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. Adolescents constitute 16% of the global population, with an absolute number of 1.2 billion. 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. 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. 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. 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. 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.
as one of the key drivers for many health disparities, including mental health status, 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.

Two social environmental factors, namely, social capital and social cohesion, 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, higher crime and homicide, and increased sexual risk behaviors. 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. Social determinants from outside the family become greater, with major influence of peers, media, education, and the beginning of workplace influences.

**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. 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. 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. 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. 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.

Over 35% of all reported AIDS cases in India occur among young people in the age group of 15–24 years. 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. 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. 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 et al.       | 2007-2008  | Data used from DLHS-3 | All states and UT, except Nagaland | Urban adolescent mothers received full antenatal care at the time of NFHS-3 | 22.9% adolescent mothers received full antenatal care 13-19 years                  |
| Hazarika           | 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 | 70.5% utilized safe delivery care 65.1% had a postnatal checkup                   |
| Parasuraman et al. | 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 | In urban slums, 45.8% of adolescents were married before 18 years of age and also had higher number of children born to them Half of the women and almost one in five men aged 15-24 were currently married |
| Ramavath and Olyai | 2009-2010  | Cross-sectional study | Five metro cities of India  | Adolescent girls in secondary schools and colleges | Adolescents Poor awareness about HPV infection and vaccination but are intensely willing to know about it and get vaccinated |
| Naswa and Marfatia | 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 et al.    | 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%. 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%. 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. 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.

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; 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. 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. 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. 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. 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. 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.

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. One of the less apparent causes of stress among adolescents is bullying. A study conducted by Mali et al. in North India reports the overall prevalence of any kind of bullying behavior as 53%. These findings are summarized in Table 3.

### Addiction Disorders

Consumption of alcohol and illicit drugs often begins early and then increases during the adolescent years. 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%). 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). Adolescents living in

### Table 2: Nutritional health of adolescents

| Author | Year | Study design | Study area | Population | Relevant findings |
|--------|------|--------------|------------|------------|-------------------|
| International Institute for Population Sciences, Mumbai | 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 et al. | 2002-2013 | Review | India | Adolescents aged 10-19 years | Prevalence of anemia among adolescent girls is 16% |
| Prashant and Shaw | 2006-2007 | Community-based cross-sectional study | Urban slum of Nalgonda town, Andhra Pradesh | Girls aged 10-18 years | Prevalence of stunting: 28.3% |
| Raj et al. | 2003-2005 | Prospective cohort study | Ernakulam district, Kerala | Children aged 5-16 years | Underweight: 22.9%; Thinness: 20.6% |
| Parekh et al. | 2013 | Cross-sectional study | Surat city, Gujarat, India | Adolescent school students 14-16 years | Proportion of overweight children increased from 4.94% in 2003 to 6.57% in 2005 |
| Priyadarshini et al. | 2013 | Cross-sectional study | Private and public schools of Chennai | Schools students aged 11-17 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 |

Table 2: Nutritional health of adolescents

---

Journal of Family Medicine and Primary Care

Volume 6 : Issue 3 : July-September 2017

Page 470
urban area were involved in substance abuse significantly more than their rural counterparts.\[39\]

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%).\[33\] 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.\[37\]

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.\[36\] Developmental immaturity,

#### Table 3: Mental health of adolescents

| Author         | Year       | Study design          | Study area                                      | Population                        | Relevant findings                                                                 |
|----------------|------------|-----------------------|------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------|
| Chambers et al\[37\] | 2003       | Review                | Neurodevelopment and substance use disorders and addiction | Adolescents                      | Adolescents are more prone to develop addiction and substance use disorders        |
| Martins et al\[39\] | 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 et al\[37\] | 2009       | Cross-sectional study | School-based                                    | Adolescents in 9th 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 et al\[39\] | 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 et al\[31\] | 2008       | Cross-sectional study | Cluster sampling                                 | Three schools and two colleges in South Delhi | 15.8% having thought of attempting suicide, while 5.1% had actually attempted suicide, both being more in females than in males |
| Grover et al\[39\] | 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                                                                 |
|-------------------|------------|-----------------------|------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------|
| Jaisoorya et al\[34\] | 2015       | Cross-sectional study | 73 schools in Kerala, India                      | Young people aged 12-19 years     | Consumption of alcohol among young people begins in the early years                |
| Pillai et al\[38\] | 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 et al\[39\]  | 2004       | Cross-sectional study | Dehradun, India                                 | 9th-12th standard students        | Prevalence of regular use of substances was significantly higher among urban students (37.9%), as compared to rural students (24.4%) |
| Saluja et al\[37\] | 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 et al\[38\] | 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 et al\[38\] | 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 et al\[37\] | 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.\textsuperscript{[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.\textsuperscript{[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.\textsuperscript{[23]} 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.\textsuperscript{[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.\textsuperscript{[47]} According to a study among urban adolescent in Karnataka, sexual abuse is more common in female slum adolescents than in school adolescents.\textsuperscript{[17–19]} 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.\textsuperscript{[49]} 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.\textsuperscript{[46,47]} Nearly 2/1000 adolescent girls and 1/1000 adolescent boys aged 15–19 suffer from diabetes in India.\textsuperscript{[48]} In a study done among school adolescents in Delhi, the prevalence of hypertension was found to be 7%.\textsuperscript{[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%.\textsuperscript{[84]} 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.\textsuperscript{[83]} 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.\textsuperscript{[82]} 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.

