

# **Dynamics of the double burden of malnutrition in Guatemala: a secondary data analysis of the Demographic Health Surveys from 1998-2015**

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## Section 1. Methods

### Specifications on variables

#### Household variables:

- Residence: urban, rural
- Region: Metropolitan, North, Northeast, Southeast, Central, Southwest, Northwest, Petén
- Department (22 subdivisions of the regions): Guatemala. Alta Verapaz, Baja Verapaz, Chimaltenango, Chiquimula, Petén, El Progreso, El Quiché, Escuintla, Guatemala, Huehuetenango, Izabal, Jalapa, Jutiapa, Quetzaltenango, Retalhuleu, Sacatepéquez, San Marcos, Santa Rosa, Sololá, Suchitepéquez, Totonicapán and Zacapa
- Number of household members: numeric
- Sex of the household head: women, men
- Age group of the household head: <20 years, 20-35 years, 35-50 years, >50y years
- Household wealth index quintile: Q1-poorest to Q5-richest; calculated by DHS
- Ownership of dwelling: owned, rented, borrowed, other
- Availability of electricity: yes, no
- Number of sleeping rooms: numeric
- Availability of a cooking room: yes, no
- Proxy for household food security: calculated based on the questions: a. In the last 30 days, did the household lack money to buy food? b. In the past 30 days, did any member of the household eat less than he/she wanted because of a lack of money? c. In the last 30 days, did any member of the household miss breakfast, lunch, or dinner because of lack of money? and classified as insecure= if 'yes' to 3/3 questions; moderate-insecure= 'yes' to 2/3 questions; low-insecure= 'yes' to 1/3 questions; secure= 'yes' to 0/3 questions

#### Women variables:

- Age: in years; age groups: 15-24 years, 25-34 years, 35-49 years
- Marital status: married or living together, divorced, widowed, single
- Education level: university, secondary, primary, no education
- Type of occupation: professional, clerical, sales-services, skilled manual, unskilled manual, not formally employed, other; based on DHS
- Ethnic group: indigenous, non-indigenous
- Language: Spanish, other
- Autonomy regarding household expenses: alone, with other
- Parity: numeric; categorical based on a median of 2
- Number of own children <5 years living in the household: numeric
- Alcohol consumption in the last 30 days: yes, no
- Tobacco consumption in the last 30 days: yes, no

#### Children variables:

- Age: in months, numeric
- Sex: boys, girls
- Being breastfed: never, ever, still breastfeeding

### Variables not available in specific surveys

The following variables were not available in the following surveys:

- Wealth index: 1998-99
- Ownership of dwelling: 2014-15
- Proxy for food security: 1998-99, 2002, 2009
- Women's occupation: 2002, 2008-09
- alcohol and tobacco consumption: 1998-99

## Section 2. Statistical analysis

Variables included in the backward stepwise logistic regression models:

- Household-level: residence, region, number of household members, sex of household head, availability of electricity and wealth index
- Woman-level: age category, education level, ethnicity and parity
- Child-level: age category, sex and breastfeeding status.

