TECHNICAL APPENDIX

Projected impact of change in the percentage of energy from each NOVA group intake on cardiovascular disease mortality in Brazil: A modelling study

Patrícia Vasconcelos Leitão Moreira[1*], Adélia da Costa Pereira de Arruda Neta[1], Flávia Emília Leite Lima Ferreira[1], Jevuks Matheus de Araújo[2], Maria Laura da Costa Louzada[3], Rafaela Lira Formiga Cavalcanti de Lima[1], Rodrigo Pinheiro de Toledo Vianna[1], José Moreira da Silva Neto[4], Zoe Colombet[5], Martin O'Flaherty[5]

[1] Department of Nutrition, Federal University of Paraiba, João Pessoa, Paraíba, Brazil.

[2] Department of Economy, Federal University of Paraiba, João Pessoa, Paraíba, Brazil.

[3] Centre for Epidemiological Studies in Health and Nutrition, Public Health Faculty, University of São Paulo, São Paulo, Brazil

[4] Technical School of Health of the Federal University of Paraíba

[5] Department of Public Health and Policy, University of Liverpool, Liverpool, United Kingdom

List of abbreviations

BR	Brazil
CHD	Cardiovascular heart disease
CMC	Cumulative mortality change
CVD	Cardiovascular disease
G1	Group 1 (Unprocessed or minimally processed food)
G2	Group 2 (Processed culinary ingredients)
G3	Group 3 (Processed food)
G4	Group 4 (Ultra-processed food)
g	Grams
HBS	Household Budget Survey
IBGE	*Instituto Brasileiro de Geografia e Estatística* (Brazilian Institute of Geography and Statistics)
Kcal	Kilo Calorie
kJ	Kilo Joules
nCMC	Non-cumulative mortality change
Na	Sodium
POF	*Pesquisa de Orçamento Familiar* (Household Budget Survey)
PUFA	Polyunsaturated fatty acids
SATFAT	Saturated Fat
UK	United Kingdom
UPF	Ultra-processed food
WHO	World Health Organization

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Section 1. Methods

In this section it will be described the steps to building the modelling. Initially, it is necessary to estimate average nutrient profile and then assess the mortality reduction associated to changes in the average nutrient profile. The data related to the personal food consumption were collected for all residents aged 10 or over from 20,112 selected households, which corresponded to a subsample of 34.7% of the 57,920 households that were investigated in the Brazilian Household Budget Survey (HBS, 2017-2018). In this way, information was obtained on the individual food consumption of 34,003 residents (BRAZIL, 2020).

Then, it will be simulated reductions in the consumption of salt, saturated fat, trans fat and added sugar and its impacts in reduction CVD deaths.

1a Quantifying the average nutrient profile by NOVA classification in the Brazilian diet

1a.1 UPP typology description

A new food classification based on the nature, extent and purpose of food processing has been devised by Monteiro et al. (2016) at the School of Public Health at the University of São Paulo in Brazil. The NOVA classification categorizes foodstuffs into four groups (1,2) and it divides foods according to the extent and the purpose of industrial processing to which they were subjected (3)(2). It is the basis of the Guide food for the Brazilian population (4). Ultra-processed foods are defined as formulations of ingredients, mostly for exclusive industrial use, which go through a series of industrial processes, generally resulting in products that are nutritionally poor and rich in calories, sugar, fat, salt and chemical additives, with flavour enhanced and longer shelf life.

1a.2 Data sources and processing

The Brazilian Institute of Geography and Statistics (IBGE) in 2002/2003, 2008/2009, 2017/2018 conducted a national household budget survey and the total numbers of households was 48,470 in 2002-2003, 55,970 in 2008-2009 and 57,920 in 2017-2018 (5)(6) (7). In this study, we analyzed the food consumption data which was obtained through two recall surveys of 24 hours, on non-consecutive days, chosen throughout the week. . All items were classified into the typology from Group 1 ('Unprocessed or minimally processed foods'), Group 2 ('Processed culinary ingredients'), Group 3 ('Processed foods') or Group 4 ('Ultra-processed foods and drink products), according to NOVA classification (3)(2).

1b Estimating the impact of reducing consumption of these foods upon mortality from coronary heart disease and stroke

The next step to take is to quantify the effect of dietary change on average daily nutritional intake in each of the scenarios run in the model. We can then estimate the subsequent effects on CVD. This is achieved using information from existing studies which quantify such effects.

1b.1 Simulating the impact of reducing saturated fat, trans-fat, salt and added sugar in the food groups

Figure 1 illustrates relationships between inputs and outputs within the model.

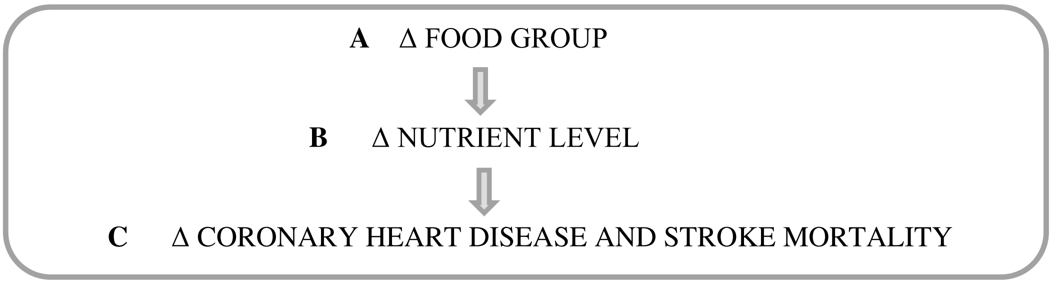

Fig 1. Links in the model

Five scenarios were constructed using consumption values in relation to the food groups already registered in previous research (7)(8). Our baseline scenario was constructed based on food consumption data for the Brazilian population, according to the HBS 2017-2018. However, the proposed scenarios were built based on the percentages of previous HSBs, both in food consumption and in household food purchases, as there is no data available for the food consumption of all previous HBS, based on the NOVA classification. The intention was to propose plausible scenarios of a reality for the Brazilian population in a not-so-distant past. See the Box 1 below.

In the **Optimistic Scenario**: we assume to increase the average energy consumption of G1 ('unprocessed or minimally processed foods') to the level of HBS 2008-2009, that is, to increase to 69.5% (9). In addition, we also assume to reduce, at the level of purchases in HBS 2002-2003, the average energy consumption of G3 ('processed foods') and G4 ('ultra-processed foods'), that is, reducing to 8% and 12.6%, respectively. And reduce to 10% in G2 ('processed culinary ingredients').

In the **Minimal Scenario:** we assume to reduce the average percentage of energy consumption in G4 ('ultra-processed foods') found in HBS in 2017-2018 (19.7%) to the average percentage of purchases in HBS in 2008-2009 (16%). We added this difference in energy percentage between HBS (3.7%) to G1 ('unprocessed or minimally processed foods'). In this scenario, the average percentage of energy consumption of G2 ("processed culinary ingredients") and G3 ('processed food'), according to HBS 2017-2018, were maintained.

Box 1: Relative participation of food groups and subgroups in total calories determined by household food purchase - Brazil - 2002/2018.

