Marni Sommer[1] / Garrison Daly[1] / Caroline Kabiru[2] / Pema Lhaki[3] / Neville Okwaro[4] / Venkatraman Chandra-Mouli[5]

Strengthening health care worker engagement with early adolescence in low- and middle-income countries: an overdue area for action

[1] Mailman School of Public Health, Columbia University, New York, USA, E-mail: ms2778@cumc.columbia.edu. https://orcid.org/0000-0001-7442-9270.
[2] Population Council, Nairobi, Kenya
[3] NFCC, Kathmandu, Nepal
[4] Ministry of Health, Nairobi, Kenya
[5] WHO Department of Reproductive Health and Research/Human Reproduction Programme, Geneva, Switzerland

Abstract:
The very young adolescent population (ages 10–14) is currently under-served by health care systems, particularly in low- and middle-income countries. Although there is a substantial and growing effort to reach adolescents with the health services and commodities they need, such efforts often overlook the period of early adolescence given this population's lower vulnerability to risk-taking behaviors. However, early adolescence is a period of significant change, with the onset of puberty introducing physiological, emotional, and social changes in girls' and boys' lives. This period also represents a time of intensifying gendered norms, and the transition of youth from childhood focused health care (e.g. deworming programs, nutrition interventions) to additional mid- and older adolescent related care [e.g. human papilloma virus (HPV) vaccine, and contraceptive provision). Strengthening young adolescents' engagement with health care workers around preventative and promotive health behaviors could have profound impacts on their health and wellbeing, which in turn could have cascading effects across the course of their lives. Critically, young adolescents would gain trust in health care systems, and be more likely to return when significant health issues arise later in adolescence or adulthood. Such an effort requires sensitizing health care workers and building their capacity to respond to young adolescents' unique needs, by defining a package of actions that they are mandated to provide, training them, providing them with desk reference tools, and putting in place systems to provide supportive supervision and collaborative learning on the one hand, and encouraging caregivers to connect their pubescent-aged boys and girls with the health care system, on the other hand. This paper presents an argument for increased focus in particular on building attitudes and capacities of health care workers on engaging with early adolescents, applying Principle 3 of the Society of Adolescent Medicine's position paper entitled "Health Care Reform and Adolescents."

Keywords: adolescents, adolescent health, health care professionals
DOI: 10.1515/ijamh-2019-0171
Received: August 8, 2019; **Accepted:** November 27, 2019

Introduction

In 2009, the Society for Adolescent Medicine published a position paper called "Health care reform and adolescents – an agenda for a lifespan" articulating five principles essential to meeting adolescents' health-related needs (Table 1) [1]. Although the paper focused on improving health care for adolescents within the USA, the five principles for promoting adolescent health are broadly applicable and useful as a framework for reviewing current approaches to adolescent health care globally. Specifically, the principle promoting improved

Marni Sommer is the corresponding author.

engagement between healthcare workers and young adolescents could have a substantial impact globally but particularly in low- and middle-income countries (Table 1, Principle 3).

Table 1: Five principles for health care reform in the interests of adolescents.

Principle 1:	Make health care financially accessible for adolescents and young adults
Principle 2:	Provide a comprehensive array of services to meet adolescents' specific needs
Principle 3:	Train a broad range of health care professionals in the needs of adolescents and compensate them fairly to work in diverse settings
Principle 4:	Protect the confidentiality of adolescents' health care communications and records
Principle 5:	Meet the specific needs of special groups of adolescents

There are many reasons for focusing on the importance of a "broad range of health care professionals" who are mandated and whose capacity is strengthened to work with adolescents (Table 1, Principle 3), including: 1, adolescence is a phase of life during which young people's lives and health behaviors are profoundly shaped by family, school, neighborhood factors, (social) media and other influences [2], [3]. Building the capacity of a range of health care professionals, either in schools, clinics or beyond, to address adolescent health and well-being issues is therefore essential [4]. 2, Many adolescents are sensitive to interpersonal exchanges during the period of life when their bodies are rapidly changing [5]; assuring health care professionals appreciate this dynamic, along with building their abilities to engage effectively with adolescents is essential. 3, In many low- and middle-income countries, the field of Adolescent Medicine is nascent; yet, having competent adolescent health and medicine experts enables the generation of resources, both financial and intellectual, to guide a national response to meeting young people's needs [6].

