

Adolescent Health 4



Health of the world's adolescents: a synthesis of internationally comparable data

George C Patton, Carolyn Coffey, Claudia Cappa, Dorothy Currie, Leanne Riley, Fiona Gore, Louisa Degenhardt, Dominic Richardson, Nan Astone, Adesola O Sangowawa, Ali Mokdad, Jane Ferguson

Adolescence and young adulthood offer opportunities for health gains both through prevention and early clinical intervention. Yet development of health information systems to support this work has been weak and so far lagged behind those for early childhood and adulthood. With falls in the number of deaths in earlier childhood in many countries and a shifting emphasis to non-communicable disease risks, injuries, and mental health, there are good reasons to assess the present sources of health information for young people. We derive indicators from the conceptual framework for the Series on adolescent health and assess the available data to describe them. We selected indicators for their public health importance and their coverage of major health outcomes in young people, health risk behaviours and states, risk and protective factors, social role transitions relevant to health, and health service inputs. We then specify definitions that maximise international comparability. Even with this optimisation of data usage, only seven of the 25 indicators, covered at least 50% of the world's adolescents. The worst adolescent health profiles are in sub-Saharan Africa, with persisting high mortality from maternal and infectious causes. Risks for non-communicable diseases are spreading rapidly, with the highest rates of tobacco use and overweight, and lowest rates of physical activity, predominantly in adolescents living in low-income and middle-income countries. Even for present global health agendas, such as HIV infection and maternal mortality, data sources are incomplete for adolescents. We propose a series of steps that include better coordination and use of data collected across countries, greater harmonisation of school-based surveys, further development of strategies for socially marginalised youth, targeted research into the validity and use of these health indicators, advocating for adolescent-health information within new global health initiatives, and a recommendation that every country produce a regular report on the health of its adolescents.

Introduction

Young people are commonly regarded as healthy and for that reason few attempts have been made to systematically measure their health. Yet adolescence and young adulthood coincide with major changes in health problems and determinants of health in later life.¹⁻⁴ Mortality rises due to preventable causes that include injury, HIV, tuberculosis, and maternal death.⁵ Mental disorders also rise sharply during the adolescent years.⁶ Many risk processes that lead to chronic non-communicable diseases in later life, including tobacco, alcohol, and illicit substance misuse, unsafe sex, obesity, and lack of physical activity, typically emerge around this time.^{6,7}

Standardised frameworks for health indicators in young people are available for some high-income countries.⁸⁻¹¹ A few also produce regular reports on the health status of their young people.¹²⁻¹⁷ These reports have generally evolved from an earlier focus on age disaggregation of routinely collected statistics to the more recent inclusion of health-risk behaviours and states, as well as contextual as well as social determinants of health.¹³ The Millennium Development Goals (MDGs) have adopted some indicators of the development of young people in low-income and middle-income countries, but with a health focus predominantly on sexual and reproductive health.¹⁸

Indicators of health and its determinants are important for good policy responses both nationally and

worldwide.¹⁹⁻²² For this reason there has been a rapid increase in indicators across many aspects of health,^{23,24} but few seem well measured.^{25,26} One consequence has been a call to define a smaller number of core health indicators.²⁷ For adolescents there is also a need for indicators beyond sexual and reproductive health, the major focus so far. These indicators need to account for

Key messages

- There is wide variation between and within regions in country profiles of adolescent health
- Sub-Saharan Africa has the worst regional adolescent health profile; risks for later life non-communicable diseases (NCDs) are spreading rapidly, with the highest rates of tobacco use and overweight and lowest rates of physical activity in low-income and middle-income countries
- Few indicators are well measured even in sexual and reproductive health, which has had the greatest policy focus
- Simple measures such as better coordination and integration of present data collections, harmonisation of measures across surveys, and development of indicators in neglected areas such as mental health would greatly improve worldwide coverage of adolescent health
- Future initiatives in tackling NCDs, mental health, sexual and reproductive health, and injuries should have explicit measurement strategies for adolescents

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This is the fourth in a [Series](#) of four papers about adolescent health

Department of Paediatrics (G C Patton MD), and Centre for Health Policy, Programs and Economics, School of Population Health (L Degenhardt PhD), University of Melbourne, Parkville, VIC, Australia; Murdoch Childrens Research Institute, Royal Children's Hospital, Parkville, VIC, Australia (G C Patton, C Coffey BSc); Statistics and Monitoring Section, UNICEF, New York, NY, USA

(C Cappa PhD); Child and Adolescent Health Research Unit, University of St Andrews, Fife, UK (D Currie MSc); Non-Communicable Disease Prevention and Health Promotion Department (L Riley MSc), Department of Health Statistics and Information Systems (F Gore MPhil), and Department of Maternal, Newborn, Child and Adolescent Health (J Ferguson MSc), World Health Organization, Geneva, Switzerland; National Drug and Alcohol Research Centre, University of New South Wales, Sydney, NSW, Australia (L Degenhardt); Social Policy Division, Organisation for Economic Cooperation and Development, Paris, France (D Richardson PhD); Department of Population, Family and Reproductive Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MA, USA (N Astone PhD); Institute of

Child Health, University College Hospital, Ibadan, Oyo State, Nigeria (A O Sangowawa MPH); and Institute of Health Metrics and Evaluation, University of Washington, Seattle, WA, USA (A Mokdad PhD)

Correspondence to: Dr George C Patton, Centre for Adolescent Health, Royal Children's Hospital, 50 Flemington Road, Parkville, VIC 3052, Australia george.patton@rch.org.au

the rapid health transitions happening in many countries.²³ More comprehensive approaches would include relevant social determinants of health as well as the contribution of adolescent-onset risk states and behaviours to future disease burden.^{3,28} We outline a set of indicators drawn from the conceptual framework of this Series (figure 1), present data on the extent to which data systems have comparable measures of these indicators, and propose strategies for improving global health surveillance in young people.