NOVA CLASSIFICATION	**HBS 2002-2003** (5)	**HBS 2008-2009** (8)	**HBS 2017-2018** (10)
G1 ('unprocessed or minimally processed foods')	53.3%	50.4%	49.5%
G2 ('processed culinary ingredients')	25.8%	24.2%	22.3%
G3 ('processed foods')	8.3%	9.4%	9.8%
G4 ('ultra-processed foods')	12.6%	16.0%	18.4%

In the **Modest Scenario**: we assume to reduce by 25% the average percentage of energy consumption, found in HBS 2017-2018, of G2 ("processed culinary ingredients") and G3 ('processed food'). In this scenario, the average percentage of energy consumption of G1 ('unprocessed or minimally processed foods') and G4 ('ultra-processed foods'), according to HBS 2017-2018, were maintained.

In the **Intermediary Scenario:** we assume to reduce the average percentage of energy consumption in G4 ('ultra-processed foods') found in HBS in 2017-2018 (19.7%) to the average percentage of purchases in HBS in 2008-2009 (16%). We added this difference in energy percentage between HBS (3.7%) to G1 ('unprocessed or minimally processed foods'). In addition, reduce by 25% the average percentage of energy consumption, found in HBS 2017-2018, of G2 ("processed culinary ingredients").

In the **Advanced Scenario**: we assume to reduce the average percentage of energy consumption in G4 ('ultra-processed foods') found in HBS in 2017-2018 (19.7%) to the average percentage of purchases in HBS in 2008-2009 (16%). We added this difference in energy percentage between HBS (3.7%) to G1 ('unprocessed or minimally processed foods'). In addition, reduce by 25% the average percentage of energy consumption, found in HBS 2017-2018, of G2 ("processed culinary ingredients") and G3 ('processed food').

We estimated the change in nutrient composition by subtracting the nutrient levels at the baseline to the healthier option.

Saturated Fat (SAT FAT)

In **Box 2** we have the distribution of saturated fat consumption by sex and age in Brazilian population.

Box 2: Distribution of saturated fat consumption by age and sex. Food consumption data – Brazil 2017/2018.

Ages	**SAT FAT in grams**		**SAT FAT in Kcal**	
Male	**Mean**	**Min-max**	**Mean**	**Min-max**
25-34	21.48	2.06-98.44	193.40	18.57-886.02
35-44	20.83	3.44-90.09	187.55	30.97-810.82
45-54	20.10	3.11-81.19	180.91	28.05-730.76
55-64	18.82	3.36-63.50	169.41	30.31-571.50
65-74	18.04	3.61-76.34	162.43	32.51-687.08
75-84	17.35	3.30-46.04	156.18	29.75-414.40
85+	16.37	4.82-56.74	147.35	43.44-510.66
Female				
25-34	17.69	2.72-142.84	159.25	24.50-1285.63
35-44	16.69	3.21-72.44	150.25	28.93-652.03
45-54	16.23	3.54-56.73	146.08	31.92-510.60
55-64	15.43	3.94-67.79	138.89	35.49-610.18
65-74	14.99	2.96-48.04	134.98	26.68-432.40
75-84	14.69	4.57-39.58	132.24	41.17-356.30
85+	14.34	3.34-41.89	129.10	30.06-377.04

Beta values for CHD and Stroke (See Box 3) were taken from a meta-analysis by Jakobsen *et al*. (2009)(11). These authors proposed replacing 5% of total energy intake coming from saturated fats with energy from polyunsaturated fats and estimated the resulting reduction in cardiovascular mortality.

Box 3: Beta values for CHD and Stroke in relation to age and sex for saturated fat.

Ages	CHD Men	STROKE Men	CHD Women	STROKE Women
25 to 34	β = 0.073894737	β = 0.081710526	β = 0.073894737	β = 0.081710526
35 to 44	β = 0.073894737	β = 0.081710526	β = 0.073894737	β = 0.081710526
45 to 54	β = 0.052	β = 0.0575	β = 0.052	β = 0.0575
55 - 64	β = 0.036947368	β = 0.040855263	β = 0.036947368	β = 0.040855263
65 - 74	β = 0.027341053	β = 0.030232895	β = 0.027341053	β = 0.030232895
75-84	β = 0.026027368	β = 0.028780263	β = 0.026027368	β = 0.028780263
85+	β = 0.026027368	β = 0.028780263	β = 0.026027368	β = 0.028780263

* Source: Jakobsen *et al*. (2009)(11)

Salt

Salt is preferred to sodium as an input for this model, meaning that we needed to convert our figures from sodium content to salt content. Quantity of salt was calculated using the following assumption: **1g Salt = 0.4 g sodium** (12).

Box 4: Distribution of salt consumption by age and sex. Food consumption data – Brazil 2017/2018.

Ages	SALT in grams	
Male	**Mean**	**Min-max**
25-34	7.66	1.35-34.31
35-44	7.42	1.51-26.23
45-54	7.11	1.60-26.37
55-64	6.75	1.53-24.82
65-74	6.33	1.13-20.56
75-84	6.03	1.55-20.02
85+	5.60	1.68-16.64
Female		

25-34	5.92	1.25-23.93
35-44	5.62	1.25-22.41
45-54	5.42	1.05-23.92
55-64	5.18	1.19-21.73
65-74	5.06	0.90-21.34
75-84	4.90	1.33-15.03
85+	4.74	1.70-14.03

Beta values for the effect of salt on CHD and stroke (See Box 5) were taken from a meta-analysis by Strazzullo *et al*. (2009)(13). Here the authors demonstrate that reducing salt intake by 5 g/day (equivalent to 2000 mg sodium less per day) translates into approximately 17% fewer CVD deaths each year.

In **Box 6** we have the distribution of saturated fat consumption by sex and age in Brazilian population.

Box 5: Beta values for CHD and Stroke in relation to age and sex for salt.

Ages	CHD Men	STROKE Men	CHD Women	STROKE Women
25 to 34	β = 0.048315789	β = 0.065368421	β = 0.048315789	β = 0.065368421
35 to 44	β = 0.048315789	β = 0.065368421	β = 0.048315789	β = 0.065368421
45 to 54	β = 0.034	β = 0.046	β = 0.034	β = 0.046
55 - 64	β = 0.024157895	β = 0.032684211	β = 0.024157895	β = 0.032684211
65 - 74	β = 0.017876842	β = 0.024186316	β = 0.017876842	β = 0.024186316
75-84	β = 0.017017895	β = 0.023024211	β = 0.017017895	β = 0.023024211
85+	β = 0.017017895	β = 0.023024211	β = 0.017017895	β = 0.023024211

* Source: Strazzullo et al. (2009) (13)

Trans Fat

Box 6: Distribution of trans fat consumption by age and sex. Food consumption data – Brazil 2017/2018.

