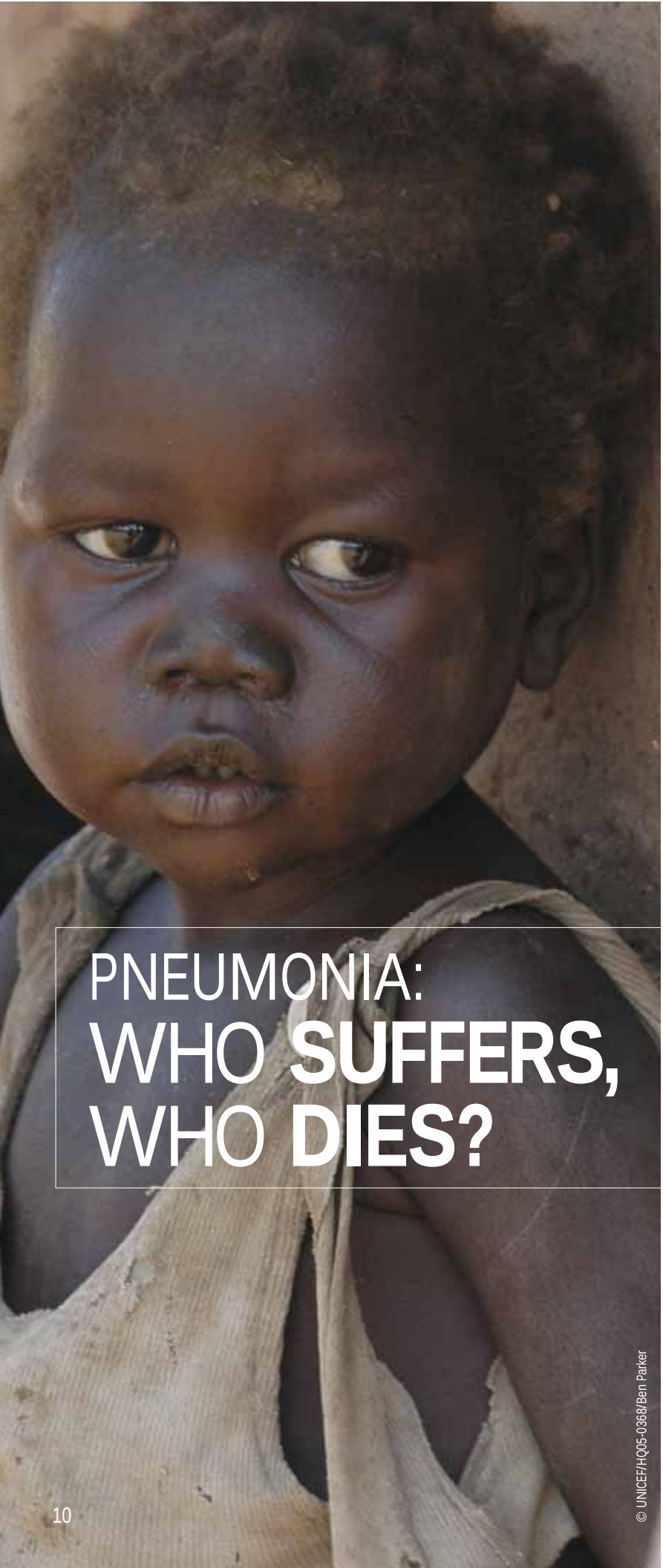
HOW IS PNEUMONIA prevented?

Preventing children from developing pneumonia in the first place is essential for reducing child deaths (*see Box 7, page 26*). Key prevention measures include promoting adequate nutrition (including breastfeeding and zinc intake), raising immunization rates (*see Box 8, page 27*) and reducing indoor air pollution.[7] HIV-positive children are less likely to develop HIV-related pneumonia if they are given a daily dose of cotrimoxazole (*see Box 3, page 8*).[8] Recent research also suggests that hand washing may play a role in reducing the incidence of pneumonia.[9]

HOW IS PNEUMONIA treated?

Prompt treatment of pneumonia with a full course of appropriate antibiotics is life-saving. UNICEF and WHO have published guidelines[10] for diagnosing and treating pneumonia in community settings in the developing world (*see Box 6, page 25*). This approach is proven, affordable and relatively straightforward to implement.[11]

Cotrimoxazole and amoxicillin are effective drugs against bacterial pathogens and are often used to treat children with pneumonia in developing countries. Infants under two months with signs of pneumonia/sepsis are at risk of suffering severe illness and death more quickly than older children, and should be immediately referred to a hospital or clinic for treatment (*for full discussion, see Box 5, page 24*).[12] Treatment regimens will need to be chosen based on their efficacy in local settings. Some areas may have high levels of resistance to certain antibiotics, rendering those drugs less effective for treating pneumonia (*see Box 4, page 21*). Other areas may have large numbers of high-risk groups, such as undernourished or HIV-positive children, and may need to adapt their treatment strategies accordingly (*see Box 3, page 8*).



PNEUMONIA: WHO **SUFFERS,** WHO **DIES?**

It is estimated that more than 150 million episodes of pneumonia occur every year among children under five in developing countries, accounting for more than 95 per cent of all new cases worldwide. Between 11 million and 20 million children with pneumonia will require hospitalization, and more than 2 million will die from the disease. It is also important to note that incidence of pneumonia among children decreases with age.[13]

South Asia and sub-Saharan Africa combined bear the burden of more than half of the total number of pneumonia episodes worldwide among children under five. Three quarters of all pneumonia episodes worldwide among children under five occur in just 15 countries.[14]

FIGURE 4
15 COUNTRIES ACCOUNT FOR THREE QUARTERS OF CHILDHOOD PNEUMONIA CASES WORLDWIDE

India	44 million
China	18 million
Nigeria	7 million
Pakistan	7 million
Bangladesh	6 million
Indonesia	6 million
Brazil	4 million
Ethiopia	4 million
Congo, Democratic Republic of the	3 million
Philippines	3 million
Afghanistan	2 million
Egypt	2 million
Mexico	2 million
Sudan	2 million
Viet Nam	2 million
Total	**113 million**

NOTE: Country-level estimates do not add up to the total due to rounding.

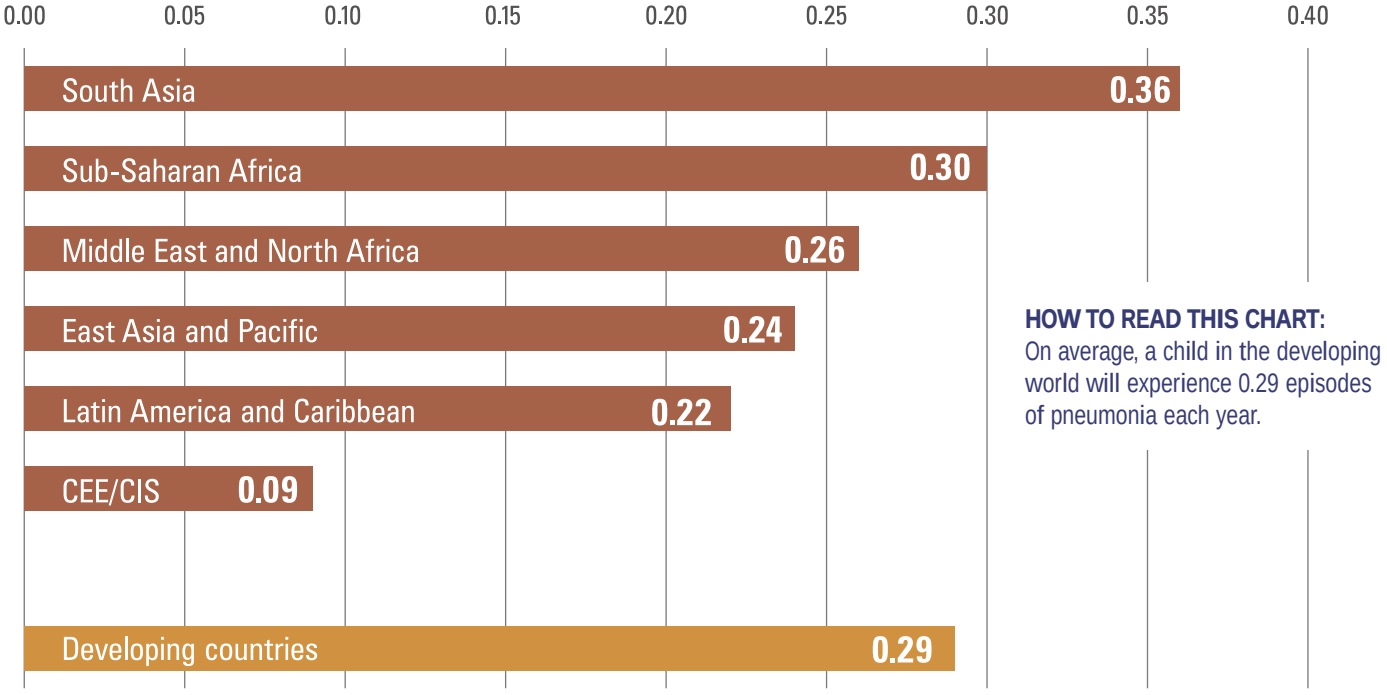
FIGURE 5
INCIDENCE OF PNEUMONIA CASES AND PNEUMONIA DEATHS AMONG CHILDREN UNDER FIVE, BY UNICEF REGION, 2004

UNICEF Regions	Number of children under five years of age (in thousands)	Number of childhood pneumonia deaths (in thousands)	Incidence of pneumonia cases (episodes per child per year)	Total number of pneumonia episodes (in thousands)
South Asia	169,300	702	0.36	61,300
Sub-Saharan Africa	117,300	1,022	0.30	35,200
Middle East and North Africa	43,400	82	0.26	11,300
East Asia and Pacific	146,400	158	0.24	34,500
Latin America and Caribbean	56,500	50	0.22	12,200
CEE/CIS	26,400	29	0.09	2,400
Developing countries	533,000	2,039	0.29	154,500
Industrialized countries	54,200	1	0.03	1,600
World	**613,600**	**2,044**	**0.26**	**158,500**

NOTE: Regional estimates in columns 2, 3 and 5 do not add up to the world total due to rounding.

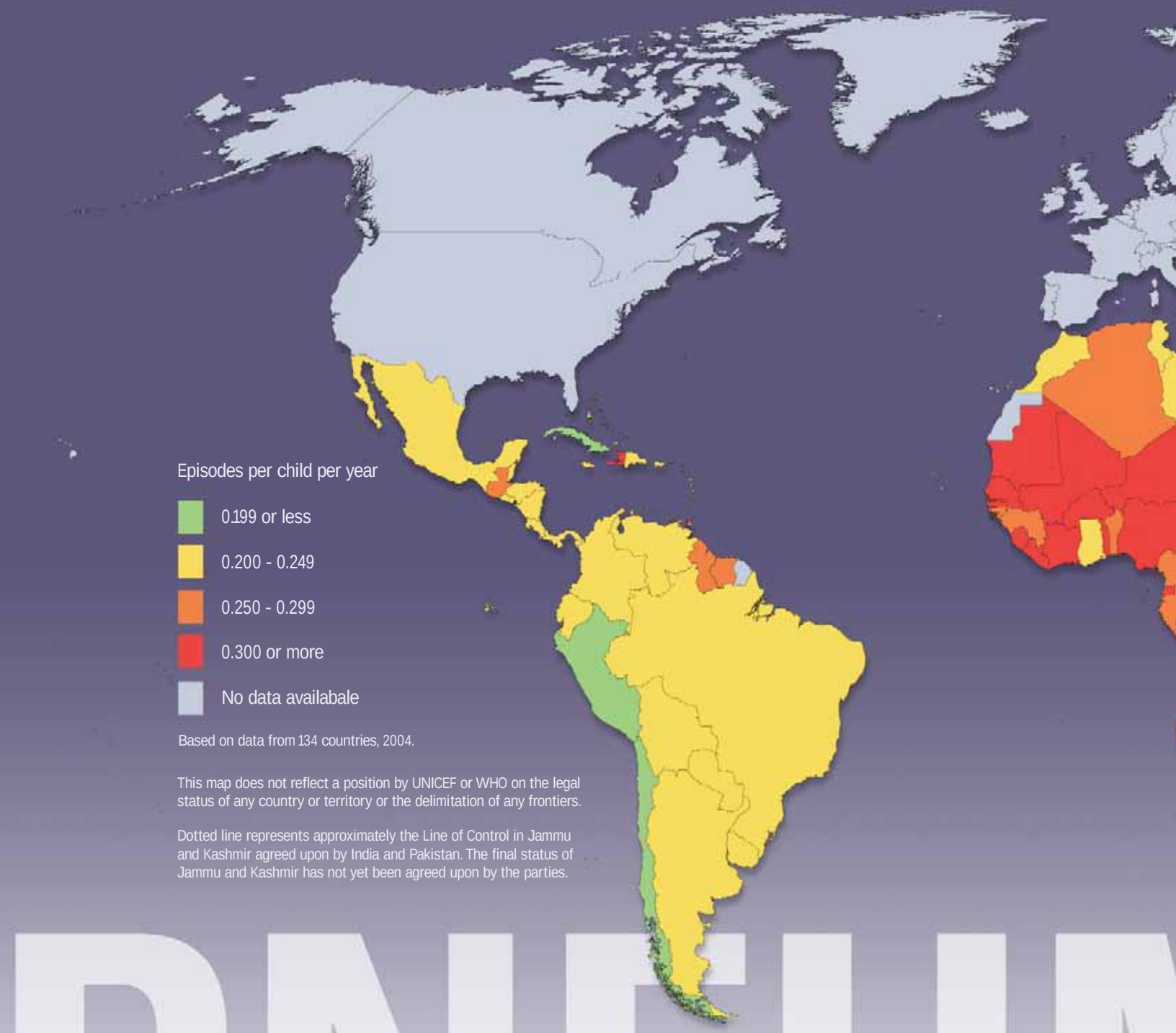
FIGURE 6
INCIDENCE OF PNEUMONIA IS HIGHEST IN SOUTH ASIA AND SUB-SAHARAN AFRICA

Episodes per child per year, by regions, 2004



Based on data from 134 countries, by UNICEF region, 2004.

