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## D3.4: Trends and differences in energy balance related behavior, overweight and obesity among adolescents in Europe and South Africa

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## Executive Summary

In 2018, more than 20 % of European adolescents lived with overweight or obesity. The prevalence of 15-year-old adolescents living with overweight or obesity has been relatively unchanged over the last decade. Affluent adolescents are less likely to live with overweight and obesity.

Overall, almost half (48%) of adolescents in the HBSC study ate neither fruit nor vegetables daily, indicating that a large group do not respond to international recommendations of daily intake. There are some positive trends in adolescents' diet, particular with regards to the decline in the prevalence reporting daily consumption of sugar sweetened beverages.

Over 80 % of the adolescents did not meet the recommendation of 60 minutes of moderate to vigorous physical activity (MVPA) every day. Affluent adolescents meet the recommendations to a larger extent.

In South Africa, the overall prevalence of adolescents living with overweight or obesity (22%) was at the same level as in the HBSC study (21%), but there is, however, a much higher prevalence among girls compared to boys. Daily intake of vegetables and fruit is much higher in South Africa than among adolescents in the HBSC study, but the trend is negative. With regards to daily consumption of sugar sweetened beverages, there has been a steep increase among South African adolescents in contrast to the trends in the HBSC study.

The socio-economic patterns in adolescents living with overweight/obesity and daily dietary intake (particular daily intake of sugar sweetened beverages) is different in South Africa compared to the average scores in the HBSC countries.

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## Background

The WHO Health Behaviour in School-aged Children (HBSC) study has been conducted every fourth year since the early 1980s. In the last survey round in 2017/2018, adolescents from 45 countries participated. The datasets provide a unique source of information of trends and cross-national comparisons on a variety of health related outcomes such as prevalence of overweight/obesity and energy balance related behaviours (EBRB) like diet and physical activity.

It has been argued that the global obesity epidemic goes through different stages with similar patterns with regards to distribution of overweight/obesity between gender, age and socio-economic groups (Jaacks et al. 2019).

In this report, we will therefore compare findings from the HBSC-countries (which primarily are European) with findings from the adolescent population in South Africa to explore eventual similarities and differences in overweight and obesity, and energy balance related behaviours (EBRB).

Within the Co-Create project, the HBSC-data will be used as measures on national trends and prevalence on adolescents living with overweight or obesity and energy-balance related behaviours, the associations with national policy contexts (see for deliverables D2.8 and D3.6).

## Deliverable description

The deliverable 3.4 is described as the “First report on time trends and differences in energy balance related behaviour, overweight and obesity rates based on HBSC data” in the Grant Agreement and is the result of task 3.3. This is based on the most recent available data from the WHO-lead Health Behaviour in School Children (HBSC) from 2017/2018 which reports time trends and differences in energy balance related behaviour, overweight and obesity rates by gender, age group and socio-economic status will be provided. This will be the first of two Co-Create reports based on data from HBSC.

The deliverable will in addition include reporting on the task 3.4 Analyses of data from South Africa on a representative sample of South African adolescents with the possibility to explore national and regional change patterns over time and how these might differ between social groups.

## Objective of deliverable

The main objective of this report is to analyse time trends and differences in EBRB, overweight and obesity rates by socio-economic status among adolescents in Europe and South Africa.

## Methods

### The Health Behaviour in School Children (HBSC) datasets

WHO Health Behaviour in School-aged Children (HBSC) surveys, first conducted in 1985 (in four countries) are now conducted every four years in 45 countries and regions across Europe and North America on 11-, 13- and 15-year-olds health and well-being, social environments and health behaviours, including self-reported height and weight (<http://www.hbsc.org>). In this report we focus on the results for the 15 year old girls and boys. In the 2017/2018 survey, approximately 220.000 adolescents participated in the survey, one third of them were 15 years old. The country specific participation rate ranged from 42 % (Sweden) to 99 % (Azerbaijan). In this report, we use results from survey rounds in 2002, 2006, 2010, 2014 and 2018.

The HBSC study is conducted under the auspices of WHO Euro who has extensive experience in analysing HBSC body weight related measures and EBRB data across time countries, gender and socio-economic groups.

In this report, we use the following measures from the HBSC:

**Overweight/obesity** is measured based on young people people's self-report on their height (without shoes) and weight (without clothes). Body mass index (BMI) was calculated from this information and cut-offs for overweight and obesity allocated based on the WHO growth reference for age and gender. In HBSC-study the missing data were more than 30 % for 15 year old adolescents from England, Greenland, Ireland, Malta, Scotland and Wales.

**Diet** is measured as daily intake of fruit, sugar sweetened beverages and vegetables.

**Physical activity** is measured by the number of days over the past week during which they were physically active for a total of at least 60 minutes. The question was introduced by a text defining moderate-to-vigorous physical activity (MVPA) as any activity that increases the heart rate and makes the person get out of breath some of the time, with examples provided. Findings presented here show the proportions who report at least 60 minutes of MVPA daily (Inchley et al 2020).

**Socio-economic status** is measured by the use of the Family Affluence Scale (Currie et al 2008, Torsheim et al 2016, Elgar et al 2017) by asking the participants about household assets and activities. The HBSC study use a summary affluence summary score was created to identify groups of low affluence (20% lowest score), medium affluence (60 % middle score) and high affluence (20%) within each country (Inchley et al 2020).

### South African datasets

The South African dataset for this report was drawn from national representative surveys; the South African Demographic and Health Survey (SADHS – 1998 and 2016) and the South African National

Health and Nutrition Examination Survey (SANHANES - 2012). Data for all surveys were combined as both studies used the Statistics South Africa's census enumeration area (EA) as the primary sampling unit, hence have similar sampling characteristics and methods.

The SADHS collected data to understand the health status of South African adult (men: 15-59 years; women: 15-49) and children (0-59 months) population. Questions for data collections are related to demographics, anthropometry, socioeconomic status, nutrition and diet, education level and family size, and other social determinants of health-related variables.

The SANHANES also assessed the health and nutritional profile of adults from age 15 years and older. The key variables in the survey include disease profile, nutrition and diet, mental and general health as well as anthropometric parameters.

In this report we have extracted data for adolescent study participants from the SANHANES and SADHS surveys within the ages of 15 – 19 years. An overview of the characteristics of the participants in the South African studies is included in appendix 1.

In this report, we use the following measures from SANHANES and SADHS:

**Overweight/obesity** is based on actual weight and height that were measured using standardized equipment and techniques in all three surveys. BMI was calculated and categorized according to the World Health Organization (WHO) Z-score classification for age and gender (WHO, 2020) into, overweight and obesity.

**Diet** was reported in two of the South African surveys (SANHANES 2012 and SADHS 2016). For this report, we created dichotomous variables on daily consumption of fruits, vegetables and sugar-sweetened drinks. Nutrition and diet variables were not available in the SADHS 1998.

**Physical activity** was not reported in the South African studies.

**Socio-economic status** is measured by the use the wealth index categories (poorest, poorer, middle, richer and richest). We measured the wealth index with the principal components analyses (PCA) method (Rutstein, 2015; Staveteig & Mallick, 2014) on main household possessions and belongings as recommended in previous literature (Senekal et al., 2019; Filmer & Pritchett, 2001). Some of the household possessions that counted in the PCA computation include ownership of refrigerator, family vehicle, washing machine, computer, internet access, telephone, material for roof, floor and wall construction, type of cooking fuel used in a household, type of toilet facility in a household, etc. The output of PCA for these variables was divided into 5 equal groups to generate the wealth index categories used in the report.

## Results

### Overweight/obesity

In 2018, the HBSC results show that more than 20 % of adolescents lived with overweight or obesity. For all the age groups (11, 13, 15 years) there has been an increase in the prevalence of overweight and obesity in almost one third of the participating countries from 2014 to 2018 (Inchley et al 2020). There are three additional patterns in the results: i) the proportion is lowest among the 15 year old adolescents, which is similar to the results from the previous HBSC survey rounds, ii) the proportion is significantly lower among girls compared to boys in almost all of the countries; and iii) affluent boys and girls are less likely to live with overweight or obesity. Details on the differences in prevalence of BMI between low and high family affluence groups in the HBSC 2018 study (11, 13 and 15 year olds) is provided in appendix 1.