Ages	Trans FAT in grams		Trans FAT in Kcal	
Male	**Mean**	**Min-max**	**Mean**	**Min-max**
25-34	1.49	0.01-12.06	13.44	0.14-108.55

35-44	1.38	0.01-11.89	12.50	0.15-107.06
45-54	1.31	0.04-12.40	11.81	0.42-111.68
55-64	1.18	0.09-7.75	10.62	0.82-69.75
65-74	1.12	0.02-5.65	10.10	0.26-50.89
75-84	1.05	0.24-4.26	9.53	2.17-38.36
85+	1.01	0.06-4.78	9.17	0.59-43.09
Female				
25-34	1.27	0.00-11.48	11.46	0.08-103.33
35-44	1.16	0.03-7.00	10.46	0.27-63.03
45-54	1.09	0.04-5.61	9.81	0.41-50.51
55-64	1.01	0.00-5.30	9.12	0.04-47.74
65-74	0.96	0.00-11.43	8.71	0.00-102.93
75-84	0.93	0.02-3.57	8.37	0.19-32.14
85+	0.84	0.00-3.16	7.57	0.00-28.44

A reduction in the consumption of 1.0% of the total energy from trans-fat, according to meta-analysis proposed by Mozaffarian & Clark (2009)(14), in which was demonstrated a 12% decrease in CVD deaths for every 1% absolute reduction of trans-fat consumption (Mozaffarian meta-analysis). From this meta-analysis was extracted the beta values for CHD and Stroke (See Box 7).

Box 7: Beta values for CHD and Stroke in relation to age and sex for trans fat

Ages	**CHD Men**	**STROKE Men**	**CHD Women**	**STROKE Women**
25 to 34	β = 0.163421053	β = 0.081710526	β = 0.163421053	β = 0.081710526
35 to 44	β = 0.163421053	β = 0.081710526	β = 0.163421053	β = 0.081710526
45 to 54	β = 0.115	β = 0.0575	β = 0.115	β = 0.0575
55 - 64	β = 0.081710526	β = 0.040855263	β = 0.081710526	β = 0.040855263
65 - 74	β = 0.060465789	β = 0.030232895	β = 0.060465789	β = 0.030232895
75-84	β = 0.057560526	β = 0.028780263	β = 0.057560526	β = 0.028780263
85+	β = 0.057560526	β = 0.028780263	β = 0.057560526	β = 0.028780263

* Source: Mozaffarian & Clark (2009)(14)

Added Sugar

In **Box 8** we have the distribution of added sugar consumption by sex and age in Brazilian population.

Box 8: Distribution of added sugar consumption by age and sex. Food consumption data – Brazil 2017/2018.

Ages	Added sugar in grams		Added sugar in Kcal	
Male	**Mean**	**Min-max**	**Mean**	**Min-max**
25-34	28.48	0.54-218.12	113.92	2.18-872.48
35-44	26.56	0.05-206.04	106.26	0.22-824.16
45-54	24.94	0.08-255.42	99.76	0.33-1021.68
55-64	24.07	0.00-221.73	96.28	0.00-886.92
65-74	23.87	0.00-205.05	95.51	0.00-820.20
75-84	27.13	0.00-264.94	108.53	0.00-1059.76
85+	28.25	0.18-127.49	113.00	0.74-509.97
Female				
25-34	27.78	0.19-375.53	111.15	0.76-1502.12
35-44	25.42	0.14-214.57	101.71	0.56-858.31
45-54	24.77	0.00-212.39	99.10	0.00-849.57
55-64	23.38	0.00-298.61	93.52	0.00-1194.45
65-74	23.63	0.00-146.26	94.54	0.00-585.04
75-84	25.44	0.00-182.91	101.77	0.00-731.67
85+	32.36	0.00-187.67	129.45	0.00-750.68

Beta values for CHD and stroke (See Box 9) were taken from a meta-analysis by Yang et al. (2014)(15). These authors proposed a reduction in 38% risk of CVD by consuming 8% per day of added sugar (15).

Box 9: Beta values for CVD in relation to age and sex for added sugar

Ages	CVD Men	CVD Women
25 to 34	ß= 0.0104	ß= 0.0104
35 to 44	ß= 0.0104	ß= 0.0104
45 to 54	ß= 0.013	ß= 0.013
55 - 64	ß= 0.0156	ß= 0.0156
65 - 74	ß= 0.01872	ß= 0.01872
75-84	ß= 0.02246	ß= 0.02246
85+	ß= 0.02246	ß= 0.02246

* Source: Yang et *al*. (2014)(15)

1b.2 Calculating the Cumulative Mortality Change (CMC) and the Non-cumulative Mortality Change (nCMC)

After inputting all β-values into the models, we evaluated the cumulative mortality change (CMC) and the non-cumulative mortality change (nCMC) for CHD and Stroke. The generic equations and examples below show how CMC and nCMC were calculated in the scenarios. For simplicity we have always used the grouping of men under the age of 35 as our examples (Box 10 to Box 14).

Box 10. FOOD POLICY OPTIMISTIC SCENARIO										
	BASELINE					**Optimistic Scenario:** Increasing G1 to 2008-9 levels, reducing G2-G3-G4.				
	GROUP1	GROUP2	GROUP3	GROUP4	Total	GROUP1	GROUP2	GROUP3	GROUP4	Total
Daily Share	53.40%	15.60%	11.30%	19.70%	100.00%	69.50%	10.00%	8.00%	12.00%	100,00%

Box 10.1: Cumulative Mortality Changes Equations (Optimistic Scenario) for CHD	
Cumulative mortality changes in the **Optimistic Scenario:**	Example: CMC for CHD in men under 35 years in the **Optimistic Scenario**
$CMC_{1(Scenario\ 1)}$ = 1- {[1-(βSatFat*SatFatBaselineG1-SatFatScenario1G1]*[1-(βSalt*SaltBaselineG1-SaltScenario1G1)]*[1-(βTransFat*TransFatBaselineG1-TransFatScenario1G1)]*[1-(βAddedSugar*AddedSugarBaselineG1-AddedSugarScenario1G1)]}	CMC_1= 1- {[1-(0.072947368*-2.587365)] * [1-(0.048315789*-0.310867)] * [1-(0.165789474*-0.078488)] * [1-(0.010453333*0.0000)]} = -**<u>0.222</u>** ➡ CMC for CHD
$CMC_{2(Scenario\ 1)}$ = 1- {[1-(βSatFat*SatFatBaselineG4-SatFatScenario1G4]*[1-(βSalt*SaltBaselineG4-SaltScenario1G4)]*[1-(βTransFat*TransFatBaselineG4-TransFatScenario1G4)]*[1-(βAddedSugar*AddedSugarBaselineG4-AddedSugarScenario1G4)]}	CMC_2= 1- {[1-(0.072947368*4.766444)] * [1-(0.048315789*0.696360)] * [1-(0.165789474*0.7123)] * [1-(0.010453333*4.3252)]} = **<u>0.469</u>** ➡CMC for CHD
$CMC_{3(Scenario\ 1)}$ =1- {[1-(βSatFat*SatFatBaselineG2-SatFatScenario1G2]*[1-(βSalt*SaltBaselineG2-SaltScenario1G2)]*[1-(βTransFat*TransFatBaselineG2-TransFatScenario1G2)]*[1-(βAddedSugar*AddedSugarBaselineG2-AddedSugarScenario1G2)]}	CMC_3= 1- {[1-(0.072947368*4.168389)] * [1-(0.048315789*1.197576)] * [1-(0.165789474*0.1497)] * [1-(0.010453333*8.6397)]} = **<u>0.418</u>** ➡ CMC for CHD
$CMC_{4(Scenario\ 1)}$ =1- {[1-(βSatFat*SatFatBaselineG3-SatFatScenario1G3]*[1-(βSalt*SaltBaselineG3-SaltScenario1G3)]*[1-(βTransFat*TransFatBaselineG3-TransFatScenario1G3)]*[1-(βAddedSugar*AddedSugarBaselineG3-AddedSugarScenario1G3)]}	CMC_4= 1- {[1-(0.072947368*2.6121)] * [1-(0.048315789*0.5617)] * [1-(0.165789474*0.2734)] * [1-(0.010453333*0.1016)]} = **<u>0.249</u>** ➡CMC for CHD

