

**Health and Nutrition in Adolescents and Young Women:  
Preparing for the Next Generation**

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# Health and Nutrition in Adolescents and Young Women: Preparing for the Next Generation

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## Preface

At a time when the world is focused on addressing the core MDG targets for maternal and child mortality, why should we be concerned with issues of health and nutrition among adolescent girls and young women? The reasons are multiple and compelling. It is clear that this age group has been shockingly ignored in global health to date. There are almost 1.2 billion adolescents in the world, and almost 90% live in low- and middle-income countries (LMICs).

Of great concern in many low-income countries is the close relationship between the general health status among adolescents and young women, including reproductive and mental health and nutrition. These issues are also tied to issues of empowerment and social determinants including education. According to recent figures from the United Nations Population Fund in 2013, nearly 16 million adolescent girls give birth every year, the majority of whom are married. These youngest, first-time mothers face significant risks during pregnancy, including obstetric fistula and maternal death. Stillbirths and deaths in the first week of life are 50% higher among babies born to adolescent mothers than among babies born to mothers in their 20s. In spite of forecasts of fertility decline, the total population of adolescents will increase to 1.3 billion by 2030, of which almost 500 million will be adolescent girls aged 10–17.

These proceedings of the 80th Nestlé Nutrition Institute Workshop on ‘Health and Nutrition in Adolescents and Young Women: Preparing for the Next Generation’ held in Bali, Indonesia, examine many of the challenges associated with this age group. George Patton and Susan Sawyer emphasize that the ‘youth bulge’ caused by rapidly falling childhood mortality in low-income settings has the potential to provide great future economic benefit and hence should be viewed as a valuable resource for future national prosperity. But there are many challenges, and the shifts in adolescent development towards earlier menarche in girls have major implications for health. Where this shift occurs in settings with poor adolescent health care, where sexual activity in young unmarried women is stigmatized and where poverty forces young women into early mar-

riage or selling sex, both health and life outcomes can be catastrophic. In this context, poor and socially marginalized adolescents, particularly those out of school, without stable accommodation or family, or in juvenile detention, have the worst health profiles.

There are great opportunities for gain (or loss) across all aspects of health in adolescence, and there is great variation between countries, even within the same region, in patterns of adolescent health and health care. Public health approaches that use multiple coordinated actions at national and local levels show great promise. These typically involve steps of using 'best available' data to evaluate local needs, identifying priority targets for intervention, implementing evidence-based programs and policies followed by monitoring, commonly using the same indicators that framed need.

Andrew Prentice reviews the incremental nutritional needs in adolescents that must be met in order to optimize their parenting capacity, and hence the health of future generations. Adolescence provides a fresh opportunity for stunted children to cross centiles and catch up with their international peers, but this opportunity may be lost if pubertal growth is prematurely terminated by a pregnancy. He particularly stresses that adolescent mothers may have less than ideal micronutrient status which, according to the latest research, could affect the epigenome of their offspring with long-term and intergenerational consequences. The best way to avoid these nutritional hazards is to avoid adolescent pregnancies.

Zulfiqar Bhutta emphasizes that many of the risk factors that impact upon maternal and newborn health such as nutritional deficiencies exist right from adolescence, and hence this age group might be the best entry point for preventive gains in nutrition. Prepregnancy underweight is a risk factor for adverse maternal and perinatal outcomes. Multiple micronutrient deficiencies also often coexist in LMICs and may be exacerbated in pregnancy. Maternal undernutrition is affected by numerous factors during adolescence and childhood, some of which may be ameliorated by interventions in the more immediate preconception period. Several nutritional interventions have been evaluated including dietary advice to pregnant women, balanced energy and protein supplementation and multiple micronutrient administration and have been shown to reduce the rates of deficiency and small for gestational age births. Folic acid and MMN supplementation is found to be significantly associated with reduced risk of recurrent NTDs when given preconceptionally. There could well be risks associated with obesity, a rapidly emerging issue globally, including adverse effects associated with prediabetes and diabetes.

The importance of considering the social determinants of health (SDH) – 'the conditions in which people are born, grow, live, work and age' – are emphasized



by Adesegun Fatusi who points out that important structural determinants include macroeconomic and policy contexts (e.g. level of national wealth and inequity, youth unemployment level) and socioeconomic positions (e.g. income, gender, education). Intermediary determinants include material conditions, behavior and biological systems, psychosocial factors, and the health system. It was stressed that adolescent health policy and programmatic interventions need to take SDH into account in order to reduce inequities, and improve health and well-being.