By "adolescent" we refer to the United Nations (UN) definition of ages 10–19 years, and early adolescence as ages 10–14 years [7]. In this paper, we are proposing that particular attention is warranted during early adolescence, a period of immense physiological and social change, but one that is frequently overlooked by health care workers, given the perception that early adolescence represents a healthy window of time between childhood vulnerability to disease, and the risk-taking behaviors of older adolescents. This misperception however leads to missed opportunities as will be explained.

While this paper focuses on Principle 3 (Table 1), all five principles are essential for adolescent health care, and critical synergies exist between them. Competent health care professionals who are supported in their work are more likely to follow Principle 4 (protecting confidentiality), and Principle 5 (address the specific needs of special groups of adolescents), although additional strategies and investments would be needed for both, and to address Principles 1 and 2. For protecting confidentiality in particular, which is often compromised by health workers living in the same geographic and social catchment area as adolescents, actions must be taken to transform mindsets and to modify practices.

The importance of intervening in early adolescence

The global adolescent population is large, with over 1.2 billion adolescents (aged 10–19) today, the vast majority residing in low- and middle-income countries [8]. Proportionally, this population represents 15–25% of the population in countries in low- and middle-income countries. As the Global Early Adolescent Study (GEAS), conducted in 13 countries and other studies such as the Young Lives Project have documented, early adolescence represents a transitional period during which gendered vulnerabilities to health risks intensify [9], [10], [11]. This includes, for example, the biological and societal related vulnerabilities girls face during adolescence to sexual violence, [12], [13] pregnancy, and infection with human papilloma virus (HPV) or HIV and AIDS; and boys becoming more vulnerable to injuries related to income-generating activities [14] and violence [11]. However, while adolescents' access to health services has begun to improve in countries such as Ethiopia and Chile, which have more recently focused on this population [15], in many other places, their access to health care, both preventative and treatment, remains patchy. For example, HPV vaccine has been piloted in a handful of low resource countries but rolled out nationally in very few, such as recently in Kenya [16], [17], [18]. However, early adolescent access to services for preventing pregnancy [5], [6], [19], and for those experiencing sexual violence, remains insufficient; child protection programs, for example, may overlook early adolescents [20]. In addition, half of all mental health disorders begin by age 14 [4]; yet access to mental health services for this population in many low- and middle-come countries remains extremely limited and stigmatized [21].

Almost a decade ago, a World Health Organization (WHO) consultation on the sexual and reproductive health of young adolescents in low- and middle-income countries emphasized the need to engage with young adolescents around their sexual and reproductive health [22]. In addition, Dixon-Mueller [23] provided an argument for improved age-specific variations when studying and addressing the sexual, marital, and reproductive transitions of adolescents, separating 10- to 19-year-olds into three categories (early/ages 10–14, mid/ages 15–17 and late/ages 18–19 adolescence). In analyzing adolescents' physiological development, cognitive abilities for making "safe, informed and voluntary" decisions, and institutional concepts of being "old enough" to make sexual and reproductive health decisions, she articulated that 10- to 14-year-olds were particularly vulnerable, and in need of attention [23].

