

Supplementary Information 1

Supplement to: Using a system dynamics model to understand the obesity transition by socioeconomic status in Colombia at the country, regional, and department level.

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Section 1. Parameters and data used in the model at national level

The following tables describe the data and parameters used in the two system dynamics (SD) models: SD model of the entire urban population and SD model segregated by socioeconomic status (SES) and to estimate the transference rates (TRs) by age, body mass index (BMI) category, and socioeconomic status (SES) at national level.

Table 1. Prevalent rates of entire population by age group, gender, and body mass index category in 2005

Age Group	Males			Females		
	Not-Overweigh	Overweigh	Obese	Not-Overweigh	Overweigh	Obese
0-4	0.76105	0.18357	0.05537	0.76409	0.18858	0.04733
5-9	0.80877	0.13750	0.05373	0.79520	0.15043	0.05437
10-14	0.83260	0.12485	0.04255	0.78549	0.17204	0.04248
15-19	0.89431	0.08268	0.02301	0.79172	0.16285	0.04543
20-24	0.76938	0.18236	0.04825	0.69604	0.22307	0.08089
25-29	0.62451	0.29679	0.07870	0.56640	0.29998	0.13362
30-34	0.50047	0.38605	0.11349	0.45741	0.36278	0.17981
35-39	0.45259	0.40518	0.14223	0.38965	0.39887	0.21148
40-44	0.42614	0.42564	0.14822	0.34379	0.40650	0.24971
45-49	0.39921	0.43704	0.16375	0.28923	0.42900	0.28178
50-54	0.41231	0.42621	0.16148	0.25499	0.41586	0.32915
55-59	0.40721	0.41261	0.18018	0.24122	0.40478	0.35400

Table 2. Prevalent rates of lower socioeconomic status population by age group, gender, and body mass index category in 2005

Age Group	Males			Females		
	Not-Overweigh	Overweigh	Obese	Not-Overweigh	Overweigh	Obese
0-4	0.78395	0.17452	0.04153	0.80653	0.16199	0.03148
5-9	0.85783	0.11623	0.02594	0.88696	0.09565	0.01739
10-14	0.88310	0.09725	0.01965	0.85980	0.12157	0.01863
15-19	0.94111	0.04837	0.01052	0.81461	0.15890	0.02648
20-24	0.81901	0.14257	0.03842	0.74058	0.20072	0.05870
25-29	0.70429	0.24785	0.04785	0.60337	0.27862	0.11801
30-34	0.58651	0.33138	0.08211	0.52023	0.33430	0.14547
35-39	0.58167	0.33333	0.08500	0.43189	0.36529	0.20283
40-44	0.56743	0.34326	0.08932	0.40071	0.38526	0.21403
45-49	0.52083	0.35000	0.12917	0.33531	0.43175	0.23294
50-54	0.53915	0.35123	0.10962	0.37478	0.36778	0.25744
55-59	0.57049	0.30492	0.12459	0.37705	0.35597	0.26698

Table 3. Prevalent rates of middle socioeconomic status population by age group, gender, and body mass index category in 2005

Age Group	Males			Females		
	Not-Overweigh	Overweigh	Obese	Not-Overweigh	Overweigh	Obese
0-4	0.74688	0.19067	0.06245	0.77889	0.18121	0.03990
5-9	0.82955	0.12074	0.04972	0.81805	0.12870	0.05325
10-14	0.81556	0.13689	0.04755	0.82092	0.13725	0.04183
15-19	0.88358	0.08657	0.02985	0.82485	0.13964	0.03550
20-24	0.77792	0.18020	0.04188	0.73680	0.19760	0.06560
25-29	0.61250	0.29306	0.09444	0.61466	0.28448	0.10086
30-34	0.50252	0.38319	0.11429	0.46230	0.37004	0.16766
35-39	0.44158	0.41065	0.14777	0.44085	0.35996	0.19919
40-44	0.45601	0.39856	0.14542	0.35722	0.40728	0.23549

Age Group	Males			Females		
	Not-Overweigh	Overweigh	Obese	Not-Overweigh	Overweigh	Obese
45-49	0.41702	0.41489	0.16809	0.27633	0.43371	0.28996
50-54	0.44875	0.41274	0.13850	0.27040	0.39520	0.33440
55-59	0.38931	0.43130	0.17939	0.28884	0.38512	0.32604