The challenges in low-income settings were contrasted with those in high-income countries, though it is frequently noted that the demographic and economic transition affecting many emerging nations is increasingly blurring these distinctions. In addressing the issues in the US and Canada, Miriam Kaufman outlines how adolescent development includes solidification of personal identity, ethical beliefs, approach to the world, patterns of friendships, cognitive sophistication and sexual/gender identity. Rapid brain development accounts for many of the changes of adolescence, but this can be affected by environmental and social factors. Access to high-quality education is particularly problematic in the United States. Alcohol and other substance use lead to health issues and also educational problems. Adolescent pregnancy, parenting and access to abortion are issues in both countries (more extreme in the US). Finally, the care of children by the state leads to issues in adolescence and adulthood.

The pandemic of obesity and its many associated health threats is a major thread throughout the proceedings. Rates of overweight and obesity are high in the obstetric population. In pregnancy, overweight and obesity are associated with increased risk of complications of pregnancy for both the mother and the infant. These complications include gestational diabetes mellitus, preeclampsia, instrumental delivery or delivery by Caesarean section in the mother. In the baby, there are increased risks for infants being born macrosomic or large for gestational age, birth injuries, neonatal hypoglycemia and increased admittance to neonatal special care nurseries. Robert Norman uses polycystic ovary syndrome (PCOS) as an exemplar of the issues encountered. PCOS is the commonest endocrine condition encountered in young women and has many reproductive, metabolic and psychological features that lead to patients consulting medical practitioners and the health service. Overweight and obesity are common among many groups of young women with PCOS and may precipitate subsequent reproductive and metabolic disorders that require expensive and invasive care. Attention to nutrition and diet is important in management of these young women.

Maria Makrides examines the drivers of dietary behavior in industrialized countries and Marloes Dekker Nitert looks at interventions to avoid an over-

weight pregnancy. A comprehensive understanding of the factors influencing women's dietary choices is central to motivating positive dietary behavior before, during and after pregnancy. Maria Makrides summarizes 34 studies which assessed modifiable individual and environmental factors influencing dietary behavior during preconception and pregnancy. Influencing factors included: perceptions regarding benefits, risks and need; psychological factors; self-efficacy and control beliefs; nutrition knowledge; financial constraints; social environment and perceived social pressure; health care providers (HCP), and the food environment. Studies consistently found that the key factors influencing positive dietary behavior were women's desire to optimize maternal and fetal health and advice received from HCPs. HCPs are in a unique position to encourage healthier choices at a time when women are strongly motivated to make positive change. Other strategies include using persuasive communication methods to aid in educating and influencing young women and the wider community; providing pregnant women with automated daily feedback regarding their adherence to dietary recommendations, and changing the food environment to make healthy choices easier. Dekker provides an overview of pre-pregnancy and pregnancy interventions aimed at preventing complications used in clinical practice and their rates of success.

Platforms for delivery of adolescent-friendly health care are examined by Susan Sawyer. The type of health issues that affect adolescents has changed, with significant implications for how health services are oriented to address these needs. Sexual and reproductive health is still a major problem in many LMICs, but HIV/AIDS, STI and unsafe abortion are increasingly affecting unmarried as well as married girls. Mental disorder and risk for later noncommunicable diseases (e.g. tobacco use) typically have their onset during adolescence, and accidents and injuries disproportionately affect the young. Yet, historically, health services in LMIC settings have assumed that adolescence is a healthy period of life, and that adolescents have little need to engage in health services. Adolescent-friendly health care refers to the provision of quality healthcare for adolescents. The goal is that health services are available and able to respond to the changing needs of young people. In particular, for adolescents, the challenge is for health services to actively engage young people in their own healthcare, rather than operating through their parents.