Box 10.2: Cumulative Mortality Changes Equations (Optimistic Scenario) for Stroke	
Cumulative mortality changes in the **Optimistic Scenario:**	Example: CMC for Stroke in men under 35 years of age in the **Optimistic Scenario**
CMC$_{1(Scenario\ 1)}$ = 1- {[1-(βSatFat*SatFatBaseline**G1-SatFat**Scenario1**G1]*[1-(βSalt*Salt**Baseline**G1-Salt**Scenario1**G1)]*[1-(βTransFat*TransFat**Baseline**G1-TransFat**Scenario1**G1)]*[1-(βAddedSugar*AddedSugar**Baseline**G1-AddedSugar**Scenario1**G1)]}**	CMC$_1$= 1- {[1-(0.018236842*-2.587365)] * [1-(0.066789474*-0.310867)] * [1-(0.082894737*-0.078488)] * [1-(0.010453333*0.0000]} = -**0.076** ➡ CMC for Stroke
CMC$_{2(Scenario\ 1)}$ = 1- {[1-(βSatFat*SatFatBaseline**G4-SatFat**Scenario1**G4]*[1-(βSalt*Salt**Baseline**G4-Salt**Scenario1**G4)]*[1-(βTransFat*TransFat**Baseline**G4-TransFat**Scenario1**G4)]*[1-(βAddedSugar*AddedSugar**Baseline**G4-AddedSugar**Scenario1**G4)]}**	CMC$_2$= 1- {[1-(0.018236842*4.766444)] * [1-(0.066789474*0.696360)] * [1-(0.082894737*0.7123)] * [1-(0.010453333*4.3252]} = **0.218** ➡CMC for Stroke
CMC$_{3(Scenario\ 1)}$ =1- {[1-(βSatFat*SatFatBaseline**G2-SatFat**Scenario1**G2]*[1-(βSalt*Salt**Baseline**G2-Salt**Scenario1**G2)]*[1-(βTransFat*TransFat**Baseline**G2-TransFat**Scenario1**G2)]*[1-(βAddedSugar*AddedSugar**Baseline**G2-AddedSugar**Scenario1**G2)]}**	CMC$_3$= 1- {[1-(0.018236842*4.168389)] * [1-(0.066789474*1.197576)] * [1-(0.082894737*0.1497)] * [1-(0.010453333*8.6397]} = **0.236** ➡ CMC for Stroke
CMC$_{4(Scenario\ 1)}$ =1- {[1-(βSatFat*SatFatBaseline**G3-SatFat**Scenario1**G3]*[1-(βSalt*Salt**Baseline**G3-Salt**Scenario1**G3)]*[1-(βTransFat*TransFat**Baseline**G3-TransFat**Scenario1**G3)]*[1-(βAddedSugar*AddedSugar**Baseline**G3-AddedSugar**Scenario1**G3)]}**	CMC$_4$= 1- {[1-(0.018236842*2.6121)] * [1-(0.066789474*0.5617)] * [1-(0.082894737*0.2734)] * [1-(0.010453333*0.1016]} = **0.105** ➡CMC for Stroke

Box 10.3: Non-cumulative Mortality Changes Equations (Optimistic Scenario) for CHD	
Non-cumulative mortality changes in the **Optimistic Scenario**:	Example: nCMC for CHD in men under 35 years of age in the **Optimistic Scenario**
nCMC$_{1(Scenario\ 1)}$ **= {[(βSatFat*SatFat**Baseline**G1-SatFat**Scenario1**G1] + [(βSalt*Salt**Baseline**G1-Salt**Scenario1**G1)] + [(βTransFat*TransFat**Baseline**G1-TransFat**Scenario1**G1)] + [(βAddedSugar*AddedSugar**Baseline**G1-AddedSugar**Scenario1**G1)]}**	nCMC$_1$= {[0.072947368*(-2.587365)] + [(0.048315789*(-0.310867)] + [(0.165789474*(-0.078488)] + [0.010453333*0.0000]} = -**<u>0.217</u>** ➡ nCMC for CHD
nCMC$_{2\ (Scenario\ 1)}$ **= {[(βSatFat*SatFat**Baseline**G4-SatFat**Scenario1**G4] [(βSalt*Salt**Baseline**G4-Salt**Scenario1**G4)] + [(βTransFat*TransFat**Baseline**G4-TransFat**Scenario1**G4)] + [(βAddedSugar*AddedSugar**Baseline**G4-AddedSugar**Scenario1**G4)]}**	nCMC$_2$= {[0.072947368*4.766444] + [0.048315789*0.696360] + [0.165789474*0.7123] + [0.010453333*4.3252]} = **<u>0.545</u>** ➡ nCMC for CHD
nCMC$_{3(Scenario\ 1)}$ **={[(βSatFat*SatFat**Baseline**G2-SatFat**Scenario1**G2] + [(βSalt*Salt**Baseline**G2-Salt**Scenario1**G2)] + [(βTransFat*TransFat**Baseline**G2-TransFat**Scenario1**G2)] + [(βAddedSugar*AddedSugar**Baseline**G2-AddedSugar**Scenario1**G2)]}**	nCMC$_3$= {[0.072947368*4.168389] + [0.048315789*1.197576] + [0.165789474*0.1497] + [0.010453333*8.6397]} = **<u>0.477</u>** ➡ nCMC for CHD
nCMC$_{4(Scenario\ 1)}$ **={[(βSatFat*SatFat**Baseline**G3-SatFat**Scenario1**G3)] + [(βSalt*Salt**Baseline**G3-Salt**Scenario1**G3)] + [(βTransFat*TransFat**Baseline**G3-TransFat**Scenario1**G3)] + [(βAddedSugar*AddedSugar**Baseline**G3-AddedSugar**Scenario1**G3)]}**	nCMC$_4$= {[0.072947368*2.6121] + [0.048315789*0.5617] + [0.165789474*0.2734] + [0.010453333*0.1016]} = **<u>0.264</u>** ➡ nCMC for CHD

