

## Saving Brains: innovation for impact

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Success for Saving Brains over the next five years will be a collection of evidence-based models that are transitioning to scale and having measurable impact on child development. Photo • Courtesy Hanoi School of Public Health

**Grand Challenges Canada – which is funded by the Government of Canada and supports bold ideas for big impact in global health – is four years into an initiative to identify and scale up the most effective ways of helping the world’s children to realise their full potential. This article previews research results which are due to be published in the coming year, and identifies some solutions already identified as holding promise.**

Shortly after Grand Challenges Canada launched five years ago, we prioritised a small number of problems that seemed particularly well suited to the application of innovative ideas for transforming the health and well-being of societies. These problems included the fact that almost one-third of the world’s children are at risk of not reaching their full developmental potential, due to failure to nurture them and protect them from

adversity. The result is a devastating waste of human capital that leaves the next generation ill-equipped to solve the enormous challenges that lock individuals, communities and societies in poverty.

The Saving Brains challenge focuses on unleashing the power of scientific, technological, social and business innovation to transform how we nurture young children in the first 1000 days of life and to establish a strong foundation for their long-term health, productivity and participation in society. The Saving Brains portfolio currently contains over 70 innovations from low- and middle-income countries.

To start, we took advantage of significant past investments to better define the long-term impact of interventions delivered in the first 1000 days of a child’s life. We funded follow-on studies for 11 well-designed

trials of interventions that were shown to be effective in improving newborn health, nutrition, infection outcomes or nurturing. Across ten countries and over two and a half years, more than 44,000 children from these trials were tracked, re-enrolled and assessed. Each of the studies collected a set of core outcome metrics to capture key constructs of development: physical growth (height for age), cognition (general intelligence and executive functioning), language (literacy), socio-emotional development (behavioural and emotional problems) and academic attainment (years of schooling). In-depth cognitive assessments were conducted on 17,500 children and young people aged between 4 and 20 and 21,000 home environments were assessed across the study sites.

The following examples illustrate the types of results anticipated from these 11 studies, many of which are expected to be published later this year:

- 4 year olds in Pakistan who were part of the Pakistan Early Child Development Study (PEDS) (Yousafzai *et al.*, 2014) were followed up to assess whether the early stimulation and nutrition interventions delivered by health workers increased their readiness for school. An additional objective of the study was to determine whether the interventions had altered parental attitudes and behaviour towards preschool.
- 7 to 10 year olds in South Africa who were part of the Vertical Transmission Study, which showed that exclusive breastfeeding reduced the rates of mother-to-child transmission of HIV (Coovadia *et al.*, 2007), were followed up to determine the effect of breastfeeding and HIV exposure on development.
- In Tanzania, Bangladesh and Ghana, 8 to 14 year olds who were part of Study 13, a randomised controlled trial of community-based pre-referral treatment with rectal artesunate for suspected severe malaria (Gomes *et al.*, 2009), were followed up to assess the long-term effects on development and disability.
- 18 to 20 year olds in Colombia who were part of a randomised controlled trial of Kangaroo Mother Care for low-birthweight babies (Charpak *et al.*, 1997) were followed up to assess a range of outcomes including brain structure and function, school attendance, wage earnings and family dynamics.

The results of the 11 studies will enrich the evidence base of how early life experiences can establish a foundation that amplifies the effect of positive factors and mitigates the effects of negative ones as the brain and the child develop.

### **The economic burden**

Next, we engaged two teams of economists to define the economic burden of the problem of children not fulfilling their development potential, based on existing data. By taking into account all the risks and protective factors for which sufficient data already existed, insights were gained into which countries bear the highest economic burden and which factors contribute most to it. The findings are expected to be published later this year. It is very exciting to see a global picture emerging of the economic burden resulting from 28 factors, and an interactive website is being developed that could ultimately model effects on child development and human capital in much the same way as the Lives Saved Tool<sup>1</sup> predicts intervention effects on infant and maternal mortality.

Some important findings have already emerged from the economic analyses. For example:

- It's 'better late than never' when it comes to good nutrition. Catch-up growth after 2 years of age was shown to have positive effects on maths and literacy scores at 8 years of age (Crookston *et al.*, 2013).
- Nutrition programmes produce clear financial returns. Nutritional interventions provide a return of between 3.6 and 48 times on investment, which is on a par with other public investments including education (Hoddinott *et al.*, 2013a).
- Poor growth in childhood affects prospects for adult income, marriage and family life. Stunting at age 2 is associated with less schooling, lower reading and nonverbal test scores, less favourable marriage partner characteristics, and increased probability of living in poverty (Hoddinott *et al.*, 2013b).
- Children from low-income homes face significant learning disadvantages by age 3. A study conducted across five Latin American countries (Schady *et al.*, 2014) has found that children from low-income

families show substantial gaps in cognitive skills by age 3, which in some cases continue and increase into school years, suggesting that learning disadvantages in poorer children are established early in life.