Defining a set of indicators

At present, there is no internationally agreed set of indicators for adolescent health. Our indicators incorporate elements from earlier national reports including measures of health and wellbeing,²⁹ social role transitions,¹⁷ risk and protective factors,³⁰ and health service system responses.^{29,31} Outlined in panel 1 is the process by which we selected the indicators.³ Our intention was not to produce a definitive list, but rather to outline constructs broad enough to cover the conceptual framework with a minimum number of measures.²⁵ We drew on the four categories of data outlined in the appendix including the global mortality database, international household surveys, international school-based surveys, and other UN sources. In figure 2 we summarise available data sources in the first three categories. We included the most recent data available, collected since 2000, even if not available for the whole of the age range or only at a subnational level. We defined regional subgroups in accordance with the 2010 burden of disease study.³⁵ For the purpose of this exercise, we excluded countries with a population of people aged 10–24 years of less than 100 000, leaving 179 of 192 countries

(South Sudan and North Sudan were not considered separately at this point) giving a 99·53% coverage of the 1·79 billion people aged 10–24 years living in UN member states (table).

Key findings

Health outcomes

Age-disaggregated death registry data with both all-cause and cause-specific mortality were available in 71 countries, representing 26% of the world's young people (table appendix 1). Registry data were largely unavailable for east Asia, south Asia, Andean Latin America, north Africa; and the Middle East, smaller countries in Oceania, and sub-Saharan Africa. Across countries with data there are substantial variations between the countries and regions. High-income countries and regions (eg, western Europe) had substantially lower mortality across this age group (10–24 years). Yet even within these low-mortality regions there were two-fold to three-fold variations in all-cause mortality. In regions with intermediate levels of mortality (eg, Latin America and eastern Europe), rates were substantially higher in males than in females with rates again varying up to three-fold between countries. South Africa, the only sub-Saharan country with data, had the highest recorded all-cause mortality rates, with those for males eight times the rates of low-mortality high-income countries and female rates 30-times higher.

Mortality due to traffic injury was substantially higher in males, rose significantly with age, and varied greatly across and within regions. Even within regions of low mortality such as western Europe there was up to five-fold variation between counties with low mortality due to traffic injury (eg, Norway and Iceland) and those with

See Online for appendix

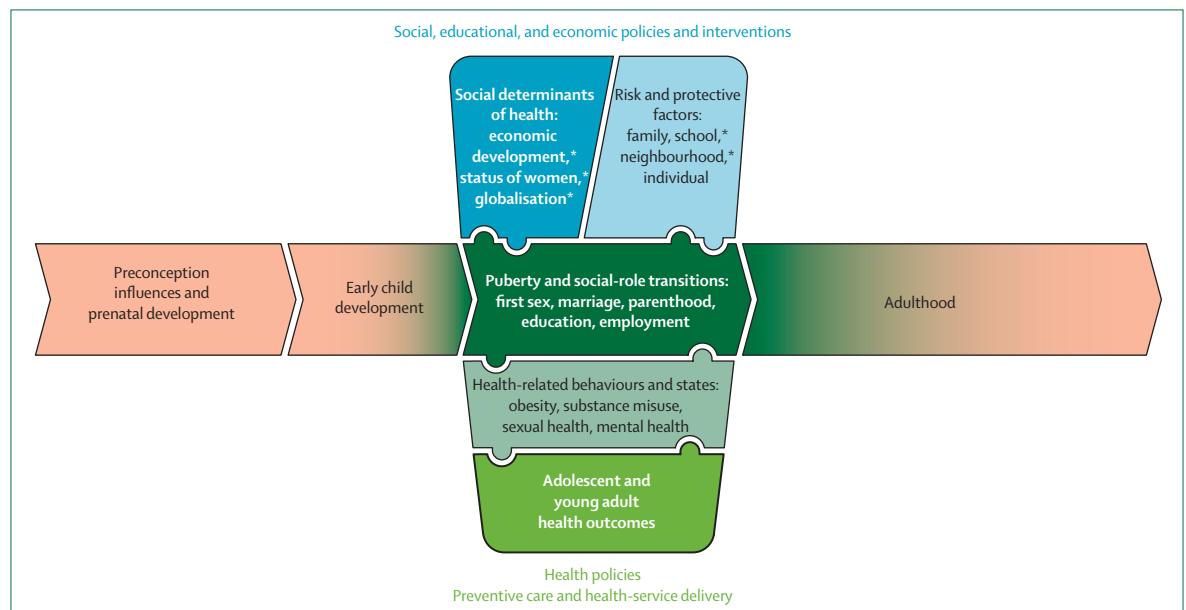


Figure 1: Conceptual framework for adolescent health

*No indicators included in this report.

relatively high mortality (eg, Portugal and Greece). In regions with intermediate mortality, the difference in rates was even greater, perhaps in part related to the availability of motorised transport. Russia had the highest recorded traffic-injury mortality in young males.

Suicide deaths were also higher in males and again showed substantial variation between and within regions. There is great variation in the quality of suicide statistics between countries.³⁹ Even so, youth suicide rates differed up to 11 times between countries that fulfil benchmarks for suicide statistics. Of these benchmarked countries, Greece, Italy, and Spain were notable for their low rates, whereas Finland, Ireland, and Norway were notable for their high rates. The highest suicide rates recorded were in eastern Europe, with particularly high rates in Kazakhstan, Lithuania, and Russia.

Deaths from violence predominantly affected males, with the highest rates in young adults. There was substantial variation between regions, with the highest rates of violent death in the Latin American regions and then eastern Europe. Within the regions with the highest mortality (eg, central Latin America) there were ten-fold differences in death rates between countries. El Salvador had the highest recorded worldwide rate of homicides both in males and females.

