

Treatment and prevention of pneumonia

Report by the Secretariat

Burden and epidemiology of pneumonia

1. Millennium Development Goal 4 (Reduce child mortality) can only be achieved through intensified efforts to reduce the major causes of death in children under the age of five years: pneumonia, diarrhoea, malaria, malnutrition and neonatal problems. Of these conditions, pneumonia remains the leading killer of children under five years of age worldwide, accounting for 1.8 million of the estimated 9 million deaths in 2007 of children under five years of age.¹
2. The incidence of pneumonia in children under five years of age is estimated to be 0.29 episodes per child-year in developing countries and 0.05 episodes per child-year in developed countries. These figures translate into about 156 million new episodes each year worldwide, of which 151 million are in the developing countries.
3. Mortality due to childhood pneumonia is strongly linked to malnutrition, poverty and inadequate access to health care. Consequently, more than 98% of deaths due to pneumonia in children occur in developing countries, mostly in marginalized communities. The burden that pneumonia places on families and the health system in resource-constrained countries in turn exacerbates inequalities. The coverage rate for interventions is consistently lowest among the poorest members of society and highest for the most affluent.
4. Bacterial infections contribute disproportionately to pneumonia mortality in developing countries. Although bacterial infections account for no more than 50% of cases of pneumonia, they cause nearly 70% of deaths due to pneumonia. Dual infections with bacteria and viruses are associated with high mortality. *Streptococcus pneumoniae* and *Haemophilus influenzae* are the most common bacteria causing pneumonia and these two organisms account for more than half of all deaths due to pneumonia in children under five years of age. Respiratory syncytial virus is the most common virus causing pneumonia, particularly in young infants, followed by influenza viruses.

¹ *World Health Statistics 2009*. Geneva, World Health Organization, 2009. Deaths due to pneumonia that occur during the neonatal period and those that are associated with measles, pertussis and HIV infection are not included in this figure.

Effective strategies for prevention and control of pneumonia

5. Over the past 20 years, evidence on the effectiveness of interventions to prevent and control pneumonia has been accumulating. The following interventions have been shown to be successful in reducing pneumonia mortality:

- vaccination, including use of vaccines against infection by *Streptococcus pneumoniae* and *Haemophilus influenzae* type b
- case management of pneumonia in the community, health centres and hospitals
- exclusive breastfeeding for the first six months of life
- improvement of nutrition and prevention of low birth weight
- control of indoor air pollution and provision of a healthy environment
- prevention and management of HIV infection.

6. The effectiveness of these interventions has been proven. Vaccination against *Streptococcus pneumoniae* and *Haemophilus influenzae* type b (Hib) infections has reduced the incidence of pneumonia in various settings by about 30% (range 20% to 37%) and 20% (range 12% to 55%), respectively. The introduction of pneumococcal vaccine in the United States of America led to a 39% decline in admissions of children to hospital for pneumonia. Increasing access to care through community-based case management of pneumonia has reduced total mortality by 27%, 20% and 24% in neonates, infants and children, respectively, and reduced pneumonia mortality in the same groups by 42%, 36%, and 36%. Promotion of exclusive breastfeeding in the first six months of life and adequate complementary feeding from 6 to 23 months of life resulted in reductions in all child deaths by 13% and 6% respectively.

7. The cost-effectiveness of the *Haemophilus influenzae* type b and pneumococcal vaccines depends on the burden of disease and the price of vaccines in the country concerned. Data from low-income countries with a high burden of disease show that, at current UNICEF prices for the *Haemophilus influenzae* type b vaccine, the cost per disability-adjusted life year averted would be US\$ 38–74. For pneumococcal conjugate vaccine, at a projected price of US\$ 5 per dose (the current advance market commitment price is expected to be US\$ 3.50 per dose for countries eligible for support from the GAVI Alliance), it would cost US\$ 100 per disability-adjusted life year averted. Based on the criteria established by WHO, both these vaccines would be considered to be highly cost-effective in settings where the disease burden is high. Cost-effectiveness of case management also depends on the burden of disease and cost of care and treatment at health-care facilities in the country concerned. The cost-effectiveness of pneumonia case management at community health facilities ranged from US\$ 21 to US\$ 343 and in secondary and tertiary health-care facilities from US\$ 62 to US\$ 1011 for every disability-adjusted life year averted for 40 countries in WHO regions subdivided in terms of child and adult mortality.

