

Adolescent health in urban India

S. Ramadass¹, Sanjeev Kumar Gupta¹, Baridalyne Nongkynrih¹

¹Centre for Community Medicine, All India Institute of Medical Sciences, New Delhi, India

ABSTRACT

Adolescence is the period in human growth and development that occurs after childhood and before adulthood, from ages 10 to 19 years. It is a period of dynamic brain development. During this period, adolescents learn from the social behavior and environmental surroundings of their community. Because of rapid urbanization without accounting for the basic health-care amenities, health disparities tend to arise. In this review, we have tried to describe the health profile of adolescents in urban India. Relevant articles were extracted from PubMed and related websites. Adolescents in urban areas perceive their physical environment as very poor. Social capital and social cohesion are very important in their development. Increasing child marriage and poor antenatal care among adolescents are key challenges in improving the reproductive and sexual health. More than half of adolescents are undernourished. About 56% of adolescent girls are anemic. At this time of fighting against under-nutrition, burden of overweight and obesity is increasing among the urban adolescents. Mass media use and increased sedentary lifestyle increase the risk factors for noncommunicable diseases. Labile mental and emotional behavior makes them prone to suicide and intentional self-harm. Another avoidable key challenge among adolescents is addiction. Urban living and regular media exposure are positively associated with smoking and alcohol consumption. Among unintentional injuries, road traffic accidents dominate the picture. Various health programs targeting adolescent health have been launched in the recent past.

Keywords: Adolescent, India, mental, noncommunicable diseases, reproductive, urban, violence

Introduction

Adolescence is the period in human growth and development that occurs after childhood and before adulthood, from the age of 10 to 19 years.^[1] Adolescents constitute 16% of the global population, with an absolute number of 1.2 billion.^[2] More than half of all adolescents live in Asia. In absolute numbers, South Asia is home to more adolescents – around 340 million – than any other region.^[3] India is home to 253 million adolescents, accounting for 20.9% of the country's population. Almost 72% of the adolescent population resides in rural areas. Adolescent population in urban areas declined from 21.9% in 2001 to 19.2% in 2011, while in rural areas, it remained more or less same.^[4] Adolescence is a period of dynamic brain development and complex interaction with the social environment shaping the capabilities an individual takes forward into adult life.^[5] During

this period, an adolescent acquires physical, emotional, cognitive, social, and economic resources that are the foundation for health and well-being in later life.^[6] Even though urbanization provides many opportunities for economic and social well-being, rapid urbanization without catering to the basic amenities will result in health disparities. This review describes the health profile of adolescents in urban India.

Determinants of Adolescent Health in Urban Areas

Neighborhood contextual factors play an important role in adolescent health. Adolescents in urban settlements may experience less poverty, better education, and health services. Conversely, urban upbringing can increase the risk of mental health, substance use, obesity, and physical inactivity. Physical environment includes built structures, air and water, indoor and outdoor noise, and parkland inside and surrounding the city^[7]

Address for correspondence: Dr. Sanjeev Kumar Gupta, Department of Centre for Community Medicine, All India Institute of Medical Sciences, New Delhi - 110 029, India.
E-mail: sgupta_91@yahoo.co.in

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as one of the key drivers for many health disparities, including mental health status,^[8] obesity, and risky sexual behaviors. In a study conducted as a part of well-being of adolescent in vulnerable environments, males and females in a slum area of New Delhi perceived their physical environment as very poor.^[9]

Two social environmental factors, namely, social capital^[10] and social cohesion,^[11] are very important in the development of adolescents. Studies have found that when adolescents have lower levels of social cohesion, they report poorer mental health status,^[12] higher crime and homicide, and increased sexual risk behaviors.^[13] Female adolescents in New Delhi, despite having high scores for social cohesion and safety in their communities, had the highest sense of fear, both in terms of their perceived fear of their neighborhood and their fear behaviors.^[9] Social determinants from outside the family become greater, with major influence of peers, media, education, and the beginning of workplace influences.^[14]

Reproductive and Sexual Health Including HIV

According to District Level Household and Facility Survey-3 (DLHS-3), 22.9% of adolescent mothers received full antenatal care, 70.5% utilized safe delivery care, and 65.1% had a postnatal checkup. Although there is an improvement in utilization of safe delivery and postnatal care services, low levels of full antenatal care services utilization among urban adolescent mothers is a cause for concern.^[15]

According to National Family Health Survey-3 (NFHS-3), 29.3% of urban women were married by 18 years of age, whereas 18.1% of urban men were married by 21 years of age. In 2005–2006, 8.7% of urban women aged 15–19 years

were already mothers/pregnant. In urban slums, 45.8% of adolescents were married before 18 years of age and also had higher number of children born to them.^[16] Parasuraman *et al.* in their analysis of data from NFHS-1, -2, and -3 highlight that at the time of NFHS-3, half of the women and almost one in five men aged 15–24 years were currently married.^[17] Even though urban adolescent women had high coverage of antenatal care, the proportion of slum women who had completed the recommended number of visits or who initiated the visit in the first trimester of pregnancy was low as compared to women from nonslum areas.^[16] A study conducted by adolescent health committee of the Federation of Obstetric and Gynecological Societies of India among urban girls of age 13–19 years showed poor awareness about human papillomavirus infection and vaccination, but they were intensely willing to know about it and get vaccinated.^[18]