Age-disaggregated data on maternal mortality were available from 114 countries and 51% of the worldwide population through the additional use of sisterhood data (ie, enquiry about the death of sisters during pregnancy, childbirth, and 6 weeks post partum) from the Multiple Indicator Cluster Surveys and Demographic and Health Surveys. However, sisterhood studies substantially underestimate maternal deaths.⁴⁰ Stronger data derived from death registries were available from the high-income regions where maternal mortality is very low. Coverage by sisterhood data was good in eastern sub-Saharan Africa, but less so in the low-income and middle-income countries of Asia and the Middle East. The highest rates of maternal mortality were reported from sub-Saharan Africa with a greater than 70-fold variation in rates between countries for girls aged 15–19 years. South Africa had the lowest rates in sub-Saharan Africa and Chad the highest. Bangladesh and Haiti were also notable for their high maternal mortality in young women.

HIV seroprevalence data based on household surveys were available from 29 countries representing 29% of the worldwide population. Data was predominantly from sub-Saharan Africa and to a lesser extent from central and southern Asia. We have not included estimates derived from women attending antenatal clinics because these generally overestimate prevalence.⁴¹ In regions where HIV is endemic, rates are substantially higher in females aged 15–24 years than males. Swaziland had the highest estimated rates of HIV infection. Countries with higher estimated rates of HIV that have not had country-wide surveys include Angola, Eritrea, Gambia,

Panel 1: Deriving a set of indicators for adolescent health

An indicator is a summary measure of population health that guides the formulation of policy and allows comparisons over time and between groups.³² Where possible, we chose indicators measuring constructs with the clearest evidence of public health importance³³ with the criteria outlined by Murray.²⁵ In addition to public health significance we used definitions as close as possible to the construct of interest, with a feasible means of measurement, and a capacity to identify changes over time and between groups within a country.

Our indicator constructs cover five of the aspects outlined in the first paper of this Series:³

- 1 Health outcomes in young people related to major causes of death and incident disability in those aged 10–24 years.
- 2 Health-related behaviours and states that carry risks for present or later-life disease and typically emerge in adolescence and young adulthood.
- 3 Risk and protective factors derived from the immediate social contexts affecting emerging health risks.
- 4 Markers of social-role transitions that are associated with altered patterns of health risk.
- 5 Health-service policy interventions provided to adolescents that have the potential to influence present or later health status.

We provide further description, including justification for our choice of indicators in the appendix. Where possible, we considered health outcomes and risk factors that are the major contributors to global disease burden in young people as estimated in the 2004 global burden of disease study.³⁴ For health risks not included in the global burden of disease but commonly covered in reports on adolescent health, we have described how the indicator relates to health, the extent to which the risk process becomes active during the adolescent and young adult years, and it being potentially modifiable with intervention (appendix). Similarly, we included interventions that are provided to, or targeted at, adolescents for which there are reasonable grounds to believe that widespread implementation will benefit present or later health.

We used various strategies to identify indicator definitions with the best comparable data with an aim of optimising worldwide coverage. We reviewed definitions used in country reports of young people's health. Some definitions (eg, all-cause and cause-specific mortality) are well accepted and consistent with those widely in use across countries. In general, these definitions mapped well to the underlying indicator constructs (ie, deaths of young people overall and due to specific causes) and were available in a form that allowed comparison between countries. For other definitions there was substantial variation. In these instances, we assessed currently available data sources (appendix) to derive a definition that allowed comparison across a maximum possible number of countries. In some instances survey data were available for other age groups or other definitions, but fewer countries were covered or data were largely restricted to women. Where there was no agreed definition, we used the guidelines around validity and maximising coverage worldwide.

Guinea-Bissau, Namibia, Nigeria, Somalia, and Sudan. Similar countries outside Africa without seroprevalence data include Pakistan, Papua New Guinea, Russia, Thailand, and Ukraine.

Data on axis-1 psychiatric disorders (ie, clinical disorders, including major mental disorders and substance misuse disorders) in the past 12 months in people aged 18–24 years was available from 23 countries, representing 37% of the worldwide population. In several countries with smaller sample sizes (<4000 for all age groups—eg, Belgium, France, Germany, and Lebanon) or with subregional samples (eg, Japan) 95% CIs around

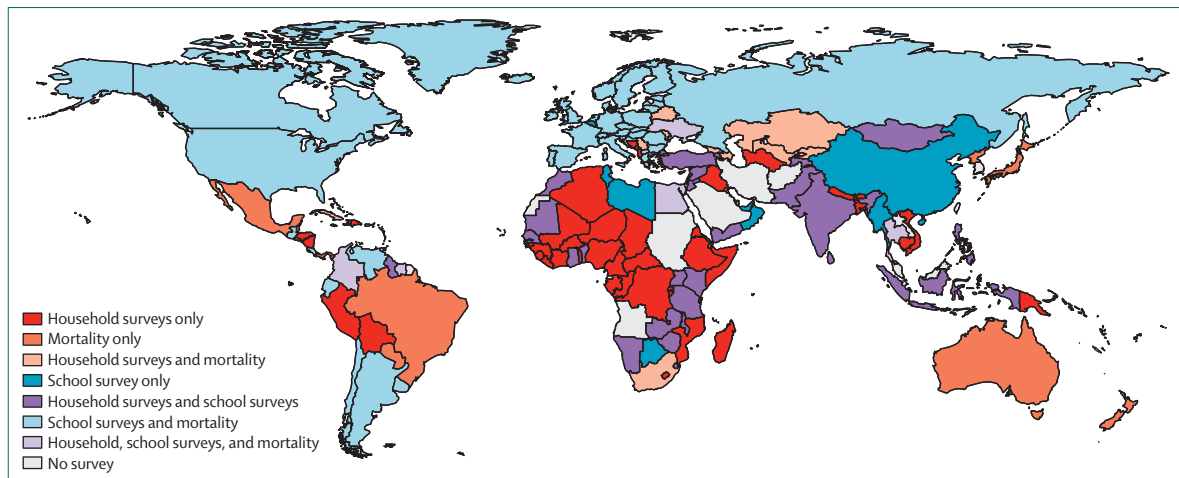


Figure 2: Worldwide coverage of major data collections relevant to adolescents since 2000

