Institution: London School of Hygiene & Tropical Medicine (LSHTM)

Unit of Assessment: UoA2 – Public Health, Health Services & Primary Care

Title of case study: Enhancing evidence-based policy decisions for neonatal and child survival in the highest mortality countries

1. Summary of the impact

LSHTM research led to the development of a computer-based tool known as the Lives Saved Tool (LiST), which has been made available to international organisations, governments and NGOs free of charge. It allows policy-makers and programme managers in the 75 countries with the highest number of child deaths to identify which policy and programme choices are likely to have the greatest impact in cutting neonatal and child mortality. Since its 2008 launch, LiST has been used widely by international agencies, foundations, bilateral agencies, large NGOs and individual countries to determine investment priorities and programme choices.

2. Underpinning research

Every year 7m children worldwide die before their fifth birthday, with 98% occurring in low- and middle-income countries, and 43% taking place during the first 28 days of life. Reducing child mortality by two thirds between 1990 and 2015 is one of the UN Millennium Development Goals.

Research conducted by Simon Cousens, Professor of Epidemiology and Medical Statistics (LSHTM since 1985), has contributed important work towards this goal through the development of the LiST. LSHTM research has contributed in three main areas: developing methods to estimate country-specific cause of death distributions; defining the structure of the model underpinning LiST; and providing key inputs to the neonatal component of LiST (estimates of neonatal deaths by cause and by country, and estimates of the effectiveness of interventions to prevent neonatal deaths).

Cousens is a member of the Child Health Epidemiology Reference Group (CHERG), which provides independent technical expertise to WHO and UNICEF on child morbidity and mortality estimates. Along with Joy Lawn, formerly Director Global Evidence and Policy, Saving Newborn Lives, Save the Children, and Professor of Maternal Reproductive and Child Health Epidemiology at LSHTM since 2013, he developed a statistical model using a multinomial modelling approach applied to vital registration data and datasets identified from a review of the literature. This produced national estimates of neonatal deaths by cause,[3.1] an approach now also used for post-neonatal child deaths.

These estimates were key inputs into the 2005 *Lancet* Neonatal Survival series (co-led with Lawn). As part of the series, Cousens developed a computer model, building on that developed previously for the 2003 *Lancet* Child Survival Series, using the estimates of neonatal deaths by cause, to estimate the number of neonatal deaths that could be prevented with different interventions.[3.2] Subsequently Cousens developed a cohort model for child mortality which formed part of the *Lancet* Maternal and Child Undernutrition series and provided estimates of the number of deaths and cases of stunting that could be averted by providing nutrition.[3.3] These models were the predecessors of LiST.

In 2008, the Bill and Melinda Gates Foundation provided funding through the Johns Hopkins School of Public Health to enable the Futures Institute to integrate the models mentioned above into Spectrum, a pre-existing suite of policy models which provide policy-makers with 'analytical tools to support the decision-making process'. This process directly led to the launch of LiST as a publicly available tool later that year.

A key input for LiST are estimates of the effectiveness of different interventions in terms of the proportion of deaths due to specific causes that an intervention can prevent. Cousens played a key role in setting the standards for the literature reviews from which these effect estimates were derived, and in establishing rules for deriving effect estimates.[3.4] He and Hannah Blencowe,

Research Fellow at LSHTM since 2010, also contributed to or led many of the reviews of interventions to prevent neonatal deaths that were coordinated by Lawn and published in a supplement to the *International Journal of Epidemiology* in 2010.[3.5,3.6]

3. References to the research

3.1 Lawn, JE, Wilczynska-Ketende, K and Cousens SN (2006) Estimating the causes of 4 million neonatal deaths in the year 2000, *International Journal of Epidemiology*, 35(3): 706–718, doi:10.1093/ije/dyl043. Citation count: 130

3.2 Darmstadt, GL, Bhutta, ZA, Cousens, S, Adam, T, Walker, N and de Bernis, L (2005) Evidence-based, cost-effective interventions: how many newborns can we save?, *Lancet*, 365(9463): 977–988, doi: 10.1016/S0140-6736(05)71088-6. Citation count: 426

3.3 Bhutta, ZA, Ahmed, T, Black, RE, Cousens, S, Dewey, K, Giugliani, E, Haider, BA, Kirkwood, B, Morris, SS, Sachdev, HP and Shekar, M, for the Maternal and Child Undernutrition Study Group (2008) What works? Interventions for maternal and child undernutrition and survival, *Lancet*, 371(9610): 417–440, doi:10.1016/S0140-6736(07)61693-6. Citation count: 386