### Section 3. Results

**Table S1. Characteristics of included households (N= 39,749), by DHS survey year**

		n*	1998-1999 (n= 3,481)	n*	2002 (n= 7,316)	n*	2008-2009 (n= 13,728 )	n*	2014-2015 (n= 15,224)
Residence, % (95%CI)	Urban	1,180	44.7 (35.5; 54.3)	2,667	44.5 (37.4; 51.8)	6,392	48.1 (44.2; 51.9)	6,774	46.0 (44.4; 47.5)
	Rural	2,301	55.3 (45.7; 64.5)	4,649	55.5 (48.2; 62.6)	7,336	52.9 (48.1; 55.8)	8,450	54.0 (52.5; 55.6)
Region, % (95%CI)	Metropolitan	275	32.2 (27.6; 37.1)	1,167	35.7 (31.3; 40.4)	1,670	22.4 (20.4; 24.6)	1,783	21.7 (20.1; 23.3)
	North	268	6.8 (5.7; 8.2)	736	6.1 (5.4; 7.0)	1,142	8.4 (7.6; 9.3)	1,275	8.7 (8.0; 9.4)
	Northeast	414	9.0 (7.7; 10.6)	573	8.7 (7.6; 10.1)	2,207	8.7 (8.2; 9.3)	2,494	8.9 (8.2; 9.6)
	Southeast	239	8.4 (6.5; 10.8)	469	8.2 (7.3; 9.2)	1,698	9.3 (8.6; 10.1)	1,888	8.8 (8.3; 9.4)
	Central	478	10.6 (9.0; 12.4)	862	10.7 (8.6; 13.4)	1,755	12.2 (11.4; 13.1)	1,912	11.3 (10.5; 12.3)
	Southwest	729	20.3 (17.9; 22.9)	1,825	18.8 (17.0; 20.8)	3,456	23.1 (21.9; 24.2)	3,888	23.8 (22.5; 25.0)
	Northwest	445	10.1 (8.8; 11.4)	1,203	8.9 (8.0; 9.8)	1,267	12.5 (11.6; 13.6)	1,343	13.1 (12.0; 14.2)
	Petén	633	2.6 (2.2; 3.1)	481	2.8 (2.1; 3.9)	533	3.2 (2.9; 3.6)	641	3.8 (3.3; 4.3)
Household members, mean (95%CI)	Number	3,481	5.8 (5.7; 6.0)	7,316	5.6 (5.5; 5.7)	13,728	5.4 (5.4; 5.5)	15,224	5.3 (5.2; 5.4)
	Missing data %		0.0		0.0		0.0		0.0
Sex of household head, % (95%CI)	Women	592	19.0 (16.8; 21.5)	1,317	18.6 (17.4; 20.0)	3,198	23.0 (22.1; 23.9)	4,020	25.5 (24.6; 26.5)
	Men	2,889	81.0 (78.5; 83.3)	5,999	81.4 (80.0; 82.8)	10,530	77.0 (76.1; 77.9)	11,204	74.5 (73.6; 75.4)
Age of household head, % (95%CI)	< 20y	15	0.6 (0.3; 1.0)	27	0.3 (0.2; 0.5)	41	0.3 (0.2; 0.4)	62	0.4 (0.3; 0.5)
	20-35y	1,023	31.5 (29.1; 34.1)	2,172	28.5 (27.2; 29.9)	4,330	32.2 (31.1; 33.3)	4,270	28.8 (27.9; 29.8)
	35-50y	1,495	42.9 (40.4; 45.5)	3,065	42.8 (41.0; 44.6)	5,621	41.0 (39.9; 42.1)	6,419	42.6 (41.6; 43.5)
	>50y	947	25.0 (22.6; 27.6)	2,052	28.4 (26.6; 30.3)	3,736	26.6 (25.4; 27.8)	4,473	28.2 (27.4; 29.1)
	Missing data %		0.01		0.0		0.0		0.0
Wealth index, % (95%CI)	Quintile 1	888	16.5 (13.6; 19.9)		-	2,638	18.8 (17.1; 20.6)	2,552	16.9 (15.6; 18.2)
	Quintile 2	721	16.5 (13.6; 19.8)		-	2,779	19.0 (17.7; 20.3)	2,805	17.7 (16.6; 18.7)
	Quintile 3	731	19.0 (16.0; 22.4)		-	2,826	19.9 (18.5; 21.4)	2,134	19.9 (18.8; 21.0)
	Quintile 4	659	22.6 (19.1; 26.5)		-	2,848	21.0 (19.6; 22.5)	2,382	22.5 (21.3; 23.8)
	Quintile 5	482	25.5 (20.7; 31.0)		-	2,637	21.3 (19.0; 23.9)	3,351	23.1 (21.7; 24.6)
Ownership of dwelling, % (95%CI)	Own	2,781	75.4 (72.0; 78.4)	6,012	79.4 (76.9; 81.6)	10,664	77.6 (76.4; 78.8)		-
	Rented	414	17.0 (14.2; 20.2)	668	13.3 (10.9; 16.1)	1,411	11.0 (10.1; 12.0)		-
	Borrowed	279	7.5 (6.0; 9.5)	624	7.2 (6.1; 8.6)	1,643	11.2 (10.4; 12.2)		-
	Other	5	0.1 (0.1; 0.3)	10	0.1 (0.1; 0.4)	10	0.1 (0.0; 0.6)		-
	Missing data %		0.1		0.0		0.0		-
Availability of electricity	Yes	2,198	73.4 (68.2; 78.0)	5,705	83.9 (81.1; 86.4)	11,738	85.6 (83.7; 87.2)	13,528	88.8 (87.5; 89.9)
	No	1,279	26.6 (22.0; 31.7)	1,610	16.1 (13.6; 18.9)	1,990	14.4 (12.8; 16.3)	1,694	11.3 (10.1; 12.5)
	Missing data %		0.1		0.0		0.0		0.0
Rooms for sleeping, median [IQR]	Number	3,407	1.0 [1.0; 2.0]	7,291	2.0 (1.0; 2.0)	13,728	2.0 (1.0; 2.0)	15,212	2.0 [1.0; 3.0]
	Missing data %		2.1		0.3		0.0		0.1

Room for cooking, % (95%CI)	Yes	2,787	79.5 [76.8; 81.9]	5,056	72.0 (69.5; 74.4)	9,261	64.7 (62.7; 66.7)	7,944	79.1 (77.6; 80.5)
	No	690	20.5 [18.1; 23.2]	2,250	28.0 (25.6; 30.6)	4,465	35.3 (33.3; 37.3)	1,864	20.9 (19.5; 22.4)
	Missing data %		0.1		0.1		0.0		35.6
Proxy food security, % (95%CI) +	Insecure		-		-		-	471	3.1 (2.7; 3.5)
	Moderate-insecure		-		-		-	1,141	7.2 (6.7; 7.8)
	Low-insecure		-		-		-	1,744	11.3 (10.6; 12.0)
	Secure		-		-		-	11,863	78.4 (77.3; 79.5)

\* Unweighted number of observations. All descriptive statistics, (median [IQR]; mean (95%CI), and % (95%CI)) are weighted. + The proxy food insecurity was calculated based on the following 3 questions: 1) In the last 30 days, did the household lack money to buy food? 2) In the past 30 days, did any member of the household eat less than he/she wanted because of lack of money? 3) In the last 30 days, did any member of the household miss breakfast, lunch or dinner because of lack of money?. The proxy food security was build up as follows: Answer 'yes' to 3/3 questions = Insecure; Answer 'yes' to 2/3 questions = Moderate-insecure; Answer 'yes' to 1/3 questions = Low-insecure; Answer 'yes' to 0/3 questions = Secure. Empty cells indicate missing variable.