Box 10.4: Non-cumulative Mortality Changes Equations (Optimistic Scenario) for Stroke	
Non-cumulative mortality changes in the **Optimistic Scenario**:	Example: nCMC for Stroke in men under 35 years of age in the **Optimistic Scenario**
nCMC$_{1(Scenario\ 1)}$ = {[(βSatFat*SatFatBaseline**G1-SatFat**Scenario1**G1]** + **[(βSalt*Salt**Baseline**G1-Salt**Scenario1**G1)] +** **[(βTransFat*TransFat**Baseline**G1-TransFat**Scenario1**G1)] +** **[(βAddedSugar*AddedSugar**Baseline**G1-AddedSugar**Scenario1**G1)]}**	nCMC$_1$= {[0.018236842*(-2.587365)] + [0.066789474*(-0.310867)] + [0.082894737*0.078488] + [0.010453333*0.0000]} = -**<u>0.074</u>** ➡ nCMC for Stroke
nCMC$_{2\ (Scenario\ 1)}$ = {[(βSatFat*SatFatBaseline**G4-SatFat**Scenario1**G4]** **[(βSalt*Salt**Baseline**G4-Salt**Scenario1**G4)] +** **[(βTransFat*TransFat**Baseline**G4-TransFat**Scenario1**G4)] +** **[(βAddedSugar*AddedSugar**Baseline**G4-AddedSugar**Scenario1**G4)]}**	nCMC$_2$= {[0.018236842*4.766444] + [0.066789474*0.696360] + [0.082894737*0.7123] + [0.010453333*4.3252]} = **<u>0.238</u>** ➡ nCMC for Stroke
nCMC$_{3(Scenario\ 1)}$ ={[(βSatFat*SatFatBaseline**G2-SatFat**Scenario1**G2] +** **[(βSalt*Salt**Baseline**G2-Salt**Scenario1**G2)] +** **[(βTransFat*TransFat**Baseline**G2-TransFat**Scenario1**G2)] +** **[(βAddedSugar*AddedSugar**Baseline**G2-AddedSugar**Scenario1**G2)]}**	nCMC$_3$= {[0.018236842*4.168389] + [0.066789474*1.197576] + [0.082894737*0.1497] + [0.010453333*8.6397]} = **<u>0.259</u>** ➡ nCMC for Stroke
nCMC$_{4(Scenario\ 1)}$ ={[(βSatFat*SatFatBaseline**G3-SatFat**Scenario1**G3)]** + **[(βSalt*Salt**Baseline**G3-Salt**Scenario1**G3)] +** **[(βTransFat*TransFat**Baseline**G3-TransFat**Scenario1**G3)] +** **[(βAddedSugar*AddedSugar**Baseline**G3-AddedSugar**Scenario1**G3)]}**	nCMC$_4$= {[0.018236842*2.6121] + [0.066789474*0.5617] + [0.082894737*0.2734] + [0.010453333*0.1016]} = **<u>0.109</u>** ➡ nCMC for Stroke

Box 11. FOOD POLICY MINIMAL SCENARIO										
	BASELINE					**Minimal Scenario:** Reducing energy intake for G4 to 2008-9 levels, increasing G1.				
	GROUP1	**GROUP2**	**GROUP3**	**GROUP4**	**Total**	**GROUP1**	**GROUP2**	**GROUP3**	**GROUP4**	**Total**
Daily Caloric	53.40%	15.60%	11.30%	19.70%	100.00%	57.10%	15.60%	11.30%	16.00%	100.00%

Box 11.1: Cumulative Mortality Changes Equations (Minimal Scenario) for CHD	
Cumulative mortality changes in the **Minimal Scenario:**	Example: CMC for **CHD** in men under 35 years in the **Minimal Scenario**
$CMC_{1(Scenario\ 2)}$ = 1- {[1-(βSatFat*SatFatBaseline**G1-SatFat**Scenario2**G1]*[1-(βSalt*Salt**Baseline**G1-Salt**Scenario2**G1)]*[1-(βTransFat*TransFat**Baseline**G1-TransFat**Scenario2**G1)]*[1-(βAddedSugar*AddedSugar**Baseline**G1-AddedSugar**Scenario2**G1)]}**	CMC_1= 1- {[1-(0.072947368*-0.594612)] * [1-(0.048315789*-0.071442)] * [1-(0.165789474*-0.018038)]*[1-(0.010453333*0.0000)]} **= -0.050 ➡ CMC for CHD**
$CMC_{2\ (Scenario\ 2)}$ = 1- {[1-(βSatFat*SatFatBaseline**G4-SatFat**Scenario2**G4]*[1-(βSalt*Salt**Baseline**G4-Salt**Scenario2**G4)]*[1-(βTransFat*TransFat**Baseline**G4-TransFat**Scenario2**G4)]*[1-(βAddedSugar*AddedSugar**Baseline**G4-AddedSugar**Scenario2**G4)]}**	CMC_2 = 1- {[1-(0.072947368*2.449423)] * [1-(0.048315789*0.357852)] * [1-(0.165789474*0.3660)] * [1-(0.010453333*2.2227)]} **= 0.259 ➡ CMC for CHD**

Box 11.2: Cumulative Mortality Changes Equations (Minimal Scenario) for Stroke	
Cumulative mortality changes in the **Minimal Scenario**:	Example: CMC for Stroke in men under 35 years of age in the **Minimal Scenario**
CMC$_{1 (Scenario\ 2)}$ = 1- {[1-(βSatFat*SatFatBaseline**G1-SatFat**Scenario2**G1]*[1-(βSalt*Salt**Baseline**G1-Salt**Scenario2**G1)]*[1-(βTransFat*TransFat**Baseline**G1-TransFat**Scenario2**G1)]*[1-(βAddedSugar*AddedSugar**Baseline**G1-AddedSugar**Scenario2**G1)]}**	CMC$_1$= 1- {[1-(0.018236842*-0.594612)] * [1-(0.066789474*-0.071442)] * [1-(0.082894737*-0.018038)] * [1-(0.010453333*0.0000)]} **= -<u>0.017</u> ➡ CMC for Stroke**
CMC$_{2 (Scenario\ 2)}$ = 1- {[1-(βSatFat*SatFatBaseline**G4-SatFat**Scenario2**G4]*[1-(βSalt*Salt**Baseline**G4-Salt**Scenario2**G4)]*[1-(βTransFat*TransFat**Baseline**G4-TransFat**Scenario2**G4)]*[1-(βAddedSugar*AddedSugar**Baseline**G4-AddedSugar**Scenario2**G4)]}**	CMC$_2$= 1- {[1-(0.018236842*2.449423)] * [1-(0.066789474*0.357852)] * [1-(0.082894737* 0.3660)] * [1-(0.010453333* 2.2227)]} **= <u>0.117</u> ➡ CMC for Stroke**

Box 11.3: Non-cumulative Mortality Changes Equations (Minimal Scenario) for CHD	
Non-cumulative mortality changes in the **Minimal Scenario**:	Example: nCMC for CHD in men under 35 years of age in the **Minimal Scenario:**
$nCMC_{1(Scenario\ 2)}$ = {[(βSatFat*SatFatBaseline**G1-SatFat**Scenario2**G1] + [(βSalt*Salt**Baseline**G1-Salt**Scenario2**G1)] + [(βTransFat*TransFat**Baseline**G1-TransFat**Scenario2**G1)] + [(βAddedSugar*AddedSugar**Baseline**G1-AddedSugar**Scenario2**G1)]}**	$nCMC_{1}$= **{**[(0.072947368*(-0.594612)] + [(0.048315789*(-0.071442)] + [(0.165789474*(-0.018038)] + [(0.010453333*0.000000)]**}** = -**<u>0.050</u>** ➡ nCMC for CHD
$nCMC_{2\ (Scenario\ 2)}$ = {[(βSatFat*SatFatBaseline**G4-SatFat**Scenario2**G4] [(βSalt*Salt**Baseline**G4-Salt**Scenario2**G4)] + [(βTransFat*TransFat**Baseline**G4-TransFat**Scenario2**G4)] + [(βAddedSugar*AddedSugar**Baseline**G4-AddedSugar**Scenario2**G4)]}**	$nCMC_{2}$= **{**[0.072947368*2.449423] + [0.048315789*0.357852] + [0.165789474*0.3660] + [0.010453333*2.2227]} = **<u>0.280</u>** ➡ nCMC for CHD