Table 4. Prevalent rates of higher socioeconomic status population by age group, gender, and body mass index category in 2005

Age Group	Males			Females		
	Not-Overweigh	Overweigh	Obese	Not-Overweigh	Overweigh	Obese
0-4	0.74297	0.18935	0.06768	0.74901	0.19337	0.05762
5-9	0.72519	0.18066	0.09415	0.76679	0.17827	0.05495
10-14	0.78177	0.15019	0.06804	0.78082	0.16895	0.05023
15-19	0.85472	0.11453	0.03075	0.82160	0.14789	0.03052
20-24	0.72394	0.21580	0.06026	0.76407	0.18831	0.04762
25-29	0.56919	0.33857	0.09225	0.66329	0.24911	0.08760
30-34	0.43184	0.43070	0.13746	0.53989	0.31589	0.14422
35-39	0.37037	0.45139	0.17824	0.45560	0.37591	0.16849
40-44	0.31415	0.49712	0.18872	0.39926	0.38755	0.21319
45-49	0.31790	0.50061	0.18149	0.28693	0.42549	0.28758
50-54	0.31294	0.48080	0.20626	0.24415	0.44150	0.31435
55-59	0.32413	0.46409	0.21179	0.23613	0.42381	0.34006

Table 5. Prevalent rates of entire population by age group, gender, and body mass index category in 2010

Age Group	Males			Females		
	Not-Overweigh	Overweigh	Obese	Not-Overweigh	Overweigh	Obese
0-4	0.73680	0.20456	0.05864	0.76409	0.18858	0.04733
5-9	0.76332	0.15196	0.08472	0.79520	0.15043	0.05437
10-14	0.77794	0.15256	0.06950	0.78549	0.17204	0.04248
15-19	0.85366	0.11398	0.03236	0.79172	0.16285	0.04543
20-24	0.73185	0.20473	0.06342	0.69604	0.22307	0.08089
25-29	0.53510	0.34540	0.11950	0.56640	0.29998	0.13362
30-34	0.44255	0.39099	0.16646	0.45741	0.36278	0.17981
35-39	0.39937	0.42872	0.17191	0.38965	0.39887	0.21148
40-44	0.36702	0.44594	0.18704	0.34379	0.40650	0.24971
45-49	0.37109	0.44759	0.18132	0.28923	0.42900	0.28178
50-54	0.36376	0.45504	0.18120	0.25499	0.41586	0.32915
55-59	0.38500	0.43760	0.17739	0.24122	0.40478	0.35400

Table 6. Prevalent rates of lower socioeconomic status population by age group, gender, and body mass index category in 2010

Age Group	Males			Females		
	Not-Overweigh	Overweigh	Obese	Not-Overweigh	Overweigh	Obese
0-4	0.73872	0.21008	0.05120	0.76813	0.18952	0.04235
5-9	0.81081	0.13745	0.05174	0.84693	0.11389	0.03918
10-14	0.83917	0.11708	0.04375	0.81566	0.14739	0.03695
15-19	0.88342	0.09347	0.02312	0.78310	0.17442	0.04248
20-24	0.76115	0.17639	0.06246	0.66899	0.23826	0.09275
25-29	0.56088	0.33523	0.10390	0.52527	0.31441	0.16032
30-34	0.50181	0.35481	0.14338	0.40909	0.37216	0.21875
35-39	0.46410	0.37565	0.16025	0.36917	0.39763	0.23320
40-44	0.41073	0.42059	0.16867	0.32658	0.39517	0.27825
45-49	0.45012	0.39549	0.15439	0.29107	0.39097	0.31796
50-54	0.45231	0.39740	0.15029	0.27503	0.40484	0.32013
55-59	0.47929	0.39842	0.12229	0.28418	0.38556	0.33026

Table 7. Prevalent rates of middle socioeconomic status population by age group, gender, and body mass index category in 2010