the estimates for people aged 18–24 years were greater than 5%. No internationally comparable data are available for people younger than 18 years. Rates of mental disorder tended to be higher in females than males in most but not all countries. There was a roughly three times difference in rates across countries, with low rates in Bulgaria, India, Italy, and the Netherlands and high rates in Brazil, France, New Zealand, Spain, and the USA.

Health-related behaviours and states

Coverage for health-risk behaviours ranged from 41 to 86 countries (table appendix 2). In general, there was good-to-excellent coverage of health-related behaviours and states in North America, the different European regions, and southern Latin America. We present data from health behaviour in school-aged children (HBSC) separately for children aged 13 and 15 years for both boys and girls, whereas we present those for Global School Health Survey and Global Youth Tobacco Survey as an estimate for children aged 13–15 years.

Data on tobacco use in the past 30 days were available in 62 countries, representing 45% of the worldwide population of young people. Rates of early tobacco use were high in Austria, Chile, Malta, and Namibia in both boys and girls and in boys in Indonesia, Jamaica, and Jordan. In the European regions, Latin America, North America, and many sub-Saharan African countries, rates of tobacco use were similar for boys and girls. In most Asian regions, the Caribbean, and the eastern Mediterranean rates were higher in boys.

Data on binge drinking in the past month were available for 51 countries and 17% of the worldwide population. Definitions are not strictly comparable between the Global School Health Survey and HBSC. The former defines binge drinking as the consumption of at least 5 units of alcohol on any day in the past month whereas the latter defines it as getting drunk at least once in the past month. Rates are substantially higher for children aged 15 years

than for those aged 13 years. In general, estimates for binge drinking from high-income countries were substantially higher than those derived from low-income and middle-income countries, with the exception of some Latin American countries. Austria, Ireland, and the USA had the highest rates with close to a third of children aged 15 years reporting binge drinking in the past month.

Data on cannabis use in the past 30 days were available in 40 countries representing 12% of the worldwide population, with the best data available for the European regions and North America. There were substantial variations in rates of use with the highest in Canada, France, the Netherlands, Spain, and the USA.

Children aged 13–15 years who were underweight could be defined in 71 countries representing 48% of the worldwide population with the greatest data availability in the European regions. Restricted data were available for central Asia and sub-Saharan Africa, regions where the prevalence of underweight might be expected to be highest. Rates were less than 10% in the European regions and North America. In regions with higher rates of underweight, more boys tended to be classed as underweight than girls. Southeast Asia had high rates of underweight, with rates in Burma, Indonesia, and Sri Lanka particularly high. Restricted data exist for other regions but Djibouti, Fiji, and Yemen were notable for their high rates, particularly in boys.

Data on children aged 13–15 years who were overweight were available for a similar range of countries. In higher-income countries, rates of overweight were substantially higher in boys than girls. Canada, Greece, Italy, Malta, and the USA were notable for their high rates, particularly in boys—more than a third were overweight. Within low-income and middle-income countries there was substantial variation in rates of overweight, with the lowest rates in Burma, Malawi, Mongolia, Pakistan, and Sri Lanka. Many low-income and middle-income countries had substantial rates of overweight, with China, eastern