Over 35% of all reported AIDS cases in India occur among young people in the age group of 15–24 years.^[19] In a retrospective study done in 2005–2011, it was observed that HIV positivity and proportion-seeking Integrated Counselling and Testing Centre (ICTC) services are high among adolescent boys as compared to that of girls.^[20] The same study also observed that heterosexual promiscuous was the most common risk behavior recorded and accounted for 44.10%, followed by parent to child transmission (14.46%) and blood transfusion (2.15%). These findings are summarized in Table 1.

Nutritional Health

More than half (58%) of adolescent boys and 47% of adolescent girls are underweight, compared to 36% of men and 41% of women aged 20–24 years.^[21] Findings from the NFHS-3 indicate that 56% of females and 30% of males in the 15–19 years age

Table 1: Reproductive and sexual health (including HIV) of adolescents

Author	Year	Study design	Study area	Population	Relevant findings
Singh <i>et al.</i> ^[15]	2007-2008	Data used from DLHS-3	All states and UT, except Nagaland	Urban adolescent women aged 13-19 years	22.9% adolescent mothers received full antenatal care 70.5% utilized safe delivery care 65.1% had a postnatal checkup
Hazarika ^[16]	2005-2006	Data used from NFHS-3	All states and UT also includes slum and nonslum data for 8 cities	Women in the age group of 15-49 years	In urban slums, 45.8% of adolescents were married before 18 years of age and also had higher number of children born to them
Parasuraman <i>et al.</i> ^[17]	2005-2006	Data used from NFHS-3	All states and UT also includes slum and nonslum data for 8 cities	Men and women in the age group of 15-24 years	Half of the women and almost one in five men aged 15-24 were currently married
Ramavath and Olyai ^[18]	2009-2010	Cross-sectional study	Five metro cities of India	Adolescent girls in secondary schools and colleges	Poor awareness about HPV infection and vaccination but are intensely willing to know about it and get vaccinated
Naswa and Marfatia ^[19]	2010	Review	Review of KAP in adolescents living with HIV in India	Adolescent	35% of all reported AIDS cases in India occur among young people in the age group of 15-24 years
Kurapati <i>et al.</i> ^[20]	2005-2011	Retrospective study	ICTC clinic at AIIMS, New Delhi	Adolescent aged 10-19 years	HIV positivity and proportion seeking ICTC services is high among adolescent boys as compared to that of girls

NFHS: National Family Health Survey; DLHS: District Level Household and Facility Survey; KAP: Knowledge, Attitude, and Practice; HPV: Human papillomavirus

group are anemic. In urban areas, the prevalence of anemia among adolescent girls is 16%.^[22] A study among 223 adolescent girls in an urban slum in Andhra Pradesh reported an overall prevalence of stunting at 28.3%, underweight at 22.9%, and thinness at 20.6%.^[23] In a cohort of 24,000 children in the 5–16 age group years in Ernakulam district of Kerala, the proportion of overweight children increased from 4.94% in 2003 to 6.57% in 2005. The increase was significant in both boys and girls, proportion of overweight was significantly higher in urban regions and in private schools, and the rising trend was limited to private schools.^[24] A study which compares obesity among rural and urban adolescents (14–16 years) demonstrated an increase in the prevalence of obesity and overweight and a decrease in the prevalence of underweight in urban adolescents as compared to their rural counterparts.^[25]

Mass media use among adolescents is higher. A study from Chennai done in the age group of 11–17 years concluded that 90% eat either food or snacks while watching TV, 82% buy food products and snacks based on advertisement, 59% skip outdoor activities for TV, 42% follow diet, and 42% exercise to get the body like their favorite media personality.^[26] These findings are summarized in Table 2.

Mental Health

Adolescence is a period of maturation of the neural systems underpinning emotional processes, which might be one of the reasons for higher risks for mental disorders.^[27] Maturation of these systems has profound implications for emotional development and the capacities that adolescents bring to their future roles as parents, citizens, and workers.^[28] A study of adolescent students in a public school concluded that 15.2% had evidence of distress; 18.4% were depressed; 5.6% students were detected to have positive scores on both the

instruments.^[29] According to a nationally representative mortality survey by Registrar General of India, for suicide deaths at ages 15 years or older, 40% of suicide deaths in men and 56% of suicide deaths in women occurred at ages 15–29 years.^[30] A cross-sectional study done in three schools and two colleges among students aged 14–19 years in South Delhi reported 15.8% having thought of attempting suicide, while 5.1% had actually attempted suicide, both being more in females than in males.^[31] A 15-year-old individual in India has a cumulative risk of about 1.3% of dying before the age of 80 years by suicide; men have a higher risk (1.7%) than women (1.0%), with especially high risks in South India.^[32]

A study of intentional self-harm among adolescents in tertiary hospital suggests that the most common method of intentional self-harm in children and adolescents is consumption of insecticides and precipitated by interpersonal problems in the family context.^[32] One of the less apparent causes of stress among adolescents is bullying. A study conducted by Malhi *et al.* in North India reports the overall prevalence of any kind of bullying behavior as 53%.^[33] These findings are summarized in Table 3.