The onset of puberty during the early adolescent window in particular provides urgency for attention to Principle 3, and the need for a broad range of health professionals (clinic, school-based, community health workers) to focus on this age group. During early adolescence, of which puberty is an integral part, tremendous physiological, cognitive and social changes occur in a person's life [24], [25]. Having competent and empathetic healthcare workers in, for example, clinics, schools, and community health units, who understand healthy developmental processes and the potential for young people to have many questions as their bodies mature, is essential [26]. In societies where engagement with healthcare workers during early adolescence is less common, parents and caregivers may not appreciate the potential benefits of such interactions. A review by Kim and White [5] identified the barriers that caregivers – including parents – may create for young adolescents intentionally engaging with health workers, for example, concerns that their confidentiality would not be maintained, and/or a sense of lacking autonomy over their own health information. Alongside this, the review pointed to concerns of caregivers, for example, wanting their young adolescents to be heard while also wanting to be engaged in the process. Importantly, Bundy et al. [27] recently proposed two packages of interventions that overlap the window of early adolescence and present potential pathways for increased engagement between health care workers and this population [5], [27]. The first is focused on ages 5–14, and includes, for example, HPV vaccines, deworming, and vision screening, while the second targets ages 15–19, and adds, for example, sexual and life skills education and mental health counseling [27]. The second package in particular is relevant for the gendered roles in relation to sex and sexuality that begin to become established for young people during early adolescence, and so healthcare worker awareness of this continuum is essential. Capable and empathic health workers are key to the delivery of these interventions.

In some contexts, parents and caregivers may also be uncomfortable, too busy, or culturally prohibited from discussing puberty with their children [28]. This reality underscores the potential value of the involvement of other adults, including healthcare workers during early adolescence, be it in school-based delivery, community health worker outreach, or clinics, that enable them to fill this gap, providing information and support, and helping to build girls' and boys' confidence about their changing bodies [29], [30], [31]. The delivery of the HPV vaccine, for example, as an intervention targeting early adolescents, creates opportunities for promoting positive interactions with healthcare workers, such as the simultaneous delivery of colorful, story-filled puberty books for girls (and boys) who come into clinics [32]. A recent special issue of the *Journal of Research on Adolescence* [33] highlighted the under-addressed areas of puberty education as a global health issue [33]. Health workers have a role to play in delivering such education, within a clinical context and potentially through the use of digital technologies [34].

Gender and health in early adolescence

There is a unique aspect of girls transitioning through early adolescence that requires improved engagement by healthcare workers per Principle 3; that of menarche or the onset of menstruation. The American College of Obstetricians and Gynecologists [35] has proposed using menstruation as a "vital sign" in reference to tracking reproductive health through the life course [35], [36], which should begin at (or soon after) menarche around the world. Although some girls may not experience their first period until mid-adolescence (age 15–17), many girls in low- and middle-income countries are likely to begin monthly bleeding during early adolescence (ages 10–14) [37]. The onset of menses introduces the need for healthcare workers with the required competencies to respond to their health-related needs [34], [38] beyond the role that family members, teachers, and others in girls' communities might provide. While it is normal for newly menstruating girls to experience irregular bleeding patterns for a year or two after menarche [37], [39], this pattern may raise concerns or anxiety among girls and their families, creating a need for reassurance. Healthcare workers in clinics or schools should also have the competencies needed to understand the existing evidence about what is considered normal or abnormal bleeding and pain, and to support girls themselves or refer them for appropriate care. This includes indications of reproductive abnormalities, such as endometriosis, which currently has a very delayed diagnosis among adolescents [40]. The WHO *Adolescent Job Aid* incorporates much of this content [41]. Using healthcare workers to educate young adolescents and their family members about menstruation in early adolescence can also begin

to offset the stigmatizing influences that some societies have regarding menstruation, many of which are defined by local religious and cultural norms. Thus, healthcare workers can serve an important role in normalizing menstruation, along with educating about it and managing problems when they arise. Clearly, this will require training in values clarification and attitude transformation, as part of a package of actions to improve and sustain improvements in performance, as discussed earlier.

In addition, the capacities of healthcare workers, whether in schools, clinics or community outreach approaches, should be built to recognize the signs and symptoms of iron-deficiency anemia in girls who have begun menstruating [41], [42]. Although a number of countries have school-based iron supplementation programs [43], there is a missed opportunity in the growing number of menstrual health programs happening in schools across low- and middle-incomes countries to incorporate attention to girls' increased vulnerability after menstrual onset to anemia. Additional exploration of the potential inequities in nutritional health of adolescents globally, with particular attention to marginalized groups is warranted.

