

Review

Risk factors for child pneumonia - focus on the Western Pacific Region

T.K.P. Nguyen^{a,b,*}, T.H. Tran^b, C.L. Roberts^{c,d}, G.J. Fox^e, S.M. Graham^f, B.J. Marais^a^a Discipline of Paediatrics and Adolescent Medicine, The Children's Hospital at Westmead, The University of Sydney, Australia^b Da Nang Hospital for Women and Children, Da Nang, Viet Nam^c Clinical and Population Perinatal Health Research, Kolling Institute, Northern Sydney Local Health District, Sydney, Australia^d Sydney Medical School Northern, The University of Sydney, Australia^e Central Clinical School, The University of Sydney^f Centre for International Child Health, University of Melbourne and Murdoch Childrens Research Institute, Royal Children's Hospital, Melbourne, Australia

EDUCATIONAL AIMS

The reader will come to appreciate that in the Western Pacific region:

- Pneumonia is a major cause of disease and death in young children.
- In addition to vaccination, primary prevention requires careful consideration of risk factors associated with child pneumonia.
- Risk factors associated with child pneumonia include: lack of exclusive breastfeeding, cigarette smoke and air pollution exposure, malnutrition and conditions of poverty.

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SUMMARY

Pneumonia is a major cause of disease and death in infants and young children (aged <5 years) globally, as it is in the World Health Organization Western Pacific region. A better understanding of the underlying risk factors associated with child pneumonia is important, since pragmatic primary prevention strategies are likely to achieve major reductions in pneumonia-associated morbidity and mortality in children. This review focuses on risk factors with high relevance to the Western Pacific region, including a lack of exclusive breastfeeding, cigarette smoke and air pollution exposure, malnutrition and conditions of poverty, as well as common co-morbidities. Case management and vaccination coverage have been considered elsewhere.

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INTRODUCTION

Globally pneumonia accounts for nearly one in five deaths among children less than 5 years of age [1,2]. The greatest number of child pneumonia episodes occur in the Asia-Pacific region, which includes the World Health Organization (WHO) defined regions of Southeast Asia and the Western Pacific [1]. Within this region, the largest absolute number of pneumonia cases occur in India, where an estimated 43 million pneumonia episodes occurred among children under the age of 5 years in 2008 [3]. This constituted a

pneumonia incidence rate of 0.37 episodes per child-year [3]. In the WHO Western Pacific region, 14% of all under-5 mortality in 2015 was attributed to pneumonia [4], with more than 75% of pneumonia-related deaths occurring in Cambodia, China, Laos, Papua New Guinea, the Philippines and Viet Nam [5]. In Viet Nam, pneumonia accounted for 11% of deaths in children under 5 years; nearly 10 times the disease rate reported in developed countries [4].

Efforts to reduce pneumonia-related morbidity and mortality often focus on vaccine-preventable causes and improved case-management. These actions are crucially important and within the domain of paediatric care. However, addressing the upstream population-level determinants of pneumonia risk is also important, although it may require the engagement of a broad coalition of contributors. Primary prevention is rarely emphasized in settings that are dominated by income-generating health care

* Corresponding author. Respiratory Department, Da Nang Hospital for Women and Children, 402 Le Van Hien Street, Ngu Hanh Son District, Da Nang, Viet Nam. Tel.: +84 905 561 593 in Viet Nam or +61 414 36 35 38 in Australia.

E-mail address: thng5150@uni.sydney.edu.au (T.K.P. Nguyen).

Table 1
Important risks factors for child pneumonia*

Risk factor	Specific determinants
Lack of breastfeeding	Exclusive breastfeeding Duration of exclusive breastfeeding Total breastfeeding duration
Cigarette smoke and air pollution exposure	Household cigarette smoke exposure Indoor air pollution Outdoor air pollution
Malnutrition and conditions of poverty	Protein and calorie intake Living conditions Hygiene and sanitation Maternal education Health care access
Co-morbid conditions	Prematurity or low birth weight Congenital heart disease Gastro-oesophageal reflux Chronic upper or lower respiratory disease Significant immunocompromise**

*Identified by the World Health Organization and from clinical experience.

**Including patients with HIV-infection, cancer, immunosuppressive therapy, congenital immune deficiency or other significant immunocompromise
HIV-human immunodeficiency virus

models, and often low on the priority list of developing countries with poor regulatory frameworks. A number of ongoing birth cohort studies will provide a comprehensive assessment of risk factors associated with child pneumonia in particular settings [6–8], but many risk factors have already been well characterized. This review explores important child pneumonia risk factors recognized by the WHO, with a specific focus on the Western Pacific region [9]. It also reflects the clinical experience of the authors working in Viet Nam and surrounding countries. Recognised risk factors considered include: 1) lack of exclusive breastfeeding, 2) cigarette smoke and air pollution exposure, 3) malnutrition and conditions of poverty and 4) common co-morbidities (Table 1). Poor vaccination coverage and sub-optimal pneumonia case management have been considered elsewhere [10].