FIGURE 7
ESTIMATED INCIDENCE OF CHILDHOOD PNEUMONIA WORLDWIDE, 2004

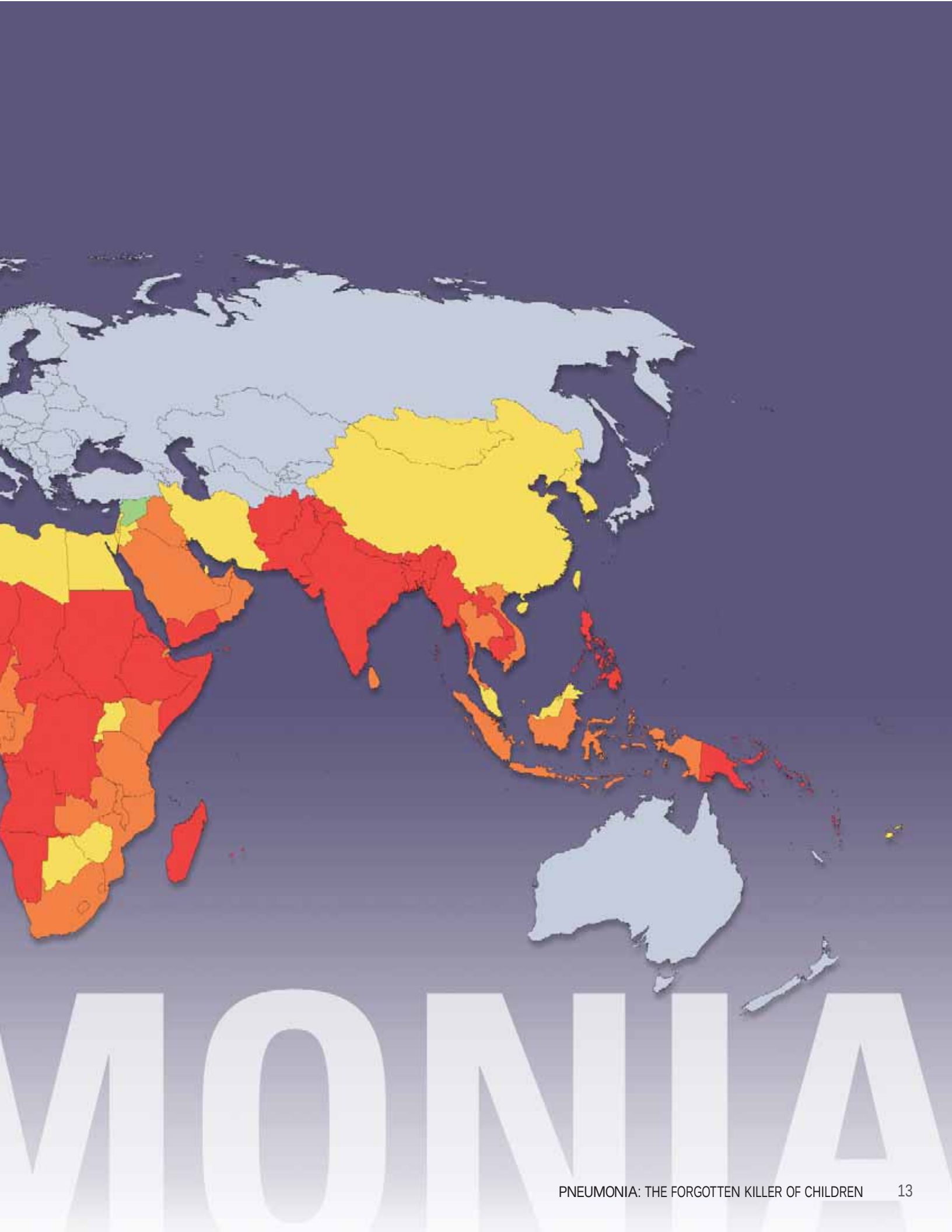


Based on data from 134 countries, 2004.

This map does not reflect a position by UNICEF or WHO on the legal status of any country or territory or the delimitation of any frontiers.

Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

PNEUM



LEVELS AND TRENDS IN KNOWLEDGE AND TREATMENT

Because pneumonia kills more children than any other illness, any effort to improve overall child survival must make the reduction of pneumonia's death toll a priority. And preventing children from developing pneumonia in the first place is critical to reducing its death toll. Prevention efforts include many well-known child survival interventions, such as expanding vaccine coverage, promoting adequate nutrition and reducing indoor air pollution (*see Box 7, page 26*).

But once a child develops pneumonia, a caregiver must recognize the symptoms and seek appropriate care immediately. Since a large proportion of severe pneumonia cases in children of the developing world is caused by bacterial pathogens, prompt treatment with a full course of effective antibiotics is key to reducing pneumonia deaths. This approach is proven, affordable and relatively straightforward to implement.[15]

1 **RECOGNIZE** a child is sick

2 **SEEK** appropriate care

3 **TREAT** appropriately with antibiotics

Three essential steps are needed to reduce deaths among children under five with pneumonia:

1. Recognize a child is sick
2. Seek appropriate care
3. Treat appropriately with antibiotics

Current levels of coverage in the developing world for each of these essential steps are assessed in the sections below, based on data maintained in the UNICEF global databases. Most information in these databases is derived from the UNICEF-supported Multiple Indicator Cluster Surveys (MICS) and the USAID-supported Demographic and Health Surveys (DHS). Additional information from a range of other national-level household surveys is also included (*see* www.childinfo.org *for more information*).

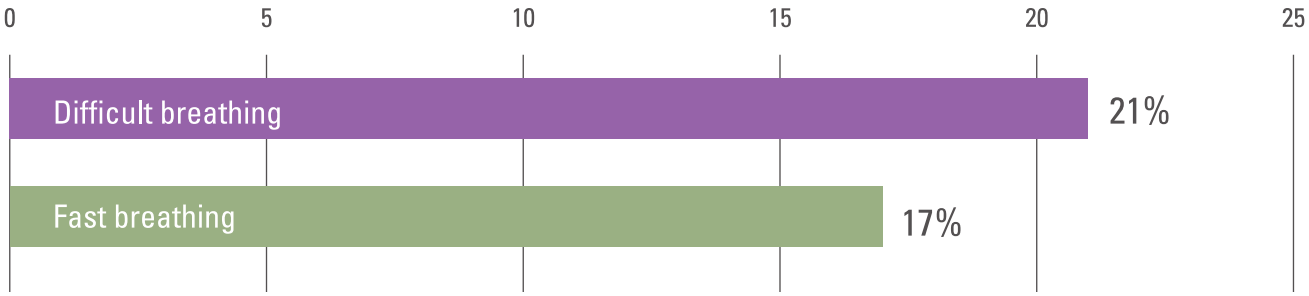
RECOGNITION OF PNEUMONIA'S DANGER SIGNS

Recognizing the symptoms of pneumonia is the first step in reducing deaths among children under five. Caregivers play a critical role in recognizing pneumonia's symptoms and immediately seeking appropriate care for their sick children. Indeed, it is critical that caregivers understand the importance of this disease and the risk it poses to their children's health.

Yet, even though pneumonia is the leading killer of children in the developing world, only 1 of every 5 caregivers knows the two tell-tale symptoms of pneumonia: fast breathing and difficult breathing. MICS provide information on caregivers' knowledge of pneumonia's symptoms, and results from 33 surveys show that these common symptoms of pneumonia are not widely recognized.

FIGURE 8
FEW CAREGIVERS RECOGNIZE THE TWO KEY DANGER SIGNS OF PNEUMONIA

% caregivers who know that difficult or fast breathing is a sign to seek care immediately



Data from 33 MICS, 1999-2001 (see statistical tables 3 and 4).

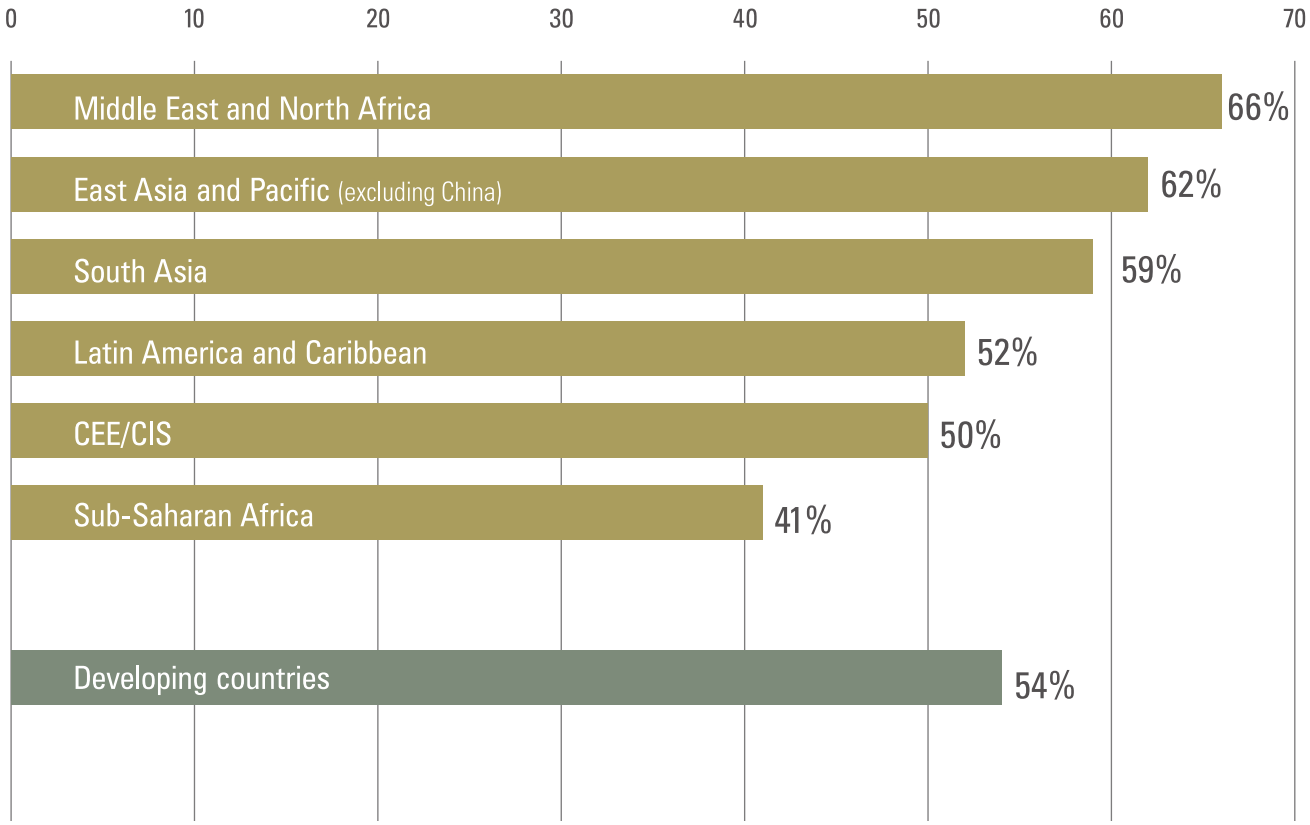
CARE-SEEKING BEHAVIOUR

The second step is for caregivers to seek appropriate medical care for a child with suspected pneumonia. Appropriate care, as defined by WHO and UNICEF, includes providers that can correctly diagnose and treat pneumonia, such as hospitals, health centres, dispensaries, community health workers, maternal and child health clinics, outreach clinics, and physicians' private offices.

MICS and DHS provide information on the extent to which caregivers seek an appropriate provider for their children with suspected pneumonia. The surveys permit assessment of disparities in such care-seeking behaviour. Only about half (54 per cent) of children under five in the developing world were taken to an appropriate provider. Sub-Saharan Africa has the lowest levels of care-seeking for pneumonia (41 per cent), while the Middle East and North Africa (66 per cent) and East Asia and Pacific, excluding China, (62 per cent) have the highest rates.

FIGURE 9
ONLY HALF OF CHILDREN WITH PNEUMONIA TAKEN TO AN APPROPRIATE PROVIDER

% under-fives with pneumonia taken to an appropriate health care provider, by UNICEF region, 1998-2004



See statistical table 1

Data for a subset of 67 countries from MICS and DHS indicate that caregivers take boys and girls to appropriate medical care almost equally. Perhaps not surprisingly, children in urban areas and those whose mothers have more education are more likely to be taken to an appropriate provider. Also, compared to poor children, children from richer families are around 30 per cent more likely to be taken for appropriate medical care.