Age Group	Males			Females		
	Not-Overweigh	Overweigh	Obese	Not-Overweigh	Overweigh	Obese
0-4	0.74826	0.19360	0.05814	0.77592	0.18416	0.03992
5-9	0.76653	0.15307	0.08041	0.79742	0.14988	0.05269
10-14	0.78466	0.15682	0.05852	0.78575	0.17370	0.04055
15-19	0.85288	0.11458	0.03254	0.80732	0.14946	0.04322
20-24	0.74719	0.19654	0.05628	0.69790	0.22132	0.08079
25-29	0.55112	0.32522	0.12366	0.57692	0.29487	0.12821
30-34	0.44526	0.38421	0.17053	0.45881	0.36490	0.17629
35-39	0.39230	0.45608	0.15162	0.38689	0.37377	0.23934
40-44	0.37437	0.42839	0.19724	0.35059	0.38285	0.26655
45-49	0.37736	0.45687	0.16577	0.27349	0.42326	0.30326
50-54	0.38679	0.43962	0.17358	0.25197	0.38583	0.36220
55-59	0.39286	0.42634	0.18080	0.24806	0.37209	0.37984

Table 8. Prevalent rates of higher socioeconomic status population by age group, gender, and body mass index category in 2010

Age Group	Males			Females		
	Not-Overweigh	Overweigh	Obese	Not-Overweigh	Overweigh	Obese
0-4	0.72199	0.20775	0.07026	0.74656	0.19149	0.06195
5-9	0.69791	0.17015	0.13194	0.72241	0.20088	0.07671
10-14	0.70526	0.18810	0.10664	0.75157	0.19821	0.05022
15-19	0.82515	0.13360	0.04126	0.78875	0.16144	0.04981
20-24	0.69251	0.23779	0.06971	0.71908	0.21069	0.07023
25-29	0.49887	0.37040	0.13073	0.59451	0.29121	0.11429
30-34	0.38442	0.43065	0.18493	0.49567	0.35355	0.15078
35-39	0.34673	0.45514	0.19813	0.40641	0.41729	0.17630
40-44	0.33097	0.47518	0.19385	0.35115	0.42872	0.22013
45-49	0.30837	0.48018	0.21145	0.29707	0.45293	0.25000
50-54	0.28793	0.50464	0.20743	0.24590	0.43735	0.31674
55-59	0.32332	0.46755	0.20913	0.21780	0.42909	0.35311

Table 9. Fraction of births by body mass index category, gender, and socioeconomic status[†]

Population Group (%/year)	Males			Females		
	Not-Overweigh	Overweigh	Obese	Not-Overweigh	Overweigh	Obese
Lower SES	82.26	12.60	5.14	82.26	12.60	5.14
Middle SES	77.87	13.11	9.02	77.87	13.11	9.02
Higher SES	77.90	16.67	5.43	77.90	16.67	5.43
Complete Urban Population	79.76	13.97	6.27	79.76	13.97	6.27

[†] The fractions of births by each BMI category correspond to the prevalences by BMI category of children aged 0 to 12 months

Table 10. Man mortality rates and population size by age group without segregate by socioeconomic status[†]

Age group	Mortality rates (R) (%/year)	Not- overweight men in 2005 (Number of people) ¹	Overweight men in 2005 (Number of people) ²	Obese men in 2005 (Number of people) ³
0-4	0,00357	1165482	281127	84801
5-9	0,00032	1289072	219149	85644
10-14	0,00033	1359604	203875	69488
15-19	0,00155	1374888	127116	35377
20-24	0,00293	1058824	250967	66405
25-29	0,00305	771818	366795	97264
30-34	0,00296	541980	418070	122902
35-39	0,00284	489080	437848	153696
40-44	0,00310	436635	436122	151873
45-49	0,00384	337634	369630	138492
50-54	0,00574	276901	286235	108449
55-59	0,00798	210765	213563	93259

[†]Values used in this table are for the urban population

¹ Initial value used in the stock of not-overweight population in 2005.

² Initial value used in the stock of overweight population in 2005.

³ Initial value used in the stock of obese population in 2005.

Table 11. Women mortality rates and population size by age group without segregate by socioeconomic status[†]

Age group	Mortality rates (R) (%/year)	Not- overweight women in 2005 (Number of people) ¹	Overweight women in 2005 (Number of people) ²	Obese women in 2005 (Number of people) ³
0-4	0,00289	1126474	278023	69772
5-9	0,00023	1227412	232199	83921
10-14	0,00024	1244635	272604	67304
15-19	0,00049	1219614	250871	69976
20-24	0,00066	1026858	329092	119328
25-29	0,00065	762616	403902	179915
30-34	0,00085	552648	438307	217248
35-39	0,00107	480958	492333	261042
40-44	0,00146	403077	476607	292781
45-49	0,00218	285037	422785	277697
50-54	0,00337	199382	325166	257368
55-59	0,00523	146397	245658	214837

[†]Values used in this table are for the urban population

¹ Initial value used in the stock of not-overweight population in 2005.