**Table S2. Characteristics of the included women (N= 39,749), by DHS survey year**

		n*	1998-1999 (n= 3,481)	n*	2002 (n= 7,316)	n*	2008-2009 (n= 13,728)	n*	2014-2015 (n=15,224 )
Age, median [IQR]	Years	3,481	32.0 [24.0; 39.0]	6,745	31.0 [24.0; 39.0]	12,930	31.0 [25.0; 38.0]	15,223	31.0 [25.0; 39.0]
	Missing data %		0.0		7.8		5.8		0.0
Age classification, % (95%CI)	18-24 y	898	25.4 (23.4; 27.6)	1,815	27.1 (25.6; 28.5)	3,234	24.7 (23.8; 25.6)	3,789	24.8 (23.9; 25.7)
	25-35 y	1,193	34.7 (32.2; 37.3)	2,398	34.1 (32.6; 35.5)	5,038	39.4 (38.4; 40.5)	5,526	36.7 (35.8; 37.6)
	>35 y	1,390	39.9 (37.3; 42.5)	2,532	38.9 (37.5; 40.3)	4,658	35.9 (34.9; 36.9)	5,909	38.5 (37.6; 39.5)
	Missing data %		0.0		7.8		5.8		0.0
Marital status, % (95%CI)	Married/living together	2,632	74.3 (71.4; 77.1)	5,067	72.7 (71.3; 74.0)	9,321	67.8 (66.8; 68.8)	10,398	68.8 (67.8; 69.7)
	Divorced	8	0.2 (0.1; 0.5)	33	0.7 (0.5; 1.1)	58	0.5 (0.3; 0.7)	67	0.4 (0.3; 0.6)
	Widowed	70	2.0 (1.4; 2.9)	175	2.6 (2.3; 3.1)	309	2.2 (1.9; 2.4)	367	2.3 (2.1; 2.6)
	Single/not living together	771	23.4 (20.8; 26.2)	1,470	24.0 (22.7; 25.3)	4,040	29.6 (28.5; 30.6)	4,392	28.5 (27.6; 29.4)
	Missing data %		0.0		7.8		0.0		0.0
Education level, % (95%CI)	University	80	3.4 (2.3; 5.0)	219	4.9 (3.7; 6.5)	755	6.1 (5.2; 7.2)	1,157	7.4 (6.7; 8.1)
	Secondary	521	19.5 (16.7; 22.5)	1,174	23.2 (20.3; 26.3)	3,006	22.4 (21.0; 23.9)	4,288	28.5 (27.3; 29.7)
	Primary	1,676	49.1 (46.1; 52.1)	3,072	45.0 (42.4; 47.5)	6,985	50.1 (48.5; 51.6)	7,250	47.0 (45.8; 48.3)
	No education	1,204	28.0 (24.8; 31.5)	2,280	27.0 (24.1; 30.0)	2,982	21.4 (20.1; 22.9)	2,529	17.1 (16.1; 18.2)
	Missing data %		0.0		7.8		0.0		0.0
Type of occupation, % (95%CI)	Professional	169	6.0 (4.5; 7.9)		-		-	1,177	7.4 (6.8; 8.1)
	Clerical	54	2.91 (1.3; 3.5)		-		-	388	2.7 (2.4; 3.0)
	Agriculture	176	4.1 (3.1; 5.4)		-		-	800	5.0 (4.4; 5.7)
	Sales Services	114	4.8 (3.4; 6.7)		-		-	3,287	22.2 (21.3; 23.2)
	Skilled manual	203	6.0 (4.7; 7.7)		-		-	931	6.0 (5.3; 6.8)
	Unskilled manual	552	17.5 (14.8; 20.5)		-		-	1,447	9.5 (8.9; 10.1)
	Not formally employed	2,207	59.1 (55.7; 62.3)		-		-	7,140	46.8 (45.5; 48.0)
	Other/Don't know	6	0.4 (0.1; 1.5)		-		-	51	0.3 (0.2; 0.5)
Ethnic group, % (95%CI)	Indigenous	1,235	29.2 (25.0; 33.9)	2,705	29.2 (25.7; 33.0)	4,643	36.3 (34.2; 38.6)	5,549	38.0 (35.6; 40.4)
	Non-indigenous	2,246	70.8 (66.1; 75.1)	4,037	70.8 (67.1; 74.4)	8,286	63.7 (61.5; 65.8)	9,675	62.0 (59.6; 64.4)
	Missing data %		0.0		7.9		5.8		0.0
Language, % (95%CI)	Spanish	2,440	76.1 (71.6; 80.0)	4,285	74.7 (71.1; 78.0)	9,682	70.2 (68.1; 72.2)	11,147	71.1 (69.0; 73.1)
	Other	1,041	24.0 (20.0; 28.4)	2,460	25.3 (22.0; 28.9)	4,046	29.8 (27.8; 31.9)	4,077	28.9 (26.9; 31.0)
	Missing data %		0.0		7.8		0.0		0.0
Women's autonomy on expenses, % (95%CI)	Alone	831	72.0 (67.3; 76.2)	1,595	68.9 (66.0; 71.7)	4,069	62.7 (61.0; 64.3)	2,300	51.8 (50.1; 53.6)