Addiction Disorders

Consumption of alcohol and illicit drugs often begins early^[34] and then increases during the adolescent years.^[35] In a study of substance use among inter-college students in Dehradun district, the prevalence of regular use of substances was significantly higher among urban students (37.9%) as compared to rural students (24.4%).^[36] A clinic-based, retrospective study on adolescents showed that there was a consistent increase in adolescents registered in de-addiction OPD, 27 in the first 20 years (1978–1997), 31 over the next 4 years (1998–2001), and 27 over the final 2 years (2002–2003).^[37] Adolescents living in

Table 2: Nutritional health of adolescents

Author	Year	Study design	Study area	Population	Relevant findings
International Institute for Population Sciences, Mumbai ^[21]	2007	Cross-sectional	29 states in India	Rural and urban women aged 15-49 and men aged 15-54 years	58% of adolescent boys and 47% of adolescent girls are underweight compared to 36% of men and 41% of women aged 20-24 years
Kalyanwala <i>et al.</i> ^[22]	2002-2013	Review	India	Adolescents aged 10-19 years	Prevalence of anemia among adolescent girls is 16%
Prashant and Shaw ^[23]	2006-2007	Community-based cross-sectional study	Urban slum of Nalgonda town, Andhra Pradesh	Girls aged 10-18 years	Prevalence of stunting: 28.3% Underweight: 22.9% Thinness: 20.6%
Raj <i>et al.</i> ^[24]	2003-2005	Prospective cohort study	Ernakulam district, Kerala	Children aged 5-16 years	Proportion of overweight children increased from 4.94% in 2003 to 6.57% in 2005
Parekh <i>et al.</i> ^[25]	2013	Cross-sectional study	Surat city, Gujarat, India	Adolescent school students 14-16 years	Increase in the prevalence of obesity and overweight and a decrease in the prevalence of underweight in urban adolescents compared to their rural counterparts
Priyadarshini <i>et al.</i> ^[26]	2013	Cross-sectional study	Private and public schools of Chennai	Schools students aged 11-17 years	90% eat either food or snacks while watching TV, 82% buy food products and snacks based on advertisement, 59% skipped outdoor activities for TV

urban area were involved in substance abuse significantly more than their rural counterparts.^[38]

India is the third-largest producer and consumer of tobacco in the world. According to a survey done by the National Sample Survey Organisation, about 20 million children of ages 10–14 are estimated to be tobacco users. Nicotine users reported peer-pressure as a single most important cause for initiation.^[39]

According to the NFHS-3, alcohol consumption among male youth is highest in Chennai (29%) and lowest in Indore (13%).^[17] Adolescents who have 5 or more years of education are less likely to smoke and

consume alcohol. Both urban living and regular media exposure are positively associated with smoking and consumption of alcohol.^[17]

Another addiction which is emerging is technology addiction, which is defined as a habitual and compulsive way of indulgence with technology deviating from meeting the life's different issues.^[40] These findings are summarized in Table 4.

Accidental and Intentional Violence

Road traffic accidents (RTAs) dominate the picture of adolescent unintentional injuries in urban areas.^[6] Developmental immaturity,

Table 3: Mental health of adolescents

Author	Year	Study design	Study area	Population	Relevant findings
Chambers <i>et al.</i> ^[27]	2003	Review	Neurodevelopment and substance use disorders and addiction	Adolescents	Adolescents are more prone to develop addiction and substance use disorders
Martins <i>et al.</i> ^[28]	2009	Meta-analysis	Relationship between emotional intelligence and health	Mean age lies between 15 and 53 years	Emotional intelligence has profound implications on their capacities that adolescents bring to their future roles as parents, citizens, and workers
Bansal <i>et al.</i> ^[29]	2009	Cross-sectional study	School-based	Adolescents in 9 th standard	15.2% were found to be having evidence of distress; 18.4% were depressed; 5.6% students were detected to have positive scores on both the instruments
Patel <i>et al.</i> ^[30]	2001-2003	Analysis of data from million death study	6671 areas selected all over India based on census 2001	Accessed cause of deaths in all age groups	40% of suicide deaths in men and 56% of suicide deaths in women occurred at ages 15-29 years
Sharma <i>et al.</i> ^[31]	2008	Cross-sectional study Cluster sampling	Three schools and two colleges in South Delhi	Adolescent students aged 14-19 years	15.8% having thought of attempting suicide, while 5.1% had actually attempted suicide, both being more in females than in males
Grover <i>et al.</i> ^[32]	2000-2002	Case-control study	Consultation-liaison services in a tertiary care center in India	Adolescent aged 12-19 years	Men have a higher risk (1.7%) of dying by suicide than women (1.0%), with especially high risks in South India