It is important to note that boys transitioning through early adolescence have unique needs as well, such as peer pressure to engage in experimental and oftentimes risky behaviors (e.g. heavy use of alcohol) and increased vulnerability to injury from physical work, motor-vehicle crashes or interpersonal violence [44]. There are also often societal and cultural elements that silo boys and girls into different hierarchical placements that may translate into differing (and unequal) health outcomes and lifespan trajectories, calling for approaches tailored to their varying needs. However, there is much less known about suitable entry points for reaching boys during early adolescence. In contexts where male circumcision is a cultural rite of passage around puberty [45], this may serve as an entry point for engaging with early adolescent boys or their families around their particular developmental needs and vulnerabilities. While a small body of literature has begun to focus on boys' transitions through puberty in low- and middle-income countries, much more attention is needed to boys' unique needs and effective approaches for reaching them [24], [46], [47].

Early adolescence within the adolescent health care agenda

The global adolescent health community has made important strides in the last two decades to promote attention to adolescent health and wellbeing. These efforts have not focused on very young adolescents in the past, but are beginning to do so now, for example, with the arrival and roll out of the HPV vaccine and male circumcision programs. Multiple organizations have developed program support tools, built capacity and supported countries to make health services more adolescent friendly. The HIV and AIDS epidemic has led to interventions being deployed across many sub-Saharan African countries focused on incorporating older children and early adolescents – infected vertically – into, and assuring adherence to, treatment [48]. Efforts to roll out the delivery of HPV vaccine have identified mechanisms for reaching young adolescent girls in particular [49], [50]; and select school systems in low- and middle-income countries have included vitamin or micronutrient fortification programs, such as the delivery of iron supplementation to early adolescents [51], [52]. Most of these responses have focused on young adolescents in non-humanitarian contexts. In humanitarian response contexts, there have for many years been interventions focused on more effective delivery of child protection services, which in particular incorporate psychosocial health care [53], [54]. In both protracted and acute emergency contexts, child protection services provide ready populations for health care worker attention.

Despite such efforts, as noted earlier, there continue to be many barriers to the provision and use of health services by and for adolescents in low- and middle-income countries and a particular gap in attention to promoting engagement of healthcare workers with very young adolescents [24]. There are many reasons for this including higher rates of morbidity and mortality among older adolescents, and the possibility that they may interact more frequently with the healthcare system in comparison to younger adolescents [55], [56], although not unmarried girls or older adolescent boys. In addition, the inclusion of attention to early adolescents in universal health care strategies, and the primary health care agenda, may not yet be adequately delineated in many countries. However, as evidence accrues for the benefits of preventative intervention in early adolescence as part of promoting an "agenda for a lifespan" [1], building the capacities (including through training and sensitization) of health care workers to intentionally engage during early adolescence in such contexts, be it through schools, community health outreach, health clinics or using new technologies, is essential [7], as part of a package of actions to improve and sustain improvements in their performance [57]. Important to note is that "adolescent friendly health services" approaches have not been universally successful in meeting the five principles amongst other limitations, and have often focused on older adolescents, overlooking the critical early adolescent period of growth and development [24], [58]. Thus, going forward, there is a need to identify effective approaches for incorporating young adolescents in such services.

The potential for improving healthcare worker engagement with early adolescents

There are both opportunities and potential benefits in applying Principle 3 to a framework of response in low- and middle-income countries that promotes healthcare worker attention to early adolescence. As noted already, there are a broad range of health professionals who could address the needs of this population, ranging from those based in clinics, to those who are school-based, to those who serve as community health workers, and those who are involved in outreach education work at schools and elsewhere, such as through youth clubs or the provision of puberty books at health clinics [3].