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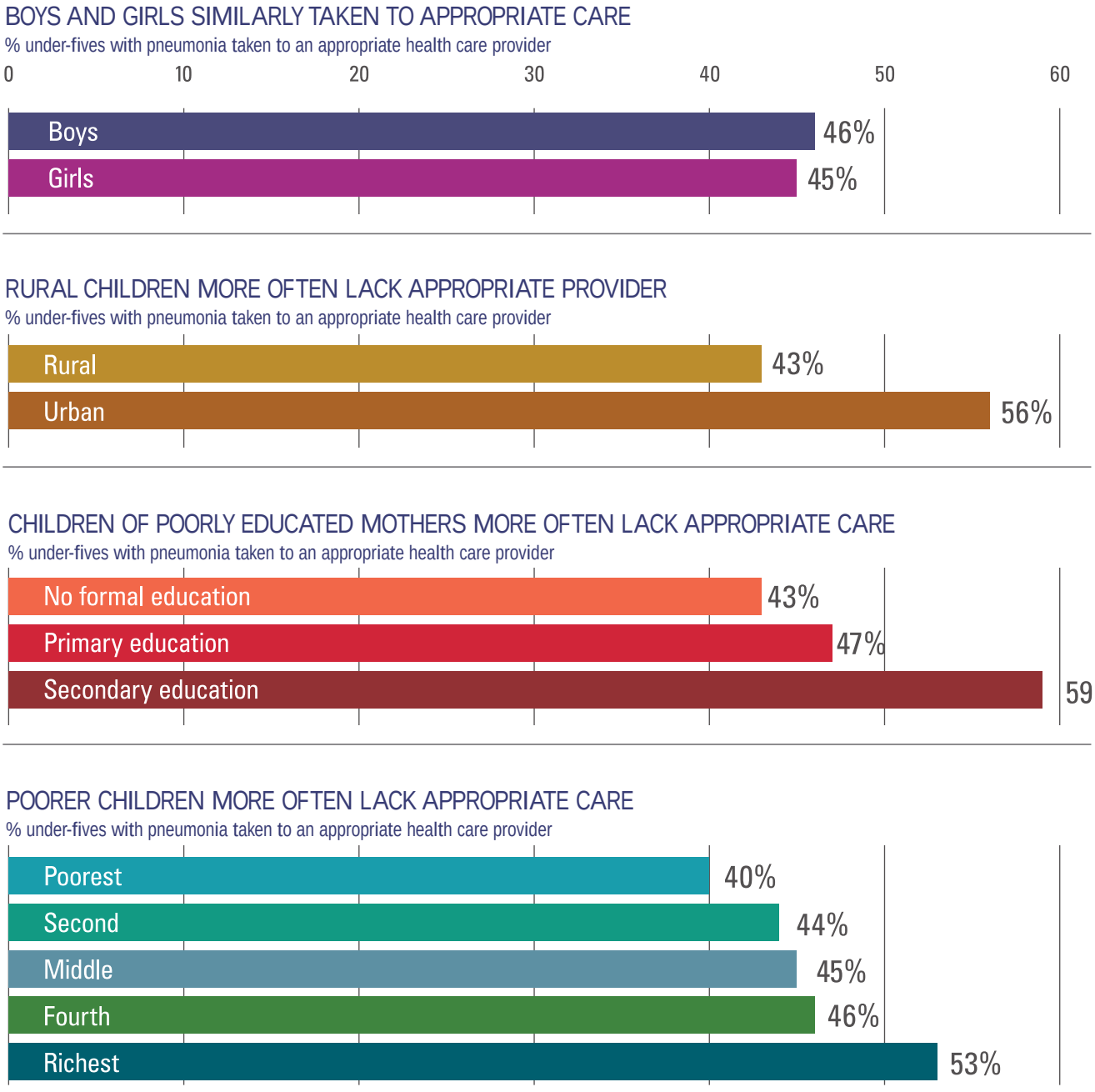
FIGURE 10
WHO LACKS APPROPRIATE CARE? DISPARITIES IN SEEKING CARE FOR PNEUMONIA

Some children are less likely than others to be taken to an appropriate health care provider for pneumonia. While boys and girls are taken at similar rates, rural children lack appropriate care compared to their urban counterparts. The same is true for poor children compared to rich ones and for children with poorly educated mothers compared to those with better-educated caregivers.



Data from 67 DHS and MICS, 1996-2003, except wealth index from 32 MICS, 1999-2003 (see statistical table 2).

Trends in care-seeking behaviour

Trend analysis in care-seeking behaviour is in great part limited by the relative lack of data from the early to mid 1990s. However, data from 38 countries, representing more than 60 per cent of the developing world's population (excluding China), are available to assess trends in care-seeking behaviour for pneumonia over time. These data indicate that there was little change in the rates at which children with pneumonia were taken to an appropriate health care provider between 1994 and 2001. Encouraging signs do emerge from some countries with very low levels of appropriate care. For example, the proportion of children taken to an appropriate provider in Burkina Faso roughly doubled (from 19 per cent to 36 per cent) between 1993 and 2003, according to DHS figures for those two years. Yet 2 out of 3 children sick with pneumonia in that country are still not receiving appropriate care. The lack of any significant progress over the past 10 years across the developing world underscores the urgent need to act now to ensure that children with pneumonia receive appropriate medical care.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ANTIBIOTIC TREATMENT FOR PNEUMONIA

Despite the essential role of antibiotics in reducing child deaths from pneumonia, information about antibiotic use is limited. Results from limited data suggest that only 19 per cent of children with pneumonia received an antibiotic in the early 1990s.* In several countries, the proportion of children receiving treatment with antibiotics was less than 10 per cent, leaving 9 of every 10 children to fight the infection unassisted. It is encouraging to note that some countries have increased their levels significantly in a short period of time. In particular, Egypt has increased antibiotic coverage from 25 per cent to 75 per cent in just eight years (1992-2000), while Colombia raised its coverage from 5 per cent to 30 per cent in only four years (1986-1990).

Data from this limited number of countries also suggest that antibiotic use was somewhat higher among children with pneumonia in urban areas (24 per cent) compared to children in rural areas (17 per cent). Similarly, antibiotic use was also higher among children of well-educated mothers (27 per cent) compared to children with mothers having no formal education (15 per cent).

Questions on antibiotic use for pneumonia have recently been added to MICS and DHS, and it is expected that a large number of countries will report this information over the next several years. This will allow for a more comprehensive assessment of both the current levels and trends in antibiotic usage.

FIGURE 11
CHILDREN UNDER FIVE WITH PNEUMONIA WHO RECEIVED ANTIBIOTICS

(DATA FROM 27 COUNTRIES, MAINLY FROM THE EARLY 1990s)

Total	19%
Urban	24%
Rural	17%
Male	19%
Female	18%
No formal education	15%
Primary education	20%
Secondary education	27%

See statistical table 5.

* Currently, only DHS mainly from the early 1990s are available for a sample of 27 countries, and these surveys are subject to under- and over-reporting as a result of caregivers' lack of knowledge regarding drug treatments. They also do not record dosage and timing of treatment. It is likely that antibiotic coverage has increased since these data were collected.

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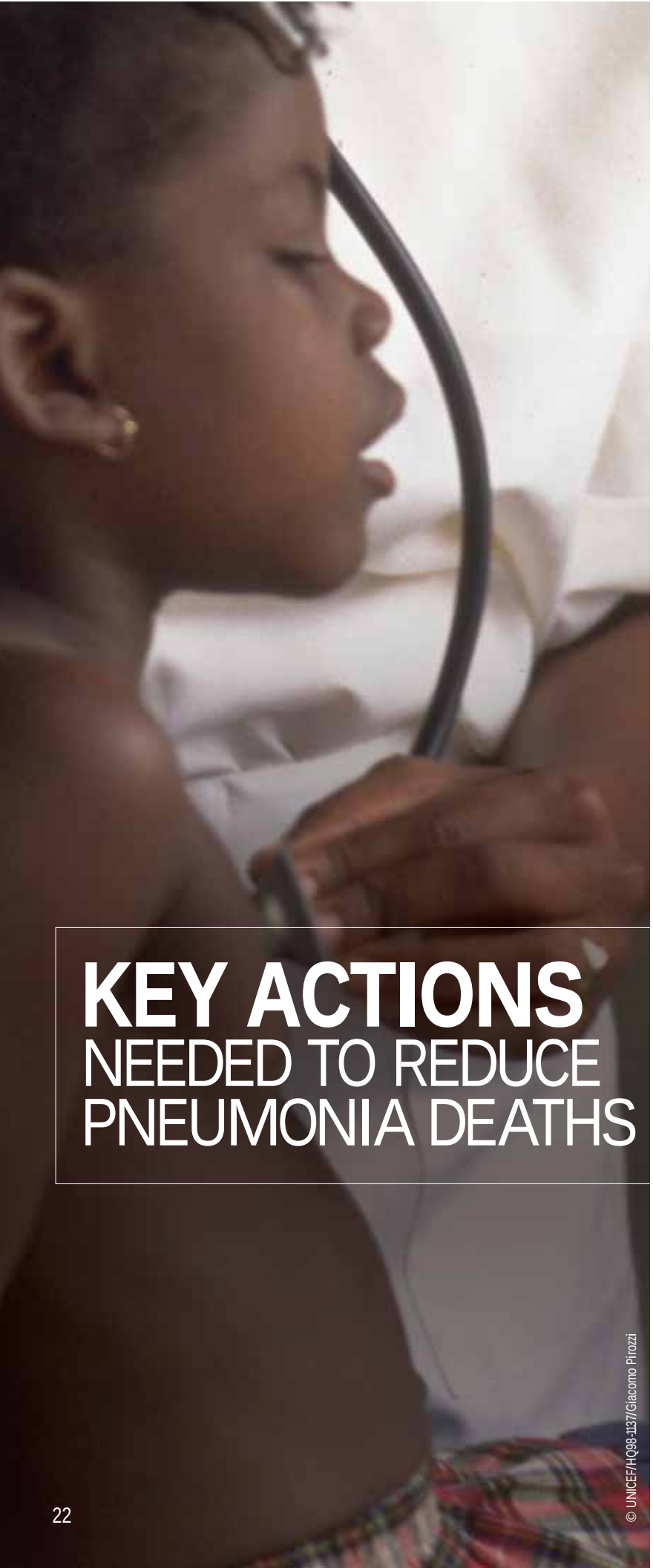
BOX 4

ANTIBIOTIC RESISTANCE AND SCALING UP TREATMENT FOR PNEUMONIA

Significantly expanding treatment coverage is essential for reducing pneumonia deaths among children under five in the developing world. However, high levels of antibiotic resistance to first-line treatments, notably cotrimoxazole, have been reported in many parts of the world. A study in Pakistan investigated the relationship between high levels of *Streptococcus pneumoniae* and *Haemophilus influenzae* type b (Hib) resistance to cotrimoxazole and the clinical efficacy of using this drug to treat children with pneumonia. This study found that despite high levels of cotrimoxazole resistance, treatment failure rates were uncommon among children with pneumonia. Cotrimoxazole, however, was less effective in children with severe cases of pneumonia than amoxicillin.[a,b] More research is urgently needed to further investigate this critical relationship.

Concern remains that expanded and sustained use of antibiotics to treat children with pneumonia could make managing antibiotic resistance more difficult in the future. And prescribing antibiotics to children with a simple cold or cough not only wastes limited resources but also increases antibiotic resistance. Therefore, it is important that scaling up treatment for pneumonia go hand-in-hand with rigorous training and oversight of health facility personnel and community health workers to ensure proper diagnosis and treatment of pneumonia in communities. Experience from the Gambia, Honduras, Kenya, Nepal and Pakistan, among other study sites, confirms that this can be done successfully.[c, d]



KEY ACTIONS NEEDED TO REDUCE PNEUMONIA DEATHS

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Preventing a child from developing pneumonia in the first place is essential for reducing deaths. But this is not enough. Children with signs of pneumonia need to be treated promptly with effective antibiotics. The following key actions are needed to reduce pneumonia deaths among children:

- **ENSURE ALL CAREGIVERS KNOW THE DANGER SIGNS OF PNEUMONIA IN CHILDREN: COUGH AND FAST OR DIFFICULT BREATHING.**

  Caregivers will need to seek appropriate medical care immediately for children with signs of pneumonia. When only 1 in every 5 caregivers knows pneumonia's danger signs, educating caregivers needs to be a top priority. Moreover, given caregivers' essential role in home-based treatment, education programmes need to ensure that caregivers broadly understand the importance of the disease and its treatment regimen, and are convinced of treatment efficacy.

- **ENSURE ALL CHILDREN WITH SIGNS OF PNEUMONIA ARE PROPERLY DIAGNOSED BY TRAINED HEALTH PERSONNEL.**

  Children with suspected pneumonia in the developing world are diagnosed based on their clinical symptoms, given that radiography and laboratory facilities are largely unavailable in resource-poor settings. Guidelines have been developed for diagnosing pneumonia in children that are of value in distinguishing most pneumonia cases from other respiratory illnesses (*see Box 5, page 24*).