Table 4: Addiction disorders among adolescents

Author	Year	Study design	Study area	Population	Relevant findings
Jaisooriya <i>et al.</i> ^[34]	2015	Cross-sectional study	73 schools in Kerala, India	Young people aged 12-19 years	Consumption of alcohol use among young people begins in the early years
Pillai <i>et al.</i> ^[35]	2005-2006	Population-based cross-sectional study	Urban and rural community in Goa, India	People aged 20-49 years	Prevalence of alcohol consumption increases as age increases
Juyal <i>et al.</i> ^[36]	2004	Cross-sectional study	Dehradun, India	9 th -12 th standard students	Prevalence of regular use of substances was significantly higher among urban students (37.9%), as compared to rural students (24.4%)
Saluja <i>et al.</i> ^[37]	1978-2003	Analysis of clinic register data	DDTC in PGI, Chandigarh, India	Adolescents aged ≤18 years	27 in the first 20 years (1978-1997), 31 over the next 4 years (1998-2001) and 27 over the final 2 years (2002-2003)
Tsering <i>et al.</i> ^[38]	2003-2004	Population-based cross-sectional study	Schools in West Bengal, India	Mean age of 15 years	Adolescents living in urban area were involved in substance abuse significantly more than their rural counterparts
Malhotra <i>et al.</i> ^[39]	2007-2013	Cross-sectional study	Tobacco cessation center in a tertiary care center in North India	Adolescents aged 10-19 years	Nicotine users reported peer-pressure as a single most important cause for initiation
Parasuraman <i>et al.</i> ^[17]	2005-2006	Data used from NFHS-3	All states and UT also includes slum and nonslum data for 8 cities	Men and women in the age group of 15-24 years	Urban living and regular media exposure are positively associated with smoking and consumption of alcohol
Livingstone and Smith ^[40]	2008	Review	Harms experienced by child users of online and mobile technologies	Children and young adults	Increase in technology addiction among children

NFHS: National Family Health Survey

risky behavior, and poor decision-making in response to hot emotions increase the risks, particularly among adolescents.^[41] The highest number of deaths due to RTA was observed in 16–18 years age group (35.3%), followed by 11–15 (25.1%) and 6–10 (24%) years age groups.^[42]

Prevention of gender-based violence remains a challenge. NFHS-3 revealed that 34% of ever-married adolescent girls (15–19 years) reported having experienced physical, emotional, or sexual violence perpetrated by their spouses.^[21] In the case of sexual violence, the prevalence (ever experienced) declines from 13% in the age group 15–19 years to 11% for the age group 20–24 years.^[43] The prevalence of spousal physical or sexual violence varies greatly by state, from 3% in Himachal Pradesh and 8%–9% in Kerala and Jammu and Kashmir to 52% in Bihar.^[17] According to a study among urban adolescent in Karnataka, sexual abuse is more common in female slum adolescents than in school adolescents.^[17,44] A study done among urban adolescent boys in Mumbai draws attention to the prevalence of inequitable gender attitudes and attitudes condoning violence against girls and the association of such attitudes with history of exposure to violence in homes and communities as well as with self-reported violence perpetration.^[45] These findings are summarized in Table 5.

Noncommunicable Diseases

Noncommunicable diseases (NCDs) have emerged as a major public health problem in urban India. Recent study findings suggest an increase in the prevalence of all risk factors for NCDs among urban adolescents.^[46,47] Nearly 2/1000 adolescent girls and 1/1000 adolescent boys aged 15–19 suffer from diabetes in India.^[48] In a study done among school adolescents in Delhi, the prevalence of hypertension was found to be 7%.^[49] Another

study done in Chennai among urban school children in the age group of 13–17 years found the prevalence of hypertension to be 21.5%.^[50] In a study done among school-going adolescents of age 9–20 years, the prevalence of bronchial asthma was found to be 2.6% among boys and 1.9% among girls.^[51] These findings are summarized in Table 6.

Adolescent Health Programmes

Recognizing the importance of adolescent health, the Government of India is implementing health programs targeted to this population. The Rashtriya Kishor Swasthya Karyakram (RKSK) was launched by the Ministry of Health and Family Welfare (MOHFW) on January 17, 2014, for adolescents in the age group of 10–19 years, which would target their nutrition, reproductive health, and substance abuse. To guide the implementation of this program, the MOHFW in collaboration with UNFPA has developed a National Adolescent Health Strategy.^[52] Under this, a core package of services, including preventive, promotive, curative, and counseling services and routine checkups at primary, secondary, and tertiary levels of care, is provided regularly to adolescents, married and unmarried, girls and boys, during the clinic sessions.

