

News Release

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#1 Risk for Child Stunting in Developing World: Poor Growth Before Birth

*Canadian Government-funded “Saving Brains” study:
25 percent of developing world’s child stunting is associated with poor growth in womb,
such as pre-term birth and low birth weight*

*Authors prescribe “paradigm shift” from interventions focused solely
on children and infants to those that reach mothers and families*

*Online map (healthychilddev.sph.harvard.edu) illustrates
top child stunting risk factors by country*

Toronto, ON / Boston, MA – In a new Canadian-funded study, Harvard T.H. Chan School of Public Health researchers today rank for the first time a range of risk factors associated with child stunting in developing countries, the greatest of which occurs before birth: poor fetal growth in the womb.

Based on their findings, they prescribe fundamental changes in approaches to remedy stunting, which today largely focus on children, calling for greater emphasis on interventions aimed at mothers and environmental factors such as poor water and sanitation and indoor biomass fuel use.

Funded by the Government of Canada through Grand Challenges Canada’s “Saving Brains” program, the study reports that in 2011 some 44 million (36 percent) of two-year-olds in 137 developing countries were stunted, defined as being two or more standard deviations shorter than the global median. About one quarter (10.8 million) of those stunting cases were attributable to full-term babies being born abnormally small.

The findings highlight a need for more emphasis on improving maternal health before and during pregnancy, according to the researchers at Harvard Chan School, who published their work today in *PLOS Medicine*.

The absence of optimal sanitation facilities that ensure the hygienic separation of human waste from human contact has the second largest impact overall, attributable to 7.2 million stunting cases (16.4 percent), followed in third place by childhood diarrhea, to which 5.8 million cases (13.2 percent) are attributed.

Child nutrition and infection risk factors accounted for six million (13.5 percent) of stunting cases overall.

Teenage motherhood and short birth intervals (less than two years between consecutive births) had the fewest attributable stunting cases of the risk factors that were analyzed — 860,000 (1.9 percent) of cases overall.

The study concludes that reducing the burden of stunting requires continuing efforts to diagnose and treat maternal and child infections, especially diarrhea, and “a paradigm shift...from interventions focusing solely on children and infants to those that reach mothers and families.”

Says lead author Goodarz Danaei, Assistant Professor of Global Health at Harvard Chan School: “These results emphasize the importance of early interventions before and during pregnancy, especially efforts to address malnutrition. Such efforts, coupled with improving sanitation and reducing diarrhea, would prevent a substantial proportion of childhood stunting in developing countries.”

“This is a serious problem at every level, from individual to national,” he adds. “Early life growth faltering is strongly linked to lost educational attainment and the immense cost of unrealized human potential in the developing world. Stunting undermines economic productivity, in turn limiting the development of low-income countries.”

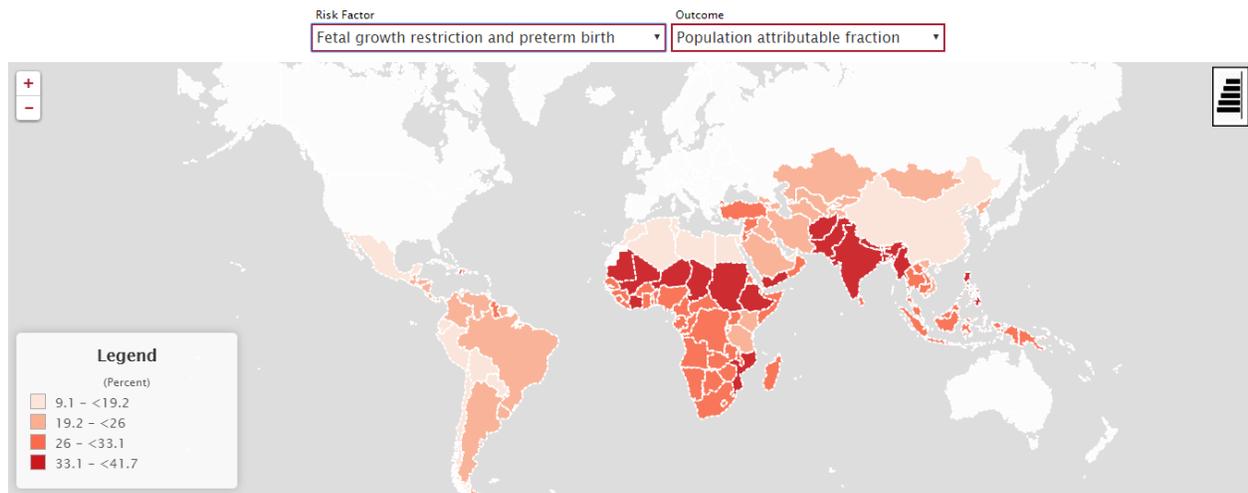
While previous research identified a large number of nutrition-specific risk factors for stunting, such as preterm birth, zinc deficiency, and maternal malaria, the relative contribution of these risk factors had not been consistently examined across countries.