	Average population aged 1–24 years (thousands) ^a	Number of countries ^b	1–4: Mortality	5: Maternal deaths	6: HIV	7: Mental disorder	8: Tobacco use	9: Binge drinking	10: Cannabis use	11: Underweight	12: Overweight	13: Physical activity	14: Parental understanding	15: Self-rated health	16: Sex by 15 years	17: Unemployment	18: Early marriage	19: Early childbirth	20: Secondary education	21: HIV knowledge	22: Condom use	23: HPV vaccination	24: Unmet mental health	25: Health service use	
Asia Pacific, high income	31322	4	100%	100%	0	64%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asia, central	23870	9	77%	77%	0	0	17%	17%	7%	7%	7%	7%	7%	7%	4%	34%	29%	100%	57%	93%	62%	29%	0	0	
Asia, eastern	330138	2	0	0	0	1%	4%	2%	0	2%	2%	2%	2%	0	0	2%	0	0	98%	1%	0	0	1%	0	
Asia, southern	458539	6	0	23%	75%	75%	86%	0	0	86%	86%	86%	86%	0	77%	96%	98%	98%	100%	92%	76%	0	75%	0	
Asia, southeast	167582	12	10%	68%	18%	0	76%	73%	0	76%	76%	76%	76%	0	60%	88%	86%	86%	100%	28%	17%	0	0	0	
Australasia	5153	2	100%	100%	0	17%	0	0	0	0	0	0	0	0	0	100%	0	0	100%	0	0	0	17%	0	
Caribbean	10160	13	32%	90%	58%	0	16%	16%	0	11%	11%	9%	16%	0	79%	67%	73%	61%	69%	79%	75%	0	0	0	
Europe, central	25436	13	93%	93%	0	24%	36%	36%	84%	84%	84%	84%	84%	84%	60%	91%	17%	83%	100%	34%	16%	0	24%	0	
Europe, western	72258	21	97%	97%	0	69%	21%	21%	98%	100%	100%	100%	100%	100%	96%	100%	100%	0	98%	100%	0	0	0	69%	
Europe, eastern	46791	7	100%	99%	0	21%	0	0	93%	93%	93%	93%	93%	93%	95%	74%	28%	27%	100%	26%	23%	0	21%	0	
Latin America, Andean	15138	3	27%	100%	0	0	27%	8%	0	8%	8%	8%	8%	0	55%	100%	73%	73%	100%	46%	37%	0	0	0	
Latin America, central	63787	9	93%	93%	0	68%	40%	15%	0%	9%	9%	15%	3%	0	20%	93%	26%	26%	100%	21%	13%	0	68%	0	
Latin America, southern	15017	3	100%	100%	0	0	100%	91%	0	91%	91%	91%	91%	0	91%	100%	0	0	100%	0	0	0	0	0	
Latin America, tropical†	53486	2	100%	100%	0	96%	0	0	0	0	0	0	0	0	0	100%	0	0	100%	0	0	0	96%	0	
North Africa and Middle East	127711	18	19%	33%	0	8%	37%	6%	7%	56%	56%	58%	59%	15%	0	77%	69%	42%	100%	35%	0	0	8%	0	
North America, high income	68892	2	100%	100%	0	91%	91%	91%	100%	100%	100%	100%	100%	100%	9%	100%	0	0	100%	0	0	0	91%	0	
Oceania	2487	7	0	0	0	0	11%	11%	1%	11%	11%	11%	1%	0	92%	3%	85%	8%	24%	10%	82%	0	0	0	
Sub-Saharan Africa, central	27134	6	0	75%	0	0	0	0	0	0	0	0	0	0	45%	0	80%	75%	100%	65%	45%	0	0	0	
Sub-Saharan Africa, eastern	101900	15	0	81%	75%	0	42%	30%	0	14%	14%	26%	26%	0	68%	46%	88%	82%	100%	84%	79%	0	0	0	
Sub-Saharan Africa, southern	21962	6	67%	97%	97%	67%	30%	18%	0	0	0	16%	18%	0	88%	92%	97%	97%	78%	22%	100%	0	67%	0	
Sub-Saharan Africa, western	95452	19	0	92%	46%	47%	15%	14%	4%	11%	11%	15%	15%	0	83%	21%	94%	97%	100%	89%	88%	0	47%	0	
Total number of countries* (% coverage of worldwide population)			79 (26%)	114 (51%)	29 (29%)	23 (37%)	62 (45%)	51 (17%)	41 (12%)	72 (48%)	72 (48%)	86 (50%)	86 (50%)	38 (13%)	115 (46%)	114 (66%)	93 (56%)	96 (57%)	172 (99%)	99 (44%)	71 (35%)	0 (37%)	0	0	

Data are percentage of population coverage within the region, unless otherwise stated. GSHS=Global School-based Student Health Survey; GYTS=Global Youth Tobacco Survey; GMHS=Global Mental Health Survey; MICS=Multiple Indicator Cluster Survey; DHS=Demographic and Health Survey; HBS=Health Behaviour in School-aged Children. *Allowance was made for incomplete population coverage but not in the country count. Surveys were regional for China in Beijing, Hangzhou, Wuhan, and Wulumqi (GSHS); 2.2% national population), Shanghai, Tianjin, and Zhuhai (GYTS); 2.3% and Shenzhen (GMHS); 1.0% for Ecuador in Guayaquil, Quito, Zamora, and Bucaramanga, Cali, and Manizales (GSHS); 2.6% national population), for Venezuela in Barinas and Lara (GSHS); 7.6% national population), for Chile in Metro, Region I, Region V, and Region VII (GSHS); 2.2% national population); for Tanzania in Dar es Salaam (GSHS); 6.7% national population); and Belgium in Flemish (only in Health Behaviour in School-aged Children sexual activity; 60%), in some countries early sexual activity was measured in females only, in which case they were deemed to have 50% coverage of the population, although they were counted as whole countries. Indicator: 1–4=WHO mortality data since 2000 (largest age range 10–14, 15–19, and 20–24 years); 5=maternal mortality (15–24 years); 6=HIV prevalence (15–24 years); 7=any axis-1 mental health disorder (18–24 years); 8=tobacco use in past 30 days (13–15 years); 9=alcohol binge drinking in the past 30 days (13–15 years); 10=cannabis use in past 30 days (13–15 years); 11=underweight (<2 SD under UN age/sex means; 13–15 years); 12=overweight (>1 SD over UN age/sex means; 13–15 years); 13=physical activity for more than 60 min each day per week (13–15 years); 14=parents or guardians understand worries most of the time (13–15 years); 15=sexual activity as fair or poor (13–15 years); 16=sexual activity by age 15 years (<15 years MICS/DHS); 13–15 years HBSC); 17=youth unemployment (15–24); 18=early marriage (females <18 years); 19=childbirth by 18 years (<18 years); 20=gross enrolment ratio in early secondary education (International Standard Classification of Education); 21=comprehensive and correct knowledge about HIV (15–24 years); 22=condom use at last high-risk sex* (15–24 years); 23=vaccination rate for human papillomavirus (females 10–19 years); 24=unmet need for treatment in those with axis-1 diagnosis (28–24 years); 25=use of health services in past 12 months (15–19 years).

Table: Availability of information from present international data collections (2000–10) to populate the indicators

Mediterranean countries, Latin American countries, Mauritania, Oceania, and Thailand having between a fifth and a third of boys overweight. Tonga had the highest rates of overweight with about 60% of children aged 13–15 years fulfilling the criteria.