Weekly iron and folic acid supplementation (WIFS) entails provision of weekly supervised iron folic acid tablets to in-school boys and girls and out-of-school girls for prevention of iron and folic acid deficiency anemia and biannual albendazole tablets for helminthic control. This program aims to cover a total of 11.2 crore beneficiaries including 8.4 crore in-school and 2.8 crore out-of-school adolescents. Until June 30, 2015, the average monthly coverage of adolescents under the WIFS program was 25%, with 28% in-school and 13% out-of-school coverage.

Table 5: Accidental and intentional violence

Author	Year	Study design	Study area	Population	Relevant findings
Singh et al. ^[42]	1974-2013	Retrospective study	Postmortem records in PGI, Chandigarh, India	Children aged ≤18 years	Highest number of deaths due to RTA was observed in 16-18 years age group (35.3%) followed by 11-15 (25.1%) and 6-10 (24%) years age groups
International Institute for Population Sciences, Mumbai ^[21]	2007	Cross-sectional	29 states in India	Rural and urban women aged 15-49 and men aged 15-54 years	34% of ever-married adolescent girls (15-19) reported having experienced physical, emotional or sexual violence perpetrated by their spouses
Parasuraman et al. ^[17]	2005-2006	Data used from NFHS-3 systematic two-stage cluster sample	All states and UT also includes slum and non-slum data for 8 cities	Men and women in the age group of 15-24 years	Spousal physical or sexual violence varies greatly by state, from 3% in Himachal Pradesh and 8%-9% in Kerala and Jammu and Kashmir to 52% in Bihar
Sanjeeva et al. ^[44]	2011	Cross-sectional study	Bengaluru, India	Adolescents 10-19 years	Sexual abuse is more common in female slum adolescents than school adolescent
Das et al. ^[45]	2009	Cross-sectional study	Urban neighborhoods of Mumbai, India	Boys aged 10-16 years	Prevalence of inequitable gender attitudes and attitudes condoning violence against girls and the association of such attitudes with histories of exposure to violence in homes and communities as well as with self-reported violence perpetration

RTA: Road traffic accident; NFHS: National Family Health Survey

Table 6: Noncommunicable diseases

Author	Year	Study design	Study area	Population	Relevant findings
Anand <i>et al.</i> ^[46]	2003-2004	Cross-sectional study	Ballabgarh, Haryana, India	15-64 years of age	Increase in the prevalence of all risk factors for NCDs
Bhagyalaxmi <i>et al.</i> ^[47]	2012	Cross-sectional study	Urban and rural population in Gujarat, Haryana	15-64 years of age	Increase in the prevalence of all risk factors for NCDs among urban adolescents
Amutha <i>et al.</i> ^[48]	1992-2009	Retrospective study	Diabetes care center in Southern India	Mean age of 15 years	2/1000 adolescent girls and 1/1000 adolescent boys aged 15-19 suffer from diabetes in India
Anand <i>et al.</i> ^[49]	2014	Cross-sectional study	Public school in Central Delhi	12-17 years of age	Prevalence of hypertension was found to be 7%
Sundar ^[50]	2013	Cross-sectional study	Public and private school in Chennai	13-17 years of age	Prevalence of hypertension was found to be 21.5%
Gupta <i>et al.</i> ^[51]	2008	Cross-sectional survey	Multicenter study involving urban and rural areas in India	15-85 years of age	Prevalence of bronchial asthma was found to be 2.6% among boys and 1.9% among girls

NCDs: Noncommunicable diseases

Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH + A) approach was launched in 2013 by MOHFW.^[53] It looks to address the major causes of mortality among women and children as well as the delays in accessing and utilizing health care and services. It has been developed to provide an understanding of “continuum of care” to ensure equal focus on various life stages. It introduced the use of scorecard to track the performance, national iron + initiative to address the issue of anemia across all age groups, and the comprehensive screening and early interventions for defects at birth, diseases and deficiencies among children and adolescents. It also directs states to focus their efforts on the most vulnerable population and disadvantaged groups. It also emphasizes the need to reinforce efforts in those poor-performing districts that have already been identified as high focus districts.

Adolescent reproductive and sexual health (ARSH)^[54] is an initiative by the MOHFW under RCH-II. The services cater to all adolescent married and unmarried girls and boys. The package of services includes promotive, preventive, curative, referral, and outreach services. This focus on ARSH and special interventions for adolescents was in anticipation of the following expected outcomes: delay age of marriage, reduce incidence of teenage pregnancies, meet unmet contraceptive needs, reduce the number of maternal deaths, reduce the incidence of sexually transmitted diseases, and reduce the proportion of HIV positive cases in the 10–19 years’ age group.

