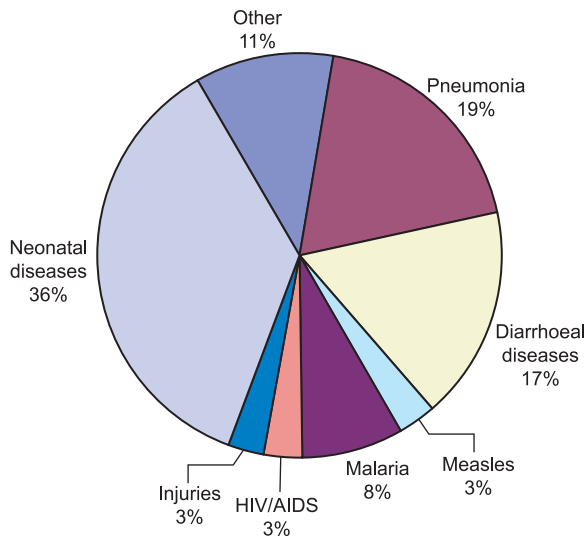


How Can We Afford to Save Our Children from Pneumonia – The Biggest Killer !

Pneumonia - the leading killer^{1,2} still claims >29%¹ (including 10% neonatal death) of world's under five (U-5) annual deaths²⁻⁴ totaling to ~3 million,¹ despite advances in the understanding of patho-physiology of child death.⁵ Pneumonia alone kills more children than combined deaths due to AIDS, malaria, tuberculosis and measles.^{1,6}

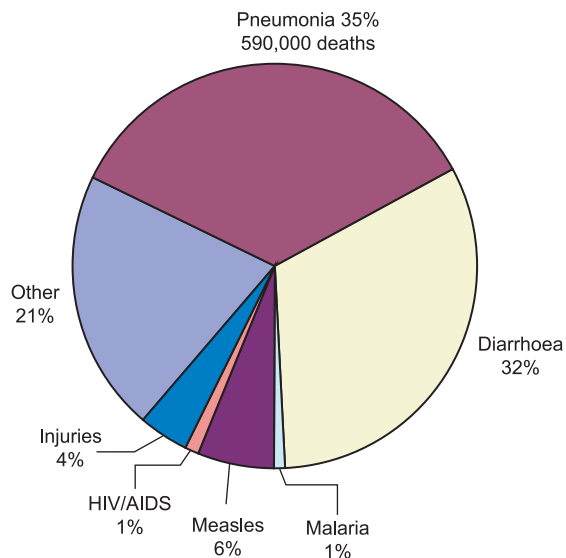


*Major causes of global under five mortality.
Source: WHO. World Health Statistics, 2007*

Extensive activities took place on international health over the past decade⁶ focusing renewed attention and possible interventions to reduce global burden of U-5 mortality and morbidity.⁵ But, pneumonia remains neglected¹ with a little attention paid on to it^{1,6} including essential research and vaccine trials.⁷ As a result, worldwide U-5 pneumonia death still persists to be unacceptably high³ particularly in least developed countries (LDC).² Global estimation revealed 150 million pneumonia episodes/year among U-5 children in developing countries, accounting for > 95% of all new cases worldwide, 11 to 20 million of which require hospitalization.⁸ Around 19%³⁻⁴ of these occur in mere 42 developing

nations⁵ and remains the highest in South-East Asia region (SEAR).^{5,9}

Causes of Child Mortality in South East Asia Region



Total average annual child deaths: 1,709,000

Average annual mortality for children under 5 years excluding neonatal deaths, 2000-03

While south Asian and sub-Sahara countries bear the burden of >half⁸ of total U-5 pneumonia episode worldwide; ³/₄th of these occur in mere 15 countries⁸ - where Bangladesh ranks 4th with 6 million pneumonia cases.^{1, 8} Incidence of ALRI (mostly pneumonia) related hospital admission among U-5 in rural Bangladesh is 50.2/child-year-observed.¹⁰ Interestingly, U-5 mortality in Bangladesh though came down from 150 in 1965 to 68 in 2007,¹¹⁻¹² pneumonia incidence still remains very high¹³ (47% of U-5 illness¹⁴) including deaths (23%^{15,16}) which may escalate even more if neonatal pneumonia death of ~10% is added.¹⁴⁻¹⁶ Pneumonia due to *Strept. pneumoniae* alone kills 1 million U-5 children annually,¹⁷ majority being among <2 years children of LDC, as WHO estimated recently.^{16, 17}

There are several risk factors for high pneumonia incidence. Undernourished and Immuno-deficient¹⁸ children, particularly who are not-exclusively breastfed remain at constant risk of developing pneumonia. Poor environment, indoor air pollution, overcrowding etc. may also play a role. Few other diseases also enhance the risk of pneumonia; like measles,¹⁹⁻²⁰ whooping cough,²⁰ etc., that are almost guarded by satisfactory EPI coverage.