Underscoring the value of applying Principle 3 to healthcare worker engagement with young adolescents, examples already exist of countries that are strengthening school-based delivery of health services to this population, and community outreach programs that target out of school adolescents. However, a larger shift is still required within countries and the global community beyond targeting interventions to prevent poor health outcomes among young adolescents and extend the "lifespan of health" per the Society of Adolescent Medicine's framework. By referring to a "lifespan of health," the society articulates the critical importance of investing in adolescence, given the implications for later life, highlighting, for example, how substance abuse in adulthood is often ingrained through adolescent behaviors. The necessary shift calls for more positive and trusting relationships that may develop between young adolescents and health professionals. Such relationships have shown to be more difficult to build when initiated in later adolescence, for example, as young people encounter healthcare worker biases against adolescent use of contraception [59], [60], [61]. Some studies have shown that training health care workers in topics such as the menstrual cycle, contraception and the stages of adolescence, increases the youth friendliness of service provision [58], [62], [63]. This however raises a key final point. Investments in improved training of healthcare workers will need to occur to enable their ability to perform well under Principle 3, ranging from friendly delivery of puberty education to strengthening their expertise in understanding menstruation as a vital sign for reproductive health. In addition, there are multiple other health preventative topics about which healthcare workers can engage this age group more sensitively, including the mental health and nutritional needs that may arise during this developmental period.

Recommendations for promoting early adolescent and healthcare worker linkages

Five recommendations emerge from the application of Principle 3 to early adolescence in low- and middle-income countries. These include: (1) Strengthening the capacity of a range of health care professionals to both value and respond to the issues of early adolescence, including considering the local development of a subspecialization in adolescent medicine; (2) Enhancing parents' and caregivers' understanding of the importance of their early adolescents engaging with healthcare professionals; (3) Improving the evidence on suitable ways to reach early adolescent boys and girls including the most marginalized with healthcare interventions and on the long-term benefits of investing in early adolescent health; (4) Mapping out examples of how different cadres of health care workers could be leveraged, either organized by setting (schools, community, facility) or by level (doctor, counselor, community health worker, nurse); and (5) Identifying opportunities for linking interventions that promote positive interactions between healthcare professionals and young adolescents, such as books on puberty or other education materials with the HPV vaccine delivery, or expanding school-based health programs.

For adolescents to truly engage with the health care community, services must be "approachable." Health care professionals who engage and encourage young adolescents to ask questions and seek quality care, and who have the trust and respect of the early adolescents and parents or caregivers within their communities, will truly contribute to the agenda of a lifespan of health among such populations.

References

[1] English A, Park MJ, Shafer MA, Kreipe RE, D'Angelo LJ. Health care reform and adolescents – an agenda for the lifespan: a position paper of the Society for Adolescent Medicine. J Adolesc Health. 2009;45(3):310–5.
[2] Sawyer SM, Afifi RA, Bearinger LH, Blakemore SJ, Dick B, Ezeh AC, et al. Adolescence: a foundation for future health. Lancet Child Adolesc Health. 2012;379(9826):1630–40.
[3] Sawyer SM, Reavley N, Bonell C, Patton GC. Platforms for delivering adolescent health actions. In: Child and Adolescent Health and Development, 3rd ed. Washington (DC): The International Bank for Reconstruction and Development/The World Bank; 2017.
[4] Laski L. Realising the health and wellbeing of adolescents. Br Med J. 2015;351:h4119.
[5] Kim B, White K. How can health professionals enhance interpersonal communication with adolescents and young adults to improve health care outcomes? Systematic literature review. Int J Adolesc Youth. 2018;23(2):198–218.