Adolescent friendly health clinics (AFHCs) provide counseling and curative services at primary, secondary, and tertiary levels of care, on fixed days and fixed time with due referral linkages. It acts as the first level of contact of primary health-care services with adolescents. As on June 30, 2015, as many as 7381 AFHCs were functional. In addition to 1402 adolescent health counselors working in the primary care health facilities, around 753 ICTC counselors (in 213 RKSK districts) are also providing adolescent health counseling services. Till October 2015, 1400 medical officers and 1207 ANMs were trained

across health-care facilities in adolescent friendly health services.^[55]

Menstrual hygiene scheme was introduced for promotion of menstrual hygiene among adolescent girls in the age group of 10–19 years in rural areas by MOHFW. The major objectives of this scheme are as follows:

1. To increase awareness among adolescent girls on menstrual hygiene
2. To increase access to and use of high-quality sanitary napkins by adolescent girls in rural areas
3. To ensure safe disposal of sanitary napkins in an environmentally-friendly manner.

A pack of six sanitary napkins is provided under the NRHM’s brand “Freedays.” These napkins are sold to the adolescent girls at Rs. 6 for a pack of six napkins in the village by the accredited social health activist (ASHA). On sale of each pack, the ASHA gets an incentive of Rs. 1 per pack besides a free pack of sanitary napkins per month. Initial model of this scheme was rolled out in 17 states and 112 districts through central supply of sanitary napkin packs. The scheme has been decentralized for procurement by the states themselves from 2015 to 2016. Funds have been approved for state-level procurement of sanitary napkin packs in 162 districts across 20 states in 2015–2016. Till June 30, 2015, a total of 6.8 crore packs of sanitary napkins supplied through central procurement were utilized, with a coverage of 2.5 crore rural adolescent girls.

Conclusions

To achieve adolescent health and well-being, planning of policies in health and allied fields should be multidimensional. Urbanization without improving basic amenities and access to health care is a major problem in India. Ministry of housing and urban poverty alleviation should plan policies to improve the physical environment of slum residents. Advertisement and media regulation to be streamlined and parental control facilities are

necessary to improve the social environment and peer groups of adolescents. Due to increase in lifestyle disorders, schools should employ a range of available strategies including physical activity, delivery of life skills for health and well-being, comprehensive sexuality education, and support of a positive school ethos. Inclusion of adolescents under RMNCH+A should remove the blanket opinion of adolescents being comparatively healthy. Adolescent health programmes mainly concentrate on the rural population. Emerging evidence shows that adolescent-related health data should be collected in demographic health surveys. These data will help in a better understanding of the nature of problems among adolescents in urban India, leading to their causes and solution. These measures will help in reaping the benefits of epidemiologic and demographic transition in India.

Recommendations

The existing national initiatives on adolescent health need to be rolled out across the country at the earliest. These address the major health issues among adolescents, namely, under-nutrition, alcohol and substance abuse, mental health, and NCDs. At the same time, health education packages on adolescent health are required for family members. They need to engage with the adolescents in their families, with a clear understanding of their challenges and specific needs. Prevention of early marriage of girls and violence against them requires concerted educational efforts in schools as well as the community. Adolescent health, including life skills and emphasis on physical activity, should be given due to importance in the curriculum of senior schools in a big way to inform and sensitize this vulnerable group.

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Conflicts of interest

There are no conflicts of interest.

References

- WHO | Adolescent Development. WHO. Available from: http://www.who.int/maternal_child_adolescent/topics/adolescence/dev/en/. [Last cited on 2016 Jul 14].
- United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2015 Revision, Volume II: Demographic Profiles (ST/ESA/SER.A/380); 2015.
- UNICEF, editor. The State of the World's Children. Adolescence: An Age of Opportunity. New York: UNICEF; 2011. p. 138.
- Chandramouli C. Population Enumeration Data (Final Population). India: Registrar General and Census Commissioner of India; 2011.
- Blakemore SJ, Mills KL. Is adolescence a sensitive period for sociocultural processing? *Annu Rev Psychol* 2014;65:187-207.
- 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* 2016;387:2423-78.
- Galea S, Vlahov D, editors. Handbook of Urban Health: Populations, Methods, and Practice. New York: Springer; 2005. p. 599.
- Ellaway A, Macintyre S. You are where you live. Evidence shows that where we live has a significant impact on our mental health. *Ment Health Today* 2004;33-5. PMID: 15575587.
- Mmari K, Lantos H, Blum RW, Brahmabhatt H, Sangowawa A, Yu C, *et al.* A global study on the influence of neighborhood contextual factors on adolescent health. *J Adolesc Health* 2014;55 6 Suppl: S13-20.
- Cattell V. Poor people, poor places, and poor health: The mediating role of social networks and social capital. *Soc Sci Med* 2001;52:1501-16.
- Altschuler A, Somkin CP, Adler NE. Local services and amenities, neighborhood social capital, and health. *Soc Sci Med* 2004;59:1219-29.
- Araya R, Dunstan F, Playle R, Thomas H, Palmer S, Lewis G. Perceptions of social capital and the built environment and mental health. *Soc Sci Med* 2006;62:3072-83.
- Browning CR, Burrington LA, Leventhal T, Brooks-Gunn J. Neighborhood structural inequality, collective efficacy, and sexual risk behavior among urban youth. *J Health Soc Behav* 2008;49:269-85.
- Viner RM, Ozer EM, Denny S, Marmot M, Resnick M, Fatusi A, *et al.* Adolescence and the social determinants of health. *Lancet* 2012;379:1641-52.
- Singh A, Kumar A, Pranjali P. Utilization of maternal healthcare among adolescent mothers in urban India: Evidence from DLHS-3. *PeerJ* 2014;2:e592.
- Hazarika I. Women's reproductive health in slum populations in India: Evidence from NFHS-3. *J Urban Health* 2010;87:264-77.
- Parasuraman S, Kishor S, Singh SK, Vaidehi Y. A Profile of Youth in India. National Family Health Survey (NFHS-3), India, 2005-2006. Mumbai, Calverton, Maryland, USA: International Institute for Population Sciences, ICF Macro; 2009.
- Ramavath KK, Olyai R. Knowledge and awareness of HPV infection and vaccination among urban adolescents in India: A cross-sectional study. *J Obstet Gynaecol India* 2013;63:399-404.
- Naswa S, Marfatia YS. Adolescent HIV/AIDS: Issues and challenges. *Indian J Sex Transm Dis* 2010;31:1-10.
- Kurapati S, Vajpayee M, Raina M, Vishnubhatla S. Adolescents living with HIV: An Indian profile. *AIDS Res Treat* 2012;2012:576149.
- International Institute for Population Sciences (IIPS) and Macro International. National Family Health Survey (NFHS-3), 2005-2006: India. Vol. I. Mumbai: International Institute for Population Sciences; 2007.
- Kalyanwala S, Sharma V, Sarna A. Adolescents in India: A desk review of existing evidence and behaviours, programmes and policies. New Delhi: Population Council and UNICEF; 2013.
- Prashant K, Shaw C. Nutritional status of adolescent girls from an urban slum area in South India. *Indian J Pediatr* 2009;76:501-4.
- Raj M, Sundaram KR, Paul M, Deepa AS, Kumar RK. Obesity in Indian children: Time trends and relationship with hypertension. *Natl Med J India* 2007;20:288-93.