² Initial value used in the stock of overweight population in 2005.

³ Initial value used in the stock of obese population in 2005.

Table 12. Man mortality rates and population size by age group for the lower socioeconomic status population[†]

Age group	Mortality rates (R) (%/year)	Not- overweight men in 2005 (Number of people) ¹	Overweight men in 2005 (Number of people) ²	Obese men in 2005 (Number of people) ³
0-4	0,00357	497762	110812	26367
5-9	0,00032	562355	76198	17003
10-14	0,00033	589337	64899	13111
15-19	0,00155	536644	27582	5996
20-24	0,00293	370955	64574	17403
25-29	0,00305	277758	97748	18872
30-34	0,00296	201479	113836	28207
35-39	0,00284	184329	105633	26936

40-44	0,00310	166239	100565	26167
45-49	0,00384	119390	80230	29609
50-54	0,00574	107116	69781	21779
55-59	0,00798	497762	110812	26367

†Values used in this table are for the urban population

¹ Initial value used in the stock of not-overweight population in 2005 for lower SES.

² Initial value used in the stock of overweight population in 2005 for lower SES.

³ Initial value used in the stock of obese population in 2005 for lower SES.

Table 13. Women mortality rates and population size by age group for the lower socioeconomic status population[†]

Age group	Mortality rates (R) (%/year)	Not- overweight women in 2005 (Number of people) ¹	Overweight women in 2005 (Number of people) ²	Obese women in 2005 (Number of people) ³
0-4	0,00289	492988	99017	19244
5-9	0,00023	563089	60725	11041
10-14	0,00024	556772	78723	12062
15-19	0,00049	465440	90792	15132
20-24	0,00066	359582	97460	28499
25-29	0,00065	259242	119709	50705
30-34	0,00085	199380	128120	55753
35-39	0,00107	156332	132225	73418
40-44	0,00146	134336	129154	71752
45-49	0,00218	89565	115324	62220
50-54	0,00337	86692	85072	59550
55-59	0,00523	62876	59361	44521

†Values used in this table are for the urban population

¹ Initial value used in the stock of not-overweight population in 2005 for lower SES.

² Initial value used in the stock of overweight population in 2005 for lower SES.

³ Initial value used in the stock of obese population in 2005 for lower SES.

Table 14. Man mortality rates and population size by age group for the middle socioeconomic status population[†]

Age group	Mortality rates (R) (%/year)	Not- overweight men in 2005 (Number of people) ¹	Overweight men in 2005 (Number of people) ²	Obese men in 2005 (Number of people) ³
0-4	0,00357	319608	81594	26723
5-9	0,00032	367767	53528	22041
10-14	0,00033	371039	62277	21633
15-19	0,00155	354964	34777	11992
20-24	0,00293	280735	65032	15113
25-29	0,00305	213399	102103	32905
30-34	0,00296	150606	114843	34252
35-39	0,00284	135738	126231	45422
40-44	0,00310	130323	113905	41560
45-49	0,00384	93601	93124	37727
50-54	0,00574	72003	66225	22223
55-59	0,00798	47562	52691	21916

†Values used in this table are for the urban population

¹ Initial value used in the stock of not-overweight population in 2005 for middle SES.

² Initial value used in the stock of overweight population in 2005 for middle SES.

³ Initial value used in the stock of obese population in 2005 for middle SES.

Table 15. Women mortality rates and population size by age group for the middle socioeconomic status population[†]

Age group	Mortality rates (R) (%/year)	Not- overweight women in 2005 (Number of people) ¹	Overweight women in 2005 (Number of people) ²	Obese women in 2005 (Number of people) ³
0-4	0,00289	320869	74652	16437
5-9	0,00023	351216	55255	22864
10-14	0,00024	362400	60592	18466
15-19	0,00049	332035	56212	14291
20-24	0,00066	285040	76444	25378
25-29	0,00065	233307	107982	38285
30-34	0,00085	154577	123728	56059
35-39	0,00107	154789	126387	69939
40-44	0,00146	116820	133190	77012
45-49	0,00218	72273	113433	75838
50-54	0,00337	50514	73828	62470
55-59	0,00523	41376	55168	46705

[†]Values used in this table are for the urban population

¹ Initial value used in the stock of not-overweight population in 2005 for middle SES.