3.4 Walker, N, Fischer-Walker, C, Bryce, J, Bahl, R and Cousens, S, writing for the CHERG Review Groups on Intervention Effects (2010) Standards for CHERG reviews of intervention effects on child survival, *International Journal of Epidemiology*, 39(Suppl. 1): i21–i31, doi:10.1093/ije/dyq036. Citation count: 60

3.5 Cousens, S, Blencowe, H, Gravett, M and Lawn JE (2010) Antibiotics for pre-term pre-labour rupture of membranes: prevention of neonatal deaths due to complications of pre-term birth and infection, *International Journal of Epidemiology*, 39(Suppl 1): i134–i143, doi:10.1093/ije/dyq030. Citation count: 12

3.6 Blencowe, H, Lawn, J, Vandelaer, J, Roper, M and Cousens, S (2010) 'Tetanus toxoid immunization to reduce mortality from neonatal tetanus, *International Journal of Epidemiology*, 39 (Suppl. 1): i102–i109, doi:10.1093/ije/dyq027. Citation count: 24

4. Details of the impact

Since its launch in 2008 on the Futures Institute website,[5.1] LiST has been adopted as a policy and decision-making tool by a wide range of international agencies and organisations, governments, NGOs and others.[5.2]

The *Global Action Plan for the Prevention and Control of Pneumonia* (GAPP), published by WHO and UNICEF in 2009, called for the increased use of interventions of proven benefit and provided guidance on how this could be done, using LiST to estimate the deaths due to pneumonia that could be prevented by scaling-up different interventions.[5.3]

In November 2009, the science academies of seven sub-Saharan African countries launched a seminal report, *Science in Action: Saving the Lives of Africa's Mothers, Newborns, and Children.* A call to action for African policy-makers, the report encouraged them to work with scientists to make the most efficient changes to their health care systems. The report makes extensive reference to LiST and its use in preparing its findings.[5.4]

The Bill and Melinda Gates Foundation used LiST to underpin their Impatient Optimist scheme (November 2009) and their Vaccine Delivery Strategy (January 2010). Save the Children employed the tool in the preparation of their *Missing Midwives* report (2011) to show that 1.3 million newborns annually could be saved using eight key interventions.[5.5]

Born Too Soon: The Global Action Report on Preterm Birth, produced in May 2012 by WHO, Save the Children, March of Dimes (an NGO that works to improve the health of mothers and babies) and The Partnership for Maternal, Neonatal and Child Health, with 50 partner organisations, used

LiST to identify priority packages and interventions for preterm babies.[5.6] This initiative achieved wide media coverage, including reports in *The Guardian*, Reuters and on the BBC in the UK, and in the *New York Times*, *USA Today* and *The Wall Street Journal* in the USA. A global relay on Twitter reached nearly 6.5 million users.

The UN Commission on Life Saving Commodities for Women and Children used LiST in 2012 to estimate how many maternal and child lives could be saved by different commodities.[5.7]

Other international users of LiST include the Pan-American Health Organisation (PAHO), the GAVI Alliance, which exists to bring life-saving vaccines to children in developing countries, and the Global Fund to Fight AIDS, Tuberculosis and Malaria; bilateral agencies including DFID, USAID, the Canadian International Development Agency (CIDA) and the Norwegian Agency for Development Cooperation; as well as large NGOs and foundations including PSI, World Vision, the Clinton Foundation, and the Children's Investment Fund Foundation.

At national and regional level, LiST has been used in the following ways.

- The 2010 Evaluation of Malawi's Emergency Human Resources Programme used LiST to analyse four indicators against which to measure increases in utilisation in priority health services; as the report states, the result was over 13,000 lives saved due to increased coverage of these indicators.[5.8]

- Two editions of Nigeria's national government report, *Saving Newborn Lives in Nigeria* (2009 and 2011) used LiST analyses.[5.9] The second report was linked to the addition of a line in the national health budget for newborn health care.

- Other individual countries that have used LiST to devise strategies to save the lives of newborns have included Burkina Faso, Ethiopia, Uganda, India (several states) and China.

- *The Lancet* Stillbirth series used LiST in 2011 to estimate stillbirths averted with various packages of care, and the linked maternal and newborn lives saved.