| Author                          | Year      | Study design            | Study area                  | Population              | Relevant findings                                                                 |
|---------------------------------|-----------|-------------------------|-----------------------------|-------------------------|-----------------------------------------------------------------------------------|
| Singh et al.\textsuperscript{[48]} | 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\textsuperscript{[23]} | 2007      | Cross-sectional study   | 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 |
| Parasarman et al.\textsuperscript{[73]} | 2005-2006 | Data used from NFHS-3 systematic two-stage cluster sample | All states and UT also includes slum and nonslum 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.\textsuperscript{[14]} | 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.\textsuperscript{[96]}   | 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.
Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH + A) approach was launched in 2013 by MOHFW. 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) 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.

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 the period 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.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**References**

1. WHO | Adolescent Development. WHO. Available from: http://www.who.int/maternal_child_adolescent/topics/adolescence/dev/en/. [Last cited on 2016 Jul 14].

2. 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.

3. UNICEF, editor. The State of the World’s Children. Adolescence: An Age of Opportunity. New York: UNICEF; 2011. p. 138.

4. Chandramouli C. Population Enumeration Data (Final Population). India: Registrar General and Census Commissioner of India; 2011.

5. Blakemore SJ, Mills KL. Is adolescence a sensitive period for sociocultural processing? Annu Rev Psychol 2014;65:187-207.

6. Patton GC, Sawyer SM, Santelli JS, Ross DA, Affifi R, Allen NB, et al. Our future: A Lancet commission on adolescent health and wellbeing. Lancet 2016;387:2423-78.

7. Galea S, Vlahov D, editors. Handbook of Urban Health: Populations, Methods, and Practice. New York: Springer; 2005. p. 599.

8. 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: 15755387.

9. Mmari K, Lantos H, Blum RW, Brahmbhatt 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.

10. 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.

11. Altschuler A, Somkin CP, Adler NE. Local services and amenities, neighborhood social capital, and health. Soc Sci Med 2004;59:1219-29.

12. 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.

13. Browning CR, Burrelltont 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.

14. 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.

15. Singh A, Kumar A, Pranjalii P. Utilization of maternal healthcare among adolescent mothers in urban India: Evidence from DLHS-3. PeerJ 2014;2:e592.

16. Hazarika I. Women’s reproductive health in slum populations in India: Evidence from NFHS-3. J Urban Health 2010;87:264-77.

17. Parasuraman S, Kishor S, Singh SK, Vaidhepi 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.

18. 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.

19. Naswa S, Marfatia YS. Adolescent HIV/AIDS: Issues and challenges. Indian J Sex Transm Dis 2010;31:1-10.

20. Kurapati S, Vajpayee M, Raina M, Vishnuhatla S. Adolescents living with HIV: An Indian profile. AIDS Res Treat 2012;2012:576149.

21. International Institute for Population Sciences (IIPS) and Macro International. National Family Health Survey (NFHS-3), India, 2005-2006: India. Vol. I. Mumbai: International Institute for Population Sciences; 2007.

22. 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.

23. Prashant K, Shaw C. Nutritional status of adolescent girls from an urban slum area in South India. Indian J Pediatr 2009;76:501-4.

24. 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.ncbi.nlm.nih.gov/pmc/articles/PMC3233055/. [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 Humaniit 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.sciencedirect.com/science/article/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, Gaur S, 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. Malini P, Bharti B, Sidhu M. Aggression in schools: Psychosocial outcomes of bullying among Indian adolescents. Indian J Pediatr 2014;81:1171-6.

34. Jaisoorya 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 S, Kishore J, 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/432620033_Substance_Use_Among_Intercollege_Students_in_District_Dehradun. [Last cited on 2016 Jul 15].

37. Saluja BS, Grover S, Irdati 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&scope=site&sid=zL175p5Xc0ISVA99KS72Q9pM1ZO7FE2mNvVFUUwqLiSTELVnR9dS7Y2wvpwaAHcplMfpp1Brdm0CQ%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/entity/traff/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. 2015.10.008].

43. Patel V, Andrew G. Gender, sexual abuse and risk behaviours in adolescents: A cross-sectional survey in schools in Goa. Natl J Med India 2001;14:4263-7.

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 Gujararat, India. J Health Popul Nutr 2013;31:78-85.

48. Amudha 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, Valarmarthi 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
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.