With regard to the 15 year old adolescents living with overweight or obesity in the European Co-Create countries, there have been a significant increase from 2014 to 2018 among girls in Portugal and Norway, no change in Poland and England, and a significant decrease among girls in the Netherlands (see figure 1 below). In Portugal 22 % of both 15 year old adolescents live with overweight or obesity, while in Poland there is a huge difference between males (23 %) and females (8 %).

#### Comparison with South African adolescents

The South African datasets include data on an older age group than the 15 year olds in the HBSC study, and the data are collected with at different time intervals. The most recent data from South Africa (2016) shows that 34% of female adolescents (15-19 years) live with overweight or obesity, in contrast to only 9 % of the male adolescents. In addition to the huge gender difference in weight status within South Africa, the pattern is the opposite of the HBSC pattern where the proportion of adolescents living with overweight or obesity was larger among 15 year old boys (22%) than among girls (14%) (see figure 2).

The SADHS 2016 study shows that overweight and obesity prevalence was significantly higher in the more affluent adolescents (classified as richer or richest in the wealth index) in South Africa (25%) compared to adolescents classified as poorer or poorest (18%). This is also an opposite result than for the 15 years olds in HBSC.

It should also be noted that the height/weight data from South Africa is objectively measured, while the data from HBSC is based of self-reports.



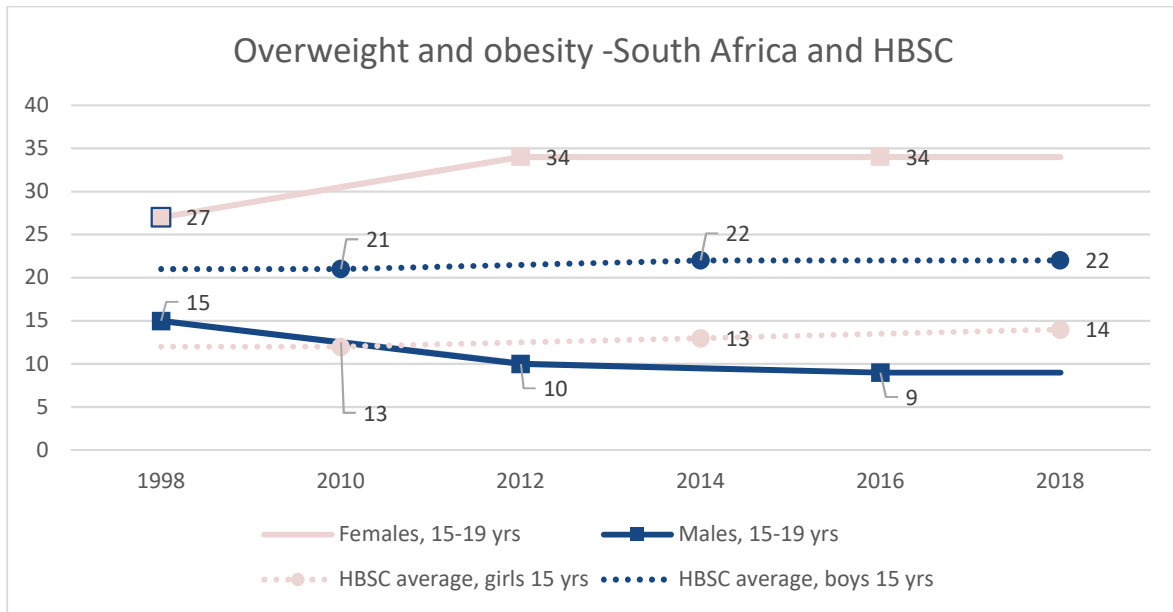


Figure 1. Proportions of 15 year old adolescents living with overweight or obesity in selected European countries (Co-Create) based on self-reported height and weight in the HBSC-study, 2010-2018. Percentages.





Figure 2. Proportions of 15-19 year old adolescents living with overweight or obesity in South Africa (1998-2016) compared with 15 year old adolescents in the HBSC study (2010-2018). Percentages.



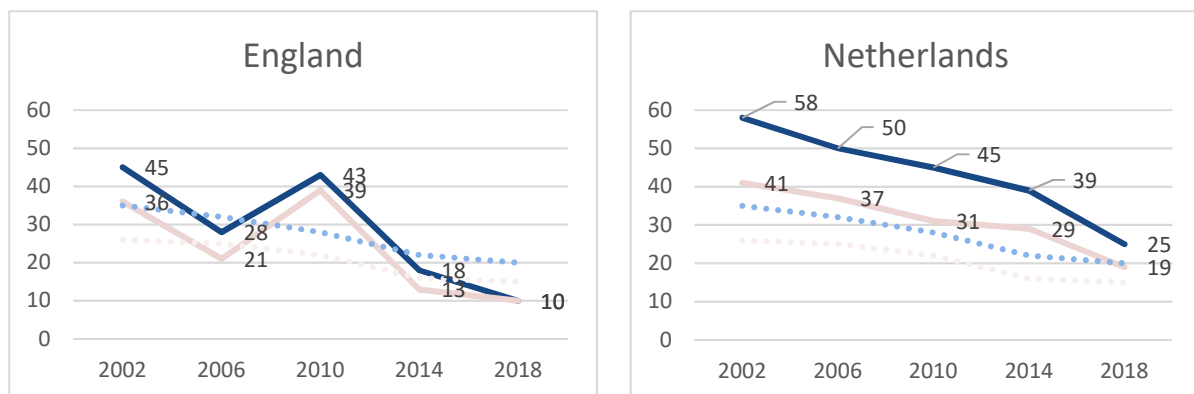
## Energy balance related behaviours

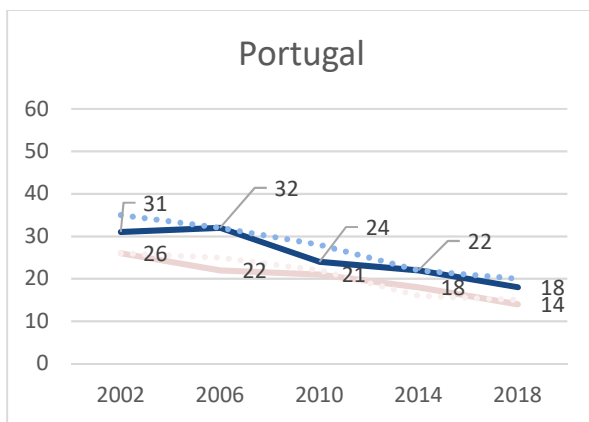
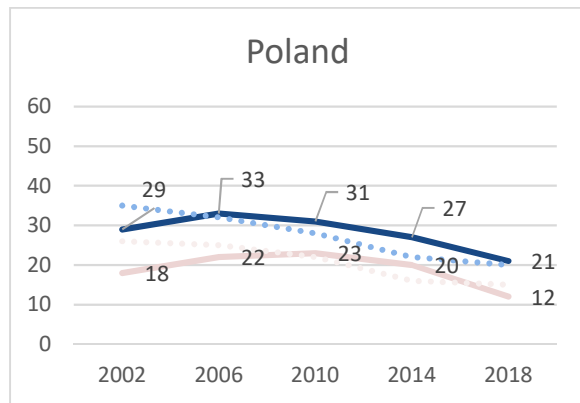
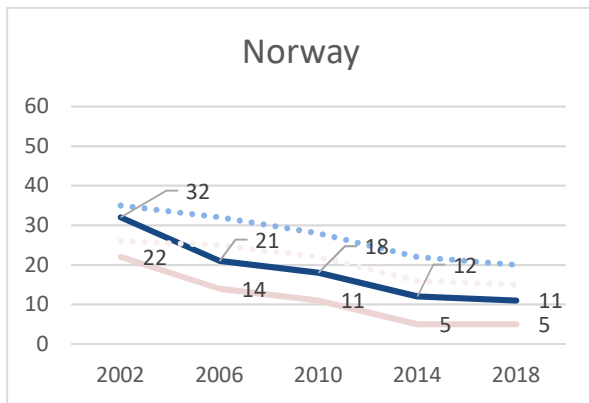
### Daily intake of sugary soft drinks

There has been a decrease in consumption of sugar sweetened beverages among adolescents in the majority of the HBSC countries over the last decade. Still, within all age groups (11, 13 and 15 year olds), 16% of the adolescents consumed sugar sweetened beverages every day. Boys were more likely to report daily soft-drink consumption compared to girls (18% and 14%, respectively) across all ages in most countries/regions. In many countries, more affluent adolescents were less likely to consume soft drinks but some countries had an opposite pattern. In some of the former USSR nations, prevalence of daily soft drink consumption was higher in the most affluent group (Inchley et al 2020).