In many of the examples mentioned, decisions based on LiST have ultimately benefited newborns and children of families in low- and middle-income countries by giving them increased access to life-saving interventions.

Jeremy Shiffman, Associate Professor of Public Administration and Policy at American University, examined the increased attention being paid to newborn survival in his paper in *The Lancet* in 2010.[5.10] He categorised this increase as 'surprising: there was no sudden increase in the number of babies dying or swift spread of a virus that alarmed citizens of rich countries'. He concluded that *The Lancet* Neonatal Survival series 2005, to which Cousens and colleagues had contributed vital research, was important in solidifying links between key individuals in the field and became 'a point of reference on the severity, causes, costing, and solutions to the problem of newborn mortality and had substantial influence in agenda setting'.

5. Sources to corroborate the impact

5.1 Website of the Futures Institute with download facility for LiST, http://www.futuresinstitute.org/spectrum.aspx.

5.2 Selected list of applications of LiST and articles referencing the tool, http://www.jhsph.edu/departments/international-health/IIP/list/applications.html.

5.3 WHO/UNICEF (2009) *Global Action Plan for Prevention and Control of Pneumonia (GAPP)*, WHO/FCH/CAH/NCH/09.04, WHO/UNICEF, http://www.unicef.org/media/files/GAPP3_web.pdf (accessed 20 September 2013). Developed using LiST (see e.g. footnote to Figure 3, p. 2 and footnote 2, p. 8).

5.4 Kinney, MV, Lawn, JE and Kerber, KJ (eds) (2009) *Science in Action: Saving the Lives of Africa's Mothers, Newborns, and Children*, report for the African Academy Science Development Initiative. Cape Town, South Africa, http://www.nationalacademies.org/asadi/2009_Conference/PDFs/ScienceInActionFullReport.pdf (accessed 11 September 2013) (see e.g. p. 3 'Saving 4 million lives each year').

5.5 Rawe, K, Williams, S, Kerber, K and Lawn, J (2011) *Missing Midwives*. London: Save the Children, http://www.savethechildren.org.uk/sites/default/files/docs/Missing_Midwives_1.pdf (accessed 11 September 2013) (see e.g. p. 3).

5.6 WHO, March of Dimes, The Partnership for Maternal, Newborn and Child Health and Save the Children (2012) *Born Too Soon: The Global Action Report on Preterm Birth*. Geneva: WHO, http://www.who.int/pmnch/media/news/2012/preterm_birth_report/en/index1.html (accessed 20 September 2013) (use of LiST, see e.g. Table 5.2, p. 65 and p. 87).

5.7 UN (2012) *UN Commission on Life-Saving Commodities for Women and Children: Commissioner's Report September 2012*. New York: UN, http://www.everywomaneverychild.org/images/UN_Commission_Report_September_2012_Final.pdf (accessed 11 September 2013). Used LiST to estimate the potential of different commodities to save maternal and child lives (see Annex, Page 19).

5.8 O'Neil, M, Jarrah, Z, Nkosi, L, Collins, D, Perry, C, Jackson, J, Kuchande, H and Mlambala, A (2010) *Evaluation of Malawi's Emergency Human Resources Programme: EHRP Final Report*. Management Sciences for Health (MSH), Management Solutions Consulting (MSC) Ltd., Department for International Development, http://www.who.int/workforcealliance/media/news/2010/Malawi_MSH_MSC_EHRP_Final.pdf (accessed 11 September 2013) (used LiST to estimate the lives saved by the Emergency Human Resources Programme in Malawi – see e.g. p. 4).

5.9 Federal Ministry of Health (2011) *Saving Newborn lives in Nigeria: Newborn Health in the Context of the Integrated Maternal, Newborn and Child Health Strategy,* 2nd edn. Abuja: Federal Ministry of Health, Save the Children & Jhpiego, http://www.healthynewbornnetwork.org/sites/default/files/resources/Nigeria%20Sit%20An%20final%20lowres_FINAL.pdf (accessed 11 September 2013) (the report used LiST to estimate the lives that could be saved by increasing coverage of key interventions – see p. 76).

5.10 Shiffman, J (2010) Issue attention in global health: the case of newborn survival, *Lancet*, 375(9730): 2045–2049, doi: 10.1016/S0140-6736(10)60710-6. Article which discusses the importance of *The Lancet* Neonatal Survival series.