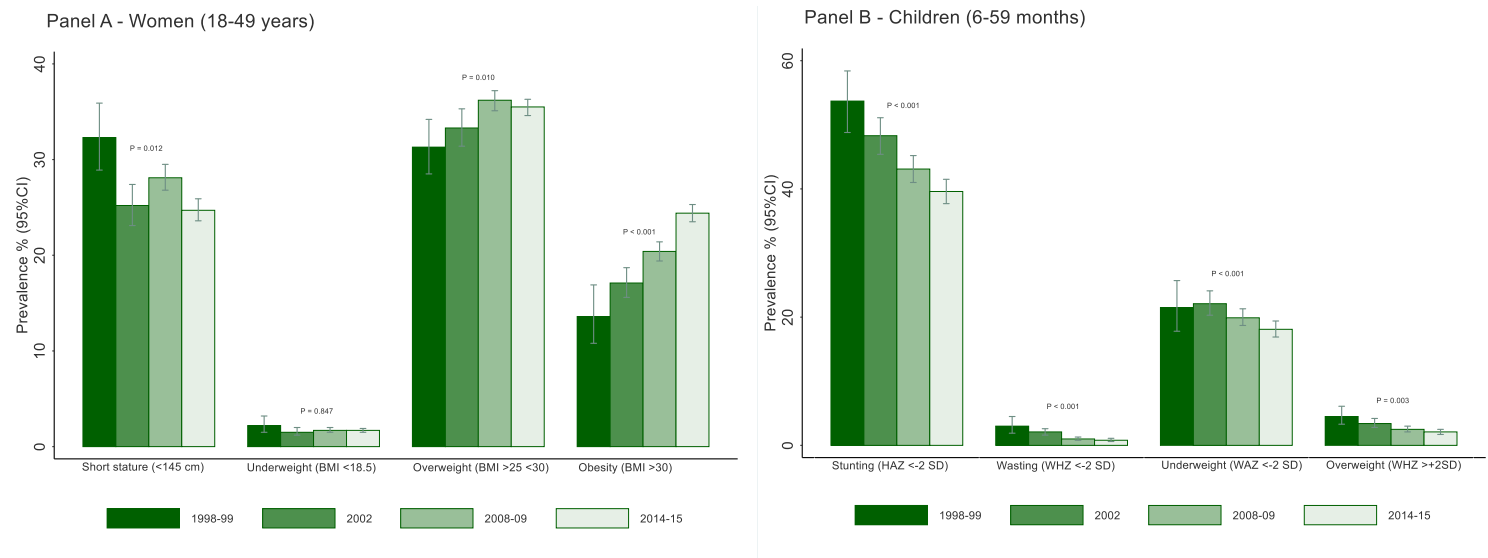
	<i>Someone else</i>	352	28.0 (23.8; 32.7)	834	31.1 (28.3; 34.0)	2,472	37.3 (35.7; 39.0)	2,183	48.2 (46.4; 49.9)
	<i>Missing data %</i>		66.0		67.0		52.4		70.6
<b>Parity, mean (95%CI)</b>	<b>Number</b>	3,481	3.4 (3.2; 3.6)	6,745	3.2 (3.0; 3.3)	12,930	2.9 (2.9; 3.0)	15,224	2.7 (2.6; 2.7)
	<i>Missing data %</i>		0.0		7.8		6.7		0.0
<b>Children in the household &lt; 5 y, mean (95%CI)</b>	<b>Number</b>	3,481	0.7 (0.7; 0.8)	5,633	1.0 (0.9; 1.0)	10,543	0.8 (0.8; 0.8)	15,224	0.5 (0.5; 0.5)
	<i>Missing data %</i>		0.0		23.0		23.2		0.0
<b>Alcohol intake in last 30 days, % (95%CI)</b>	<b>Yes</b>		-	292	19.1 (16.3; 22.3)	774	21.6 (19.8; 23.4)	1,207	8.3 (7.7; 8.9)
	<b>No</b>		-	1,304	80.9 (77.7; 83.7)	2,860	78.5 (76.6; 80.2)	14,006	91.7 (91.1; 92.3)
	<i>Missing data %</i>		-		78.2		73.8		0.1
<b>Smoked in last 30 days, % (95%CI)</b>	<b>Yes</b>		-	147	27.3 (22.8; 32.4)	169	18.9 +	218	1.6 (1.4; 1.9)
	<b>No</b>		-	417	72.7 (67.6; 77.2)	848	81.1 +	14,995	98.4 (98.1; 98.6)
	<i>Missing data %</i>		-		92.3		92.6		0.1
<b>Weight, mean (95%CI)</b>	<b>Kilogrammes</b>	1,683	55.7 (54.6; 56.8)	5,922	57.7 (57.1; 58.3)	12,549	58.6 (58.2; 58.9)	14,884	59.5 (59.2; 59.9)
	<i>Missing data %</i>		51.7		19.1		8.6		2.2
<b>Height, mean (95%CI)</b>	<b>Centimetres</b>	1,681	147.8 (146.8; 148.8)	5,936	149.3 (148.9; 149.6)	12,536	148.8 (148.5; 149.0)	15,015	149 (149.1; 149.4)
	<i>Missing data %</i>		51.7		18.9		8.7		1.4
<b>Height classification, % (95%CI)</b>	<b>&lt; 145 cm</b>	584	32.3 (28.9; 35.9)	1,809	25.2 (23.1; 27.4)	3,510	28.1 (26.8; 29.5)	3,676	25.1 (23.9; 26.2)
	<b>≥ 145 cm</b>	1,097	67.7 (64.1; 71.1)	4,127	74.8 (72.6; 76.9)	9,026	71.9 (70.5; 73.2)	11,339	74.9 (73.8; 76.2)
	<i>Missing data %</i>		51.7		18.9		8.7		1.4
<b>BMI, mean (95%CI)</b>	<b>Kg/m<sup>2</sup></b>	1,676	25.2 (24.8; 25.6)	5,922	25.8 (25.6; 26.0)	12,535	26.4 (26.3; 26.5)	15,013	26.8 (26.7; 26.9)
	<i>Missing data %</i>		51.9		19.1		8.7		1.4
<b>BMI classification, % (95%CI)</b>	<b>Underweight</b>	50	2.2 (1.5; 3.2)	84	1.5 (1.2; 2.0)	219	1.7 (1.5; 2.0)	264	1.7 (1.5; 1.9)
	<b>Normal</b>	934	53.0 (49.3; 56.6)	2,945	48.1 (46.0; 50.3)	5,284	41.7 (40.5; 43.0)	5,832	38.5 (37.4; 39.6)
	<b>Overweight</b>	505	31.3 (28.5; 34.2)	2,000	33.3 (31.4; 35.3)	4,458	36.2 (35.1; 37.2)	5,277	35.5 (34.6; 36.3)
	<b>Obesity</b>	187	13.6 (10.8; 16.9)	893	17.1 (15.6; 18.7)	2,574	20.4 (19.4; 21.4)	3,640	24.4 (23.5; 25.3)
	<i>Missing data %</i>		51.9		19.1		8.7		1.4

Abbreviations: Body mass index (BMI); Interquartile range (IQR); 95% confidence interval (95% CI). \* Unweighted number of observations. All descriptive statistics, (median [IQR]; mean (95% CI), and % (95% CI)) are weighted based on survey design. + 95% CI could not be calculated because of stratum with single sampling. Empty cells indicate missing variable.