The 15 years old girls and boys reported higher consumption of soft drinks compared to the 11 and 13 year old participants. There was, however, a significant decrease for both genders also among the 15 year olds group in 11 of the HBSC-countries from 2014 to 2018. For the European Co-Create countries, English boys (10%) and Norwegian girls had the lowest (5 %) daily soft drink consumption, while Dutch girls (19%) and boys (25%) had the highest consumption in this age group (see figure 2 below).

*Figure 3. Daily intake of sugar sweetened beverages among 15 year olds in selected European countries (Co-Create) based on self-reports in the HBSC-study, 2002-2018. Percentages.*





—●●● Boys, 15 yrs  
— Girls, 15 yrs  
●●●● HBSC average, boys 15 yrs  
●●●● HBSC average, girls 15 yrs

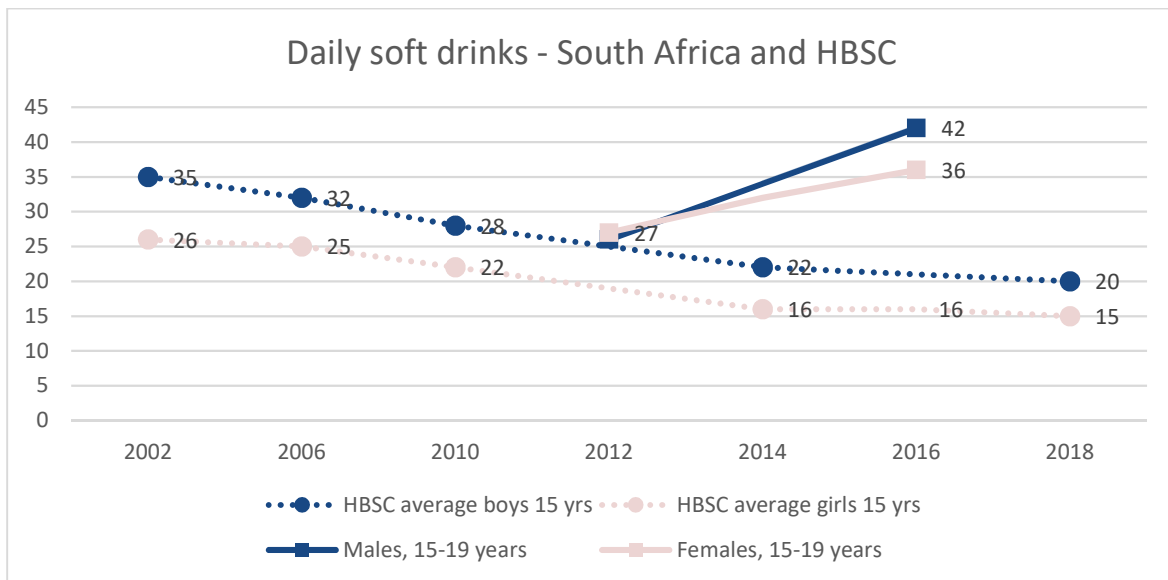
#### Comparison with South African adolescents

In contrast to the results from the HBSC study, the South African studies show an increase in the proportion of daily consumption of soft drinks among adolescents. Even if the South African participants were older, the trends for the two groups seem to go in opposite directions (see figure 4).

In the SADHS 2016 study, a significantly higher proportion (49%) of the more affluent adolescents drank sugar sweetened beverages daily compared to the proportion of poor adolescents (32%).



Figure 4. Daily intake of sugar sweetened beverages among 15-19 year old South African adolescents (2012-2016) and 15 year olds in the HBSC study (2002-2018). Percentages.



### Daily intake of fruit and vegetables

Overall, almost half (48%) of adolescents in the HBSC 2018-study ate neither fruit nor vegetables daily.

Only two fifths of adolescents (40%) ate fruit every day. More girls than boys reported a daily intake of fruit compared to boys (43% and 37%, respectively). A significant gender difference was observed in more than half of countries/regions. From 2014 to 2018 daily fruit consumption increased in one quarter of the countries, while a decrease was found for countries like Denmark, Croatia and Norway. In most of the countries, more affluent adolescents were more likely to have a daily intake of fruit (Inchley et al 2020).

The 15 year old girls and boys had a lower intake of daily fruit than the younger participants, but from 2014 to 2018 the only significant decrease was found among girls from Ukraine in this age group. For 15 year old girls in 7 countries and for 15 year old boys in 9 countries, a significant increase in daily intake of fruits were observed. In the European Co-Create countries, English girls had the highest daily intake of fruit (42 %) while the lowest intake was seen among Dutch boys (22 %) among the 15 year olds (see figure 3 below).

Less than two fifths of the adolescents (38%) ate vegetables every day. Similar to daily fruit intake, girls were more likely to have a daily intake of vegetables than boys (42% versus 35%). From 2014 to 2018, daily intake of vegetables increased in half of the countries. There was a huge variation between the countries.

The 15 year olds were less likely to eat vegetables on a daily basis compared to the 11- and 13-year olds. In 9 countries there were a significant increase in daily intake of vegetables among 15 year old girls, and for 15 year old boys a significant increase were observed in 12 countries. For the Co-Create countries, English and Dutch girls had the highest proportion daily vegetable intake (47%) compared to Portuguese boys who had the lowest (26%).

### Comparison with South African adolescents

In comparison to the results from the HBSC study, the South African studies indicate a higher intake of fruit and vegetables per day. However, while a slight increased trend in the proportion of adolescents that consume fruit and vegetables daily is observed for the HBSC data, a decrease trend is noticed for the South African adolescents (see figure 7 and 8).

In the SADHS 2016 study, there were no significant differences in vegetable and fruit intake between adolescents from the three wealth index categories.



Figure 5. Daily intake of vegetables among 15 year olds in selected European countries (Co-Create) based on self-report in the HBSC-study, 2002-2018. Percentages.

