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An unfinished agenda on adolescent health: Opportunities for interventions

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ABSTRACT

The Millennium Development Goal era has resulted in improvements in maternal and child health worldwide. As more children are surviving past their fifth birthday, the population of adolescents is increasing. Adolescence is a time of significant developmental transition; adolescence sets the stage for adult health through risks taken and beneficial and detrimental habits that are formed and it is thus an optimal time to target health interventions. Beginning interventions in adolescence or even earlier in childhood maximizes the impact on the individual's health in adult life. Evidence suggests that interventions to promote sexual and reproductive health, physical activity and healthy lifestyle, mental health and wellbeing, safe and hazard-free environment, improving access to nutritious and healthy foods, and minimizing exposure to substance abuse can improve health outcomes in young adolescents. School-based delivery strategies appear to be the most highly evaluated for improving adolescent health; they have been used to deliver interventions such as sexual health, substance abuse prevention, and nutritional interventions. Use of social media and information technologies, cash transfers, social protection, and micro-finance initiatives are promising strategies; however, given the lack of rigorous evaluations, there is a need for further research. Additional research is also warranted to strengthen the evidence base by establishing causality, understanding the differential impacts of adolescent health in different contexts particularly in low- and middle-income countries. In addition, research and evaluation in the domain of adolescent health must focus on how to implement interventions effectively at-scale, sustain the impacts over time and ensure equitable outcomes.

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Introduction

The Millennium Development Goals (MDGs) have resulted in improvements in the lives of women and children globally.¹ Despite the failure of many countries to meet the MDG targets, the improved focus and attention stemming from

the MDGs has resulted in lower maternal mortality ratios, improved access to primary education, and a reduction in deaths of children under 5 years of age.^{1,2} Child deaths have been reduced from 12.7 million in 1990 to 6.3 million in 2013.³ As millions more children are surviving past their fifth birthday, the number of adolescents, defined by the United

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Nations as persons aged 10–19 years, has increased.⁴ In 2010, there were 1.2 billion adolescents living in the world and adolescents represented 23%, 19%, and 12% of the population in least developed, developing, and industrialized countries, respectively.⁴ The population of adolescents is predicted to increase through 2050,⁴ although the proportion of adolescents in the population is declining globally.⁴

Nearly 1.3 million adolescents died in 2012⁵ and approximately 70% of all adolescent deaths occurred in just two regions: Africa and Southeast Asia. Unintentional injuries such as road traffic accidents (RTA) and drowning are the leading causes of death in adolescents. RTAs alone are responsible for 10.2 deaths per 100,000 adolescents. Suicide, violence, infectious diseases, and pregnancy-related deaths are other important causes of mortality in this period.⁵ Among females aged 15–19 years, pregnancy-related deaths is the second leading cause of death after self-harm while road injuries and interpersonal violence are the main cause of death among males in this age group.⁶

Adolescence is a transitional period from childhood to adulthood in which adolescents undergo physical, psychological, emotional, and economic changes.⁴ Adolescence is also a period of risk taking; risky behaviors in adolescence not only affect health within this period but also set the stage for one's health across the life course.^{4,7,8} Risky behaviors often established in adolescence include substance abuse (tobacco, alcohol, and drugs), sexual risks such as engaging in unprotected sex, and lack of physical activity. One-third of the total disease burden in adults and two-thirds of premature deaths are related to behaviors originating in adolescence.⁴

Substance misuse is one of the many risk factors for mental health disorders, which in turn are responsible for a considerable portion of adolescent mortality and disability-adjusted life years (DALYs).^{4,9} Adolescent boys are more likely than girls to report tobacco use, alcohol consumption, and cannabis use. Consequences of tobacco use include lung cancer and respiratory diseases in adulthood; alcohol abuse can also lead to cancer and cause cirrhosis and injuries. Injectable drug use increases HIV risk.⁴

Considering adolescent sexual health, a higher number of girls report having sex before age of 15 years than boys.³ Early sexual debut increases risk of sexually transmitted infections (STIs), including HIV, and can result in early childbearing. In countries with HIV prevalence higher than 5%, the use of condom in last high-risk sexual episode is above 60%.³ Nearly one-quarter of girls aged 15–19 years are married and 90% of births to adolescents in low- and middle-income countries (LMICs) are within marriage.³ Risk of obstetric fistula, a potentially debilitating condition, is higher for younger mothers¹⁰ and younger adolescents are at increased risk for anemia, eclampsia, post-partum hemorrhage, and puerperal endometritis.¹⁰ In addition to affecting the health of the mother,^{4,8} early marriage and childbearing also often prevent girls from attending school and perpetuate the cycle of poverty.^{4,7,10} Another potentially harmful traditional practice is female genital cutting (FGC) mainly practiced on prepubescent girls in 28 countries in Africa. It involves partial or total removal of the external female genitalia or other injury to the female genital organs for non-medical reason.

Healthy lifestyle and nutrition are crucial factor for proper growth and development as they are pre-requisites for achieving full growth potential. Premature childbearing hampers height gain in girls during pregnancy and lactation and evidence from LMICs has suggested negative impacts on weight and body mass index (BMI).¹¹ While unhealthy practices can lead to substance abuse, a sedentary lifestyle, and unprotected sexual activities, failure to achieve optimal nutrition may lead to delayed and stunted linear growth and also lead to poor pregnancy outcomes.¹² Both under- and over-nutrition can lead to poor health. Under-nutrition increases susceptibility to infection and illness and it is of particular concern in pregnant adolescent girls as it has consequences for the fetus, including fetal growth restriction and low birth weight. Anemia not only increases risk of maternal hemorrhage and sepsis but also causes cognitive and physical deficits in children born to adolescents with anemia.⁴ Conversely, overweight is associated with multiple immediate and long-term risks including raised cholesterol, triglycerides and glucose, type 2 diabetes, high blood pressure, and adult obesity and its associated consequences.^{13,14} Over the last two decades, increasing rates of overweight and obesity among children and adolescents have been seen in many countries. Many LMICs now bear a double burden of nutritional disorders, due to the emerging issue of overweight and obesity along with the existing high rates of stunting and micronutrient deficiencies.^{15,16}

Adolescence is an optimal time to target health interventions for a number of reasons. Firstly, adolescence is a period of risk taking which can have dire consequences on adult health. Actions during adolescence or even earlier during childhood, both beneficial and harmful, form the basis of habits during adulthood. Finally, targeting adolescents, rather than adults, allows for maximal enhancement of an individual's health and that of his/her children. Recently, there has been a growing interest in adolescent nutrition in LMICs as a means to improve the health of women and children. The World Health Organization (WHO) organized a study group for adolescent health and development along with United Nations International Children's Emergency Fund (UNICEF) and United Nations Framework for Population Activities (UNFPA) in 1995.^{17–21} Evidence on potential strategies for improving health of adolescents exists; however, implementation, scaling up, and sustainability may be difficult to achieve and needs careful consideration. Below we highlight interventions that can improve the health and practices of adolescents (Fig.; Table) and underscore the delivery platforms which have shown promise in targeting adolescents, along with remaining challenges. We also discuss knowledge gaps and recommendations for future research.

Promotion of wellbeing and prevention of unhealthy behaviors

Sexual and reproductive health

Curriculum-based sex and STI/HIV education programs implemented in schools or communities have shown promising results in delaying sex and reducing frequency of unprotected sex.²² Emerging data further suggests that

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