“Our findings provide further evidence that integrated nutrition-sensitive interventions, such as improved water and sanitation, are warranted in addition to nutrition-specific interventions to have an impact on the risk of stunting globally,” says senior author and Principal Investigator Wafaie Fawzi, Professor and Chair of the Department of Global Health and Population at Harvard Chan School.

In all, 18 risk factors, selected based on the availability of data, were grouped into five categories and ranked:

1. Poor fetal growth and preterm birth,
2. Environmental factors, including water, sanitation and indoor biomass fuel use,
3. Maternal nutrition and infection,
4. Child nutrition and infection, and
5. Teenage motherhood and short birth intervals (less than two years between child births).

The researchers map the burden of stunting attributable to these risk factors in the developing world on a website, healthychilddev.sph.harvard.edu, helping policy makers visualize important differences across regions, sub-regions and countries.



“These findings can help regions and countries make evidence-based decisions on how to reduce the burden of stunting within their borders,” says Professor Danaei.

Findings at the regional level include:

- Environmental factors, such as water, sanitation and indoor biomass fuel use, are the second leading risk category in South Asia, Sub-Saharan Africa, East Asia and the Pacific.
- Poor child nutrition and infection is the second leading risk category in Central Asia, Latin America and the Caribbean, North Africa and the Middle East.
- Among Sub-Saharan African countries, the prevalence of stunting associated with poor sanitation in Central, East and West Africa is more than double that of southern Africa.
- Childhood diarrhea was associated with almost three times the burden of stunting in Andean and central Latin America compared with tropical and southern Latin America.
- Somalia had the largest prevalence of stunting attributable to breastfeeding that was discontinued before a child reaches 6-24 months of age.

The new study follows the publication of two major studies focused on poor child growth and developmental milestones by the same Canadian-funded “Saving Brains” team at Harvard T.H. Chan School of Public Health.

The first study, published in *PLOS Medicine* on June 7, 2016, found that one-third of three- and four-year-olds in low- and middle-income countries fail to reach basic milestones in cognitive and/or socio-emotional growth.

The second study, published in *The American Journal of Clinical Nutrition* on June 29, 2016, found that poor child growth costs the developing world US\$177 billion in lost wages and 69 million years of educational attainment for children born each year.

“Knowing the major risk factors for stunting, the global cost of poor child growth, and the number of children missing developmental milestones are key pieces of information in ensuring children not only survive, but thrive,” says Dr. Peter A. Singer, Chief Executive Officer of Grand Challenges Canada.

“This kind of information is essential to achieving the targets set out by the Every Woman Every Child Global Strategy for Women’s, Children’s, and Adolescent’s Health. If you are a finance minister, you will want to check out the risk factors for stunting to reduce the toll on human capital and GDP in your country.”

The importance of children thriving, not just surviving, is emphasized in the United Nations Sustainable Development Goals and is central to the Every Woman Every Child Global Strategy for Women’s, Children’s and Adolescent’s Health. In 2014, the World Health Assembly set a target to reduce by 40 percent the number of stunted children worldwide by 2025.

The Saving Brains program supports new approaches to ensure children thrive by protecting and nurturing early brain development, providing a long-term exit strategy from poverty. Saving Brains has invested a total of \$43 million in 108 innovations and the Saving Brains technical platform that helps to track and accelerate progress against the challenge.