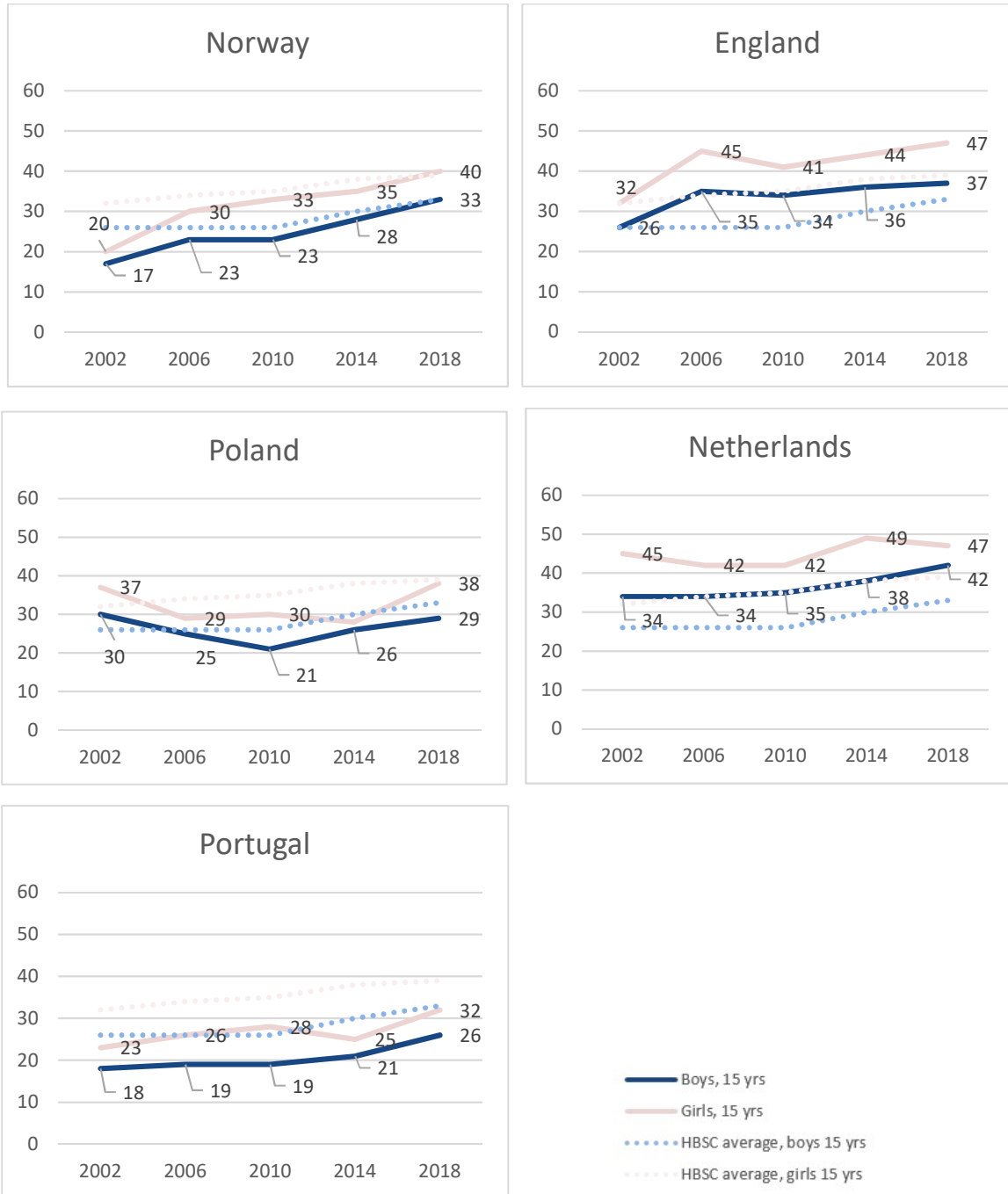




Figure 6. Daily intake of fresh fruit among 15 year olds in selected European countries (Co-Create) based on self-report in the HBSC-study, 2002-2018. Percentages.

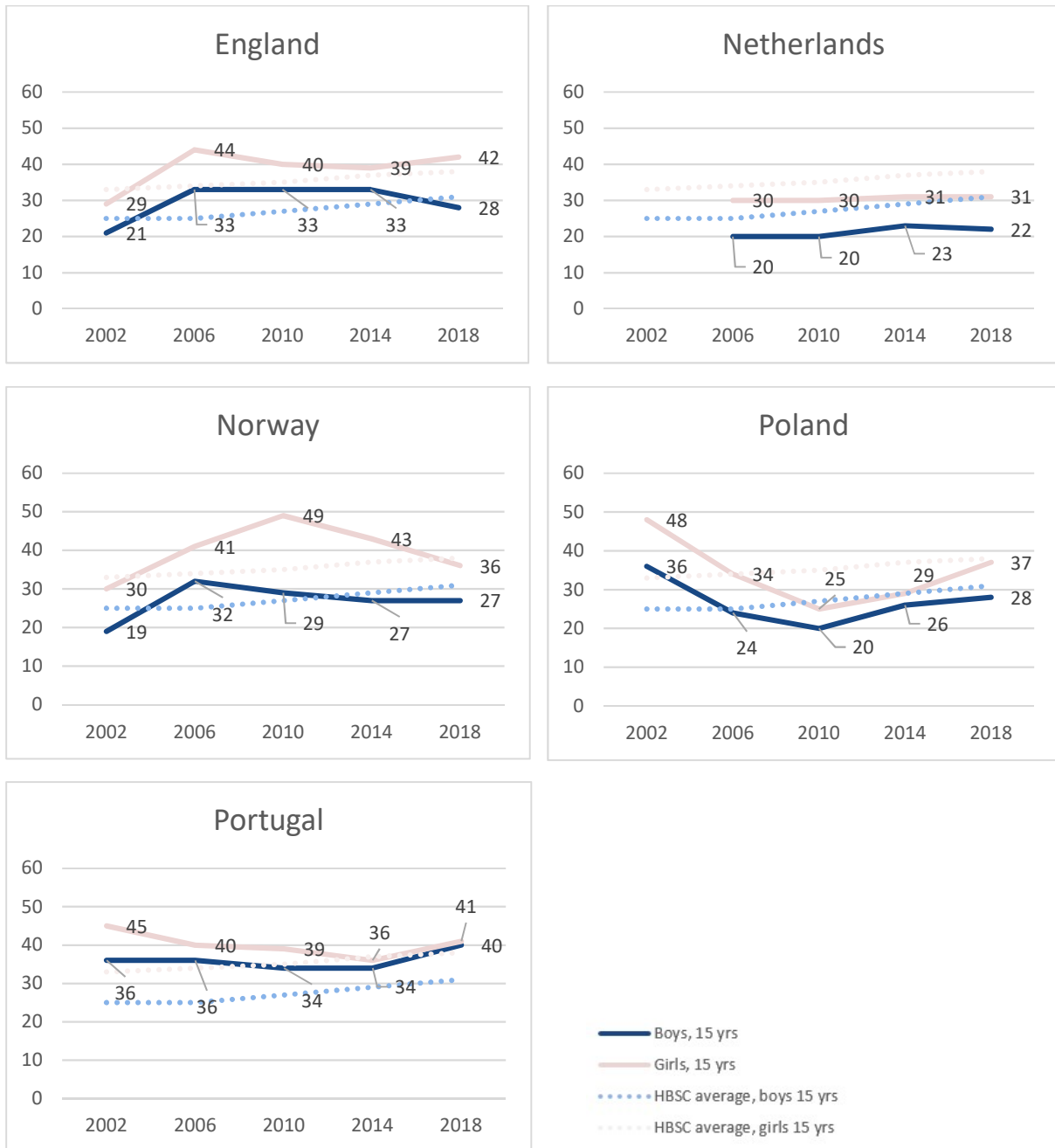






Figure 7. Daily intake of fresh fruit among South African 15-19 year old adolescents (2012-2016) and 15 year olds in the HBSC-study, 2002-2018. Percentages.