Health personnel, including community health workers, need to be trained to diagnose pneumonia in children under five and given respiratory rate timers to assist this diagnosis. More research is also needed to develop simple diagnostic tests that can be used in community settings to better identify those children with pneumonia who need antibiotics.

- **ENSURE ALL CHILDREN DIAGNOSED WITH PNEUMONIA ARE TREATED PROMPTLY WITH EFFECTIVE ANTIBIOTICS.**

Health personnel, including community health workers, need to be rigorously trained to treat children with pneumonia and refer severe cases to health facilities. Inappropriate antibiotic use, including prescribing antibiotics to children with simple colds or coughs, will not only waste resources, it will also increase antibiotic resistance. Again, guidelines have been developed for diagnosing and treating children with pneumonia in community settings (*see Box 5, page 24*), and numerous countries in the developing world have implemented these guidelines successfully (*see Box 6, page 25*). Moreover, an adequate supply of antibiotics to treat pneumonia needs to be made available to all health facilities and community health workers. In some cases, governments may need to explicitly authorize trained community health workers to prescribe antibiotics for children with pneumonia.

- **MONITOR REGULARLY THE CLINICAL EFFICACY OF PNEUMONIA TREATMENT TO REVISE NATIONAL TREATMENT POLICIES, AS NECESSARY, BASED ON ANTIMICROBIAL RESISTANCE INFORMATION, CLINICAL OUTCOMES AND OTHER DATA.**

BOX 5

HOW TO DIAGNOSE AND TREAT PNEUMONIA IN COMMUNITY SETTINGS

Once caregivers have recognized the danger signs of pneumonia (cough and fast or difficult breathing) and taken their children to appropriate medical care, health personnel – including trained community health workers – should then diagnose and treat pneumonia in children according to the following Integrated Management of Childhood Illness (IMCI) guidelines:[a, b]

- **Diagnosis:** Children aged 2 months to 5 years are diagnosed with pneumonia if they exhibit a cough and fast or difficult breathing. Thresholds for fast breathing depend on the child's age (see 'What is fast breathing?', below). Severe pneumonia in children is diagnosed if they exhibit lower chest wall indrawing (when the child's chest moves in or retracts during inhalation) or stridor (a harsh noise made during inhalation). Respiratory rate timers should be available to help health personnel count breathing rates.
- **Treatment:** Children aged 2 months to 5 years with severe pneumonia should be referred to the nearest health facility immediately. Those diagnosed with pneumonia may be treated at home with a full course of effective antibiotics.[c] Infants less than 2 months old with signs of pneumonia should be referred promptly to the nearest health facility because they are at high risk of suffering severe illness or death.

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SIGNS	CLASSIFY AS	TREATMENT
• Fast breathing (see below) • Lower chest wall indrawing • Stridor in calm child	Severe pneumonia	• Refer urgently to hospital for injectable antibiotics and oxygen if needed • Give first dose of appropriate antibiotic
• Fast breathing (see below)	Non-severe pneumonia	• Prescribe appropriate antibiotic • Advise mother on other supportive measures and when to return for a follow-up visit
• No fast breathing	Other respiratory illness	• Advise mother on other supportive measures and when to return if symptoms persist or get worse

WHAT IS FAST BREATHING?

If the child is...	The child has fast breathing if you count…
2 months to 12 months old	50 breaths or more per minute
12 months to 5 years old	40 breaths or more per minute

BOX 6

COMMUNITY-BASED CASE MANAGEMENT OF PNEUMONIA SIGNIFICANTLY REDUCES CHILD MORTALITY: EVIDENCE FROM NINE STUDIES

A meta-analysis[a] of results from nine studies that investigated the impact of community-based case management of pneumonia on child mortality was recently completed. In these studies, children with pneumonia were diagnosed and treated according to the guidelines described in Box 5, page 24. Across these nine trials, total mortality was reduced by 27 per cent, 20 per cent and 24 per cent among neonates, infants and chidren 0-4 years, respectively. Mortality from pneumonia among these same three groups was found to be reduced by 42 per cent, 36 per cent and 36 per cent. The larger-than-expected effect of intervening to prevent pneumonia deaths suggests the important indirect role of pneumonia as a cause of death. The authors conclude that community-based interventions to diagnose and treat pneumonia have a significant impact on under-five mortality and should urgently be incorporated into primary health care in developing countries.

An important finding of the analysis was that the community-based case management approach works even in the most difficult and deprived settings and among children with multiple risk factors. Indeed, its impact will be greatest in those areas with poorest access to health care. Organized training of community health workers in such areas remains one of the great challenges still to be tackled. More research is also urgently needed to determine how effectively the community-based case management approach can be implemented at a national scale while maintaining adequate control over antibiotic prescribing practice.

BOX 7

PREVENTING PNEUMONIA IS KEY

Reducing pneumonia deaths also requires implementing effective prevention measures so that children are healthier and less likely to develop pneumonia in the first place. The prevention measures listed below all show at least some evidence of reducing pneumonia mortality among under-fives.[a] Some research has also suggested that hand washing and lowering indoor air pollution play a role in reducing pneumonia deaths among children in the developing world.[b, c] For HIV-infected children, preventing pneumonia (PCP) through cotrimoxazole prophylaxis is essential (*see Box 3, page 8*).[d]

IMMUNIZATION

Immunizations help reduce childhood deaths from pneumonia in two ways. First, vaccinations help prevent children from developing infections that directly cause pneumonia, such as *Haemophilus influenzae* type b (Hib). Second, immunizations may prevent infections that can lead to pneumonia as a complication (e.g., measles and pertussis). Three vaccines have the potential to significantly reduce child deaths from pneumonia. These vaccines include the measles, Hib and pneumococcal conjugate vaccines. Their ability to reduce pneumonia deaths is detailed in Box 8, page 27.

ADEQUATE NUTRITION

Undernourished children are at a substantially higher risk of suffering childhood death or disability. It has been estimated that child under-nutrition contributes to more than half of all child deaths in developing countries, and that undernutrition in children aged 0-4 years contributes to more than 1 million pneumonia deaths each year.[e] Undernutrition may place children at an increased risk of developing pneumonia in two ways. First, malnutrition weakens a child's overall immune system, as an adequate amount of protein and energy is needed for proper immune system functioning. Second, undernourished children have weakened respiratory muscles, which inhibits them from adequately clearing secretions found in their respiratory tract.[f, g]

EXCLUSIVE BREASTFEEDING

It is widely recognized that children who are exclusively breastfed develop fewer infections and have less severe illnesses than those who are not. Breast milk contains the nutrients, antioxidants, hormones and antibodies needed by the child to survive and develop, and specifically for a child's immune system to function properly. Yet only about one third of infants in the developing world are exclusively breastfed for the first six months of life.[h] Infants under six months old who are not breastfed are at five times the risk of dying from pneumonia as infants who are exclusively breastfed for the first six months of life. Furthermore, infants 6 - 11 months old who are not breastfed are also at an increased risk of dying from pneumonia compared to those who are breastfed. [i]

ZINC

Children who lack sufficient amounts of specific micronutrients, particularly zinc, face additional risks of developing and dying from pneumonia. A growing body of research highlights the importance of zinc to child survival and to specifically reducing deaths from pneumonia. [j, k, l] Zinc intake helps reduce the incidence of pneumonia and the severity of the disease. Specifically, research has shown that zinc intake during the acute phase of severe pneumonia decreased the duration and severity of pneumonia and reduced treatment failure rates when compared with a placebo intervention.[m] Improving the zinc status of children is currently being considered by public health and nutrition experts.

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BOX 8

VACCINES HOLD PROMISE OF SAVING MILLIONS OF CHILDREN FROM DYING OF PNEUMONIA

Three vaccines have the potential to save millions of children's lives by reducing deaths from pneumonia. These vaccines work to reduce the incidence of pneumonia caused by the bacterial pathogens *Streptococcus* pneumoniae (pneumococcal conjugate vaccine) and *Haemophilus influenzae* type b (Hib vaccine), as well as pneumonia caused by serious complications from measles (measles vaccine).

MEASLES VACCINE

Measles is an acute viral infection that often causes only a self-limiting illness in children. But complications that can lead to disability or death are relatively common, especially in children who are undernourished or have compromised immune systems. Pneumonia is a serious complication of measles, and the most common cause of death associated with measles worldwide. Thus, reducing the incidence of measles in young children through vaccination would also help to reduce deaths from pneumonia.[a] A safe and effective measles vaccine has been available for use in developing countries for the past 40 years, and the coverage rate for the measles vaccine was estimated at 76 per cent worldwide in 2004.[b] Yet despite much progress in increasing vaccine coverage, measles still infects about 30 million to 40 million children each year.[c]

HIB VACCINE

Haemophilus influenzae type b (Hib) is an important cause of pneumonia and meningitis among children in developing countries. It has been estimated that Hib causes 2 to 3 million cases of severe disease every year.[d] Hib vaccine has been available for more than a decade, but its high cost and limited information on Hib disease in some areas have posed obstacles to its introduction in developing countries. While in developed countries 92 per cent of the population was vaccinated against Hib in 2003, vaccine coverage was 42 per cent in the developing world and just 8 per cent in the least developed countries during that time.[e] Expanding coverage to more children in the developing world is urgently needed. An advisory group established by the World Health Organization recently recommended that Hib vaccine be made available to all developing countries except where evidence indicates a low burden of disease or where overwhelming impediments to implementation exist.[f]

PNEUMOCOCCAL CONJUGATE VACCINE

Streptococcus pneumoniae is the most common cause of severe pneumonia among children in the developing world. Vaccines to protect against this infection have been available for adults and children over 2 years of age for years, but only recently has a new vaccine been developed that is suitable for infants and toddlers, called the pneumococcal conjugate vaccine (PCV). In 2000, the United States approved this vaccine for use in routine immunizations of all infants, and many other countries have also implemented this vaccine with success.

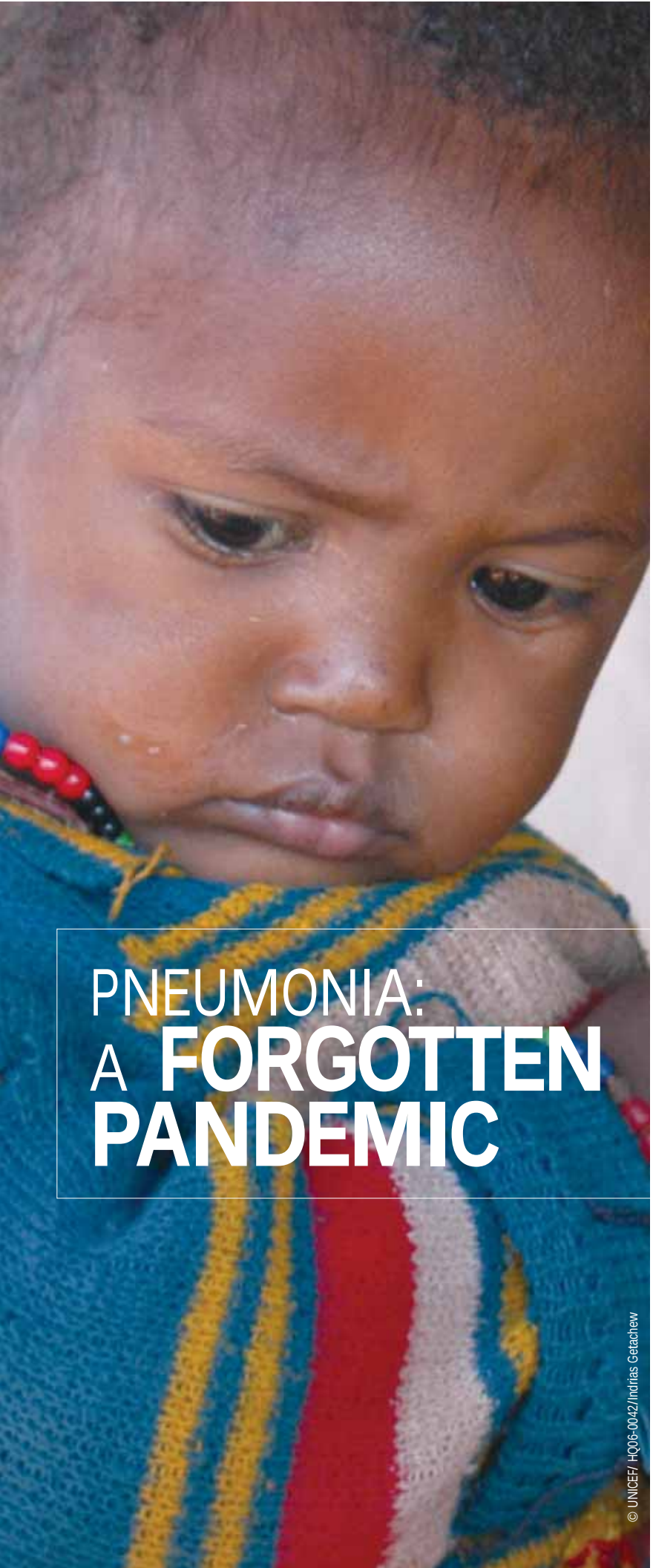
The vaccine used in the United States is seven-valent (PCV7), meaning that it includes the seven most common pneumococcal serotypes found in industrialized countries. Manufacturers are also developing newer vaccines that work against 9-, 11- or 13-valent pneumococcal serotypes, which will provide increased coverage of the serotypes most commonly found in developing countries. These vaccines may become available as early as 2008. Recent results from trials of 17,000 children in the Gambia showed that children immunized with the 9-valent vaccine had 37 per cent fewer cases of pneumonia (as confirmed by chest X-rays), 15 per cent fewer hospitalizations and a 16 per cent reduction in overall mortality. Indeed, the trial showed this vaccine to be highly effective in reducing child deaths from pneumonia.[g]

THE **COST** OF REDUCING PNEUMONIA DEATHS

More than 1 million lives could be saved if both prevention and treatment interventions for pneumonia were implemented universally. Around 600,000 children's lives could be saved each year through universal treatment with antibiotics alone, costing around $600 million.[16]

It is important to note that this cost estimate refers only to treatment costs and does not include investments such as prevention efforts or funding for pneumonia research. However, the cost does include more than simply the purchase price of antibiotics, which is very little in most countries (an appropriate course of antibiotics for treating pneumonia costs on average about $0.27). Also included in the estimate are the costs of scaling up treatment coverage to universal levels, which include training and supervising staff and funding hospital stays for those children with severe pneumonia. These investments are not only critical for expanding treatment coverage with antibiotics but are also necessary for strengthening the broader health system.