25. Parekh A, Parekh M, Vadasmiya D. Prevalence of overweight and obesity in adolescents of urban and rural area of Surat, Gujarat. *Natl J Med Res* 2012;2:325-9. Available from: <http://www.scopemed.org/?mno=26266>. [Last cited on 2016 Jul 15].
26. Priyadarshini R, Jasmine S, Valarmathi S, Kalpana S, Parameswari S. Impact of media on the physical health of urban school children of age group 11-17 years in Chennai – A cross sectional study. *IOSR J Humanit Soc Sci* 2013;9:30-5.
27. Chambers RA, Taylor JR, Potenza MN. Developmental neurocircuitry of motivation in adolescence: A critical period of addiction vulnerability. *Am J Psychiatry* 2003;160:1041-52.
28. Martins A, Ramalho N, Morin E. A comprehensive meta-analysis of the relationship between emotional intelligence and health. *Pers Individ Dif* 2010;49:554-64. Available from: <http://www linkinghub.elsevier.com/retrieve/pii/S019188691000276X>. [Last cited on 2016 Jul 15].
29. Bansal V, Goyal S, Srivastava K. Study of prevalence of depression in adolescent students of a public school. *Ind Psychiatry J* 2009;18:43-6. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3016699/>. [Last cited on 2016 Jul 15].
30. Patel V, Ramasundarahettige C, Vijayakumar L, Thakur JS, Gajalakshmi V, Gururaj G, *et al.* Suicide mortality in India: A nationally representative survey. *Lancet* 2012;379:2343-51.
31. Sharma R, Grover VL, Chaturvedi S. Suicidal behavior amongst adolescent students in South Delhi. *Indian J Psychiatry* 2008;50:30-3.
32. Grover S, Sarkar S, Chakrabarti S, Malhotra S, Avasthi A. Intentional self-harm in children and adolescents: A study from psychiatry consultation liaison services of a tertiary care hospital. *Indian J Psychol Med* 2015;37:12-6.
33. Malhi P, Bharti B, Sidhu M. Aggression in schools: Psychosocial outcomes of bullying among Indian adolescents. *Indian J Pediatr* 2014;81:1171-6.
34. Jaisooriya TS, Beena KV, Beena M, Ellangovan K, Jose DC, Thennarasu K, *et al.* Prevalence and correlates of alcohol use among adolescents attending school in Kerala, India. *Drug Alcohol Rev* 2016;35:523-9.
35. Pillai A, Nayak MB, Greenfield TK, Bond JC, Hasin DS, Patel V. Adolescent drinking onset and its adult consequences among men: A population based study from India. *J Epidemiol Community Health* 2014;68:922-7.
36. Juyal R, Bansal R, Kishore S, Negi KS, Chandra R, Semwal J. Substance use among intercollege students in district Dehradun. *Indian J Community Med* 2006;31:251-4. Available from: https://www.researchgate.net/publication/45262033_Substance_Use_Among_Intercollege_Students_in_District_Dehradun. [Last cited on 2016 Jul 15].
37. Saluja BS, Grover S, Irpati AS, Mattoo SK, Basu D. Drug dependence in adolescents 1978-2003: A clinical-based observation from North India. *Indian J Pediatr* 2007;74:455-8.
38. Tsering D, Pal R, Dasgupta A. Licit and illicit substance use by adolescent students in Eastern India: Prevalence and associated risk factors. *J Neurosci Rural Pract* 2010;1:76-81.
39. Malhotra S, Kakkar N, Ghosh A, Khan I. Smoking and smokeless tobacco use in children and adolescents: Clinical profile and comparison. *J Indian Assoc Child Adolesc Ment Health* 2016;12:116-20. Available from: <http://www.search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=09731342&AN=114349581&h=5yqH00mFl5MQwCWKVEA9Sr72QnM1ZO7IEF2rnNnVFUUwqLIsTELvtNRA9ddzS7Y2opwvaAHcpiMffp1Brdm0cQ%3D%3D&crl=c>. [Last cited on 2016 Aug 05].