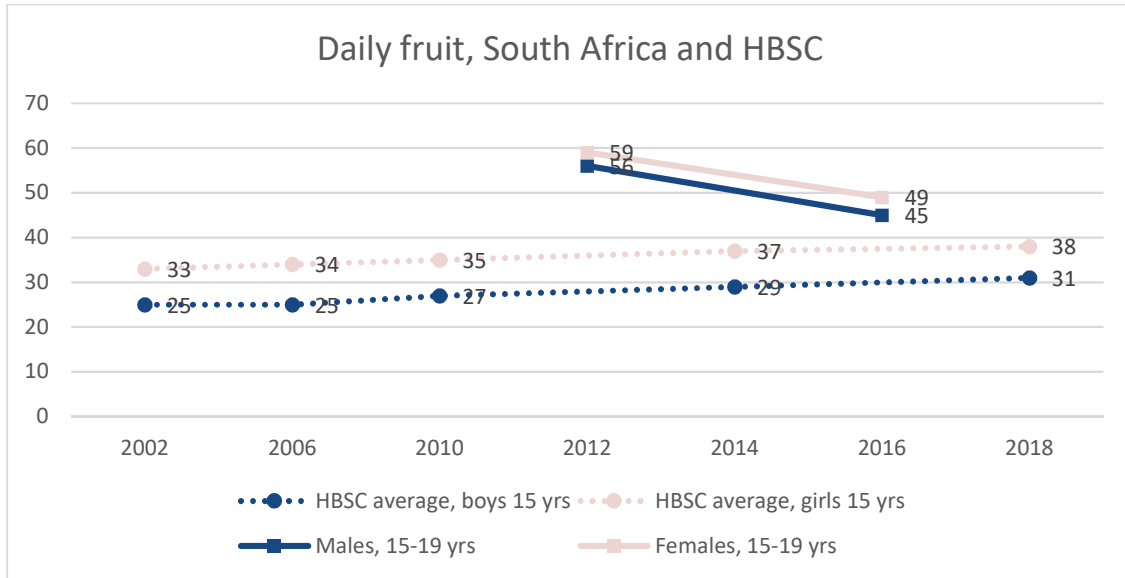
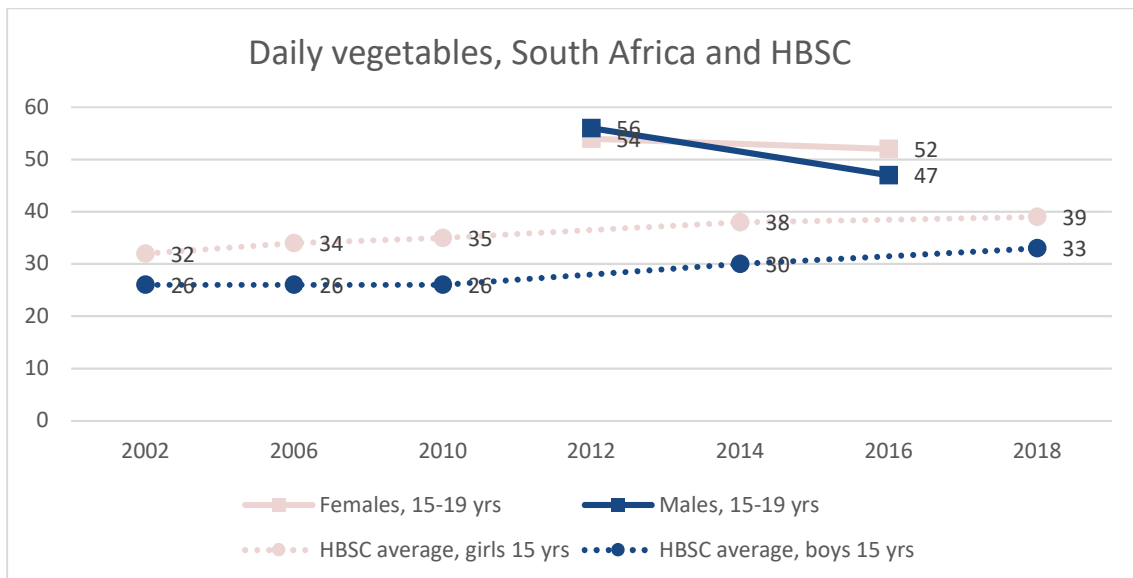


Figure 8. Daily intake of vegetables among South African 15-19 year old adolescents (2012-2016) and 15 year olds in the HBSC-study, 2002-2018. Percentages



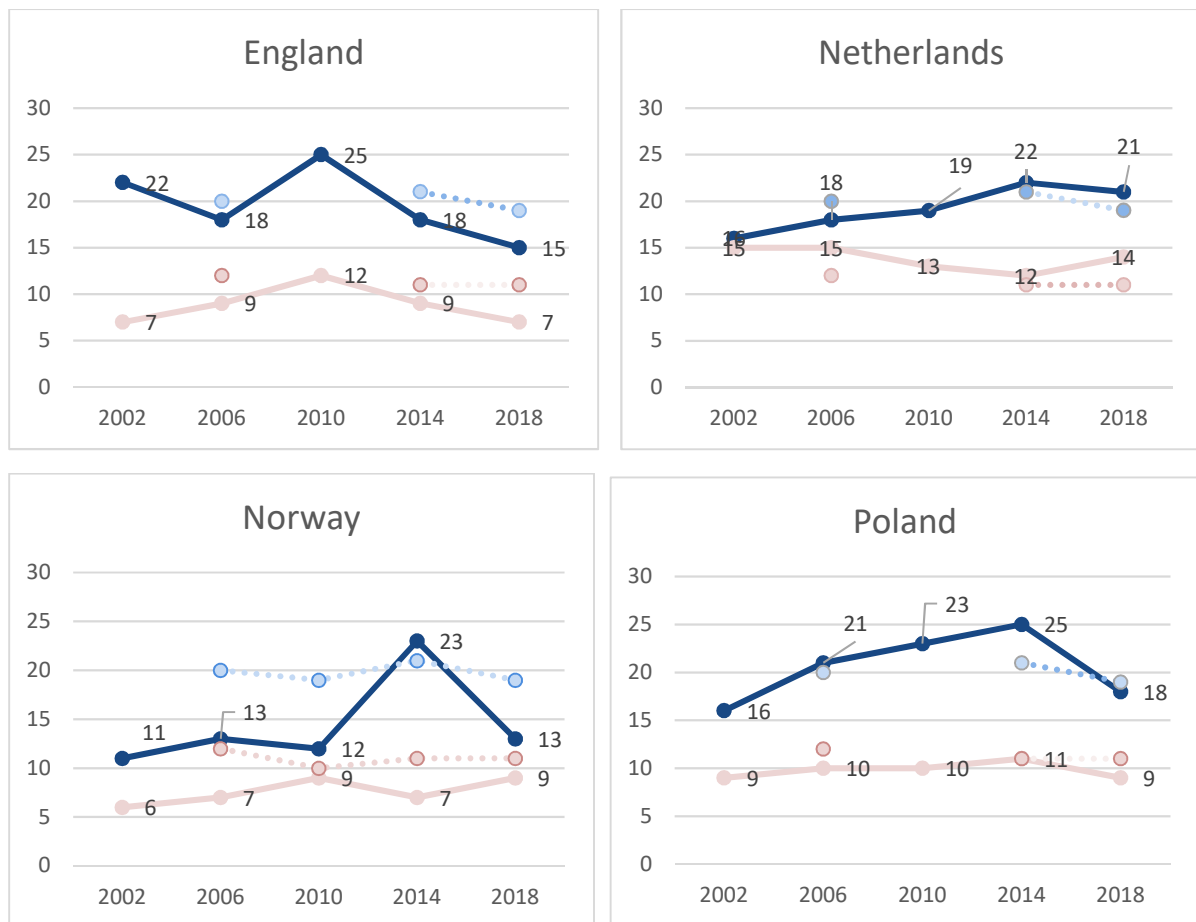


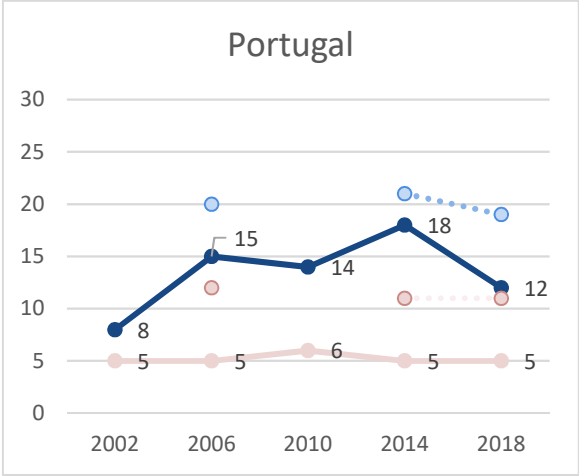
**Physical activity**

Fewer than one in five adolescents (19%) met the current recommendation of 60 minutes of MVPA every day. A significant association between MVPA and family affluence was found in 31 countries/regions for boys and 26 for girls.

Physical activity participation is lower among older adolescents and those from low-affluence families (see appendix 5 for more details).

*Figure 9. Moderate-to-vigorous-intensity physical activity of 60 minutes or more daily among 15 year olds in selected European countries (Co-Create) based on self-report in the HBSC-study, 2002-2018. Percentages.*







## Conclusion

In 2018, more than 20 % of European adolescents lived with overweight or obesity. The prevalence of 15 year old adolescents living with overweight or obesity has been relatively unchanged over the last decade. Affluent adolescents are less likely to live with overweight and obesity.

