Global investments to optimise the health and wellbeing of children with disabilities

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Moving forward, we here offer three general suggestions for producing machine learning markers with maximal impact. First, focus should be cast on modifiable risk. For example, an algorithm that uniformly assigns high risk of myocardial infarction to older individuals is likely to be less valuable than one which accurately predicts risk in a 30-year-old, where risk factor modification has greater potential to alter disease trajectory. Second, biologically aware data modalities should be leveraged. Imaging and omics features, particularly when data are acquired more uniformly (eg, electrocardiograms, echocardiograms, genomic arrays) might be less subject to ascertainment biases compared with other types of EHR variables. Third, gaps need to be filled in with regard to existing standards of care. An important consideration, particularly for complex models, is whether increased predictive performance provides an adequate improvement over the many risk models already available. This is particularly true for coronary artery disease, for which previous studies have noted comparable risk performance using llaboratory-based and non-laboratory-based risk assessment,[11] stratification available from the time of birth based on a polygenic score to quantify inherited susceptibility,[12] and considerable utility of a non-invasive CT scan to measure coronary artery calcification.[13]

With the growing availability of large datasets and maturation of novel machine learning marker methods like those presented in Forrest and colleagues' Article, we anticipate an important shift from the development of methods to maximise predictive accuracy to those that enable equitable identification of individuals who might respond best to a therapeutic intervention.

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Global investments to optimise the health and wellbeing of children with disabilities: a call to action

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On Nov 20, 2022, we celebrate World Children's Day and the theme this year is inclusion, for every child. However, children with disabilities have received little attention from global health and development stakeholders.

Since the launch of the first comprehensive global health agenda in 2000 under the Millennium Development Goals, the dearth of population data had hampered global policy, investment, and interventions for children with disabilities.[1] For policy makers, no data mean no problem, which translates into no action. As part of the concerted efforts by stakeholders to address this gap within the framework of the UN's Sustainable

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Development Goals (SDGs) 2015–30, UNICEF, in 2021, published a landmark report on the state of the world's children with disabilities.[2] The report was intended to provide authoritative data on the global prevalence of disabilities in children aged 17 years or younger and to draw attention to the living experiences of these invisible children and their families. Estimates based on data from household surveys of parent-reported functional difficulties indicate that almost 240 million (one in ten) children and adolescents have moderate-to-severe disabilities globally, including 29 million children aged 0–4 years.[2] Estimates from the Global Burden of Disease Study suggest that around 50 million (one in 12) children younger than 5 years have mild-to-severe disabilities requiring some form of intervention.[1,3]

The UN Convention on the Rights of the Child (1989) recognises the rights of a child with disability to a full and decent life of dignity, self-reliance, and active participation in the society for the fullest possible social integration. However, childhood disability is still neglected, stigmatised, and associated with discrimination and isolation, and places considerable emotional and financial burden on families. The absence of services for early detection and appropriate intervention including financial support in many communities, particularly in low-income and middle-income countries (LMICs),[2,4] often invokes a sense of helplessness and hopelessness for parents about the uncertain future that awaits their child. According to UNICEF, children with disabilities have worse outcomes than children without disabilities in key measures of early childhood care, health, and development as well as educational attainment.[2] For example, children with disabilities are 42% less likely to have foundational reading and numeracy skills, 49% more likely to have never attended school, 47% more likely to be out of primary school (children aged 6–11 years), 41% more likely to experience discrimination, and 20% less likely to have expectations of a better life.[2] These data suggest an urgent need for a robust global response to address the many avoidable health, educational, and social inequalities faced by children with disabilities and their families.

Investments to build local capacity in national health and educational systems to deliver early detection and intervention services for children with disabilities from early childhood offer pathways to wellbeing, optimal developmental outcomes, inclusive education, economic empowerment, financial independence, and the opportunity to become productive members of society.[5] The provisions of the SDGs (4.2) for school readiness in early childhood towards equitable, inclusive, and quality education already present unequivocal political support to justify such investments as a priority for all countries. Development Assistance for Health (DAH; financial and in-kind contributions) is the major source of funding in global child health.[6] Since 2015, an average of US$8 billion annually has been expended on neonatal and child health services in LMICs representing about 20% of total DAH ($40 billion) in 2019 before the COVID-19 pandemic. Understandably, these investments have so far been devoted entirely to strengthening the capacity of health systems to meet global targets for reducing child mortality. However, despite these substantial investments, health systems in many LMICs are still ill-equipped to support the needs of children with disabilities due to the scarcity of requisite facilities and qualified health-care professionals to deliver services.[7] In April, 2022, the World Bank Group (WBG) launched the Childcare Incentive Fund in partnership with the governments of Australia, Canada, and the USA as well as some private donors to promote child development in LMICs.[8] The US Agency for International Development has committed up to $50 million over 5 years as part of the expected funding pool of at least $180 million. No specific budget was announced for childhood disability. Even at the current level of funding for the care of children (which is less than 3% of annual expenditure on child survival) little or no progress will be achieved by 2030 for children with disabilities.

The available evidence on childhood disabilities calls for a recalibration of global funding priorities for a disability-inclusive child health agenda beyond survival.[1] A well focused global initiative to promote school readiness for disability-inclusive education as enshrined in the SDGs now needs to be accelerated as previously advocated.[1] School readiness requires investment to ensure the readiness of the individual child for primary school enrolment and participation; the school's readiness to provide an optimal learning environment for the child; and family and community support that contributes to child readiness for school.[9] This process requires coordination between the health and educational sectors to ensure effective transition into the educational system at school entry.[5] As a priority, sociocultural and financial access barriers to early detection and intervention must be addressed systematically to ensure that children with or at risk of disabilities are placed on a trajectory for optimum health, education, and development.[2,10] Stigma and discrimination towards children with disabilities and their families are major sociocultural barriers that must receive attention.[2,4,11] Intervention studies on stigma reduction reported so far are generally of low quality and call for further robust implementation research.[11] A 2022 *Lancet* Commission has offered a comprehensive framework for tackling stigma and discrimination in mental health that can be adapted effectively for childhood disability.[12] Investment in recruiting, training, and appropriately equipping health workers to routinely deliver basic screening services for conditions that can be readily detected from birth is also needed as part of health-care strengthening. For instance, a global programme to support early detection of children with hearing impairment and major birth defects in the first month of life as currently offered routinely in high-income countries should be considered as a starting point. The cost-effectiveness of neonatal hearing screening as a component of universal health coverage has been demonstrated.[13] This global programme will entail investments to support the development of affordable assistive technologies including screening devices for LMICs.

The societal costs of not responding to these challenges and the population benefits of inclusion are substantial globally.[14,15] Without purposeful and well coordinated global investments, many children will remain at risk of exclusion from inclusive education as envisioned by the SDGs. We are calling on the contributors to DAH, including the WBG, to adjust their funding budget and priorities to reflect the stark inequity and inequality faced by children with disabilities in LMICs. The sooner the better.

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