² Initial value used in the stock of overweight population in 2005 for middle SES.

³ Initial value used in the stock of obese population in 2005 for middle SES.

Table 16. Man mortality rates and population size by age group for the higher socioeconomic status population[†]

Age group	Mortality rates (R) (%/year)	Not- overweight men in 2005 (Number of people) ¹	Overweight men in 2005 (Number of people) ²	Obese men in 2005 (Number of people) ³
0-4	0,00357	348113	88721	31711
5-9	0,00032	358950	89423	46601
10-14	0,00033	399228	76699	34744
15-19	0,00155	483279	64757	17388
20-24	0,00293	407134	121362	33890
25-29	0,00305	280661	166945	45486
30-34	0,00296	189894	189391	60444
35-39	0,00284	169012	205984	81337
40-44	0,00310	140072	221653	84146
45-49	0,00384	124643	196277	71156
50-54	0,00574	97782	150229	64447
55-59	0,00798	82068	117506	53624

[†]Values used in this table are for the urban population

¹ Initial value used in the stock of not-overweight population in 2005 for higher SES.

² Initial value used in the stock of overweight population in 2005 for higher SES.

³ Initial value used in the stock of obese population in 2005 for higher SES.

Table 17. Women mortality rates and population size by age group for the higher socioeconomic status population[†]

Age group	Mortality rates (R) (%/year)	Not- overweight women in 2005 (Number of people) ¹	Overweight women in 2005 (Number of people) ²	Obese women in 2005 (Number of people) ³
0-4	0,00289	337851	87222	25989
5-9	0,00023	367555	85451	26338
10-14	0,00024	386919	83719	24890
15-19	0,00049	465482	83787	17289
20-24	0,00066	460639	113529	28708
25-29	0,00065	356321	133820	47061

30-34	0,00085	264860	154972	70755
35-39	0,00107	237476	195942	87825
40-44	0,00146	203703	197731	108768
45-49	0,00218	131088	194393	131387
50-54	0,00337	88819	160613	114358
55-59	0,00523	70102	125824	100959

†Values used in this table are for the urban population

¹ Initial value used in the stock of not-overweight population in 2005 for higher SES.

² Initial value used in the stock of overweight population in 2005 for higher SES.

³ Initial value used in the stock of obese population in 2005 for higher SES.

Table 18. Data and projections of the Fertility rates†

Year	Fertility rate	Year	Fertility rate	Year	Fertility rate
1960	6.807	1985	3.420	2010	2.010
1961	6.801	1986	3.320	2011	1.978
1962	6.779	1987	3.227	2012	1.948
1963	6.736	1988	3.142	2013	1.921
1964	6.668	1989	3.065	2014	1.897
1965	6.567	1990	2.994	2015	1.874
1966	6.425	1991	2.927	2016	1.851
1967	6.246	1992	2.860	2017	1.828
1968	6.034	1993	2.794	2018	1.805
1969	5.797	1994	2.727	2019	1.782
1970	5.548	1995	2.660	2020	1.759
1971	5.300	1996	2.596	2021	1.736
1972	5.067	1997	2.535	2022	1.713
1973	4.857	1998	2.481	2023	1.690
1974	4.675	1999	2.432	2024	1.667
1975	4.523	2000	2.389	2025	1.644
1976	4.396	2001	2.349	2026	1.621
1977	4.284	2002	2.311	2027	1.598
1978	4.177	2003	2.274	2028	1.575
1979	4.071	2004	2.236	2029	1.552
1980	3.965	2005	2.197	2030	1.529
1981	3.855	2006	2.157		
1982	3.744	2007	2.118		
1983	3.634	2008	2.080		
1984	3.526	2009	2.044		

†Data of Fertility rate of world Data Bank(1960–2015)[1] was used to forecast the fertility rate from 2015 to 2030. Holt-Winters no seasonal method in EVIEWS 5 (Quantitative Micro Software, LLC) was used to forecast the fertility rate. In the SD model we used data from 2005 to 2030.

References

- 1 World Data Bank. World Development Indicators. <http://databank.worldbank.org/data/reports.aspx?source=World%20Development%20Indicators> (accessed 22 Aug 2019).