Overall, almost half (48%) of adolescents in the HBSC study ate neither fruit nor vegetables daily, indicating that a large group has an insufficient diet. There are some positive trends on adolescents' diet, particular with regards to the decline in daily consumption of sugar sweetened beverages.

Over 80 % of the adolescents in the HBSC study did not meet the recommendation of 60 minutes of MVPA every day. Affluent adolescents met the recommendations to a larger extent.

In South Africa, the overall prevalence of adolescents living with overweight and obesity was at the same level as in the HBSC study (22%), but there was, however, a much higher prevalence among girls compared to boys. Prevalence of adolescents reporting daily intake of vegetables and fruit was much higher in South Africa compared to Europe, but the South African trend is negative. With regards to daily consumption of sugar sweetened beverages, there has been a steep increase among South African adolescents in contrast to the trends among European adolescents.

Even if socioeconomic status was measured differently in the South African studies, the different socio-economic patterns in adolescents living with overweight/obesity and daily dietary intake (particular daily intake of sugar sweetened beverages) suggest the overweight/obesity epidemic is in a different stage than the HBSC countries.



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## Appendices

### Appendix 1: Number of respondents, HBSC 2017/2018

Number of respondents in the HBSC 2017/2018 survey												
Country/ region	11-year-olds			13-year-olds			15-year-olds			Total		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Albania	279	378	657	117	156	273	367	411	778	763	945	1708
Armenia	768	730	1498	827	808	1635	758	826	1584	2353	2364	4717
Austria	702	608	1310	705	736	1441	616	731	1347	2023	2075	4098
Azerbaijan	820	760	1580	717	825	1542	672	792	1464	2209	2377	4586
Belgium (Flemish)	799	846	1645	634	594	1228	711	749	1460	2144	2189	4333
Belgium (French)	1018	1093	2111	514	457	971	437	463	900	1969	2013	3982
Bulgaria	806	854	1660	709	662	1371	685	832	1517	2200	2348	4548
Canada	1814	1807	3621	2369	2512	4881	2094	2198	4292	6277	6517	12794
Croatia	792	766	1558	791	708	1499	1052	1060	2112	2635	2534	5169
Czechia	1897	1899	3796	1990	1964	3954	1934	1880	3814	5821	5743	11564
Denmark	648	726	1374	505	536	1041	392	374	766	1545	1636	3181
England	679	630	1309	693	507	1200	432	431	863	1804	1568	3372
Estonia	780	779	1559	817	788	1605	759	783	1542	2356	2350	4706
Finland	466	480	946	560	558	1118	531	545	1076	1557	1583	3140
France	1559	1551	3110	1827	1843	3670	1114	1212	2326	4500	4606	9106
Georgia	674	716	1390	776	724	1500	655	690	1345	2105	2130	4235
Germany	673	719	1392	692	713	1405	659	858	1517	2024	2290	4314
Greece	607	620	1227	649	659	1308	659	651	1310	1915	1930	3845
Greenland	212	262	474	215	231	446	168	146	314	595	639	1234
Hungary	625	634	1259	645	723	1368	506	639	1145	1776	1996	3772
Iceland	1179	1134	2313	1247	1245	2492	1074	1104	2178	3500	3483	6983
Ireland	682	584	1266	713	743	1456	529	554	1083	1924	1881	3805
Italy	679	696	1375	726	720	1446	581	720	1301	1986	2136	4122

Kazakhstan	867	837	1704	801	769	1570	772	803	1575	2440	2409	4849
Latvia	744	791	1535	776	743	1519	660	682	1342	2180	2216	4396
Lithuania	665	672	1337	667	595	1262	572	610	1182	1904	1877	3781
Luxembourg	651	624	1275	616	644	1260	653	683	1336	1920	1951	3871
Malta	511	536	1047	378	409	787	345	383	728	1234	1328	2562
Netherlands	723	763	1486	837	845	1682	720	803	1523	2280	2411	4691
North Macedonia	776	835	1611	766	785	1551	736	760	1496	2278	2380	4658
Norway	788	853	1641	396	399	795	327	350	677	1511	1602	3113
Poland	874	836	1710	841	885	1726	852	929	1781	2567	2650	5217
Portugal	1064	1105	2169	1046	1209	2255	664	751	1415	2774	3065	5839
Republic of Moldova	767	810	1577	809	733	1542	774	793	1567	2350	2336	4686
Romania	725	727	1452	735	764	1499	752	817	1569	2212	2308	4520
Russian Federation	556	582	1138	635	690	1325	852	966	1818	2043	2238	4281
Scotland	877	959	1836	797	856	1653	684	735	1419	2358	2550	4908
Serbia	515	578	1093	619	596	1215	799	811	1610	1933	1985	3918
Slovakia	771	815	1586	981	925	1906	703	590	1293	2455	2330	4785
Slovenia	951	982	1933	1026	989	2015	898	815	1713	2875	2786	5661
Spain	575	620	1195	760	820	1580	753	792	1545	2088	2232	4320
Sweden	592	563	1155	703	708	1411	771	825	1596	2066	2096	4162
Switzerland	1253	1223	2476	1310	1306	2616	1208	1186	2394	3771	3715	7486
Ukraine	1057	1201	2258	1148	1229	2377	1042	983	2025	3247	3413	6660
Wales	2753	2823	5576	2946	2937	5883	2167	2137	4304	7866	7897	15763
Total	38213	39007	77220	39031	39248	78279	35089	36853	71942	112333	115108	227441