This estimated total includes costs for Mexico and Brazil, which are disproportionately high because service delivery and hospitalization are much more expensive in those two countries. At the same time, around 85 per cent of pneumonia deaths among children under five occur in sub-Saharan Africa and South Asia, where treatment costs are much lower. In fact, it is estimated that expanding treatment coverage to universal levels in those two regions alone would cost only $200 million a year, which means that one third of the entire $600 million would address 85 per cent of the problem.



PNEUMONIA: A FORGOTTEN PANDEMIC

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Pneumonia is the leading killer of children under five, yet it has become a forgotten pandemic. Few headlines report the impact pneumonia has on children's lives. Yet the toll pneumonia exacts on children of the developing world would surprise, or even shock, most readers.

A few major public health scourges, like malaria and AIDS, have rightly received increased attention in recent years. Yet the increased funding that has accompanied that attention is still insufficient to reduce their heavy burdens. Incredibly, pneumonia – which kills more children under five than AIDS, malaria and measles *combined* – has received far less attention and funding than any of them. Each year, more than 2 million children under five die of pneumonia in the developing world, compared to an estimated 800,000 children who die from malaria and around 300,000 children under five who die from AIDS (out of about 3 million total AIDS deaths).

Limited information exists on donor spending directed specifically towards reducing pneumonia deaths. Most donor spending on pneumonia is channelled through broader child health initiatives, such as integrated child survival intervention programmes and immunization efforts. These activities are critical to reducing child deaths, including those from pneumonia, and must be urgently strengthened and expanded.

APPENDIX

DATA USED IN THIS REPORT

The data used in this report were derived from a range of sources. Cause-specific mortality estimates and the incidence of pneumonia were based on the work of the Child Health Epidemiological Reference Group (CHERG), which is coordinated by the World Health Organization (Department of Child and Adolescent Health and Development), and supported by the Evidence and Information for Policy Cluster of WHO, with financial support from the Bill and Melinda Gates Foundation. Care-seeking behaviour data were derived from household surveys compiled by UNICEF headquarters as part of its ongoing monitoring work on child survival. In addition, a more detailed analysis was conducted on DHS and MICS to assess knowledge of danger signs, antibiotic use for pneumonia and care-seeking behaviour by background characteristics. More specific details on these data sources are summarized below.

CAUSE-SPECIFIC MORTALITY

As mentioned above, data on pneumonia-specific mortality were based on the work of the CHERG, which was established in 2001 by WHO to estimate the distribution of under-five deaths by cause. The CHERG has used various methods, including single-cause and multi-cause proportionate mortality models. It should be noted that the distribution of under-five deaths by cause refers to the primary cause of death. The most recent update of the cause-specific mortality figures was done for the period 2000-2003. The resulting proportionate mortality estimates were applied in this report to the 2004 envelope of total under-five deaths in the developing world (10.5 million deaths in 2004) to arrive at the number of under-five deaths due to pneumonia that occurred in 2004.[17]

Further details on the specific methods used by the CHERG to estimate cause-specific mortality are available at http://www.who.int/child-adolescent-health/.

INCIDENCE OF PNEUMONIA

This report includes updated estimates for the global and regional incidences of pneumonia. These incidence estimates are based on prevalence data for children's exposure to the major pneumonia risk factors in each country relative to the global exposure. These risk factors include: underweight prevalence (weight for age less than two standard deviations from the median value of the standard reference population), low birthweight (less than 2,500 grams at birth), lack of exclusive breastfeeding for the first six months of life, measles immunization rates and crowding (five or more persons per household). All risk factors except crowding were derived from the UNICEF global databases. Country-level estimates of pneumonia incidence were then aggregated to derive estimates for UNICEF regions in 2004.[18]

CARE-SEEKING FOR PNEUMONIA

UNICEF headquarters maintains a global database on the frequency of care-seeking for suspected pneumonia, based on 97 national-level household surveys conducted in the developing world. The majority of data is derived from the UNICEF-supported Multiple Indicator Cluster Surveys (MICS) and the USAID-supported Demographic and Health Surveys (DHS). However, information from a range of other national-level household surveys, such as the Gulf Child Health Surveys, is included. The latest available estimates from this database are published annually in UNICEF's *The State of the World's Children* report and are available at: www.childinfo.org.

Data on care-seeking behaviour are derived from the surveys included in the UNICEF global database and are based on questions about whether and where advice or treatment were sought outside the home for children with symptoms of pneumonia. Estimates were tabulated for the percentage of children with suspected pneumonia who were taken to an appropriate provider. Appropriate providers for the treatment of pneumonia include hospitals, health centres, dispensaries, village health workers, maternal and child health clinics, mobile or outreach clinics, and private physicians. Traditional healers, pharmacies/drug sellers and relatives/friends are not included.

Further analysis was conducted by UNICEF on a subset of 67 MICS and DHS to assess disparities in care-seeking behaviour by residence, gender and maternal education. Disparities by wealth quintile were based on 32 MICS only.

KNOWLEDGE OF PNEUMONIA'S DANGER SIGNS

Data on mothers' or caregivers' knowledge of danger signs of pneumonia, including 'fast breathing' or 'difficult breathing', were analysed from 33 MICS. This information was based on the question, "What types of symptoms would cause you to take your child to a health facility right away?" Respondents could provide multiple responses but were not prompted about specific symptoms. It is, of course, possible that some responses were simply omitted by the respondent because the symptom did not immediately come to mind. Results on knowledge of danger signs may therefore be somewhat underreported.

ANTIBIOTIC COVERAGE

Estimates on the use of antibiotics for treating pneumonia at a national level are not readily available. A few DHS, mainly conducted in the early 1990s, did include questions on antibiotic use, but results were generally not published in the survey reports. For the purpose of this analysis, all available data on antibiotic use from the DHS were analysed, including 27 surveys mainly from the early 1990s. Overall antibiotic coverage was calculated for children with pneumonia in the two weeks prior to the survey, as well as disparities by residence, gender and maternal education. It should be noted that these data do not specify the type of antibiotic used nor whether proper dosing was applied. Responses to survey questions on antibiotic use will be limited by mothers'/caregivers' knowledge about the drugs given to treat the disease. It is also expected that antibiotic coverage has increased since these data were collected.

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FIGURES

FIGURES 1 & 2

Cause-specific mortality estimates from: World Health Organization, *World Health Report 2005: Make Every Mother and Child Count*, World Health Organization, Geneva, 2005; under-five mortality estimates from: UNICEF, *The State of the World's Children 2006*, UNICEF, New York, 2005; Bryce, J., C. Boschi-Pinto, K. Shibuya and R.E. Black, on behalf of the Child Epidemiology Reference Group, 'WHO Estimates of the Causes of Death in Children', *The Lancet*, 2005, vol. 365, pp. 1147-1152; Lawn, J.E., K. Wilczynska-Ketende and S. Cousens, 'Estimates of Causes of 4 Million Neonatal Deaths in the Year 2000', *International Journal of Epidemiology,* vol. 35, no. 3, 2006, pp. 706-718; World Health Organization, *World Health Statistics 2006*, World Health Organization, Geneva, 2006.

FIGURE 3

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FIGURE 5

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FIGURES 4, 6 & 7

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FIGURE 8

Based on data appearing in statistical tables 3 and 4.

FIGURE 9

UNICEF, *The State of the World's Children 2006*, UNICEF, New York, 2005. Based on the latest estimates available between the period 1998 and 2004, except data from Brazil, which is for 1996. Also see statistical table 1.

FIGURE 10

Based on data appearing in statistical table 2.

FIGURE 11

Based on data appearing in statistical table 5.

BOXES

BOX 2

a. World Health Organization, *Technical Basis for the WHO Recommendations on the Management of Pneumonia in Children at First-Level Health Facilities*, 1991, op. cit.

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BOX 3

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BOX 5

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BOX 6

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TABLE 1 KEY PNEUMONIA INDICATORS: MORTALITY, PREVENTION AND TREATMENT

Countries and territories	Under-five mortality rate	Total number of under-five deaths (000s)	Total number of under-five children (000s)	PNEUMONIA DEATHS: % of under-five deaths due to pneumonia	PNEUMONIA DEATHS: Total number of under-five pneumonia deaths (000s)[a]	PREVENTION: % of children who are underweight (0-59 months)		PREVENTION: % of infants who are exclusively breastfed (<6 months)	PREVENTION: % of one-year-old children immunized against:		TREATMENT: % of under-fives with pneumonia taken to an appropriate health-care provider
						moderate & severe	severe		measles	Hib	
	2004	2004	2004	2004	2004	(1996-2004)*	(1996-2004)*	(1996-2004)*	2004	2004	1998-2004*
Afghanistan	257	359	5,329	25	89	39	12	-	61	-	28
Albania	19	1	256	11	0	14	1	6	96	-	83
Algeria	40	27	3,099	14	4	10	3	13	81	-	52
Andorra	7	0	3	-	-	-	-	-	98	95	-
Angola	260	195	2,887	25	48	31	8	11	64	-	58
Antigua and Barbuda	12	0	8	2	0	10 [x]	4 [x]	-	97	97	-
Argentina	18	12	3,350	3	0	5	1	-	95	90	-
Armenia	32	1	164	12	0	3	0	30	92	-	26
Australia	6	1	1,257	1	0	-	-	-	93	95	-
Austria	5	0	387	1	0	-	-	-	74	83	-
Azerbaijan	90	12	607	18	2	7	1	7	98	-	36
Bahamas	13	0	30	5	0	-	-	-	89	93	-
Bahrain	11	0	65	1	0	9 [x]	2 [x]	34 [x, k]	99	98	-
Bangladesh	77	288	17,284	18	51	48	13	36	77	-	20
Barbados	12	0	16	0	0	6 [x]	1 [x]	-	98	93	-
Belarus	11	1	444	9	0	-	-	-	99	-	-
Belgium	5	1	565	1	0	-	-	-	82	95	-
Belize	39	0	34	7	0	6 [x]	1 [x]	24 [k]	95	96	66
Benin	152	52	1,406	21	11	23	5	38	85	-	35
Bhutan	80	5	289	19	1	19	3	-	87	-	-
Bolivia	69	18	1,231	17	3	8	1	54	64	81	52
Bosnia and Herzegovina	15	1	194	3	0	4	1	6	88	79	80
Botswana	116	5	221	1	0	13	2	34	90	-	14
Brazil	34	127	17,946	13	17	6	1	-	99	96	46 [x]
Brunei Darussalam	9	0	40	1	0	-	-	-	99	92	-
Bulgaria	15	1	332	16	0	-	-	-	95	-	-
Burkina Faso	192	115	2,393	23	27	38	14	19	78	-	36
Burundi	190	63	1,270	23	14	45	13	62	75	83	40
Cambodia	141	60	1,801	21	12	45	13	12	80	-	37
Cameroon	149	84	2,434	22	18	18	4	21	64	-	40
Canada	6	2	1,705	1	0	-	-	-	95	83	-
Cape Verde	36	1	70	13	0	14 [x]	2 [x]	57 [k]	69	-	-
Central African Republic	193	29	636	19	5	24	6	17	35	-	32
Chad	200	91	1,804	23	21	28	9	2	56	-	22
Chile	8	2	1,246	6	0	1	-	63	95	94	-
China	31	539	86,055	13	72	8	-	51	84	-	-
Colombia	21	20	4,734	10	2	7	1	26	92	89	51
Comoros	70	2	125	16	0	25	9	21	73	-	49
Congo	108	19	727	14	3	14	3	4 [k]	65	-	-
Congo, Democratic Republic of the	205	572	10,829	23	132	31	9	24	64	-	36
Cook Islands	21	0	2	1	0	-	-	19 [k]	99	-	-
Costa Rica	13	1	393	4	0	5	0	35 [x, k]	88	90	-
Côte d'Ivoire	194	128	2,751	20	25	17	5	5	49	-	38
Croatia	7	0	210	1	0	1	-	23	96	93	-
Cuba	7	1	689	4	0	4	0	41	99	99	-
Cyprus	5	0	49	2	0	-	-	-	86	58	-
Czech Republic	4	0	449	4	0	1 [x]	0 [x]	-	97	98	-
Denmark	5	0	329	1	0	-	-	-	96	95	-
Djibouti	126	3	120	20	1	18	6	-	60	-	-
Dominica	14	0	7	0	0	5 [x]	0 [x]	-	99	-	-
Dominican Republic	32	7	997	13	1	5	1	10	79	71	64
Ecuador	26	8	1,449	12	1	12	-	35	99	90	-
Egypt	36	68	8,795	15	10	9	1	30	97	-	70
El Salvador	28	5	804	13	1	10	1	24	93	83	62
Equatorial Guinea	204	4	86	17	1	19	4	24	51	-	-
Eritrea	82	14	733	19	3	40	12	52	84	-	44
Estonia	8	0	63	2	0	-	-	-	96	27	-
Ethiopia	166	509	12,861	22	114	47	16	55	71	-	16
Fiji	20	0	93	9	0	8 [x]	1 [x]	47 [x, k]	62	71	-