Data on physical activity (60 min or greater on each of the past 7 days) were available for 85 countries representing more than half the world population. With the exception of boys aged 13 years in Slovakia, no country had more than 50% of either boys or girls achieve the recommended exercise level. Boys were more likely to fulfil criteria for activity than girls. This sex difference was particularly striking in several countries of north Africa and the Middle East, where very few girls met the recommendations for physical activity. Within most HBCS countries activity levels seem higher in boys aged 13 years than aged 15 years, with boys having higher rates than girls. Rates of physical activity in many high-income countries were low, with Ireland, Slovakia, and the USA having higher rates and Germany Norway, Russia, and Switzerland lower. Of low-income and middle-income countries India, Lebanon, and Tanzania were notable for their somewhat higher rates of activity.

Data on parental connection was available in 85 countries, representing 50% of the worldwide population.¹² Adolescents reporting that parents understood their worries most of the time was common in high-income countries. In general, rates of endorsement were lower in most low-income and middle-income countries but with substantial variation. Several north African and Middle East countries, Mongolia, the Philippines, Thailand, Tonga, and Zambia are notable for their lower rates.

Self-rated health as fair or poor was available through the HBCS survey in 37 countries mostly in Europe and North America, representing 13% of the worldwide population. In general, rates of endorsement of only fair or poor health were higher in girls than boys. There were wide variations with poorer self-rated health in several European countries including Greece, Italy, Macedonia, Slovakia, Spain, and Switzerland.

Social-role transitions

The indicator of sexual activity by age 15 years was well populated with data for 115 countries and almost half the worldwide population (table appendix 3). Generally, more information was available for females than males. Both school and household survey data were used to populate this indicator, but with slightly different definitions for each source. The household-survey data derive from retrospective reports in samples of people aged 15–24 years, whereas school-based survey data are based on reports of sex by the time of report. Rates from retrospective reports seemed lower than those from concurrent reports in countries where both sets of data are available. In European countries surveyed through HBCS there was a variation in rates between countries of almost four times for males and up to eight times for

females. Coverage was poorest in North Africa and the Middle East, with restricted coverage in the Asia-Pacific high-income countries, and eastern Asia. Of HBCS countries, Bulgaria, Denmark, Finland, Iceland, Sweden, and the UK have higher rates of early sexual activity. In low-income and middle-income countries, the Central African Republic, Mozambique, and Zambia had higher rates of early sexual activity in females.

Data on unemployment rates for people aged 15–24 years were available from labour workforce survey or census data collated by the International Labour Organization for 116 countries, representing about two-thirds of the worldwide population of young people. There was great variation in unemployment rates across and within regions. Within high-income regions such as western Europe, variation was up to seven-fold between countries with low youth unemployment (eg, Netherlands) and high (eg, Macedonia and Spain). Particularly high unemployment rates were identified in north Africa and the Middle East, as well as parts of central Asia and central Europe.

Because of coverage in household surveys, there were good data available on female marriage before age 18 years for much of Africa, and mixed coverage in the Asian regions, the Middle East, and Latin America. These data might be available in higher-income countries,⁴⁵ but are not collated according to this definition to allow international comparability. Rates of early marriage were high in southern Asia, with Bangladesh reporting the highest regional rate with two-thirds of women marrying before age 18 years. Very high rates of early marriage were reported from most of sub-Saharan Africa, with Niger, at 75%, having the highest rate worldwide. Rates in eastern Europe and Latin America were generally in the intermediate range but with notable variations between countries.

Data on childbirth by age 18 years were available for 57% of the world's young women, in 96 countries across a wide range of incomes. Rates of early childbirth were closely related to rates of early marriage. High rates were identified in sub-Saharan Africa, southern Asia, and some countries of the Caribbean and Latin America. Namibia, South Africa, and Swaziland stand out for their relatively high early birth rates and lower rates of early marriage.

Data on enrolment in lower secondary education was available for 172 countries, representing 99% of the worldwide population. The available measure of gross enrolment ratio in lower secondary education can be thought more an indicator of the capacity of the school system to enrol students and hence can be greater than 100%. Net enrolment rates, potentially a better indicator of those in lower secondary education, are not available at present. For many regions gross enrolment ratio was much greater than 90% for most countries. Exceptions were south and southeast Asia, some countries in central Latin America, and much of sub-Saharan Africa. It is

noteworthy that where enrolment ratios are low they tend to be lower for females than males.

Health-policy interventions

Data on comprehensive knowledge of HIV transmission were available from 41 countries, representing 35% of the worldwide population with greater coverage in sub-Saharan Africa, and more restricted coverage in north Africa and the Middle East (table appendix 3). There was relatively poor coverage in Latin America, high-income countries, and much of Asia. Within regions where HIV is endemic, rates of comprehensive knowledge were low with relatively few achieving greater than 50% and no country greater than 65%. There was a tendency, particularly in western sub-Saharan Africa, for girls to have less knowledge than boys. It is notable that countries with high estimated HIV rates, including Botswana, Papua New Guinea, Russia, Somalia, South Africa, and Sudan do not have comparable data available.

Coverage of the MDG indicator on the use of condoms at last high-risk sex varied across regions, with 71 countries having recent data for people aged 15–24 years but with worldwide coverage a little greater than a third. Rates of condom use at last high-risk sex were generally less than 50% in many countries, with notably lower rates of use reported by females compared with males. Botswana, Burkina Faso, Lesotho, Namibia, South Africa, Swaziland, and Zimbabwe (girls only), and the Dominican Republic and Ukraine (boys only; girls are about 44%) had higher rates of condom use.

Human papillomavirus vaccination-rate coverage was not available from any routinely collected international source, related to the intervention becoming available only in the past 5 years. 14 mainly high-income countries now have vaccination programmes in place so that monitoring coverage might soon become feasible.

Data on the receipt of any treatment for an axis-1 mental disorder was available in 23 countries—just greater than a third of the worldwide population. Rates were generally higher in the USA than elsewhere but no country achieved more than 50% treatment rates.