## Appendix 2: Characteristics of the participants in the SADHS and SANHANES

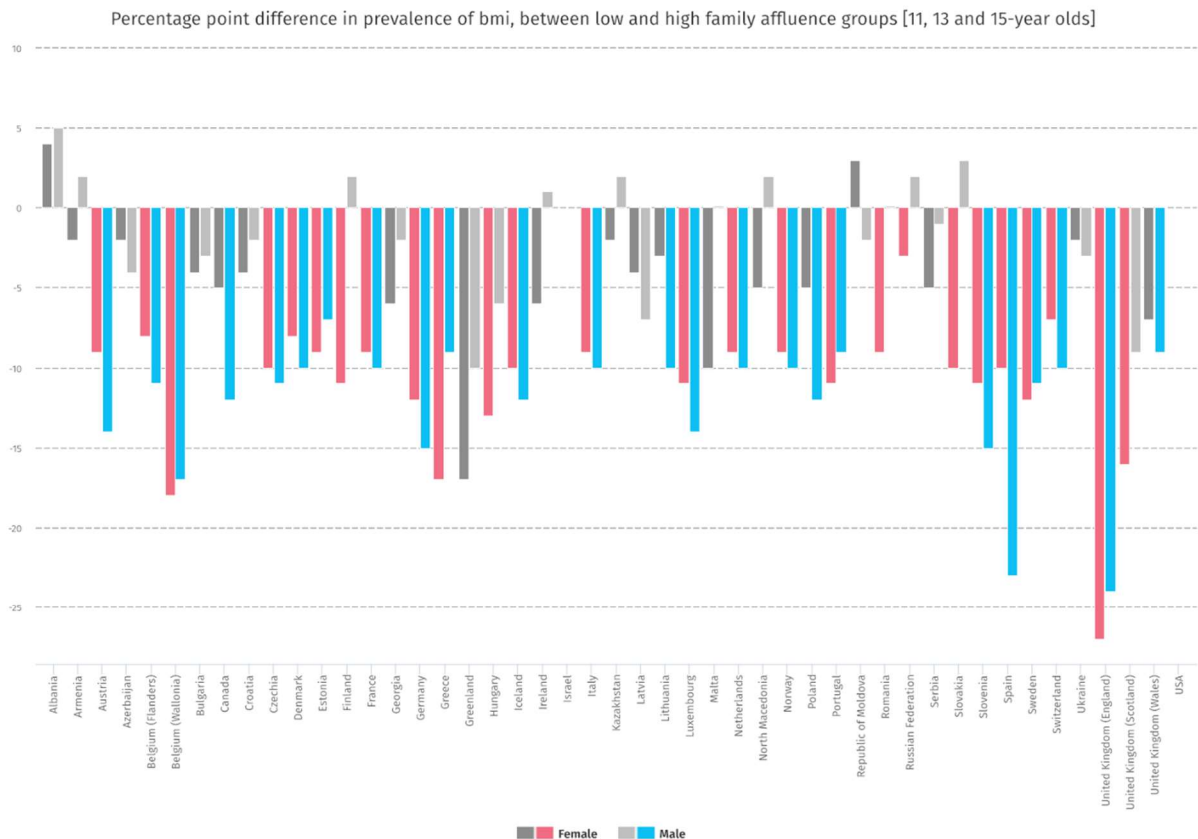
	1998 (SADHS) N= 2172	2012 (SANHANES) N= 2622	2016 (SADHS) N= 1505
Sex: n (%)			
• Female	1099 (50.60)	1190(45.39)	730(48.50)
• Male	1073 (49.40)	1127 (42.98)	705 (46.84)
• Not indicated	0 (0)	305 (11.63)	70 (4.65)
Population group: n (%)			
• Black/African	1738 (80.02)	1698(64.76)	1324 (87.97)
• Coloured	255 (11.75)	432 (16.48)	152 (10.09)
• Indian/Asian	64 (2.95)	127 (4.84)	10 (0.66)
• White	113(5.21)	52 (1.98)	19(1.26)
• Other	2 (0.09)	313 (11.94)	0 (0)
Age (Years)			
• Mean (sd)	16.95 (1.38)	17.01 (1.41)	17.03 (1.39)
Weight (kg)			
• Mean (sd)	56.44 (11.70)	58 (12.90)	58.48 (12.90)
• Range	27 – 167.50	27.3 – 155.8	31.90 – 115.30
Height (cm)			
• Mean (sd)	161.99 (9.34)	161.23 (8.73)	157.62 (5.99)
• Range	84 – 197.50	115 – 189	139 – 177.40
BMI (kg/m <sup>2</sup> )			
• Mean (sd)	21.45 (4.02)	22.38 (5.09)	23.52(4.84)
• Range	12.84 – 47.99	10.15 – 63.69	14.47 – 43.02
Type of place of residence: n (%)			
• Rural	1095 (50.41)	1021 (38.88)	736 (48.90)
• Urban	1077 (49.59)	1601 (61.11)	769 (51.10)
Province: n (%)			
• Eastern Cape	526 (24.22)	336 (12.80)	202 (13.42)
• Free state	176 (8.10)	153 (5.83)	139 (9.24)
• Guateng	150 (6.91)	373 (14.20)	109 (7.24)
• Kwazulu natal	284 (13.08)	452 (17.21)	272 (18.07)
• Mpumalanga	248 (11.42)	224 (8.53)	193 (12.82)
• North-west	196 (9.02)	317 (12.07)	133 (8.84)
• Northern Cape	444 (20.44)	150 (5.71)	127 (8.44)
• Western Cape	148 (6.81)	356 (13.55)	106 (7.04)
• Limpopo		261 (9.95)	224 (14.88)
Wealth index categories			
• Poorest	359 (16.57)	81 (3.09)	373 (24.78)
	585 (26.97)	148 (5.64)	334 (22.19)



• Poorer	473 (21.81)	418 (15.94)	308 (20.47)
• Middle	455 (20.97)	1225 (46.72)	306 (20.33)
• Richer	297 (13.68)	724 (27.61)	184 (12.23)
• Richest	3 (0.14)	26 (0.99)	0 (0)
• Not indicated			



### Appendix 3. Differences in prevalence of BMI between low and high family affluence groups in the HBSAC 2018 study (11, 13 and 15 year olds)

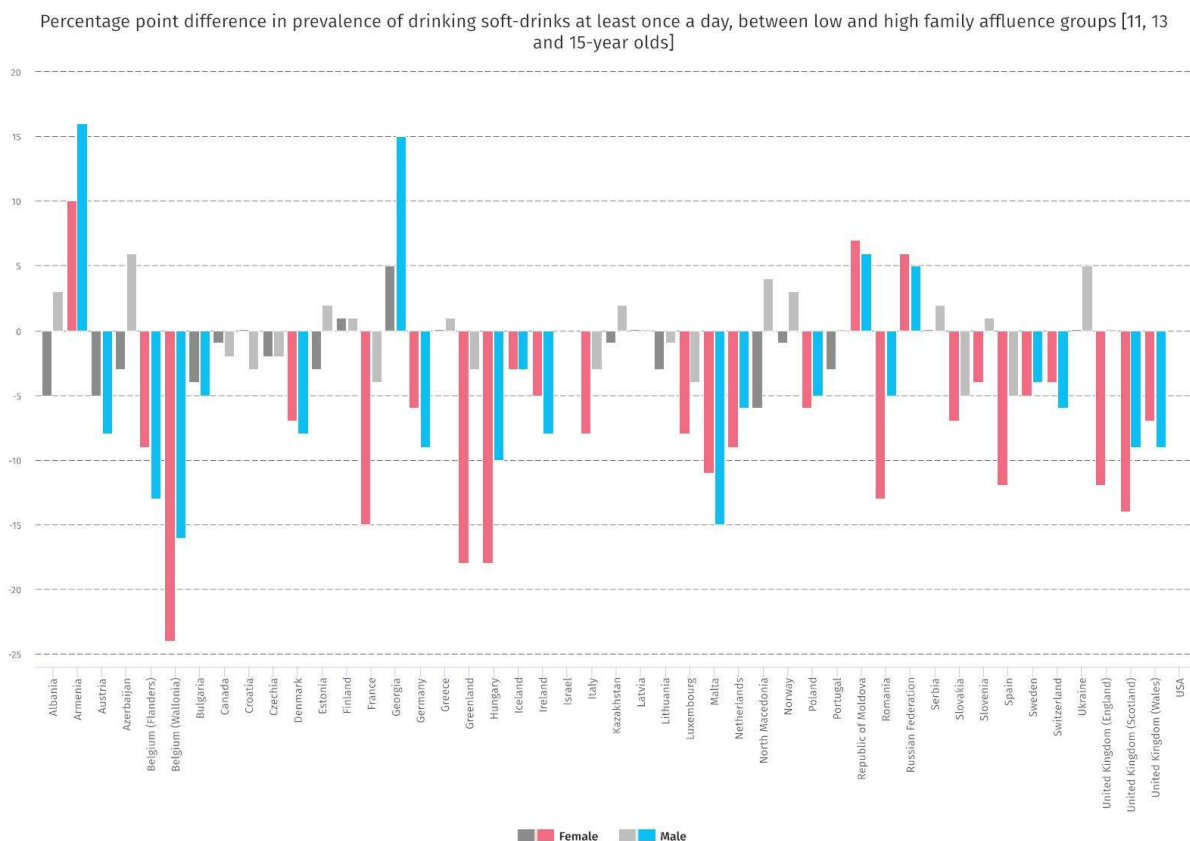


Note: statistically significant differences in percentage-point prevalence between LOW and HIGH family affluence groups are displayed in color. Values that are not statistically significant are display in gray. Negative values indicate decreasing prevalence with higher family affluence. Positive values indicate increasing prevalence with higher family affluence.  
 \* The former Yugoslav Republic of Macedonia (MKD is an abbreviation by the International Organization for Standardization (ISO))

(Source: WHO European Health Information Gateway, <https://gateway.euro.who.int/en/datasets/hbsac/>)



### Appendix 4. Differences in prevalence of drinking soft drinks at least once a day, between low and high family affluence groups in the HBS 2018 study (11, 13 and 15 year olds)