For more information, visit grandchallenges.ca and look for us on Facebook, Twitter, YouTube and LinkedIn.

– 30 –

Grand Challenges Canada

Grand Challenges Canada is dedicated to supporting Bold Ideas with Big Impact® in global health. We are funded by the Government of Canada and we support innovators in low- and middle-income countries and Canada. The bold ideas we support integrate science and technology, social and business innovation – we call this Integrated Innovation®. Grand Challenges Canada focuses on innovator-defined challenges through its Stars in Global Health program and on targeted challenges in its Saving Lives at Birth, Saving Brains and Global Mental Health programs. Grand Challenges Canada works closely with Canada’s International Development Research Centre (IDRC), the Canadian Institutes of Health Research (CIHR) and Global Affairs Canada to catalyze scale, sustainability and impact. We have a determined focus on results, and on saving and improving lives.

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Saving Brains

Saving Brains is a partnership of Grand Challenges Canada, Aga Khan Foundation Canada, Bernard van Leer Foundation, Bill & Melinda Gates Foundation, The ELMA Foundation, Grand Challenges Ethiopia, Maria Cecilia Souto Vidigal Foundation, Palix Foundation, UBS Optimus Foundation and World Vision Canada. It seeks and supports bold ideas for products, services and implementation models that protect and nurture early brain development relevant to poor, marginalized populations in low- and middle-income countries. www.savingbrainsinnovation.net

Harvard T.H. Chan School of Public Health

Harvard T.H. Chan School of Public Health brings together dedicated experts from many disciplines to educate new generations of global health leaders and produce powerful ideas that improve the lives and health of people everywhere. As a community of leading scientists, educators, and students, we work together to take innovative ideas from the laboratory to people's lives—not only making scientific breakthroughs, but also working to change individual behaviors, public policies, and health care practices. Each year, more than 400 faculty members at Harvard Chan School teach 1,000-plus full-time students from around the world and train thousands more through online and executive education courses. Founded in 1913 as the Harvard-MIT School of Health Officers, the School is recognized as America's oldest professional training program in public health.

<http://www.hsph.harvard.edu>

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Appendix

Table 1: Number of stunting cases (in thousands) in children aged two in 2011 attributable to risk factor groups.

Risk Factor Group	Number of Attributable Stunting Cases (in thousands)	Risk Factors	Definition
Fetal growth restriction and preterm birth	14,366	Preterm, small-for-gestational age	Birth before 37 weeks of gestation and weight <10 th percentile for gestational age
		Preterm, appropriate-for-gestational age	Birth before 37 weeks of gestation and weight ≥10 th percentile for gestational age
		Term, small-for-gestational age	Birth at or after 37 weeks of gestation and weight <10 th percentile for gestational age
		Low birth weight	Birth weight <2500g
Environmental factors	9,584	Unimproved sanitation	Lack of access to safe sanitation in the community (based on WHO/UNICEF Joint Monitoring Programme definition of improved sanitation)
		Unimproved water	Lack of access to clean water in the community (based on WHO/UNICEF Joint Monitoring Programme definition of improved water source)
		Use of biomass fuels	Use of biomass fuels for cooking and heating
Maternal nutrition and infection	6,374	Maternal short stature	Maternal height <160cm
		Maternal underweight	Maternal BMI <18.5 kg/m ²
		Maternal malaria	Malaria in pregnancy
		Maternal anemia	Maternal hemoglobin <110g/L
Child nutrition and infection	5,962	Childhood zinc deficiency	Deficient zinc intake during childhood based on age- and sex-specific zinc requirements
		Childhood diarrhea	Mean number of diarrhea episodes per year during childhood
		Non-exclusive breastfeeding	Non-exclusive breastfeeding of infants under six months of age
		Discontinued breastfeeding	Discontinued breastfeeding of children 6-24 months of age
		HIV infection without highly active	Child HIV infection without initiation of HAART until after two

		antiretroviral therapy (HAART) before 2 years of age	years of age
Teenage motherhood and short birth intervals	858	Teenage motherhood	Maternal age at delivery <20 years
		Short birth intervals	<24 months between consecutive births