Box 11.4: Non-cumulative Mortality Changes Equations (Minimal Scenario) for Stroke	
nCMC for Stroke in men under 35 years of age in the **Minimal Scenario:**	Example: nCMC for Stroke in men under 35 years in the **Minimal Scenario**
nCMC$_{1 (Scenario 2)}$ = {[(βSatFat*SatFatBaseline**G1-SatFat**Scenario2**G1]** + **[(βSalt*Salt**Baseline**G1-Salt**Scenario2**G1)] + [(βTransFat*TransFat**Baseline**G1-TransFat**Scenario2**G1)] + [(βAddedSugar*AddedSugar**Baseline**G1-AddedSugar**Scenario2**G1)]}**	nCMC$_1$= **{**[(0.018236842*(-0.594612)] + [0.066789474*(-0.071442)] + [0.082894737*(-0.018038)] + [0.010453333*0.0000]**}** = -**<u>0.017</u>** ➡ nCMC for Stroke
nCMC$_{2 (Scenario 2)}$ = {[(βSatFat*SatFatBaseline**G4-SatFat**Scenario2**G4] [(βSalt*Salt**Baseline**G4-Salt**Scenario2**G4)] + [(βTransFat*TransFat**Baseline**G4-TransFat**Scenario2**G4)] + [(βAddedSugar*AddedSugar**Baseline**G4-AddedSugar**Scenario2**G4)]}**	nCMC$_2$= **{**[0.018236842*2.449423] + [0.066789474*0.357852] + [0.082894737*0.3660] + [0.010453333*2.2227]**}** = **<u>0.122</u>** ➡ nCMC for Stroke

Box 12. FOOD POLICY MODEST SCENARIO										
	BASELINE					**Modest Scenario:** Reducing G2 and G3 by 25%.				
	GROUP1	**GROUP2**	**GROUP3**	**GROUP4**	**Total**	**GROUP1**	**GROUP2**	**GROUP3**	**GROUP4**	**Total**
Daily Caloric	53.40%	15.60%	11.30%	19.70%	100.00%	53.40%	11.70%	8.47%	19.70%	93.27%

Box 12.1: Cumulative Mortality Changes Equations (Modest Scenario) for CHD	
Cumulative mortality changes in the **Modest Scenario**:	Example: CMC for **CHD** in men under 35 years in the **Modest Scenario**
$CMC_{1(Scenario\ 3)}$ = 1- {[1-(βSatFat*SatFatBaseline**G2-SatFat**Scenario3**G2]*[1-(βSalt*Salt**Baseline**G2-Salt**Scenario3**G2)]*[1-(βTransFat*TransFat**Baseline**G2-TransFat**Scenario3**G2)]*[1-(βAddedSugar*AddedSugar**Baseline**G2-AddedSugar**Scenario3**G2)]}**	CMC_1= 1- {[1-(0.072947368*2.902985)] * [1-(0.048315789*0.834026)] * [1-(0.165789474*0.104222)] * [1-(0.010453333*6.016900)]} = **0.303** ➡ CMC for CHD
$CMC_{2(Scenario\ 3)}$ = 1- {[1-(βSatFat*SatFatBaseline**G3-SatFat**Scenario3**G3]*[1-(βSalt*Salt**Baseline**G3-Salt**Scenario3**G3)]*[1-(βTransFat*TransFat**Baseline**G3-TransFat**Scenario3**G3)]*[1-(βAddedSugar*AddedSugar**Baseline**G3-AddedSugar**Scenario3**G3)]}**	CMC_2= 1- {[1-(0.072947368*2.240095)] * [1-(0.048315789*0.481719)] * [1-(0.165789474*0.2344)] * [1-(0.010453333*0.0872)]} = **0.215** ➡CMC for CHD

Box 12.2: Cumulative Mortality Changes Equations (Modest Scenario) for Stroke	
Cumulative mortality changes in the **Modest Scenario**:	Example: CMC for Stroke in men under 35 years of age in the **Modest Scenario**
$CMC_{1(Scenario\ 3)}$ = 1- {[1-(βSatFat*SatFatBaseline**G2-SatFat**Scenario3**G2]*[1-(βSalt*Salt**Baseline**G2-Salt**Scenario3**G2)]*[1-(βTransFat*TransFat**Baseline**G2-TransFat**Scenario3**G2)]*[1-(βAddedSugar*AddedSugar**Baseline**G2-AddedSugar**Scenario3**G2)]}**	CMC_1= 1- {[1-(0.018236842*2.902985)] * [1-(0.066789474*0.834026)] * [1-(0.082894737*0.104222)] * [1-(0.010453333*6.016900]} = **0.169** ➡ CMC for Stroke
$CMC_{2(Scenario\ 3)}$ = 1- {[1-(βSatFat*SatFatBaseline**G3-SatFat**Scenario3**G3]*[1-(βSalt*Salt**Baseline**G3-Salt**Scenario3**G3)]*[1-(βTransFat*TransFat**Baseline**G3-TransFat**Scenario3**G3)]*[1-(βAddedSugar*AddedSugar**Baseline**G3-AddedSugar**Scenario3**G3)]}**	CMC_2= 1- {[1-(0.018236842*2.240095)] * [1-(0.066789474*0.481719)] * [1-(0.082894737*0.2344)] * [1-(0.010453333*0.0872]} = **0.091** ➡ CMC for Stroke

Box 12.3: Non-cumulative Mortality Changes Equations (Modest Scenario) for CHD	
Non-cumulative mortality changes in the **Modest Scenario:**	Example: nCMC for CHD in men under 35 years of age in the **Modest Scenario:**
$nCMC_{1(Scenario\ 3)}$ = {[(βSatFat*SatFatBaseline**G2-SatFat**Scenario3**G1] + [(βSalt*Salt**Baseline**G2-Salt**Scenario3**G2)] + [(βTransFat*TransFat**Baseline**G2-TransFat**Scenario3**G2)] + [(βAddedSugar*AddedSugar**Baseline**G2-AddedSugar**Scenario3**G2)]}**	$nCMC_1$= {[0.072947368*2.902985] + [0.048315789*0.834026] + [0.165789474*0.104222] + [0.010453333*6.016900]} = **0.332** ➡ nCMC for CHD
$nCMC_{2(Scenario\ 3)}$ = {[(βSatFat*SatFatBaseline**G3-SatFat**Scenario3**G3] [(βSalt*Salt**Baseline**G3-Salt**Scenario3**G3)] + [(βTransFat*TransFat**Baseline**G3-TransFat**Scenario3**G3)] + [(βAddedSugar*AddedSugar**Baseline**G3-AddedSugar**Scenario3**G3)]}**	$nCMC_2$= {[(0.072947368*2.240095] + [0.048315789*0.481719] + [0.165789474*0.2344] + [0.010453333*0.0872)]} = **0.226** ➡ nCMC for CHD