RISK FACTORS FOR CHILD PNEUMONIA

Lack of breastfeeding

Lack of breastfeeding is a leading risk factor of child morbidity and mortality in developing countries [11,12]. Universal exclusive

breastfeeding during the first 6 months of life would prevent an estimated 1,301,000 deaths in children under 5 years of age per year, or 13% of all under-5 mortality [13]. Shorter duration exclusive breastfeeding also has a protective effect, albeit reduced [14]. In developing countries non-breastfed children experience a 14-fold increase in all-cause mortality compared to those who are exclusively breast-fed for 6 months (Relative Risk (RR) 14.4; 95% Confidence Interval (CI) 6.1–33.9) [12]. Furthermore, inadequate breastfeeding is specifically associated with pneumonia death (Odds Ratio (OR) 1.8; 95%CI 1.2–2.7) [15] and severe pneumonia in children less than 5 years of age (OR 2.3; 95%CI 1.4–3.9) [16]. The risk of dying from pneumonia in infancy is reduced by 70% with exclusive breastfeeding for 6 months (pooled RR 0.3; 95%CI 0.2–0.6) [17].

Breastfeeding is recognized as the most cost-effective health intervention to reduce pneumonia related deaths in infancy [13,17], especially in developing countries where its mortality benefit is most pronounced. Breastfeeding also reduces the child pneumonia disease burden in developed country settings [18]. Following global declines in breastfeeding during the 1970s and 80s, breastfeeding rates increased in recent decades, although it remains well below optimal levels (universal breastfeeding) specified by WHO [11]. In 2015, the WHO estimated that the percentage of infants exclusively breastfed for the first 6 months of life globally was only 36% [4]. Progress has been variable with minimal change, or even decreasing rates of breastfeeding, observed in the 10 most populous countries in the world, including China, India, Indonesia, Pakistan, Nigeria, Bangladesh, Mexico, the Philippines and Viet Nam [11]. Figure 1 illustrates the change in exclusive breastfeeding prevalence in 137 developing countries from 1990 to 2010.

Studies in the Western Pacific region support the protection afforded by exclusive breastfeeding [19,20], but the prevalence of exclusive breastfeeding during the first 6 months of life is less than 30% [4,21]. In the Philippines, diarrhoea and pneumonia-related death in infancy was six times higher among infants who were not exclusively breastfed during the first 6 months of life (adjusted RR 5.7; 95%CI 1.8–18.4) [20]. The study documented an average breastfeeding duration of 9 months with higher rates and a longer duration of exclusive breastfeeding among rural women. This was similar to findings in China, where mothers living in urban centres have the lowest rate of exclusive breastfeeding [22]. In Viet Nam, only 40% of newborns breastfed within one hour of birth and 27% of mothers reported exclusive breastfeeding during the neonatal

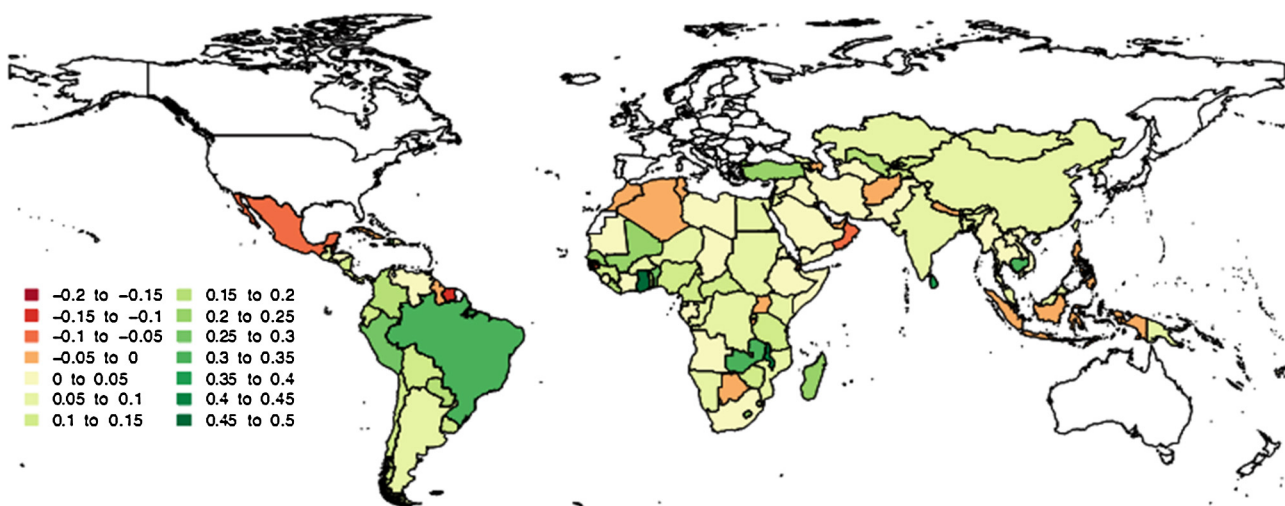


Figure 1. Change in exclusive breastfeeding prevalence from 1990 to 2010 in 137 developing countries*.

*Adapted from [11]

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