**Table S3. Characteristics of included children between 6-59 months (N= 23,612), by DHS survey year**

		n*	1998-1999 (n= 2,840)	n*	2002 (n= 5,408)	n*	2008-2009 (n= 7,583)	n*	2014-2015 (n= 7,781)
Age, median [IQR]	Months	2,723	32.0 (17.0; 47.0)	5,408	32.0 (17.0; 46.0)	7,583	32.2 [17.9; 45.6]	7,506	33.0 (19.0; 46.0)
	Missing data %		4.1		0.0		0.0		3.5
Sex, % (95%CI)	Boys	1,452	51.4 (48.8; 54.2)	2,717	50.9 (49.1; 52.7)	3,769	50.1 (48.7; 51.6)	4,031	52.2 (50.9; 53.5)
	Girls	1,388	48.5 (45.8; 51.3)	2,691	49.1 (47.3; 50.9)	3,814	49.9 (48.5; 51.3)	3,750	47.8 (46.5; 49.1)
Ever breastfed, % (95%CI)	Never breastfed	145	4.8 (3.5; 6.5)	174	3.5 (2.8; 4.4)	163	2.9 (2.5; 3.5)	258	3.4 (2.9; 3.9)
	Ever breastfed	1,689	61.1 (58.8; 63.3)	3,325	62.8 (61.0; 64.5)	3,452	60.5 (58.8; 62.1)	4,853	63.4 (62.1; 64.6)
	Still breastfeeding	990	34.1 (32.2; 36.2)	1,902	33.7 (32.0; 35.5)	2,114	36.6 (35.0; 38.3)	2,665	33.3 (32.0; 34.5)
	Missing data %		0.6		0.1		24.5		0.1
Weight, mean (95%CI)	Kilogrammes	2,386	11.7 (11.5; 12.0)	4,585	11.9 (11.7; 12.0)	7,286	11.9 (11.8; 12.0)	7,402	12.1 (12.0; 12.2)
	Missing data %		16.0		15.2		3.9		4.9
Length/Height, mean (95%CI)	Centimetres	2,366	83.2 (82.5; 83.9)	4,598	83.7 (83.2; 84.2)	7,260	84.3 (84.0; 84.7)	7,401	85.2 (84.9; 85.5)
	Missing data %		16.7		15.0		4.3		4.9
Height-for-age, mean (95%CI)	Z score	2,295	-2.2 (-2.3; -2.0)	4,568	-1.9 (-2.0; -1.8)	7,247	-1.8 (-1.8; -1.7)	7,386	-1.7 (-1.7; -1.6)
	Missing data %		19.2		15.5		4.4		5.1
HAZ, % (95%CI)	Normal	946	46.4 (41.6; 51.2)	2,108	51.7 (48.9; 54.5)	4,074	56.9 (54.9; 59.0)	4,467	60.4 (58.5; 62.3)
	Stunting	1,349	53.7 (48.8; 58.4)	2,460	48.3 (45.5; 51.1)	3,183	43.1 (41.0; 45.2)	2,919	39.6 (37.7; 41.5)
	Missing data %		19.2		15.5		4.4		5.1
Weight-for-height, mean (95%CI)	Z score	2,295	0.3 (2.0; 0.4)	4,569	0.0 (-0.0; 0.1)	7,250	-0.0 (-0.0; 0.0)	7,386	-0.0 (-0.1; -0.0)
	Missing data %		19.2		15.5		4.4		5.1
WHZ, % (95%CI)	Wasting	60	3.0 (1.9; 4.5)	86	2.1 (1.6; 2.6)	77	1.0 (0.8; 1.3)	60	0.8 (0.6; 1.1)
	Normal	2,136	92.5 (90.1; 94.4)	4,331	94.5 (93.6; 95.3)	6,986	96.5 (96.0; 97.0)	7,164	97.1 (96.6; 97.5)
	Overweight/obese	99	4.5 (3.3; 6.1)	152	3.4 (2.8; 4.2)	187	2.5 (2.1; 3.0)	162	2.1 (1.7; 2.5)
	Missing data %		19.2		15.5		4.4		5.1
Weight-for-age, mean (95%CI)	Z score	2,295	-1.0 (-1.2; -0.9)	4,578	-1.2 (-1.2; -1.1)	7,280	-1.1 (-1.2; -1.1)	7,386	-1.1 (-1.1; -1.1)
	Missing data %		19.2		15.4		4.0		5.1
WAZ % (95%CI)	Underweight	492	21.5 (17.8; 25.7)	1,162	22.1 (20.3; 24.1)	1,474	19.9 (18.7; 21.3)	1,362	18.1 (16.9; 19.4)
	Normal	1,803	78.5 (74.3; 82.2)	3,416	77.9 (75.9; 79.6)	5,806	80.1 (78.7; 81.4)	6,024	81.9 (80.6; 83.2)
	Missing data %		19.2		15.4		4.0		5.1

Abbreviations: Height-for-age z-scores (HAZ); Interquartile range (IQR); Weight-for-height z-scores (WHZ); Weight-for-age z-scores (WAZ); 95% confidence interval (95%CI). \* Unweighted number of observations. All descriptive statistics, (median [IQR]; mean (95%CI), and % (95%CI)) are weighted based on survey design.



**Figure S1. Evolution of anthropometric profiles of women and children from 1998 – 2015**

Panel A illustrates the anthropometric profile evolution of women including short stature, underweight, overweight and obesity. Panel B depicts the anthropometric profile evolution of children (6-59 months) including stunting, wasting, underweight and overweight. P-values correspond to the % of annual rate change in the prevalence derived from logistic regression models in which where the survey year was translated into time and included in the model as a continuous variable.