TABLE 1 KEY PNEUMONIA INDICATORS: MORTALITY, PREVENTION AND TREATMENT (CONTINUED)

Countries and territories	Under-five mortality rate	Total number of under-five deaths (000s)	Total number of under-five children (000s)	PNEUMONIA DEATHS		PREVENTION					TREATMENT
				% of under-five deaths due to pneumonia	Total number of under-five pneumonia deaths (000s)[a]	% of children who are underweight (0-59 months)		% of infants who are exclusively breastfed (<6 months)	% of one-year-old children immunized against:		% of under-fives with pneumonia taken to an appropriate health-care provider
						moderate & severe	severe		measles	Hib	
	2004	2004	2004	2004	2004	(1996-2004)*	(1996-2004)*	(1996-2004)*	2004	2004	1998-2004*
Finland	4	0	281	1	0	-	-	-	97	96	-
France	5	4	3,722	1	0	-	-	-	86	86	-
Gabon	91	4	193	11	0	12	2	6	55	-	48
Gambia	122	6	228	15	1	17	4	26	90	90	75
Georgia	45	2	245	12	0	3	0	18 [k]	86	-	99
Germany	5	3	3,615	1	0	-	-	-	92	90	-
Ghana	112	76	3,069	15	11	22	5	53	83	80	44
Greece	5	1	517	3	0	-	-	-	88	88	-
Grenada	21	0	10	10	0	-	-	39 [k]	74	83	-
Guatemala	45	19	1,988	15	3	23	4	51	75	-	64
Guinea	155	59	1,562	21	12	21	-	23	73	-	33
Guinea-Bissau	203	16	300	23	4	25	7	37	80	-	64
Guyana	64	1	76	5	0	14	3	11	88	91	78
Haiti	117	30	1,137	20	6	17	4	24	54	-	26
Holy See	-	-	-	-	-	-	-	-	-	-	-
Honduras	41	8	975	14	1	17	-	35	92	89	-
Hungary	8	1	481	4	0	2 [x]	0 [x]	-	99	99	-
Iceland	3	0	21	0	0	-	-	-	93	99	-
India	85	2,210	120,155	19	410	47	18	37 [k]	56	-	67
Indonesia	38	171	21,477	14	25	28	9	40	72	-	61
Iran (Islamic Republic of)	38	50	5,890	6	3	11	2	44	96	-	93
Iraq	125	122	4,274	18	22	16	2	12	90	-	76
Ireland	6	0	296	1	0	-	-	-	81	89	-
Israel	6	1	660	0	0	-	-	-	96	96	-
Italy	5	3	2,661	1	0	-	-	-	84	90	-
Jamaica	20	1	262	9	0	4	-	-	80	77	39
Japan	4	5	5,912	4	0	-	-	-	99	-	-
Jordan	27	4	734	12	0	4	1	27	99	95	78
Kazakhstan	73	17	1,079	17	3	4	0	36	99	-	48
Kenya	120	159	5,557	20	32	20	4	13	73	73	49
Kiribati	65	0	12	12	0	13 [x]	-	80 [x, k]	56	-	-
Korea, Democratic People's Republic of	55	19	1,763	15	3	23	8	65	95	-	93
Korea, Republic of	6	3	2,521	2	0	-	-	-	99	-	-
Kuwait	12	1	235	4	0	10	3	12 [k]	97	98	-
Kyrgyzstan	68	8	539	17	1	11	2	24	99	-	48 [x]
Lao People's Democratic Republic	83	17	884	19	3	40	13	23	36	-	36
Latvia	12	0	99	1	0	-	-	-	99	95	-
Lebanon	31	2	327	1	0	3	0	27 [k]	96	92	74
Lesotho	82	4	232	5	0	18	4	15	70	-	49
Liberia	235	39	621	23	9	26	8	35	42	-	70
Libyan Arab Jamahiriya	20	3	623	9	0	5 [x]	1 [x]	-	99	-	-
Liechtenstein	5	0	2	-	-	-	-	-	-	-	-
Lithuania	8	0	154	5	0	-	-	-	98	35	-
Luxembourg	6	0	29	1	0	-	-	-	91	86	-
Madagascar	123	87	3,064	21	18	42	11	67	59	-	48
Malawi	175	96	2,319	23	22	22	-	44	80	89	27
Malaysia	12	7	2,738	4	0	11	1	29 [k]	95	99	-
Maldives	46	0	46	17	0	30	7	10	97	-	22
Mali	219	142	2,540	24	34	33	11	25	75	-	36
Malta	6	0	20	0	0	-	-	-	87	55	-
Marshall Islands	59	0	7	14	0	-	-	63 [x, k]	70	46	-
Mauritania	125	15	513	22	3	32	10	20	64	-	41
Mauritius	15	0	98	4	0	15 [x]	2 [x]	21 [k]	98	-	-
Mexico	28	62	10,962	8	5	8	1	38 [x, k]	96	98	-
Micronesia (Federated States of)	23	0	16	11	0	-	-	60 [k]	85	65	-
Moldova, Republic of	28	1	211	16	0	3	-	-	96	-	78
Monaco	5	0	2	-	-	-	-	-	99	99	-
Mongolia	52	3	268	17	1	13	3	51	96	-	78
Montenegro***	15	2	611	9	0	2	0	11 [k]	96	-	97

TABLE 1 KEY PNEUMONIA INDICATORS: MORTALITY, PREVENTION AND TREATMENT (CONTINUED)

Countries and territories	Under-five mortality rate	Total number of under-five deaths (000s)	Total number of under-five children (000s)	PNEUMONIA DEATHS		PREVENTION					TREATMENT
				% of under-five deaths due to pneumonia	Total number of under-five pneumonia deaths (000s)[a]	% of children who are underweight (0-59 months)		% of infants who are exclusively breastfed (<6 months)	% of one-year-old children immunized against:		% of under-fives with pneumonia taken to an appropriate health-care provider
						moderate & severe	severe		measles	Hib	
	2004	2004	2004	2004	2004	(1996-2004)*	(1996-2004)*	(1996-2004)*	2004	2004	1998-2004*
Morocco	43	31	3,343	14	4	9	2	31	95	10	38
Mozambique	152	117	3,254	21	25	24	6	30	77	-	55
Myanmar	106	105	4,716	19	20	32	7	15 [k]	78	-	66
Namibia	63	4	273	3	0	24	5	19	70	-	53
Nauru	30	0	2	30	0	-	-	-	40	-	-
Nepal	76	60	3,638	19	11	48	13	68	73	-	26
Netherlands	6	1	979	1	0	-	-	-	96	97	-
New Zealand	6	0	276	3	0	-	-	-	85	90	-
Nicaragua	38	6	730	14	1	10	2	31	84	79	57
Niger	259	190	2,775	25	48	40	14	1	74	-	27
Nigeria	197	1,049	21,943	20	211	29	9	17	35	-	33
Niue	-	-	0	-	-	-	-	-	99	99	-
Norway	4	0	286	1	0	-	-	-	88	93	-
Occupied Palestinian Territory	24	3	637	-	-	4	1	29 [k]	96	-	65
Oman	13	1	302	7	0	24 [x]	4 [x]	-	98	99	-
Pakistan	101	478	20,922	19	92	38	12	16 [x, k]	67	-	66 [x]
Palau	27	0	2	12	0	-	-	59 [x, k]	99	98	-
Panama	24	2	341	11	0	7	-	25 [x]	99	99	-
Papua New Guinea	93	16	820	18	3	35 [x]	-	59	44	-	75 [x]
Paraguay	24	4	814	12	0	5	-	22	89	76	51 [x]
Peru	29	18	3,007	14	2	7	1	67	89	91	58
Philippines	34	69	9,873	13	9	28	-	34	80	-	55
Poland	8	3	1,830	3	0	-	-	-	97	-	-
Portugal	5	1	562	2	0	-	-	-	95	95	-
Qatar	21	0	65	8	0	6 [x]	-	12 [k]	99	96	-
Romania	20	4	1,063	27	1	6 [x]	1 [x]	-	97	-	-
Russian Federation	21	32	7,052	6	2	3 [x]	1 [x]	-	98	-	-
Rwanda	203	74	1,477	23	17	27	7	84	84	89	20
Saint Kitts and Nevis	21	0	4	0	0	-	-	56 [k]	98	95	-
Saint Lucia	14	0	14	1	0	14 [x]	-	-	95	91	-
Saint Vincent and the Grenadines	22	0	12	11	0	-	-	-	99	99	-
Samoa	30	0	26	10	0	-	-	-	25	-	-
San Marino	4	0	1	-	-	-	-	-	98	98	-
Sao Tome and Principe	118	1	23	21	0	13	2	56	91	-	47
Saudi Arabia	27	18	3,178	7	1	14	3	31 [k]	97	96	-
Senegal	137	57	1,820	21	12	23	6	24 [k]	57	-	27
Serbia***	15	2	611	9	0	2	0	11 [k]	96	-	97
Seychelles	14	0	14	10	0	6 [x]	0 [x]	-	99	-	-
Sierra Leone	283	69	925	25	18	27	9	4	64	-	50
Singapore	3	0	226	9	0	14 [x]	-	-	94	-	-
Slovakia	9	0	259	9	0	-	-	-	98	99	-
Slovenia	4	0	87	0	0	-	-	-	94	93	-
Solomon Islands	56	1	71	9	0	21 [x]	4 [x]	65 [k]	72	-	-
Somalia	225	81	1,446	24	19	26	7	9	40	-	-
South Africa	67	73	5,248	1	1	12	2	7	81	92	75
Spain	5	2	2,160	1	0	-	-	-	97	96	-
Sri Lanka	14	5	1,631	9	0	29	-	84	96	-	-
Sudan	91	106	5,180	15	16	17 [x]	7 [x]	16	59	-	57
Suriname	39	0	46	11	0	13	2	9	86	-	58
Swaziland	156	5	138	12	1	10	2	24	70	-	60
Sweden	4	0	479	1	0	-	-	-	94	98	-
Switzerland	5	0	361	1	0	-	-	-	82	91	-
Syrian Arab Republic	16	8	2,488	10	1	7	1	81 [k]	98	99	66
Tajikistan	118	22	839	20	4	-	-	50	89	-	51
Tanzania, United Republic of	126	177	5,998	21	37	22	4	41	94	-	68
Thailand	21	21	5,020	11	2	19 [x]	-	4 [x, k]	96	-	-
The former Yugoslav Republic of Macedonia	14	0	119	4	0	6	1	37	96	-	-

TABLE 1 KEY PNEUMONIA INDICATORS: MORTALITY, PREVENTION AND TREATMENT (CONTINUED)