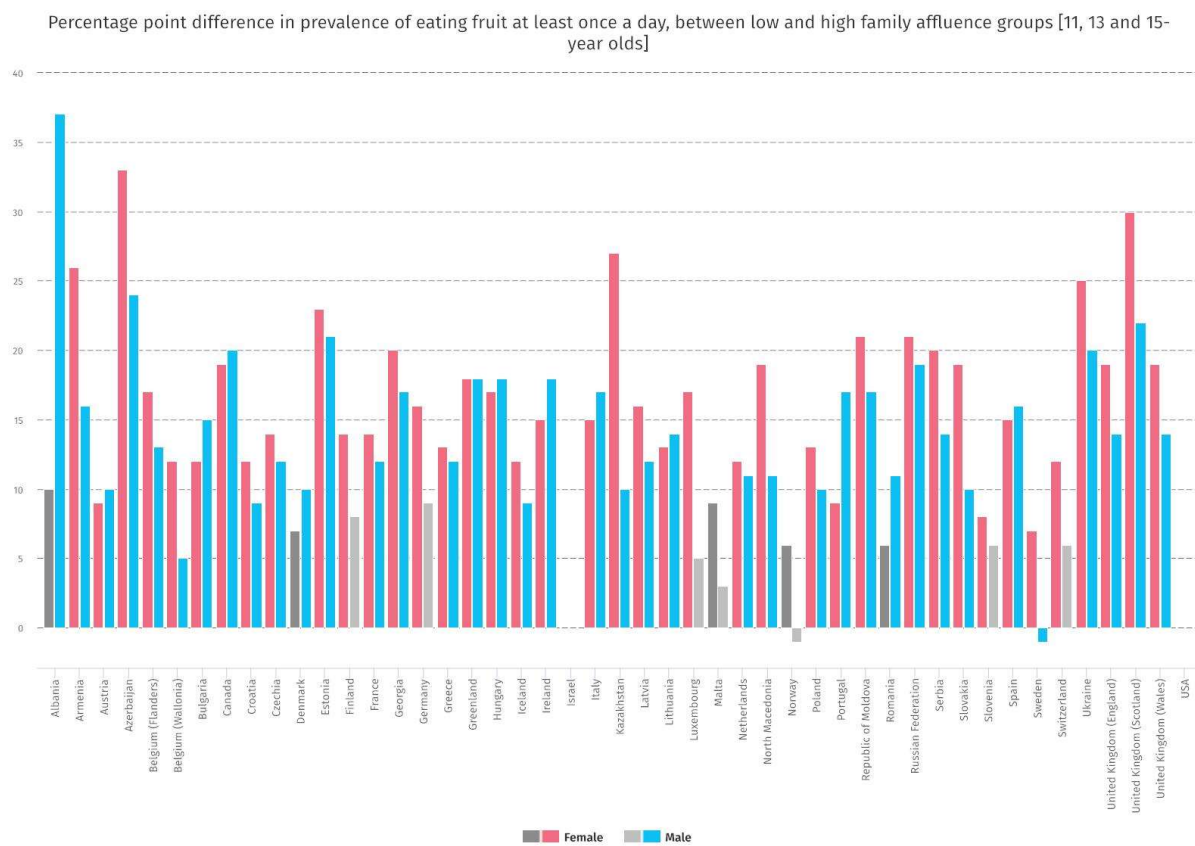


Note: statistically significant differences in percentage-point prevalence between LOW and HIGH family affluence groups are displayed in color. Values that are not statistically significant are display in gray. Negative values indicate decreasing prevalence with higher family affluence. Positive values indicate increasing prevalence with higher family affluence.  
 \* The former Yugoslav Republic of Macedonia (MKD is an abbreviation by the International Organization for Standardization (ISO)

(Source: WHO European Health Information Gateway, <https://gateway.euro.who.int/en/datasets/hbsc/>)



## Appendix 5. Differences in prevalence of eating fruits at least once a day, between low and high family affluence groups in the HBSC 2018 study (11, 13 and 15 year olds)



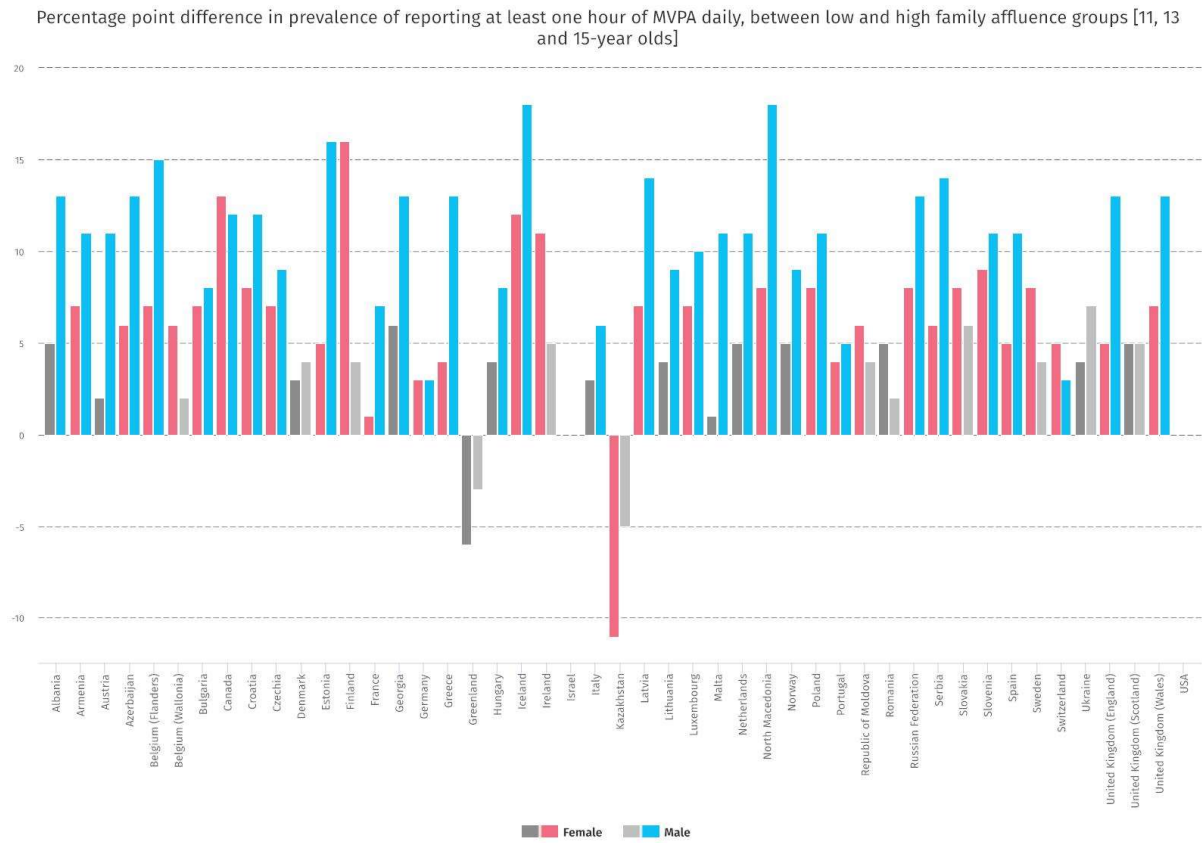
Note: statistically significant differences in percentage-point prevalence between LOW and HIGH family affluence groups are displayed in color. Values that are not statistically significant are displayed in gray. Negative values indicate decreasing prevalence with higher family affluence. Positive values indicate increasing prevalence with higher family affluence.

\* The former Yugoslav Republic of Macedonia (MKD) is an abbreviation by the International Organization for Standardization (ISO)

(Source: WHO European Health Information Gateway, <https://gateway.euro.who.int/en/datasets/hbsc/>)



## Appendix 6. Differences in prevalence of reporting at least one hour of MVPA daily, between low and high family affluence groups in the HBSC 2018 study (11, 13 and 15 year olds)



Note: statistically significant differences in percentage-point prevalence between LOW and HIGH family affluence groups are displayed in color. Values that are not statistically significant are displayed in gray. Negative values indicate decreasing prevalence with higher family affluence. Positive values indicate increasing prevalence with higher family affluence.  
 \* The former Yugoslav Republic of Macedonia (MKD) is an abbreviation by the International Organization for Standardization (ISO)

(Source: WHO European Health Information Gateway, <https://gateway.euro.who.int/en/datasets/hbhc/>)



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