40. Livingstone S, Smith PK. Annual research review: Harms experienced by child users of online and mobile technologies: The nature, prevalence and management of sexual and aggressive risks in the digital age. *J Child Psychol Psychiatry* 2014;55:635-54.
41. Toroyan T, Peden MM. Youth and Road Safety. Geneva, Switzerland: World Health Organization; 2007. Available from: http://www.who.int/publications/2007/9241595116_eng.pdf. [Last cited on 2016 Jul 15].
42. Singh D, Singh SP, Kumaran M, Goel S. Epidemiology of road traffic accident deaths in children in Chandigarh zone of North West India. *Egypt J Forensic Sci* 2016;6:255-60. [DOI: 10.1016/j.ejfs. 2015.01.008].
43. Patel V, Andrew G. Gender, sexual abuse and risk behaviours in adolescents: A cross-sectional survey in schools in Goa. *Natl Med J India* 2001;14:263-7.
44. Sanjeeva GN, Patil AT, Kumar P. A study of abuse including physical, substance, and sexual abuse among urban adolescent children. *Indian J Child Health* 2016;2:210-4. Available from: <http://www.atharvapub.net/index.php/IJCH/article/view/334>. [Last cited on 2016 Jul 15].
45. Das M, Ghosh S, Verma R, O'Connor B, Fewer S, Virata MC, *et al.* Gender attitudes and violence among urban adolescent boys in India. *Int J Adolesc Youth* 2014;19:99-112. Available from: <http://www.tandfonline.com/doi/abs/10.1080/02673843.2012.716762>. [Last cited on 2016 Jul 16].
46. Anand K, Shah B, Yadav K, Singh R, Mathur P, Paul E, *et al.* Are the urban poor vulnerable to non-communicable diseases? A survey of risk factors for non-communicable diseases in urban slums of Faridabad. *Natl Med J India* 2007;20:115-20.
47. Bhagyalaxmi A, Atul T, Shikha J. Prevalence of risk factors of non-communicable diseases in a District of Gujarat, India. *J Health Popul Nutr* 2013;31:78-85.
48. Amutha A, Datta M, Unnikrishnan R, Anjana RM, Mohan V. Clinical profile and complications of childhood- and adolescent-onset type 2 diabetes seen at a diabetes center in South India. *Diabetes Technol Ther* 2012;14:497-504.
49. Anand T, Ingle GK, Meena GS, Kishore J, Kumar R. Hypertension and its correlates among school adolescents in Delhi. *Int J Prev Med* 2014;5 Suppl 1:S65-70.
50. Sundar JS, Adaikalam JMS, Parameswari S, Valarmarathi S, Kalpana S, Shantaram D. Prevalence and Determinants of Hypertension among Urban School Children in the Age Group of 13- 17 Years in, Chennai, Tamilnadu. *Epidemiol* 2013;3:130. doi:10.4172/2161-1165.1000130.
51. Gupta D, Aggarwal AN, Kumar R, Jindal SK. Prevalence of bronchial asthma and association with environmental tobacco smoke exposure in adolescent school children in

- Chandigarh, North India. *J Asthma* 2001;38:501-7.
52. Rashtriya Kishor Swasthya Karyakram (RKSK) | National Health Portal of India. Available from: http://www.nhp.gov.in/rashtriya-kishor-swasthya-karyakram-rksk_pg. [Last cited on 2016 Jul 15].
 53. Reproductive, Maternal, Newborn, Child and Adolescent Health - Government of India. Available from: <http://www.nrhm.gov.in/nrhm-components/rmnch-a/reproductive-maternal-newborn-child-and-adolescent-health.html>. [Last cited on 2016 Jul 15].
 54. Nair MK, Leena ML, George B, Thankachi Y, Russell PS. ARSH 2: Reproductive and sexual health knowledge, attitude and practices: Comparison among boys and girls (10-24 y). *Indian J Pediatr* 2013;80 Suppl 2:S199-202.
 55. Ministry of Health and Family Welfare. Annual Report 2015-2016. Government of India; 2016.