Challenges of implementation

8. Most deaths of children under the age of five years due to pneumonia would be avoided if the effective interventions were implemented on a broad scale and reached the most vulnerable populations. It is vital that carers know and recognize the danger signs of pneumonia in children and

that children with signs of pneumonia are properly diagnosed and treated with appropriate antibiotics by trained health personnel. Currently only 54% of children with pneumonia are reportedly taken to a qualified health-care provider in developing countries.¹ Despite the essential role of antibiotics in reducing the number of child deaths from pneumonia, only 19% of children under five years of age with clinical signs of pneumonia receive antibiotics. To date, few countries have included a pneumococcal conjugate vaccine in their national immunization programmes. Exclusive breastfeeding up to six months is practised by only 34.8% of mothers.² Low coverage prevails for other interventions also, and in such circumstances it is usually the children at greatest risk of pneumonia who are not covered.

9. A particular challenge is to create synergies among the concerned programmes and departments within health ministries and among other institutions that provide health services or implement complementary interventions. Action is urgently needed, and, in order to ensure that an environment suitably receptive to interventions is in place and that resources are available, interventions against pneumonia must be prioritized at both policy and financial levels.

10. Major interventions such as promotion of breastfeeding, case management and prevention of missed opportunities for vaccination need to be delivered together at the point of care, as is the case in the integrated management of childhood illnesses. Furthermore, there is a need to determine barriers to scaling up of proven pneumonia interventions and identify effective solutions.

Opportunities and cost

11. Unprecedented opportunities to improve prevention and treatment of pneumonia currently exist. These have arisen because of the renewed momentum of primary health care and efforts to strengthen health systems capacity; the availability of tools such as the Integrated Management of Childhood Illness approach for case management at all levels; and the introduction of vaccines against *Haemophilus influenzae* type b and *Streptococcus pneumoniae* infections.

12. A further opportunity lies in the general recognition that success in alleviating global health problems requires active involvement of affected communities supported by effective partnership and collaborative efforts. This is already happening in the context of primary health care, with policies and actions recognizing, and preparing the ground for, this community-based approach.

13. The Global Action Plan for the Prevention and Control of Pneumonia, issued jointly in November 2009 by WHO and UNICEF,³ was drawn up in collaboration with other global partners. It aims to increase awareness of pneumonia as a major cause of child death, calls for expanding the use of the interventions of proven benefit, and provides guidance on how this can be done. The Plan enjoins global and government policy-makers, donor agencies and civil society to work together as a broad coalition.

¹ United Nations Children's Fund and World Health Organization. *Pneumonia: the forgotten killer of children*. New York, United Nations Children's Fund, 2006.

² WHO Global Data Bank on Infant and Young Child Feeding, 2009.

³ Document WHO/FCH/CAH/NCH/09.04.

14. The aim of the Action Plan is that every child is protected against pneumonia through a healthy environment and has access to preventive and treatment services. Specifically, it aims:

- to protect children by providing an environment where they are at low risk of pneumonia
- to prevent children becoming ill with pneumonia
- to treat children who become ill with pneumonia.

The Plan aims to expand simultaneously immunization coverage, case management and other interventions through coordinated and synergistic actions by existing programmes such as the Expanded Programme on Immunization and Integrated Management of Childhood Illnesses at the global, national and subnational levels.

15. The global investment required between 2010 and 2015 to deliver these interventions to all children in the 68 countries with a high burden of under-five mortality is estimated at US\$ 38 000 million. Resources for the introduction of vaccines against *Haemophilus influenzae* type b and *Streptococcus pneumoniae* infections in the world's poorest countries, which also carry a disproportionate burden of pneumonia, are being made available through the GAVI Alliance and the Pneumococcal Advance Market Commitment. At the same time initiatives are under way to identify mechanisms by which low- and middle-income countries that are not eligible for support from the GAVI Alliance can obtain these vaccines, and to help countries that are benefiting from support from the GAVI Alliance to ensure financial sustainability beyond the period of support. Mechanisms that are being actively discussed at international level and pursued in some regions are: promoting pooled procurement; expanding the supply base; and guaranteeing preferential prices for vaccines. The availability of resources through the GAVI Alliance and other donors can catalyse further investment in the more comprehensive range of investments needed to prevent and control pneumonia.

16. Additional resources, for strengthening country health systems and extending other pneumonia control interventions, will be required in order to realize fully the potential and goals of the Global Action Plan for the Prevention and Control of Pneumonia.

Potential impact

17. WHO and UNICEF estimate that these interventions, if implemented fully, could result in a 67% reduction in the number of deaths due to pneumonia by 2015, with a cumulative total of 5.3 million deaths of children being averted between 2010 and the end of 2015, thereby significantly contributing to achievement of Millennium Development Goal 4.

18. At its 126th session, the Executive Board supported the strengthening of efforts at national, regional and international levels to prevent and treat pneumonia and adopted resolution EB126.R15 on "Accelerating progress towards achievement of Millennium Development Goal 4 to reduce child mortality: prevention and treatment of pneumonia".

ACTION BY THE HEALTH ASSEMBLY

19. The Health Assembly is invited to adopt the resolution recommended by the Executive Board in resolution EB126.R15.

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