Box 12.4: Non-cumulative Mortality Changes Equations (Modest Scenario) for Stroke	
Non-cumulative mortality changes in the **Modest Scenario**:	Example: nCMC for Stroke in men under 35 years of age in the **Modest Scenario:**
nCMC$_{1(Scenario\ 3)}$ = {[(βSatFat*SatFatBaseline**G2-SatFat**Scenario3**G1]** + **[(βSalt*Salt**Baseline**G2-Salt**Scenario3**G2)] +** **[(βTransFat*TransFat**Baseline**G2-TransFat**Scenario3**G2)] +** **[(βAddedSugar*AddedSugar**Baseline**G2-AddedSugar**Scenario3**G2)]}**	nCMC$_1$= **{**[0.018236842*2.902985] + [0.066789474*0.834026] + [0.082894737*0.104222] + [0.010453333*6.016900]**}** = **<u>0.180</u>** ➡ nCMC for Stroke
nCMC$_{2\ (Scenario\ 3)}$ = {[(βSatFat*SatFatBaseline**G3-SatFat**Scenario3**G3]** **[(βSalt*Salt**Baseline**G3-Salt**Scenario3**G3)] +** **[(βTransFat*TransFat**Baseline**G3-TransFat**Scenario3**G3)] +** **[(βAddedSugar*AddedSugar**Baseline**G3-AddedSugar**Scenario3**G3)]}**	nCMC$_2$= **{**[0.018236842*2.240095] + [0.066789474*0.481719] + [0.082894737*0.2344] + [0.010453333*0.0872]**}** = **<u>0.093</u>** ➡ nCMC for Stroke

Box 13. FOOD POLICY INTERMEDIARY SCENARIO										
	BASELINE					**Intermediary Scenario:** Reducing G4 and G2 to 2008-9 levels, increasing G1.				
	GROUP1	**GROUP2**	**GROUP3**	**GROUP4**	**Total**	**GROUP1**	**GROUP2**	**GROUP3**	**GROUP4**	**Total**
Daily Caloric	53.40%	15.60%	11.30%	19.70%	100.00%	57.10%	11.70%	11.30%	16.00%	96.10%

Box 13.1: Cumulative Mortality Changes Equations (Intermediary Scenario) for CHD	
Cumulative mortality changes in the **Intermediary Scenario**:	Example: CMC for **CHD** in men under 35 years in the **Intermediary Scenario**
$CMC_{1(Scenario\ 4)}$ = 1- {[1-(βSatFat*SatFatBaseline**G1-SatFat**Scenario4**G1]*[1-(βSalt*Salt**Baseline**G1-Salt**Scenario4**G1)]*[1-(βTransFat*TransFat**Baseline**G1-TransFat**Scenario4**G1)]*[1-(βAddedSugar*AddedSugar**Baseline**G1-AddedSugar**Scenario4**G1)]}**	CMC_1= 1- {[1-(0.072947368*-0.594612)] * [1-(0.048315789*-0.071442)] * [1-(0.165789474*-0.018038)] * [1-(0.010453333*0.0000)]} = -**<u>0.050</u>** ➡ CMC for CHD
$CMC_{2(Scenario\ 4)}$ = 1- {[1-(βSatFat*SatFatBaseline**G4-SatFat**Scenario4**G4]*[1-(βSalt*Salt**Baseline**G4-Salt**Scenario4**G4)]*[1-(βTransFat*TransFat**Baseline**G4-TransFat**Scenario4**G4)]*[1-(βAddedSugar*AddedSugar**Baseline**G4-AddedSugar**Scenario4**G4)]}**	CMC_2= 1- {[1-(0.072947368*2.449423)] * [1-(0.048315789*0.357852)] * [1-(0.165789474* 0.3660)] * [1-(0.010453333*2.2227)]} = **<u>0.259</u>** ➡ CMC for CHD
$CMC_{3(Scenario\ 4)}$ =1- 1- {[1-(βSatFat*SatFatBaseline**G2-SatFat**Scenario4**G2]*[1-(βSalt*Salt**Baseline**G2-Salt**Scenario4**G2)]*[1-(βTransFat*TransFat**Baseline**G2-TransFat**Scenario4**G2)]*[1-(βAddedSugar*AddedSugar**Baseline**G2-AddedSugar**Scenario4**G2)]}**	CMC_3= 1- {[1-(0.072947368*2.902985)] * [1-(0.048315789*0.834026)] * [1-(0.165789474* 0.1042)] * [1-(0.010453333*6.0169)]} = **<u>0.303</u>** ➡ CMC for CHD

Box 13.2: Cumulative Mortality Changes Equations (Intermediary Scenario) for Stroke	
Cumulative mortality changes in the **Intermediary Scenario**:	Example: CMC for Stroke in men under 35 years of age in the **Intermediary Scenario**
CMC$_{1(Scenario 4)}$ = 1- {[1-(βSatFat*SatFatBaseline**G1-SatFat**Scenario4**G1]*[1-(βSalt*Salt**Baseline**G1-Salt**Scenario4**G1)]*[1-(βTransFat*TransFat**Baseline**G1-TransFat**Scenario4**G1)]*[1-(βAddedSugar*AddedSugar**Baseline**G1-AddedSugar**Scenario4**G1)]}**	CMC$_1$= 1- {[1-(0.018236842*-0.594612)] * [1-(0.066789474*-0.071442)] * [1-(0.082894737*-0.018038)] * [1-(0.010453333*0.0000]} = -**0.017** ➡ CMC for Stroke
CMC$_{2(Scenario 4)}$ = 1- {[1-(βSatFat*SatFatBaseline**G4-SatFat**Scenario4**G4]*[1-(βSalt*Salt**Baseline**G4-Salt**Scenario4**G4)]*[1-(βTransFat*TransFat**Baseline**G4-TransFat**Scenario4**G4)]*[1-(βAddedSugar*AddedSugar**Baseline**G4-AddedSugar**Scenario4**G4)]}**	CMC$_2$= 1- {[1-(0.018236842*2.449423)] * [1-(0.066789474*0.357852)] * [1-(0.082894737*0.3660)] * [1-(0.010453333*2.2227]} = **0.117** ➡ CMC for Stroke
CMC$_{3(Scenario 4)}$ =1- 1- {[1-(βSatFat*SatFatBaseline**G2-SatFat**Scenario4**G2]*[1-(βSalt*Salt**Baseline**G2-Salt**Scenario4**G2)]*[1-(βTransFat*TransFat**Baseline**G2-TransFat**Scenario4**G2)]*[1-(βAddedSugar*AddedSugar**Baseline**G2-AddedSugar**Scenario4**G2)]}**	CMC$_3$= 1- {[1-(0.018236842*2.902985)] * [1-(0.066789474*0.834026)] * [1-(0.082894737*0.1042)] * [1-(0.010453333*6.0169]} = **0.169** ➡ CMC for Stroke