- Cognitive development suffers if children are left behind by both parents. Analysis of data collected from rural China, where over 61 million children are left behind by parents migrating for work, showed children left behind by both parents have reduced maths and language scores. Much smaller, insignificant impacts were observed for children who have a single parent absent (Zhang *et al.*, 2014).

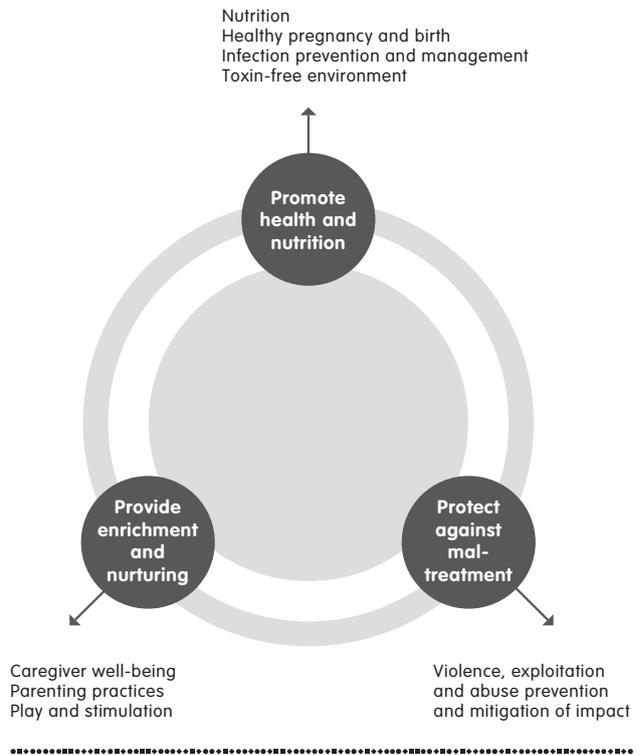
**Towards solutions at scale**

Saving Brains is now in a solutions-oriented phase where we are seeking innovative products, policies, services and implementation models that have the potential to promote and nurture healthy brain and child development at scale. We welcome bold ideas that promote health and nutrition, that provide nurturing and enriching environments, and that protect against child maltreatment (see Figure 1). The following are some examples:

- A team at the Institute of Nutrition of Central America and Panama (INCAP) is bringing to life a policy that rice, the staple crop in the region, must be fortified with folic acid, by incentivising rice millers in Nicaragua.
- Mobile Crèches is developing a social franchise model to leverage the resources of construction companies and local civil society organisations to scale early child development centres for the children of migrant construction workers in India.
- A team at the Hanoi School of Public Health is engaging fathers in parenting in Vietnam, where this is not the cultural norm.

Saving Brains innovators are taking on the dual challenge of meaningfully improving developmental outcomes for each child reached *and* increasing the number of children reached with their solutions. They are designing their innovations with scale and sustainability in mind; striving from the outset to understand who is going to pay for them and what they

**Figure 1 Promoting and nurturing healthy brain and child development**



are willing to pay, how much time is being asked of whom and whether they value what is offered enough to give that time. Only in this way will we move beyond pilot projects that impact hundreds of children and start addressing the hundreds of millions of children in need. We expect the portfolio of Saving Brains innovations to help us define what works for whom, how it is best delivered, and how much it costs, so that we can continue to innovate until every child has the opportunity to thrive.

Success for Saving Brains over the next five years will be a collection of evidence-based models that are transitioning to scale and having measurable impact on child development. With a growing Saving Brains partnership, including the Aga Khan Foundation Canada, Bernard van Leer Foundation, Bill & Melinda Gates Foundation, Maria Cecila Souto Vidigal Foundation, Norlien Foundation, UBS Optimus Foundation and World Vision Canada, and with each

partner bringing its expertise and networks to bear, there is a higher likelihood that this impact will be achieved.

Every day that ends with the status quo unchanged means we are failing another set of children who could hold greater solutions to the world's problems than we can even imagine. Innovation is a means to introduce completely different ways of addressing the problem, and to increase the outcomes for every unit of resources invested. Saving Brains is a means to make tomorrow a brighter day than today.

#### Note

<sup>1</sup> Information about the Lives Saved Tool (LiST), software for predicting maternal and infant mortality, can be found at: <http://livessavedtool.org/> (accessed April 2015).

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