The use of a health service in the past 12 months has no locatable internationally comparable data at present.

A global picture of adolescent health?

Our overview illustrates wide international variations in almost all aspects of adolescent health. These differences exist both between and within regions. The poorest regional health profiles were for young people in sub-Saharan Africa where mortality, HIV infection, and role transitions linked to health risk (eg, early childbirth) were high. There were notable regional differences that include high death rates from violence in Latin America and wide variations in rates of suicide and deaths due to traffic-related injury. There is clear evidence that risks for later life non-communicable diseases are spreading rapidly worldwide, with the highest rates of tobacco use and

overweight, and lowest rates of physical activity, predominantly in adolescents living in low-income and middle-income countries.

The development of good information systems has underpinned advances in health in other age groups.⁴⁶ There is growing evidence that it can promote effective responses to the health problems of young people,⁴⁷ including the prevention of traffic injury,⁴⁸ adolescent alcohol misuse,⁴⁹ underweight and malnutrition,⁵⁰ and the creation of social, neighbourhood, and school contexts necessary for healthy development.^{20,51,52} Yet the global picture of young people's health is patchy with major data gaps.⁵³ Accurate population data on the major causes of non-fatal health-related disability in this age group, even for HIV, is notable by its absence. Sexual and reproductive health in adolescents has had the greatest policy and programmatic attention, leading to a greater degree of consensus on definitions of indicators and, in turn, the collection of data. In other important aspects of health, there are difficulties both in defining and measuring indicators. A lack of investment in, and agreement around, indicators of mental health is one gap that has particular relevance for an age group that has the peak onset for mental disorders.⁶ This gap arises from a lack of clarity around the definitions of suitable indicators as well as which standardised and practical measures of common mental disorders might be used widely in health surveys. Potentially useful measures do exist, the Kessler 6 (K6) and the Patient Health Questionnaires (PHQ2 and 9) seem brief enough to be useful in the major surveys, particularly if standardised against diagnostic interviews.^{54–56}

Indicators of health-service delivery to young people are also poorly measured outside an MDG focus on HIV. In some instances, such as vaccination to prevent human papillomavirus infection, the lack of measurement relates to its recent introduction and as yet absence of large-scale implementation.⁵⁷ In other instances, such as health care, poor measurement relates to both lack of clarity on the indicator as well as measurement problems. In measuring the coverage and quality of health care, evidence on the effectiveness of interventions such as youth-friendly primary health care and treatments for mental disorders would be useful.^{58,59} Present international surveys, such as those done by the Commonwealth Fund, do provide data on unmet health-care needs but are focused on a few high-income countries and without scope for disaggregation by age group. Given that the delivery of high-quality interventions is probably the main way in which health systems can effect change in adolescent health, this gap is notable.

Few previous reports have addressed well the measurement of risk and protective factors in the social contexts of child and adolescent development. These are not only important determinants of adolescent health, but are also aspects for which evidence around prevention often exists.⁴⁶⁰ Positive family, school, and community

connection are measured in school health surveys, but much more work needs to be done to clarify cross-culturally valid measures and indicators.⁶¹

It was sometimes unclear which indicator and definition was most valid and whether a single indicator was sufficient (eg, maternal mortality rate and ratio, unemployment rate and ratio). Both the choice and definition of indicators in earlier national and international reports have varied greatly in part because of the data available. Many high-income countries have used HBSC and this has led to not only comparable measures but also the adoption of similar indicator definitions.^{13,62} Nevertheless, there are health indicators such as tobacco use, substance misuse, and physical activity for which measurement is not a major problem but where there are substantial differences in the definitions used, restricting comparisons between countries and over time. It was not within the scope of our assessment to undertake new analyses of longitudinal studies to establish the predictive validity of different definitions, but such work will be important in the future.

International comparability can be optimised where similar methods of sampling and measurement are used across surveys.⁶³ Such harmonisation of data collection is evident in the major household surveys (Multiple Indicator Cluster Surveys and Demographic and Health Surveys), but is not yet optimum for the major international school-based surveys, even though some comparisons are possible. The Global School Health Survey complements the more established HBSC by providing new data on adolescents in low-income and middle-income countries. Despite the difficulties inherent in international comparisons, there seem to be sufficient similarities between these two international surveys to suggest that aggregated analyses might be feasible in the future.⁶³ This comparability could be further strengthened with alignment of sampling and measurement strategies.

Some of the difficulties in capturing a complete picture of young people's health lie in the limits of international data-collection systems and apply to all ages. Mortality indicators, though a poorer guide to health status than in other age groups with higher death rates, depend on good national registers of death. At present those countries with the highest mortality, and where it is therefore a more important indicator, tend to be those without national registers.^{5,23}

A call from the 2000 World Health Assembly to measure the health risks for non-communicable diseases that emerge in adolescence and young adulthood^{64,65} has led to greater investment.⁶⁶ Yet many estimates in low-income and middle-income countries are currently based on only one datapoint, with little certainty about whether and when serial measures will be feasible. Recently introduced surveys, such as the Global School Health Survey, are also restricted to younger (age 13–15 years) adolescents in school rather than being population based. To what extent the measurement of young people's health best takes place in adolescent school-based surveys or augmentation of existing household surveys that include older age groups, is an important question. School-based surveys are efficient where a high proportion of adolescents are in school, but for those countries and regions where school retention rates are low or absenteeism high, it is unlikely to be a sufficient strategy without data collection on the higher-risk groups outside school.⁶⁷ This difficulty will be particularly true for girls in countries with lower enrolments—ie, they are less likely to be in school than boys. Furthermore, because of lower school retention in later secondary school school-based surveys, even in high-income countries, will probably provide a better measure of the health of younger rather than older adolescents (ie, older than 15 years). Yet it is in older adolescence when many health-risk behaviours, such as tobacco and alcohol use, other substance misuse, obesity, and physical activity, and states become established.⁶⁷ The younger adolescent age group with the greatest