[6] Birkhead GS, Riser MH, Mesler K, Tallon TC, Klein SJ. Youth development is a public health approach. Introduction. J Public Health Manag Pract. 2006;2:S1–3.
[7] Patton GC, Sawyer SM, Santelli JS, Ross DA, Afifi R, Allen NB, et al. Our future: a Lancet commission on adolescent health and wellbeing. Lancet Child Adolesc Health. 2016;387(10036):2423-78.
[8] United Nations Children's Fund (UNICEF). The State of the World's Children 2016: Executive Summary. A Fair Chance for Every Child. UNICEF; 2016.
[9] McCarthy K, Brady M, Hallman K. Investing when it counts: reviewing the evidence and charting a course of research and action for very young adolescents. Population Council; 2016.
[10] Lane C, Brundage CL, Kreinin T. Why we must invest in early adolescence: early intervention, lasting impact. J Adolesc Health. 2017;61(4):S10–1.
[11] Blum RW, Li M, Naranjo-Rivera G. Measuring adverse child experiences among young adolescents globally: relationships with depressive symptoms and violence perpetration. J Adolesc Health. 2019;65(1):86–93.
[12] Decker MR, Latimore AD, Yasutake S, Haviland M, Ahmed S, Blum RW, et al. Gender-based violence against adolescent and young adult women in low-and middle-income countries. J Adolesc Health. 2015;56(2):188–96.
[13] Chandra-Mouli V, Svanemyr J, Amin A, Fogstad H, Say L, Girard F, et al. Twenty years after International Conference on Population and Development: where are we with adolescent sexual and reproductive health and rights? J Adolesc Health. 2015;56(1):S1–6.
[14] Sommer M, Likindikoki S, Kaaya S. Tanzanian adolescent boys' transitions through puberty: the importance of context. Am J Public Health. 2014;104(12):2290–7.
[15] Chandra-Mouli V, Plesons M, Hadley A, Maddaleno M, Oljira L, Tibebu S, et al. Lessons learned from national government-led efforts to reduce adolescent pregnancy in Chile, England and Ethiopia. Early Childhood Matters. 2019;128:50–6. https://earlychildhoodmatters.online/2019/lessons-learned-from-national-government-led-efforts-to-reduce-adolescent-pregnancy-in-chile-england-and-ethiopia/.
[16] Mwakisha JW, Boakye-Agyemang C. Kenya takes vital step against cervical cancer and introduces HPV vaccine into routine immunization. World Health Organization Africa; 2019. Available from: https://www.afro.who.int/news/kenya-takes-vital-step-against-cervical-cancer-and-introduces-hpv-vaccine-routine-immunization.
[17] Mburu A, Itsura P, Mabeya H, Kaaria A, Brown DR. Knowledge of cervical cancer and acceptability of prevention strategies among human papillomavirus-vaccinated and human papillomavirus-unvaccinated adolescent women in Eldoret, Kenya. BioRes Open Access. 2019;8(1):139–45.
[18] Bruni L, Diaz M, Barrionuevo-Rosas L, Herrero R, Bray F, Bosch FX, et al. Global estimates of human papillomavirus vaccination coverage by region and income level: a pooled analysis. Lancet Global Health. 2016;4(7):e453–63.
[19] Chandra-Mouli V, Svanemyr J, Amin A, Fogstad H, Say L, Girard F, et al. Twenty years after International Conference on Population and Development: where are we with adolescent sexual and reproductive health and rights? J Adolesc Health. 2015;56(1):S1–6.