**Table S4. Anthropometric values of excluded women of reproductive age and children (N= 19,529), by DHS survey year**

		n*	1998-1999 <sup>+</sup>	n*	2002	n*	2008-2009	n*	2014-2015
<b>Women</b>		2,540		2,410		3,889		10,690	
Weight, <i>mean (95%CI)</i>	Kilogrammes	1,068	54.5	2,171	53.9 (53.2; 54.6)	3,797	54.3 (53.9; 54.7)	9,137	54.7 (54.3; 55.0)
	<i>Missing data %</i>		58.0		9.9		2.4		14.5
Length/Height, <i>mean (95%CI)</i>	Centimetres	1,068	147.7	2,176	148.4 (147.9; 148.9)	3,797	148.3 (148.0; 148.6)	9,180	149.2 (149.0; 149.4)
	<i>Missing data %</i>		58.0		9.7		2.4		14.1
<b>Children</b>		2,103		2,506		2,887		4,659	
Weight, <i>mean (95%CI)</i>	Kilogrammes	1,683	10.3	1,842	11.1 (10.9; 11.4)	2,814	9.6 (9.5; 9.8)	4,388	10.0 (9.9; 10.1)
	<i>Missing data %</i>		20.0		26.5		2.5		5.8
Length/Height, <i>mean (95%CI)</i>	Centimetres	1,669	76.6	1,841	80.4 (79.4; 81.4)	2,805	74.7 (74.1; 75.2)	4,388	76.2 (75.7; 76.7)
	<i>Missing data %</i>		20.6		26.5		2.8		5.8
Height-for-age, <i>mean (95%CI)</i>	Z score	1,602	-2.1	1,828	-2.1 (-2.2; -2.0)	2,798	-1.7 (-1.7; -1.6)	4,288	-1.7 (-1.7; -1.6)
	<i>Missing data %</i>		23.8		27.1		3.1		8.0
Weight-for-height, <i>mean (95%CI)</i>	Z score	1,602	0.5	1,834	0.1 (0.0; 0.2)	2,730	0.3 (0.3; 0.4)	4,288	0.3 (0.2; 0.3)
	<i>Missing data %</i>		23.8		26.8		5.4		8.0
Weight-for-age, <i>mean (95%CI)</i>	Z score	1,602	-0.9	1,837	-1.2 (-1.3; -1.1)	2,813	-0.8 (-0.9; -0.7)	4,288	-0.8 (-0.9; -0.8)
	<i>Missing data %</i>		23.8		26.7		2.6		8.0

Abbreviations: 95% confidence interval (95%CI). \* Unweighted number of observations. All descriptive statistics, (mean (95%CI)), are weighted based on survey design. + 95%CI could not be calculated because of stratum with single sampling.

**Table S5. Regional prevalence and trend of any DBM and typologies (Prevalence and 95%CI)**

Outcome	Region	1998-1999	2002	2008-2009	2014-2015
Any DBM					
	Metropolitan, n/N*	33/138	79/434	117/658	115/618
	Prevalence % (95%CI)	25.2 (18.6; 33.2)	17.3 (12.5; 23.4)	11.8 (9.2; 15.0)	13.8 (11.0; 17.3)
	North, n/N*	47/179	189/599	13/765	172/741
	Prevalence % (95%CI)	8.4 (5.6; 12.4)	11.9 (9.6; 14.6)	13.0 (10.4; 16.1)	10.7 (8.8; 13.0)
	Northeast, n/N*	56/270	64/362	207/1118	229/1221
	Prevalence % (95%CI)	8.0 (5.3; 11.9)	8.4 (6.0; 11.6)	6.7 (5.3; 8.5)	7.3 (5.8; 9.2)
	Southeast, n/N*	43/165	62/312	180/896	194/937
	Prevalence % (95%CI)	7.6 (4.8; 11.7)	8.3 (5.9; 11.6)	6.7 (5.5; 8.3)	7.5 (6.2; 8.9)
	Central, n/N*	99/293	157/497	263/862	264/899
	Prevalence % (95%CI)	13.6 (10.2; 17.9)	13.6 (10.6; 17.2)	13.0 (10.7; 15.6)	12.9 (10.9; 15.2)
	Southwest, n/N*	120/467	304/1146	544/1796	500/1853
	Prevalence % (95%CI)	20.9 (16.2; 26.6)	24.5 (20.9; 28.5)	26.4 (23.3; 29.6)	24.9 (22.3; 27.8)
	Northwest, n/N*	91/308	212/797	266/827	237/781
	Prevalence % (95%CI)	13.5 (10.4; 17.4)	12.2 (10.0; 14.9)	19.3 (16.0; 23.0)	18.7 (16.0; 21.6)
	Petén, n/N*	102/449	81/378	71/299	77/321
	Prevalence % (95%CI)	2.8 (2.0; 4.0)	3.9 (2.3; 6.3)	3.1 (2.4; 4.1)	4.2 (3.0; 5.2)
<b>I. Women with overweight + short stature</b>					
	Metropolitan, n/N*	13/114	73/881	155/1421	174/1751
	Prevalence % (95%CI)	27.1 (18.1; 38.6)	23.9 (19.0; 29.6)	15.5 (12.9; 18.5)	16.7 (13.8; 20.1)
	North, n/N*	12/127	121/671	185/1100	176/1268
	Prevalence % (95%CI)	6.1 (3.8; 9.4)	10.6 (8.5; 13.1)	11.1 (9.3; 13.1)	10.1 (7.8; 13.0)
	Northeast, n/N*	21/194	44/394	187/2076	213/2459
	Prevalence % (95%CI)	10.1 (5.6; 17.6)	8.0 (5.4; 11.8)	5.9 (4.8; 7.1)	5.9 (4.7; 7.3)
	Southeast, n/N*	12/121	20/296	141/1613	159/1860
	Prevalence % (95%CI)	6.0 (3.2; 10.9)	2.7 (1.7; 4.4)	5.4 (4.5; 6.6)	5.2 (4.3; 6.2)
	Central, n/N*	35/223	93/674	260/1594	325/1886
	Prevalence % (95%CI)	11.7 (8.3; 16.4)	10.9 (8.4; 14.1)	11.8 (10.1; 13.8)	12.9 (11.2; 14.8)
	Southwest, n/N*	45/339	254/1563	631/3082	653/3829
	Prevalence % (95%CI)	19.9 (14.3; 27.1)	27.8 (24.0; 32.0)	29.8 (27.2; 32.5)	27.8 (25.1; 30.7)
	Northwest, n/N*	40/226	174/1003	252/1156	262/1324
	Prevalence % (95%CI)	16.2 (12.0; 21.6)	13.3 (11.0; 15.9)	17.8 (15.6; 20.3)	17.5 (15.3; 22.0)
	Petén, n/N*	36/332	46/440	65/493	92/636