Panel 2: Three sets of recommendations to achieve a more complete picture of young people's health

Indicator development and measurement

- Research is needed into the measurement of neglected aspects of adolescent health including mental health, health system functioning, and risk and protective factors in adolescents' immediate social contexts
- There is a need for consensus on the most valid definitions of indicators that are at present well measured but where comparability is limited by the use of different thresholds or age categories
- Further work to achieve harmonisation between surveys, both those that have an international focus and those that are focused within countries will ensure best use of available data collections
- There is need for consensus around a core set of global indicators of adolescent health that should in turn provide the technical specifications for optimum data collection

Extending data coverage

- There is a need to extend data coverage of major health problems affecting young people including injury and HIV where good indicators exist but where coverage, even in countries with endemic problems, is poor
- Strategies are needed to collect data on socially marginalised young people, including those out-of-school, out-of-home, and in juvenile detention, not captured in present systems

Leadership and coordination

- The UN and its agencies need to have a central role in aligning systems of data collection, drawing in expertise from academia and globally oriented research institutes to develop strategies to fill the present gaps in knowledge
- Supported by this coordination, every country should be encouraged to produce a report on the health of its young people to guide the plans of government and non-government agencies working towards their healthy development
- Within future global health initiatives tackling non-communicable diseases, mental health, sexual and reproductive health, and injury, there is a need for explicit data strategies to guide policies for young people including age and sex disaggregation of data and capture of risk processes during the adolescent years

coverage is arguably too young to adequately assess the extent of these problems. Although some programmes (Stepwise Approach to Chronic Disease Factor Surveillance, European School Survey Project on Alcohol and Other Drugs) do capture risk behaviours and states in older age groups, the range of country coverage worldwide is restricted or depends on high-retention rates in upper-secondary schools. For this reason, the extension of household surveys with a broader range of measures is important. At present, most of these household surveys collect fewer data from men and remain largely restricted to sexual and reproductive health, even though Multiple Indicator Cluster Surveys have taken some recent steps to extend to other aspects of health. In doing so, there are challenges beyond survey design related to burden and cost. Questions might also arise about whether an adolescent or a parent is the better informant, who provides consent, and whether confidentiality can be maintained. There is also an important question about whether household and school surveys can provide equivalent estimates of risk factors such as early initiation of sex,⁶⁸ and a need for a synthesis of strategies relevant to socially marginalised young people, including those out-of-school, out-of-home, and in juvenile detention. These people are unlikely to be included in present data collections and health profiles, and their access to health services is often very poor.⁶⁹ Strategies for health surveillance in these groups, such as focused institutional surveys or respondent-driven sampling, have been used to track HIV prevalence and risk behaviours at a local level.⁷⁰

Digital technologies might offer one way forward, either in existing or new surveys. The methods of web-based sampling and assessment, the use of mobile phones and hand-held devices for data collection, and new data-sharing strategies have great potential to increase the range and use of data.⁷¹ In countries with conspicuous acute adolescent health problems (eg, injury, HIV, and mental disorders), it might be possible to use these technologies to tap into data from existing facilities where young people are seeking care.⁷² Used with logic models, these technologies might also generate data at local levels to guide practice responses and in turn secure support for data collection by decision makers.^{21,73}

No clear auspice or inclusive forum currently exists for the collection and collation of data on young people's health. As a result some countries with advanced survey and health information systems (eg, Australia, Brazil, and New Zealand) do not have data that are easily internationally comparable.^{74,75} A simple solution of incorporating at least some elements of HBSC into national surveys in such countries, as well as the adoption of an agreed international core set of indicators, would do much to extend international comparability. However, more systematic approaches are needed. Various UN agencies and other groups contribute elements of available data, but without any clear coordinating

mechanism.^{26,76–78} In other aspects of global health, the development of mechanisms for the coordination of strategic information has underpinned many advances.⁷⁹ In HIV, malaria control, vaccine-preventable diseases, and diarrhoeal diseases, monitoring and evaluation groups have been adopted, and might extend across UN agencies.⁷⁹ The Child Health Epidemiology Reference Group (CHERG) was established in 2001 in response to the need for better information on infant and child mortality in pursuit of MDG 4.⁷⁷ CHERG subsequently extended its work to assess the relation between infant and maternal mortality and, over the course of almost a decade, produced reports that have shaped policy responses to early childhood mortality. A coordinating entity might have a plan that includes research leading to better measures of neglected indicators, the refinement of indicator definitions, ascertainment of the best methods of capturing data in the adolescent age group, and ensuring the full use of available data. Ultimately this effort could lead to harmonisation across the different data sources, the establishment of a consensus set of indicators, the development of a global index of adolescent health, and better use of data for policy formation.

Outside high-income countries, with some notable exceptions, few countries have yet compiled status reports on the health and development of young people.⁸⁰ Our report illustrates how patterns of adolescent health can vary greatly between countries, even within the same region. There is therefore a need for country-based data collection and collation to specify local priorities and to achieve political engagement (panel 2).⁸¹ With support, the development of such reports now seems feasible for many countries, albeit with gaps, and would do much to focus and guide policy in adolescent health in the coming years.

Contributors

GP came up with the idea for this report and was involved in its design, data analysis, and preparation. CCo, CCa, DC, and LR were involved in the data analysis and preparation of the report. FG, LD, DR, NA, AOS, AM, and JF advised on access to data and contributed to the writing of the report.

Conflicts of interest

We declare that we have no conflicts of interest.

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