[20] Guedes A, Bott S, Garcia-Moreno C, Colombini M. Bridging the gaps: a global review of intersections of violence against women and violence against children. Global Health Action. 2016;9(1):31516.
[21] World Health Organization (WHO). Adolescent mental health. Published September 2018. [cited 2019 April 15]. Available from: https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health.
[22] World Health Organization. The sexual and reproductive health of young adolescents in developing countries: reviewing the evidence, identifying research gaps, and moving the agenda: report of a WHO technical consultation, Geneva, 4–5 November 2010. Geneva: World Health Organization; 2011.
[23] Dixon-Mueller R. How young is "too young"? Comparative perspectives on adolescent sexual, marital, and reproductive transitions. Stud Fam Plann 2008;39(4):247–62.
[24] Sommer M. An overlooked priority: puberty in sub-Saharan Africa. Am J Public Health. 2011;101(6):979–81.
[25] Dorn LD, Hostinar CE, Susman EJ, Pervanidou P. Conceptualizing puberty as a window of opportunity for impacting health and well-being across the life span. J Res Adolesc. 2019;29(1):155–76.
[26] Sanders RA. Adolescent psychosocial, social, and cognitive development. Pediatr Rev. 2013;34(8):354–8.
[27] Bundy DA, de Silva N, Horton S, Patton GC, Schultz L, Jamison DT, et al. Investment in child and adolescent health and development: key messages from Disease Control Priorities. Lancet Child Adolesc Health. 2018;391(10121):687–99.
[28] Hindin MJ, Fatusi AO. Adolescent sexual and reproductive health in developing countries: an overview of trends and interventions. Int Perspect Sex Reprod Health. 2009;35(2):58–62.
[29] Bastien S, Kajula LJ, Muhwezi WW. A review of studies of parent-child communication about sexuality and HIV/AIDS in sub-Saharan Africa. Reprod Health. 2011;8(1):25.
[30] Dorn LD, Biro FM. Puberty and its measurement: a decade in review. J Res Adolesc. 2011;21(1):180–95.
[31] Khaled M, Soliman C, Oraby D. Training manual for the providers of youth friendly services. North Carolina: FHI; 2008.
[32] Sommer M. The Puberty (Kubalehe) Book, 2010. [cited 2013 March 12]. Retrieved from: http://www.growandknow.org/Grow_and_Know.Puberty_(kubalehe)_book.Pdf.
[33] Crockett LJ, Deardorff J, Johnson M, Irwin C, Petersen AC. Puberty education in a global context: knowledge gaps, opportunities, and implications for policy. J Res Adolesc. 2019;29(1):177–95.
[34] Blum R, Boyden J. Understand the lives of youth in low-income countries. Nature. 2018;554(7693):435.
[35] ACOG Committee Opinion No. 651: Menstruation in girls and adolescents: using the menstrual cycle as a vital sign. Obstet Gynecol. 2015;126(6):e143–6.
[36] American Academy of Pediatrics, American College of Obstetricians and Gynecologists. Menstruation in girls and adolescents: using the menstrual cycle as a vital sign. Pediatrics. 2006;118:2245–50.
[37] Sommer M. Menarche: a missing indicator in population health from low-income countries. Pub Health Rep. 2013;128(5):399–401.
[38] Aniebue UU, Aniebue PN, Nwankwo TO. The impact of pre-menarcheal training on menstrual practices and hygiene of Nigerian school girls. Pan Afr Med J. 2009;2(1):9.