Countries and territories	Under-five mortality rate	Total number of under-five deaths (000s)	Total number of under-five children (000s)	PNEUMONIA DEATHS		PREVENTION					TREATMENT
				% of under-five deaths due to pneumonia	Total number of under-five pneumonia deaths (000s)[a]	% of children who are underweight (0-59 months)		% of infants who are exclusively breastfed (<6 months)	% of one-year-old children immunized against:		% of under-fives with pneumonia taken to an appropriate health-care provider
						moderate & severe	severe		measles	Hib	
	2004	2004	2004	2004	2004	(1996-2004)*	(1996-2004)*	(1996-2004)*	2004	2004	1998-2004*
Timor-Leste	80	4	160	20	1	46	15	31	55	-	24
Togo	140	33	996	17	6	25	7	18	70	-	30
Tonga	25	0	12	7	0	-	-	62 [k]	99	-	-
Trinidad and Tobago	20	0	89	2	0	7 [x]	0 [x]	2	95	94	74
Tunisia	25	4	806	8	0	4	1	47	95	97	43
Turkey	32	48	7,236	14	7	4	1	21	81	-	41
Turkmenistan	103	11	484	19	2	12	2	13	97	-	51
Tuvalu	51	0	1	14	0	-	-	-	98	-	-
Uganda	138	195	5,744	21	41	23	5	63	91	87	67
Ukraine	18	7	1,930	6	0	1	0	22	99	-	-
United Arab Emirates	8	1	325	5	0	14 [x]	3 [x]	34 [x, k]	94	94	-
United Kingdom	6	4	3,398	2	0	-	-	-	81	91	-
United States	8	33	20,243	1	0	1 [x]	0 [x]	-	93	94	-
Uruguay	17	1	283	5	0	5 [x]	1 [x]	-	95	94	-
Uzbekistan	69	42	2,815	17	7	8	2	19	98	-	57
Vanuatu	40	0	30	13	0	20 [x]	-	50 [k]	48	-	-
Venezuela (Bolivarian Republic of)	19	11	2,842	6	1	4	1	7 [k]	80	61	72
Viet Nam	23	38	7,900	12	4	28	4	15	97	-	7
Yemen	111	92	3,581	20	18	46	15	12	76	-	47
Zambia	182	85	1,987	22	19	23	-	40	84	80	69
Zimbabwe	129	50	1,756	15	7	13	2	33	80	-	50
UNICEF Regions											
Sub-Saharan Africa	171	4,833	117,346	21	1,022	28	8	30	66	-	41
Eastern and Southern Africa	149	1,992	56,702	21	414	29	8	41	77	-	47
Western and Central Africa	191	2,844	60,644	21	608	28	9	20	55	-	35
Middle East and North Africa	56	539	44,067	15	82	14	3	29	89	-	66
South Asia	92	3,409	169,294	21	702	46	16	38	61	-	59
East Asia and Pacific	36	1,078	146,536	15	158	15	-	43	83	-	62 [**]
Latin America and Caribbean	31	362	56,526	14	50	7	1	-	92	91	52 [w]
CEE/CIS	38	212	26,430	13	29	5	1	22	93	-	50
Industrialized countries	6	65	54,200	2	1	-	-	-	92	92	-
Developing countries	87	10,411	548,486	20	2,039	27	10	36	74	-	54 [**]
Least developed countries	155	4,313	117,229	23	976	36	11	34	72	-	38
World	**79**	**10,503**	**614,399**	**19**	**2,044**	**26**	**10**	**36**	**76**	**-**	**54** [**]

* Data refer to the most recent year available during the period specified in the column heading.

** Excludes China.

*** Data represent combined estimates for Serbia and Montenegro. At the time of publication, no separate estimates were available.

a Regional and global totals are based on unrounded estimates of under-five deaths.

k Refers to exclusive breastfeeding for less than four months.

w Regional average includes data for Brazil from 1996.

x Indicates data that refer to years or periods other than those specified in the column heading, differ from the standard definition or refer to only part of a country.

Sources: Columns 2-4 and 7-12: UNICEF, *The State of the World's Children 2006*, UNICEF, New York, December 2005; Columns 5-6: Estimates of childhood pneumonia death based on the work of the CHERG (see Appendix), and appear in World Health Organization, 2006, World Health Statistics 2006, WHO, Geneva.

TABLE 2 CARE-SEEKING BEHAVIOUR FOR PNEUMONIA, BY SELECTED BACKGROUND CHARACTERISTICS, 1996-2003

Countries and territories	Year	% of under-fives with pneumonia taken to an appropriate health care provider	Area of residence		Gender		Mother's education			Source
			Urban	Rural	Male	Female	No formal education	Primary	Secondary[1]	
Angola	2001	58	55	64	58	59	55	58	73	MICS 2001
Armenia	2000	26	28	24	24	29	-	0	26	DHS 2000
Azerbaijan	2000	36	29	38	30	42	-	-	35	MICS 2000
Bangladesh	2000	27	48	24	29	25	24	24	38	DHS 2000
Benin	2001	35	39	33	36	34	31	49	41	DHS 2001
Bolivia	2003	52	56	45	54	49	41	48	61	DHS 2003
Botswana	2000	14	15	13	16	13	-	-	0	MICS 2000
Brazil	1996	46	50	34	47	45	25	40	54	DHS 1996
Burkina Faso	2003	36	65	32	36	36	32	51	84	DHS 2003
Burundi	2000	40	69	39	40	39	38	40	67	MICS 2000
Cambodia	2000	37	47	35	40	33	30	37	51	DHS 2000
Cameroon	2000	25	48	19	27	22	18	22	42	MICS 2000
Central African Republic	2000	32	42	27	32	32	26	38	48	MICS 2000
Chad	2000	22	36	35	22	21	17	19	51	MICS 2000
Comoros	2000	49	64	46	49	49	45	51	71	MICS 2000
Congo, Democratic Republic of the	2001	36	46	32	35	36	32	35	44	MICS 2001
Côte d'Ivoire	2000	38	46	34	37	38	35	39	53	MICS 2000
Dominican Republic	2002	63	64	63	64	63	71	64	63	DHS 2002
Egypt	2000	66	77	61	68	64	60	61	75	DHS 2000
Eritrea	2002	44	57	40	44	43	39	53	55	DHS 2002
Ethiopia	2000	16	41	14	17	14	15	17	37	DHS 2000
Gabon	2000	48	52	34	51	44	47	42	52	DHS 2000
Gambia	2000	75	93	70	71	79	72	81	100	MICS 2000
Ghana	2003	44	53	40	44	44	35	38	57	DHS 2003
Guatemala	2000	37	46	33	38	36	38	37	38	DHS 2000
Guinea	2003	33	43	29	32	34	32	19	46	MICS 2003
Guinea-Bissau	2000	64	76	57	64	65	60	81	74	MICS 2000
Guyana	2000	78	86	75	72	85	47	86	76	MICS 2000
Haiti	2000	26	32	24	25	27	23	24	42	DHS 2000
India	2000	67	78	64	69	63	60	71	79	DHS 2000
Indonesia	2002	61	68	55	60	62	63	57	66	DHS 2002
Jordan	2002	78	79	77	82	73	81	75	78	DHS 2002
Kenya	2003	49	63	46	50	48	47	49	52	DHS 2003
Kyrgyzstan	1997	48	91	42	49	46	-	-	48	DHS 1997
Lao People's Democratic Republic	2000	36	55	32	36	37	20	42	51	MICS 2000
Lesotho	2000	49	52	48	49	50	61	46	56	MICS 2000
Madagascar	2000	47	-	-	50	44	40	47	66	MICS 2000
Malawi	2000	27	48	25	26	27	22	26	53	DHS 2000
Mali	2001	36	68	26	38	33	31	49	77	DHS 2001
Mauritania	2001	41	56	26	43	38	33	51	64	DHS 2001
Mongolia	2000	78	78	77	78	78	71	73	157	MICS 2000
Morocco	2003	38	50	25	42	34	32	45	51	DHS 2003
Mozambique	1997	39	65	28	41	36	26	46	91	DHS 1997
Myanmar	2000	48	66	45	50	46	40	43	69	MICS 2000
Namibia	2000	53	63	49	54	53	46	47	61	DHS 2000
Nepal	2000	26	41	25	29	23	23	32	36	DHS 2000
Nicaragua	2001	58	65	51	58	57	45	58	68	DHS 2001
Niger	2000	27	63	46	26	28	25	44	55	MICS 2000
Nigeria	2003	33	34	32	32	33	23	42	47	DHS 2003
Peru	2000	58	64	51	57	59	45	49	67	DHS 2000
Philippines	2003	55	63	49	55	54	33	51	58	DHS 2003
Rwanda	2000	16	24	14	16	15	15	15	26	DHS 2000
Sao Tome and Principe	2000	47	39	57	46	46	55	50	40	MICS 2000
Senegal	2000	27	30	26	30	23	25	34	42	MICS 2000
Sierra Leone	2000	50	57	48	51	48	48	36	69	MICS 2000
South Africa	1998	75	78	73	75	75	73	77	75	DHS 1998
Sudan	2000	57	67	50	59	56	50	62	69	MICS 2000
Suriname	2000	58	49	61	56	60	74	52	54	MICS 2000
Swaziland	2000	60	56	60	58	62	58	58	64	MICS 2000
Tajikistan	2000	51	40	54	45	55	50	-	51	MICS 2000
Tanzania, United Republic of	1996	70	81	67	70	69	74	68	82	DHS 1996
Togo	2000	30	62	25	35	24	28	35	37	MICS 2000
Uganda	2000	67	80	65	68	65	61	67	77	DHS 2000
Viet Nam	2002	71	75	71	76	65	88	66	72	DHS 2002
Yemen	1997	32	43	29	33	31	29	44	51	DHS 1997
Zambia	2002	69	73	67	68	70	64	69	74	DHS 2002
Zimbabwe	1999	50	55	48	50	50	39	49	52	DHS 1999
Average (67 countries)		**46**	**56**	**43**	**46**	**45**	**43**	**47**	**59**	

[1] Data from DHS refer to secondary education or higher.

MICS: Multiple Indicator Cluster Survey
DHS: Demographic and Health Survey

TABLE 3 CAREGIVERS WHO KNOW THAT FAST BREATHING IS A SIGN TO SEEK CARE IMMEDIATELY, BY BACKGROUND CHARACTERISTICS, 1999-2001

Countries and territories	Year	% of caregivers who know that fast breathing is a sign to seek care immediately	Area of residence		Mother's education			Wealth quintiles					Source
			Urban	Rural	No formal education	Primary	Secondary	Poorest	Second	Middle	Fourth	Richest	
Angola	2001	37	35	40	37	38	32	40	39	33	36	37	MICS 2001
Azerbaijan	2000	5	5	6	-	4	6	6	6	4	5	6	MICS 2000
Bolivia	2000	1	1	1	0	1	1	1	0	1	1	1	MICS 2000
Bosnia and Herzegovina	2000	33	32	34	-	35	32	-	-	-	-	-	MICS 2000
Burundi	2000	47	55	47	47	53	63	46	46	45	48	51	MICS 2000
Cameroon	2000	4	5	4	3	4	5	3	3	5	5	5	MICS 2000
Central African Republic	2000	15	17	14	16	15	13	17	15	15	14	15	MICS 2000
Chad	2000	11	12	11	14	10	10	15	10	10	12	11	MICS 2000
Comoros	2000	13	18	10	13	10	16	11	13	10	14	15	MICS 2000
Congo, Democratic Republic of the	2001	32	27	34	68	69	56	36	36	35	26	26	MICS 2001
Côte d'Ivoire	2000	9	11	7	8	9	13	8	7	6	10	16	MICS 2000
Dominican Republic	2000	5	4	6	4	6	4	5	8	3	4	6	MICS 2000
Gambia	2000	18	25	13	17	17	21	11	14	15	24	25	MICS 2000
Guinea-Bissau	2000	39	55	29	36	48	57	19	29	40	46	65	MICS 2000
Guyana	2000	17	30	14	9	16	18	-	-	-	-	-	MICS 2000
Indonesia	2000	25	24	25	21	21	-	-	-	-	-	-	MICS 2000
Lao People's Democratic Republic	2000	15	22	13	12	17	21	11	16	14	17	21	MICS 2000
Lesotho	2000	33	26	35	32	34	31	38	35	33	30	30	MICS 2000
Madagascar	2000	3	3	3	3	3	2	3	3	3	3	2	MICS 2000
Mongolia	2000	11	13	10	13	10	21	8	12	13	13	11	MICS 2000
Myanmar	2000	10	8	11	14	11	9	11	11	10	9	8	MICS 2000
Niger	2000	6	7	5	5	8	10	6	4	4	5	7	MICS 2000
Rwanda	2000	19		20	19	19	19	18	21	20	18	17	MICS 2000
Sao Tome and Principe	2000	7	9	4	6	5	9	3	3	7	8	12	MICS 2000
Senegal	2000	6	8	5	5	8	6	3	7	6	6	6	MICS 2000
Sierra Leone	2000	24	17	27	26	19	17	23	24	20	29	25	MICS 2000
Sudan	2000	26	26	26	25	36	26	24	25	25	29	29	MICS 2000
Suriname	2000	7	2	7	12	12	3	1	5	5	5	15	MICS 2000
Swaziland	2000	14	22	12	12	13	15	13	12	14	15	16	MICS 2000
Tajikistan	2000	48	57	46	35	30	49	54	47	46	44	51	MICS 2000
Togo	2000	8	8	8	9	5	4	19	-	5	-	13	MICS 2000
Viet Nam	2000	21	20	22	18	18	46	22	20	21	25	18	MICS 2000
Zambia	1999	7	9	6	7	7	8	6	7	4	7	12	MICS 1999
Average (33 countries)		**17**	**19**	**17**	**17**	**18**	**20**	**16**	**16**	**16**	**17**	**19**	

TABLE 4 CAREGIVERS WHO KNOW THAT DIFFICULT BREATHING IS A SIGN TO SEEK CARE IMMEDIATELY, BY SELECTED BACKGROUND CHARACTERISTICS, 1999-2001