Returning to low-income settings, Zohra Lassi and Zulfiqar Bhutta provide a systematic review of evidence-based interventions against obesity, prediabetes and diabetes in adolescents and women. Simple interventions such as diet, physical activity and strict glycemic control can reduce adiposity in young girls and women. The evidence of benefit for physical activity on gestational diabetes is also more convincing as it reduces the risk by 53%. Physical activity and diet for

maintaining normal weight in women has shown improvements in pregnancy outcomes. Similarly, dietary counseling and glycemic monitoring in women with prediabetes and diabetes have also shown improvements. Given that weight is a modifiable risk factor, public health campaigns should direct their focus on young and adolescent girls to make them aware of the importance of healthy eating, physical activity and maintaining normal weight for their own well-being as well as for the problems they could face during pregnancy.

In line with latest efforts to enhance the continuity of care across all phases of reproduction and child health, preconception care allows time for interventions to have the maximum impact on optimizing the health of the mother-to-be. Preconception care includes 'any intervention provided to women of child-bearing age, regardless of pregnancy status or desire, before pregnancy, to improve health outcomes for women, newborns and children'. There is a growing interest in preconception care as a means to improve the health of women and children, and such interventions could have a focus on addressing key nutrition targets. An evidence base has already been established as to what healthcare for women before pregnancy should entail. In developing countries, where there is the highest burden of maternal and newborn deaths, preconception care might provide opportunities both in the community and healthcare settings to deliver basic nutrition interventions to improve the health of women and their babies. Despite the advocacy for preconception nutrition care, there have been very few studies implementing and evaluating preconception nutrition interventions. One of the major drivers for focusing on such interventions in adolescent girls and young women is the ability to reach and influence outcomes through an intervention that has sufficient duration. Reaching women during pregnancy in primary care settings usually means detection in the second trimester and hence a relatively limited duration of interventions during pregnancy.

Late in the day, many health agencies around the world are increasingly recognizing the importance of focusing on adolescents and young adults; the rationale is eloquently summarized in these proceedings.

*Zulfiqar A. Bhutta  
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## Foreword

The focus of the 80th Nestlé Nutrition Institute Workshop (Bali, November 2013) was to get more insight into the influence of maternal health and nutrition on fetal and postnatal growth and health of the offspring. Two previous NNI workshops with the topics ‘Importance of the First 1,000 Days’ [1] and ‘International Nutrition: Achieving Millennium Goals and Beyond’ [2] already had nutrition topics related to pregnancy and lactation as part of the program. The topic of the 80th Nestlé Nutrition Institute Workshop ‘Health and Nutrition in Adolescents and Young Women: Preparing for the Next Generation’ went beyond ‘the first 1,000 days concept’ and discussed the importance of health and nutrition of future mothers from their adolescence to pregnancy.

During the workshop, it became clear that nutrition of young women and how it can affect the offspring is an almost neglected topic in both developed and developing countries. Only recently have international NGOs and research groups [3, 4] begun addressing this topic. Both under- and overnutrition of the mother can negatively program the child’s health. The recent Lancet series [3, 4] provides insights into how maternal undernutrition and micronutrient deficiencies are related to low birthweight (LBW) and intrauterine growth retardation. LBW babies have a higher risk of morbidity, stunting and mortality between birth and 5 years of age. Recently, it has been shown that maternal undernutrition results in epigenetic programming during conception and in the newborn which is associated with negative health outcome [5]. There is also evidence that LBW babies have a higher risk of developing noncommunicable diseases such as obesity and related complications – diabetes, cardiovascular disease, and stroke later in life [6]. Long-term studies in offspring from obese mothers indicate a lower lifespan, which could be related to the higher risk of having metabolic syndrome in their adult life [7]. In their final comments, the chairpersons pointed out that targeting nutrition of female adolescents and young women during their reproductive age is crucial for both mothers’ health and long-term health outcome of their children.

We would like to thank the three Chairpersons for putting the program together: Maria Makrides – Director of the Women’s and Children’s Health Research Institute, University of Adelaide; Zulfiqar Bhutta – Director of Global Child Health, Hospital for Sick Children in Toronto, Founding Director of the Center of Excellence in Women and Child Health, Aga Khan University, Pakistan, and Andrew Prentice, Director of the MRC International Nutrition Group, London School of Hygiene and Tropical Medicine. We would also like to thank the renowned speakers, moderators and scientific experts in the audience, who have significantly contributed to the workshop. Finally, we very much appreciated the excellent logistic support provided by the teams from Nestlé Nutrition in Southeast Asia and Indonesia.

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80th Nestlé Nutrition Institute Workshop  
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