	Prevalence % (95%CI)	2.7 (1.9; 4.1)	2.8 (1.6; 4.8)	2.7 (2.0; 3.7)	3.9 (2.9; 4.)
<b>II. Child with overweight + stunting</b>					
	Metropolitan, n/N*	1/142	5/439	1/659	0/620
	Prevalence % (95%CI)	13.2 (2.0; 53.1)	20.7 (9.7; 39.0)	5.3 (0.8; 28.9)	-
	North, n/N*	3/181	12/603	12/768	2/741
	Prevalence % (95%CI)	9.4 (3.0; 25.5)	16.2 (8.5; 28.6)	31.7 (19.1; 47.8)	16.6 (4.4; 46.1)
	Northeast, n/N*	2/270	1/363	2/1123	4/1224
	Prevalence % (95%CI)	3.0 (0.7; 12.2)	2.3 (0.3; 14.9)	2.6 (0.6; 10.4)	11.2 (3.8; 28.4)
	Southeast, n/N*	6/168	3/314	3/901	5/938
	Prevalence % (95%CI)	9.8 (5.1; 18.1)	4.1 (1.0; 15.1)	4.1 (1.3; 12.4)	16.2 (6.4; 35.2)
	Central, n/N*	5/295	2/500	3/867	3/899
	Prevalence % (95%CI)	9.1 (3.8; 20.1)	3.6 (0.9; 13.8)	5.7 (1.7; 17.2)	8.4 (2.5; 24.4)
	Southwest, n/N*	11/471	14/1159	15/1801	6/1860
	Prevalence % (95%CI)	35.6 (18.7; 57.1)	23.9 (14.1; 37.4)	26.9 (15.4; 42.6)	12.3 (4.8; 27.8)
	Northwest, n/N*	7/311	22/814	6/830	4/783
	Prevalence % (95%CI)	17.9 (8.6; 33.4)	27.1 (16.8; 40.7)	19.4 (9.4; 35.8)	35.4 (14.9; 67.2)
	Petén, n/N*	8/457	2/377	2/301	0/321
	Prevalence % (95%CI)	2.0 (0.8; 5.3)	2.0 (0.3; 11.1)	4.3 (1.1; 15.6)	-
<b>III. Child with stunting + mother with overweight</b>					
	Metropolitan, n/N*	20/138	58/437	66/658	69/618
	Prevalence % (95%CI)	20.1 (13.4; 29.0)	16.9 (12.0; 23.3)	9.5 (7.0; 12.7)	11.6 (8.6; 15.5)
	North, n/N*	37/179	143/602	151/766	119/741
	Prevalence % (95%CI)	8.6 (5.8 (5.8; 12.6)	12.1 (9.6; 15.2)	13.7 (10.6; 17.6)	10.4 (8.1; 13.3)
	Northeast, n/N*	44/270	45/362	145/1118	152/1221
	Prevalence % (95%CI)	8.1 (4.8; 13.5)	7.9 (5.5; 11.1)	6.4 (5.0; 8.1)	6.8 (5.3; 8.6)
	Southeast, n/N*	36/165	46/312	142/896	150/937
	Prevalence % (95%CI)	8.2 (4.8; 13.6)	7.8 (5.5; 10.9)	7.4 (5.8; 9.3)	7.9 (6.5; 9.6)
	Central, n/N*	75/293	122/497	198/862	178/899
	Prevalence % (95%CI)	14.2 (9.9; 19.9)	13.5 (10.5; 17.2)	13.4 (10.9; 16.5)	12.2 (10.1; 14.8)
	Southwest, n/N*	100/467	235/1149	383/1798	372/1853
	Prevalence % (95%CI)	22.9 (17.3; 29.8)	25.1 (21.0; 29.7)	25.1 (21.9; 28.6)	25.7 (22.6; 29.1)
	Northwest, n/N*	75/308	164/798	213/828	193/781
	Prevalence % (95%CI)	14.7 (11.1; 19.2)	12.7 (10.2; 15.7)	21.6 (18.0; 25.7)	21.2 (18.0; 24.9)
	Petén, n/N*	85/449	65/379	46/302	54/321
	Prevalence % (95%CI)	3.2 (2.2; 4.5)	4.2 (2.6; 6.4)	2.9 (2.0; 4.3)	4.2 (2.9; 5.9)