Countries and territories	Year	% of caregivers who know that difficult breathing is a sign to seek care immediately	Area of residence		Mother's education			Wealth quintiles					Source
			Urban	Rural	No formal education	Primary	Secondary	Poorest	Second	Middle	Fourth	Richest	
Angola	2001	31	29	34	29	32	29	32	30	28	33	30	MICS 2001
Azerbaijan	2000	11	13	9	-	7	16	10	12	11	10	12	MICS 2000
Bolivia	2000	3	4	2	1	2	4	2	3	3	2	5	MICS 2000
Bosnia and Herzegovina	2000	40	42	40	-	38	42	-	-	-	-	-	MICS 2000
Burundi	2000	54	53	54	52	59	61	48	52	58	55	58	MICS 2000
Cameroon	2000	8	8	8	7	8	9	6	10	8	9	8	MICS 2000
Central African Republic	2000	15	15	15	16	15	13	17	16	14	15	12	MICS 2000
Chad	2000	17	16	17	17	17	16	22	15	13	16	16	MICS 2000
Comoros	2000	16	21	14	16	13	19	15	14	17	15	18	MICS 2000
Congo, Democratic Republic of the	2001	33	31	35	70	73	60	36	37	38	29	28	MICS 2001
Côte d'Ivoire	2000	10	14	9	9	11	18	10	8	9	12	17	MICS 2000
Dominican Republic	2000	19	19	19	18	19	20	18	23	17	18	20	MICS 2000
Gambia	2000	19	25	15	17	27	23	16	11	17	24	27	MICS 2000
Guinea-Bissau	2000	38	57	26	34	49	63	12	25	40	48	67	MICS 2000
Guyana	2000	25	31	24	17	25	25	-	-	-	-	-	MICS 2000
Indonesia	2000	35	36	35	34	31	-	-	-	-	-	-	MICS 2000
Lao People's Democratic Republic	2000	25	34	22	21	26	32	20	25	23	27	31	MICS 2000
Lesotho	2000	29	23	30	34	28	28	29	34	27	28	25	MICS 2000
Madagascar	2000	7	7	7	6	7	7	7	6	8	7	6	MICS 2000
Mongolia	2000	12	12	11	12	9	24	11	13	12	11	11	MICS 2000
Myanmar	2000	14	12	14	17	14	13	14	12	20	13	9	MICS 2000
Niger	2000	10	15	7	9	13	19	6	7	8	9	14	MICS 2000
Rwanda	2000	20	-	20	20	19	24	19	19	18	22	28	MICS 2000
Sao Tome and Principe	2000	6	8	5	6	6	7	4	4	5	5	14	MICS 2000
Senegal	2000	8	9	7	7	8	8	7	9	8	8	6	MICS 2000
Sierra Leone	2000	27	18	30	28	31	18	25	27	29	32	21	MICS 2000
Sudan	2000	35	36	34	34	36	36	31	34	36	39	36	MICS 2000
Suriname	2000	11	6	12	18	15	8	10	8	9	9	18	MICS 2000
Swaziland	2000	12	16	10	11	10	13	10	10	12	13	17	MICS 2000
Tajikistan	2000	56	64	53	54	48	56	60	57	51	52	59	MICS 2000
Togo	2000	15	17	14	16	12	16	33	-	13	-	30	MICS 2000
Viet Nam	2000	39	42	38	29	37	82	35	41	41	45	37	MICS 2000
Zambia	1999	8	10	6	8	8	8	7	6	4	8	13	MICS 1999
Average (33 countries)		**21**	**23**	**20**	**21**	**23**	**26**	**19**	**20**	**20**	**21**	**23**	

TABLE 5 CHILDREN UNDER FIVE WITH PNEUMONIA TREATED WITH ANTIBIOTICS (MAINLY FROM THE EARLY 1990s), BY SELECTED BACKGROUND CHARACTERISTICS

Countries and territories	Year	% of under-fives with pneumonia treated with antibiotics	Area of residence		Gender		Mother's education			Source	
			Urban	Rural	Male	Female	No formal education	Primary	Secondary[1]		
Brazil	1991	13	14	13	14	13	9	14	22	DHS	1991
Brazil	1996	15	16	12	14	16	14	11	19	DHS	1996
Burkina Faso	1992-93	12	27	9	12	12	10	19	61	DHS	1992-93
Burundi	1987	1	3	1	1	1	1	1	1	DHS	1987
Cameroon	1991	13	19	10	14	12	3	17	27	DHS	1991
Colombia	1986	5	7	2	6	4	3	6	5	DHS	1986
Colombia	1990	30	30	31	31	30	14	33	30	DHS	1990
Dominican Republic	1991	29	29	28	30	27	20	29	31	DHS	1991
Dominican Republic	1996	10	12	8	10	10	6	12	9	DHS	1996
Egypt	1992	25	35	18	29	20	18	27	36	DHS	1992
Egypt	2000	75	82	73	76	75	70	71	83	DHS	2000
Ghana	1993	24	38	21	23	26	16	34	13	DHS	1993
Ghana	1998	16	13	17	14	18	14	17	18	DHS	1998
India	1992-93	33	37	33	34	32	32	32	40	DHS	1992-93
Kenya	1993	22	24	22	25	20	20	23	24	DHS	1993
Liberia	1986	2	2	2	2	3	2	2	3	DHS	1986
Madagascar	1992	20	25	19	20	20	17	16	33	DHS	1992
Malawi	1992	24	38	22	22	26	23	24	27	DHS	1992
Mali	1987	2	3	2	4	0	1	12	0	DHS	1987
Morocco	1992	7	11	5	8	5	5	10	21	DHS	1992
Namibia	1992	23	26	22	22	24	21	23	25	DHS	1992
Niger	1992	9	25	7	10	9	9	9	26	DHS	1992
Nigeria	1990	23	35	21	24	23	21	27	26	DHS	1990
Pakistan	1990-91	16	24	13	16	16	14	20	28	DHS	1990-91
Paraguay	1992	29	34	24	33	23	17	28	34	DHS	1992
Philippines	1993	44	49	40	47	41	29	39	49	DHS	1993
Philippines	1998	36	43	32	39	33	30	28	42	DHS	1998
Rwanda	1992	4	18	3	4	3	3	4	14	DHS	1992
Senegal	1992-93	18	21	17	18	19	17	25	24	DHS	1992-93
Tanzania, United Republic of	1992	22	22	22	20	23	16	24	32	DHS	1992
Turkey	1993	22	29	16	23	22	22	20	33	DHS	1993
Yemen	1991-92	7	12	6	7	6	6	16	32	DHS	1991-92
Zambia	1992	14	23	8	14	14	9	12	29	DHS	1992
Average (27 countries)[1]		**19**	**24**	**17**	**19**	**18**	**15**	**20**	**27**		

[1] Average is based on the latest available data for 27 countries.

REGIONAL SUMMARIES

Regional averages presented in this report, including Statistical Table 1, are calculated using data from the countries and territories as grouped below.

Sub-Saharan Africa

Angola; Benin; Botswana; Burkina Faso; Burundi; Cameroon; Cape Verde; Central African Republic; Chad; Comoros; Congo; Congo, Democratic Republic of the; Côte d'Ivoire; Equatorial Guinea; Eritrea; Ethiopia; Gabon; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Lesotho; Liberia; Madagascar; Malawi; Mali; Mauritania; Mauritius; Mozambique; Namibia; Niger; Nigeria; Rwanda; Sao Tome and Principe; Senegal; Seychelles; Sierra Leone; Somalia; South Africa; Swaziland; Tanzania, United Republic of; Togo; Uganda; Zambia; Zimbabwe.

Middle East and North Africa

Algeria; Bahrain; Djibouti; Egypt; Iran (Islamic Republic of); Iraq; Jordan; Kuwait; Lebanon; Libyan Arab Jamahiriya; Morocco; Occuped Palestinian Territory; Oman; Qatar; Saudi Arabia; Sudan; Syrian Arab Republic; Tunisia; United Arab Emirates; Yemen.

South Asia

Afghanistan; Bangladesh; Bhutan; India; Maldives; Nepal; Pakistan; Sri Lanka.

East Asia and Pacific

Brunei Darussalam; Cambodia; China; Cook Islands; Fiji; Indonesia; Kiribati; Korea, Democratic People's Republic of; Korea, Republic of; Lao People's Democratic Republic; Malaysia; Marshall Islands; Micronesia (Federated States of); Mongolia; Myanmar; Nauru; Niue; Palau; Papua New Guinea; Philippines; Samoa; Singapore; Solomon Islands; Thailand; Timor-Leste; Tonga; Tuvalu; Vanuatu; Viet Nam.

Latin America and Caribbean

Antigua and Barbuda; Argentina; Bahamas; Barbados; Belize; Bolivia; Brazil; Chile; Colombia; Costa Rica; Cuba; Dominica; Dominican Republic; Ecuador; El Salvador; Grenada; Guatemala; Guyana; Haiti; Honduras; Jamaica; Mexico; Nicaragua; Panama; Paraguay; Peru; Saint Kitts and Nevis; Saint Lucia; Saint Vincent and the Grenadines; Suriname; Trinidad and Tobago; Uruguay; Venezuela (Bolivarian Republic of).

CEE/CIS

Albania; Armenia; Azerbaijan; Belarus; Bosnia and Herzegovina; Bulgaria; Croatia; Georgia; Kazakhstan; Kyrgyzstan; Moldova, Republic of; Montenegro; Romania; Russian Federation; Serbia; Tajikistan; the former Yugoslav Republic of Macedonia; Turkey; Turkmenistan; Ukraine; Uzbekistan.

Industrialized countries

Andorra; Australia; Austria; Belgium; Canada; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Holy See; Hungary; Iceland; Ireland; Israel; Italy; Japan; Latvia; Liechtenstein; Lithuania; Luxembourg; Malta; Monaco; Netherlands; New Zealand; Norway; Poland; Portugal; San Marino; Slovakia; Slovenia; Spain; Sweden; Switzerland; United Kingdom; United States.

Developing countries

Afghanistan; Algeria; Angola; Antigua and Barbuda; Argentina; Armenia; Azerbaijan; Bahamas; Bahrain; Bangladesh; Barbados; Belize; Benin; Bhutan; Bolivia; Botswana; Brazil; Brunei Darussalam; Burkina Faso; Burundi; Cambodia; Cameroon; Cape Verde; Central African Republic; Chad; Chile; China; Colombia; Comoros; Congo; Congo, Democratic Republic of the; Cook Islands; Costa Rica; Côte d'Ivoire; Cuba; Cyprus; Djibouti; Dominica; Dominican Republic; Ecuador; Egypt; El Salvador; Equatorial Guinea; Eritrea; Ethiopia; Fiji; Gabon; Gambia; Georgia; Ghana; Grenada; Guatemala; Guinea; Guinea-Bissau; Guyana; Haiti; Honduras; India; Indonesia; Iran (Islamic Republic of); Iraq; Israel; Jamaica; Jordan; Kazakhstan; Kenya; Kiribati; Korea, Democratic People's Republic; Korea, Republic of; Kuwait; Kyrgyzstan; Lao People's Democratic Republic; Lebanon; Lesotho; Liberia; Libyan Arab Jamahiriya; Madagascar; Malawi; Malaysia; Maldives; Mali; Marshall Islands; Mauritania; Mauritius; Mexico; Micronesia (Federated States of); Mongolia; Morocco; Mozambique; Myanmar; Namibia; Nauru; Nepal; Nicaragua; Niger; Nigeria; Niue; Occuped Palestinian Territory; Oman; Pakistan; Palau; Panama; Papua New Guinea; Paraguay; Peru; Philippines; Qatar; Rwanda; Saint Kitts and Nevis; Saint Lucia; Saint Vincent and the Grenadines; Samoa; Sao Tome and Principe; Saudi Arabia; Senegal; Seychelles; Sierra Leone; Singapore; Solomon Islands; Somalia; South Africa; Sri Lanka; Sudan; Suriname; Swaziland; Syrian Arab Republic; Tajikistan; Tanzania, United Republic of; Thailand; Timor-Leste; Togo; Tonga; Trinidad and Tobago; Tunisia; Turkey; Turkmenistan; Tuvalu; Uganda; United Arab Emirates; Uruguay; Uzbekistan; Vanuatu; Venezuela (Bolivarian Republic of); Viet Nam; Yemen; Zambia; Zimbabwe.

Least developed countries

Afghanistan; Angola; Bangladesh; Benin; Bhutan; Burkina Faso; Burundi; Cambodia; Cape Verde; Central African Republic; Chad; Comoros; Congo, Democratic Republic of; Djibouti; Equatorial Guinea; Eritrea; Ethiopia; Gambia; Guinea; Guinea-Bissau; Haiti; Kiribati; Lao People's Democratic Republic; Lesotho; Liberia; Madagascar; Malawi; Maldives; Mali; Mauritania; Mozambique; Myanmar; Nepal; Niger; Rwanda; Samoa; Sao Tome and Principe; Senegal; Sierra Leone; Solomon Islands; Somalia; Sudan; Tanzania, United Republic of; Timor-Leste; Togo; Tuvalu; Uganda; Vanuatu; Yemen; Zambia.

PNEUMONIA KILLS MORE CHILDREN THAN ANY OTHER ILLNESS – MORE THAN AIDS, MALARIA AND MEASLES COMBINED.

EFFECTIVE INTERVENTIONS TO REDUCE PNEUMONIA DEATHS ARE AVAILABLE BUT REACH TOO FEW CHILDREN.

MORE THAN A MILLION LIVES COULD BE SAVED IF PREVENTION AND TREATMENT INTERVENTIONS WERE IMPLEMENTED UNIVERSALLY.

PREVENTING CHILDREN UNDER FIVE FROM DEVELOPING PNEUMONIA IN THE FIRST PLACE IS KEY.

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