It is difficult to identify a pathogen responsible for pneumonia death as most of the cases are not bacteremic and blood culture is insensitive. However, the innovative use of vaccine as a probe, showed that infection caused by *Streptococcus pneumoniae* (Pneumococcus)^{1,7,21} and *Haemophilus influenzae* type b (Hib)^{16,22-25} are the major causes of fatal childhood pneumonia which accounts for about 50% and 25%, respectively.

So, this emerging problem needs urgent attention towards its prevention and treatment in following two ways: first, proper case management with appropriate antibiotic therapy; and second, prevention by immunization with suitable vaccines. As appropriate vaccines are yet to be made available in 3rd world countries, Government of Bangladesh (GOB) has adopted programs like Acute Respiratory Illness (ARI) Control Program and subsequently Integrated Management of Childhood Illness (IMCI), developed by WHO and UNICEF, in creating awareness among the doctors, community health workers and care givers. The awareness mainly aimed at early case detection, quick referral and providing appropriate treatment. These activities also extended upto family level to empower the caregivers with sufficient knowledge in addressing common problems and deciding when to transport the child to a health care facility with more extensive supervised care. These measures proved to have significant impact in reducing U-5 mortality.

Current findings from hospital and community based studies underscored the need for preventive strategies as in adjunct to accurate clinical approach, improved diagnostic tools and perfect treatment regimen.⁵ But these may hamper due to lack in gold standard in current algorithms (insufficient specificity) and lack in classic microbiological methods (poor sensitivity).⁵ It is also essential to combine vaccines with particular emphasis on appropriate use of

antibiotics in pneumonia prevention programs.^{5, 26, 27}

Meanwhile, Hib-vaccine trial conducted in different countries has shown considerable reduction in pneumonia incidence. GOB has recently introduced Global Alliance for Vaccine and Immunization (GAVI) - funded penta-valent vaccine (DPT, Hepatitis-B and Hib) with a target of not only reducing pneumonia deaths but also preventing ~90% of Hib-meningitis and others.¹⁶ But, Bangladeshi children will still die of pneumonia due to a major pathogen, *Strept. pneumoniae*²¹ which remains uncovered to several serotypes.¹⁶

Thus, in Bangladesh, where care seeking behavior remains poor and access to health care facilities is hard-to-reach, it is imperative that Govt. of Bangladesh should take prompt initiative to introduce pneumococcal vaccine under EPI though its formulation remains challenging as *Streptococcus pneumoniae* has 90 serotypes having geographically diverse and immunologically distinct characteristics.^{1, 7, 21-22} Currently available 7-valent pneumococcal vaccine is customized based on the predominant serotypes of industrialized countries.¹⁷ So, vaccines need to be customized according to our need by gathering further information about circulating invasive pneumococcal serotypes in Bangladesh and neighboring regions to facilitate accurate formulation of next generation pneumococcal vaccine which we expect to be available soon with the active support from GAVI, to help bring down U-5 pneumonia death significantly.

However a huge budgetary involvement in procuring such a vaccine remains a potential constraint. The GOB should seek financial/technical assistance from donors/UN agencies for this approach. However, a new vaccine grant by GAVI is only \$0.30/infant in the birth cohort/year or minimum \$100,000.²⁸ GOB essentially needs a defined strategy, a robust work plan and a strong political will to make such a vaccination procurement project, cost-effective and sustainable.

Anticipating the huge consumption of pneumococcal vaccine in Bangladesh where birth cohort is ~4%, it will be more cost-effective, if the GOB can start manufacturing this vaccine on its own capacity through transfer of technology. At the same time it will exert a positive impact in our national economy through industrialization and thus creating scope of employment, at least in part.

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Prof Samir Kumar Saha, *Professor of Microbiology, Dhaka Shishu Hospital*

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Md Abid Hossain Mollah¹, Sheguftha Rahman², Kazi Selim Anwar³

¹*Professor of Pediatrics, Mymensingh Medical College.*

²*FCPS part II student in Pediatrics, BSMMU.*

³*Public Health Specialist & Microbiologist.*

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