IV. Child with wasting + mother with overweight					
	Metropolitan, n/N*	2/138	3/435	1/659	6/618
	Prevalence % (95%CI)	37.5 (12.1; 72.4)	15.7 (5.1; 39.2)	4.5 (0.6; 26.0)	43.0 (22.8; 65.9)
	North, n/N*	1/179	3/601	3/765	1/741
	Prevalence % (95%CI)	4.6 (0.6; 27.9)	4.8 (1.5; 14.5)	17.3 (5.9; 41.3)	0.9 (0.1; 6.7)
	Northeast, n/N*	6/270	7/363	7/1121	9/1221
	Prevalence % (95%CI)	18.3 (6.0; 43.6)	21.8 (10.4; 40.0)	16.7 (6.9; 34.8)	15.6 (6.4; 33.3)
	Southeast, n/N*	1/165	2/313	5/896	2/937
	Prevalence % (95%CI)	11.1 (1.5; 49.8)	7.1 (1.4; 28.4)	16.9 (7.1; 35.4)	4.6 (1.1; 17.2)
	Central, n/N*	2/293	3/500	2/866	5/899
	Prevalence % (95%CI)	9.6 (2.1; 34.5)	17.5 (4.7; 47.8)	13.9 (3.5; 42.0)	16.7 (6.7; 36.0)
	Southwest, n/N*	4/467	12/1150	8/1797	6/1853
	Prevalence % (95%CI)	13.6 (4.7; 33.4)	23.8 (12.6; 40.4)	30.8 (15.2; 52.5)	19.1 (8.2; 38.3)
	Northwest, n/N*	1/308	5/810	0/828	0/781
	Prevalence % (95%CI)	3.7 (0.5; 23.4)	5.5 (2.2; 13.0)	-	-
	Petén, n/N*	2/449	2/377	0/299	0/321
	Prevalence % (95%CI)	1.6 (0.4; 7.1)	3.9 (0.5; 23.3)	-	-
V. Child with underweight + mother with overweight					
	Metropolitan, n/N*	8/138	23/437	31/662	38/618
	Prevalence % (95%CI)	27.4 (12.9; 48.8)	16.0 (9.5; 25.7)	11.5 (7.2; 17.9)	14.2 (10.5; 19.0)
	North, n/N*	10/179	58/601	51/766	39/741
	Prevalence % (95%CI)	8.1 (3.9; 16.0)	11.4 (7.6; 16.7)	11.0 (7.9; 15.0)	7.7 (4.9; 12.0)
	Northeast, n/N*	12/270	22/363	55/1122	89/1221
	Prevalence % (95%CI)	8.0 (3.7; 16.7)	8.1 (4.6; 13.9)	6.4 (4.7; 8.6)	9.7 (7.5; 12.6)
	Southeast, n/N*	9/165	19/313	48/900	54/937
	Prevalence % (95%CI)	7.0 (2.9; 15.7)	7.4 (4.3; 12.6)	6.7 (5.0; 9.0)	6.9 (5.1; 9.2)
	Central, n/N*	17/293	54/501	81/872	63/899
	Prevalence % (95%CI)	10.4 (5.9; 17.6)	15.1 (10.7; 20.9)	14.4 (10.5; 19.3)	11.5 (8.6; 15.3)
	Southwest, n/N*	28/467	101/1152	154/1809	155/1853
	Prevalence % (95%CI)	21.7 (13.2; 33.6)	26.1 (20.3; 32.9)	26.6 (21.8; 32.1)	25.4 (21.3; 30.0)
	Northwest, n/N*	23/308	68/811	79/830	74/781
	Prevalence % (95%CI)	15.3 (9.4; 23.9)	12.4 (9.1; 16.8)	20.7 (16.5; 25.6)	20.3 (15.1; 26.7)
	Petén, n/N*	17/449	25/380	17/300	23/321
	Prevalence % (95%CI)	2.1 (1.1; 4.0)	3.4 (2.0; 5.6)	2.7 (1.4; 5.0)	4.2 (2.7; 6.6)
VI. Child with overweight + mother with short stature					

	Metropolitan, n/N*	0/140	0/435	1/659	2/618
	Prevalence % (95%CI)	-	-	2.6 (0.4; 16.3)	17.8 (4.8; 48.4)
	North, n/N*	2/179	12/603	4/765	3/741
	Prevalence % (95%CI)	13.6 (3.7; 39.6)	28.4 (16.2; 44.9)	16.5 (6.9; 34.5)	14.0 (4.1; 38.1)
	Northeast, n/N*	0/270	1/363	7/1121	6/1221
	Prevalence % (95%CI)	-	4.0 (0.6; 23.5)	9.5 (4.3; 19.9)	17.3 (7.3; 35.7)
	Southeast, n/N*	4/167	2/313	3/896	3/937
	Prevalence % (95%CI)	13.7 (4.6; 34.4)	5.3 (1.4; 18.5)	5.3 (1.7; 15.6)	7.3 (2.2; 21.4)
	Central, n/N*	3/293	3/500	3/866	5/899
	Prevalence % (95%CI)	11.1 (3.7; 28.6)	7.5 (2.4; 21.1)	6.9 (2.0; 21.6)	17.9 (6.8; 39.2)
	Southwest, n/N*	6/469	11/1151	14/1797	2/1853
	Prevalence % (95%CI)	38.2 (19.0; 62.0)	31.5 (18.1; 48.9)	33.2 (18.3; 52.4)	4.8 (1.1; 18.9)
	Northwest, n/N*	4/311	9/810	5/828	3/781
	Prevalence % (95%CI)	20.9 (8.3; 43.4)	19.5 (10.3; 33.6)	19.0 (18.4; 37.8)	20.8 (7.2; 47.2)
	Petén, n/N*	3/449	2/377	3/299	0/321
	Prevalence % (95%CI)	2.6 (0.7; 9.5)	3.8 (0.7; 17.5)	1.0 (2.3; 19.4)	-
VII. Child with overweight + mother with underweight					
	Metropolitan, n/N*	0/138	0/435	1/659	0/618
	Prevalence % (95%CI)	-	-	56.4 (10.4; 93.5)	-
	North, n/N*	0/179	0/601	0/765	0/741
	Prevalence % (95%CI)	-	-	-	-
	Northeast, n/N*	0/270	0/363	0/1121	0/1221
	Prevalence % (95%CI)	-	-	-	-
	Southeast, n/N*	0/165	0/313	2/896	1/937
	Prevalence % (95%CI)	-	-	43.6 (6.5; 89.6)	-
	Central, n/N*	0/293	0/500	0/866	0/899
	Prevalence % (95%CI)	-	-	-	-
	Southwest, n/N*	1/467	0/1150	0/1797	0/1853
	Prevalence % (95%CI)	-	-	-	-
	Northwest, n/N*	0/308	0/810	0/828	0/781
	Prevalence % (95%CI)	-	-	-	-
	Petén, n/N*	0/449	0/378	0/299	0/321
	Prevalence % (95%CI)	-	-	-	-

Abbreviations: 95% confidence interval (95%CI). \* Unweighted number of observations. Prevalence % and ORs with their corresponding 95%CI are weighted based on survey design