[39] WHO. World Health Organization multicenter study on menstrual and ovulatory patterns in adolescent girls. J Adolesc Health. 1986;7(4):229–35.
[40] Dun EC, Kho KA, Morozov VV, Kearney S, Zurawin JL, Nezhat CH. Endometriosis in adolescents. J Soc Laparoendoscopic Surgeons (JSLS) 2015;19(2):e2015.00019.
[41] World Health Organization (WHO). Adolescent job aid: a handy desk reference tool for primary level health workers. 2010.
[42] Pasricha SR, Drakesmith H, Black J, Hipgrave D, Biggs BA. Control of iron deficiency anemia in low-and middle-income countries. Blood. 2013;121(14):2607–17.
[43] Give Well. Iron supplementation for school-age children. Intervention Report. Published February 2019 [cited 2019 April 15]. Accessed from: https://www.givewell.org/research/incubation-grants/march-2019-evidence-action-beta-iron-folic-acid-impact-evaluation.
[44] Sommer M, Likindikoki S, Kaaya S. Tanzanian adolescent boys' transitions through puberty: the importance of context. Am J Public Health. 2014;104(12):2290–7.
[45] UNAIDS. Protecting men and boys' health in Swaziland. UNAIDS, 21 Oct. 2016 [cited 2019 April 20]. Accessed from: https://www.unaids.org/en/resources/presscentre/featurestories/2016/october/20161021_swaziland.
[46] Kågesten A, Gibbs S, Blum RW, Moreau C, Chandra-Mouli V, Herbert A, et al. Understanding factors that shape gender attitudes in early adolescence globally: a mixed-methods systematic review. PLoS One. 2016;11(6):e0157805.
[47] Patton GC, Olsson CA, Skirbekk V, Saffery R, Wlodek ME, Azzopardi PS, et al. Adolescence and the next generation. Nature. 2018;554(7693):458.
[48] Ssewamala FM, Byansi W, Bahar OS, Nabunya P, Neilands TB, Mellins C, et al. Suubi+ Adherence Study Protocol: a family economic empowerment intervention addressing HIV treatment adherence for perinatally infected adolescents. Contemp Clin Trials Commun. 2019;16:100463.
[49] Watson-Jones D, Lees S, Mwanga J, Neke N, Changalucha J, Broutet N, et al. Feasibility and acceptability of delivering adolescent health interventions alongside HPV vaccination in Tanzania. Health Policy Planning. 2016;31(6):691–9.
[50] World Health Organization. Scaling-up HPV vaccine introduction. 2016. Accessed from: https://apps.who.int/iris/bitstream/handle/10665/251909/9789241511544-eng.pdf.
[51] Wei D, Brigell R, Khadka A, Perales N, Fink G. Comprehensive school-based health programs to improve child and adolescent health: evidence from Zambia. PLoS One. 2019;14(5):e0217893.
[52] Adelman S, Gilligan DO, Konde-Lule J, Alderman H. School feeding reduces anemia prevalence in adolescent girls and other vulnerable household members in a cluster randomized controlled trial in Uganda. J Nutr. 2019;149(4):659–66.
[53] Meyer SR, Meyer E, Bangirana C, Mangen PO, Stark L. Protection and well-being of adolescent refugees in the context of a humanitarian crisis: perceptions from South Sudanese refugees in Uganda. Soc Sci Med. 2019;221:79–86.
[54] Chaudhary P, Vallese G, Thapa M, Alvarez VB, Pradhan LM, Bajracharya K, et al. Humanitarian response to reproductive and sexual health needs in a disaster: the Nepal Earthquake 2015 case study. Reprod Health Matters. 2017;25(51):25–39.
[55] Igras SM, Macieira M, Murphy E, Lundgren R. Investing in very young adolescents' sexual and reproductive health. Global Public Health. 2014;9(5):555–69.
[56] Taliaferro LA, Borowsky IW. Beyond prevention: promoting healthy youth development in primary care. Am J Public Health. 2012;102(S3):S317–21.
[57] Nair M, Baltag V, Bose K, Boschi-Pinto C, Lambrechts T, Mathai M. Improving the quality of health care services for adolescents, globally: a standards-driven approach. J Adolesc Health. 2015;57(3):288–98.
[58] Chakare RS. Attitudes towards adolescent friendly health service provision among health workers at a primary health care clinic in Windhoek, Namibia (Doctoral dissertation, Stellenbosch: Stellenbosch University).
[59] Cooke A. A Systematic Review of Physician-Patient Interactions and the Effect of Health Care Provider Bias and Knowledge on Adolescent Contraception Counseling in Developing Countries and Comprehensive Review: Contraceptive Use and Impact of Physician Counseling for Adolescent Patients of Method Choices and Side Effects in Developing Countries. Pheonix: The University of Arizona. Accessed on January 24, 2020. Available at: https://repository.arizona.edu/bitstream/handle/10150/633424/SP_2019_Cooke_Thesis.pdf?sequence=1&isAllowed=y.
[60] Sieverding M, Schatzkin E, Shen J, Liu J. Bias in contraceptive provision to young women among private health care providers in South West Nigeria. Int Perspect Sexual Reprod Health. 2018;44(1):19–29.
[61] Jonas K, Crutzen R, van den Borne B, Reddy P. Healthcare workers' behaviors and personal determinants associated with providing adequate sexual and reproductive healthcare services in sub-Saharan Africa: a systematic review. BMC Pregnancy Childbirth. 2017;17(1):86.
[62] Brittain AW, Briceno AC, Pazol K, Zapata LB, Decker E, Rollison JM, et al. Youth-friendly family planning services for young people: a systematic review update. Am J Prevent Med. 2018;55(5):725–35.
[63] Renju J, Andrew B, Nyalali K, Kishamawe C, Kato C, Changalucha J, et al. A process evaluation of the scale up of a youth-friendly health services initiative in northern Tanzania. J Int AIDS Soc. 2010;13(1):32.