Box 13.3: Non-cumulative Mortality Changes Equations (Intermediary Scenario) for CHD	
Non-cumulative mortality changes in the **Intermediary Scenario**:	Example: nCMC for CHD in men under 35 years of age in the **Intermediary Scenario**

nCMC$_{1(\text{Scenario 4})}$ = {[(βSatFat*SatFatBaseline**G1-SatFat**Scenario4**G1] + [(βSalt*Salt**Baseline**G1-Salt**Scenario4**G1)] + [(βTransFat*TransFat**Baseline**G1-TransFat**Scenario4**G1)] + [(βAddedSugar*AddedSugar**Baseline**G1-AddedSugar**Scenario4**G1)]}**	nCMC$_1$= {[(0.072947368*(-0.594612)] + [(0.048315789*(-0.071442)] + [(0.165789474*(-0.018038)] + [(0.010453333*0.000000)]} = -**<u>0.050</u>** ➡ nCMC for CHD
nCMC$_{2\ (\text{Scenario 4})}$ = {[(βSatFat*SatFatBaseline**G4-SatFat**Scenario4**G4] + [(βSalt*Salt**Baseline**G4-Salt**Scenario4**G4)] + [(βTransFat*TransFat**Baseline**G4-TransFat**Scenario4**G4)] + [(βAddedSugar*AddedSugar**Baseline**G4-AddedSugar**Scenario4**G4)]}**	nCMC$_2$= {[0.072947368*2.449423] + [0.048315789*0.357852] + [0.165789474*0.3660] + [0.010453333*2.2227]} = **<u>0.280</u>** ➡ nCMC for CHD
nCMC$_{3(\text{Scenario 4})}$ ={[(βSatFat*SatFatBaseline**G2-SatFat**Scenario4**G2] + [(βSalt*Salt**Baseline**G2-Salt**Scenario4**G2)] + [(βTransFat*TransFat**Baseline**G2-TransFat**Scenario4**G2)] + [(βAddedSugar*AddedSugar**Baseline**G2-AddedSugar**Scenario4**G2)]}**	nCMC$_3$= {[0.072947368*2.902985] + [0.048315789*0.834026] + [0.165789474*0.104222] + [0.010453333*6.016900]} = **<u>0.332</u>** ➡ nCMC for CHD

Box 13.4: Non-cumulative Mortality Changes Equations (Intermediary Scenario) for Stroke	
nCMC for Stroke in men under 35 years of age in the **Intermediary Scenario**	Example: nCMC for Stroke in men under 35 years of age in the **Intermediary Scenario**
nCMC$_{1(\text{Scenario 4})}$ = {[(βSatFat*SatFatBaseline**G1-SatFat**Scenario4**G1] + [(βSalt*Salt**Baseline**G1-Salt**Scenario4**G1)] + [(βTransFat*TransFat**Baseline**G1-TransFat**Scenario4**G1)] + [(βAddedSugar*AddedSugar**Baseline**G1-AddedSugar**Scenario4**G1)]}**	nCMC$_1$= {[(0.018236842*(-0.594612)] + [0.066789474*(-0.071442)] + [0.082894737*(-0.018038)] + [0.010453333*0.0000]} = -**0.017** ➡ nCMC for Stroke
nCMC$_{2\ (\text{Scenario 4})}$ = {[(βSatFat*SatFatBaseline**G4-SatFat**Scenario4**G4] [(βSalt*Salt**Baseline**G4-Salt**Scenario4**G4)] + [(βTransFat*TransFat**Baseline**G4-TransFat**Scenario4**G4)] + [(βAddedSugar*AddedSugar**Baseline**G4-AddedSugar**Scenario4**G4)]}**	nCMC$_2$= {[0.018236842*2.449423] + [0.066789474*0.357852] + [0.082894737*0.3660] + [0.010453333*2.2227]} = **0.122** ➡ nCMC for Stroke
nCMC$_{3(\text{Scenario 4})}$ ={[(βSatFat*SatFatBaseline**G2-SatFat**Scenario4**G2] + [(βSalt*Salt**Baseline**G2-Salt**Scenario4**G2)] + [(βTransFat*TransFat**Baseline**G2-TransFat**Scenario4**G2)] + [(βAddedSugar*AddedSugar**Baseline**G2-AddedSugar**Scenario4**G2)]}**	nCMC$_3$= {[0.018236842*2.902985] + [0.066789474*0.834026] + [0.082894737*0.104222] + [0.010453333*6.016900]} = **0.180** ➡ nCMC for Stroke

Box 14. FOOD POLICY ADVANCED SCENARIO										
	BASELINE					**Advanced Scenario:** Reducing G4 to 2008-9 levels, increase G1 reducing G2/ G3.				
	GROUP1	GROUP2	GROUP3	GROUP4	Total	GROUP1	GROUP2	GROUP3	GROUP4	Total
Daily Caloric	53.40%	15.60%	11.30%	19.70%	100.00%	57.10%	11.70%	8.47%	16.00%	93.27%

Box 14.1: Cumulative Mortality Changes Equations (Advanced Scenario) for CHD	
Cumulative mortality changes in the **Advanced Scenario**:	Example: CMC for CHD in men under 35 years in the **Advanced Scenario**
$CMC_{1(Scenario\ 5)}$ = 1- {[1-(βSatFat*SatFatBaselineG1-SatFatScenario5G1]*[1-(βSalt*SaltBaselineG1-SaltScenario5G1)]*[1-(βTransFat*TransFatBaselineG1-TransFatScenario5G1)]*[1-(βAddedSugar*AddedSugarBaselineG1-AddedSugarScenario5G1)]}	CMC_1= 1- {[1-(0.072947368*-0.594612)] * [1-(0.048315789*-0.071442)] * [1-(0.165789474*-0.018038)] * [1-(0.010453333*0.0000)]} = -**0.050** ➡ CMC for CHD
$CMC_{2(Scenario\ 5)}$ = 1- {[1-(βSatFat*SatFatBaselineG4-SatFatScenario5G4]*[1-(βSalt*SaltBaselineG4-SaltScenario5G4)]*[1-(βTransFat*TransFatBaselineG4-TransFatScenario5G4)]*[1-(βAddedSugar*AddedSugarBaselineG4-AddedSugarScenario5G4)]}	CMC_2= 1- {[1-(0.072947368*2.449423)] * [1-(0.048315789*0.357852)] * [1-(0.165789474* 0.3660)] * [1-(0.010453333*2.2227)]} = **0.259** ➡ CMC for CHD
$CMC_{3(Scenario\ 5)}$ =1- 1- {[1-(βSatFat*SatFatBaselineG2-SatFatScenario5G2]*[1-(βSalt*SaltBaselineG2-SaltScenario5G2)]*[1-(βTransFat*TransFatBaselineG2-TransFatScenario5G2)]*[1-(βAddedSugar*AddedSugarBaselineG2-AddedSugarScenario5G2)]}	CMC_3= 1- {[1-(0.072947368*2.902985)] * [1-(0.048315789*0.834026)] * [1-(0.165789474* 0.1042)] * [1-(0.010453333*6.0169)]} = **0.303** ➡ CMC for CHD
$CMC_{4(Scenario\ 5)}$ =1- 1- {[1-(βSatFat*SatFatBaselineG3-SatFatScenario5G2]*[1-(βSalt*SaltBaselineG3-SaltScenario5G2)]*[1-	CMC_4= 1- {[1-(0.072947368*2.240095)] * [1-(0.048315789*0.481719)] * [1-(0.165789474*0.2344)] * [1-(0.010453333*0.0872)]}

(βTransFat*TransFatBaseline**G3-TransFat**Scenario5**G3)]*[1-(βAddedSugar*AddedSugar**Baseline**G3-AddedSugar**Scenario5**G3)]}**	= **0.215** ➡ CMC for CHD
Box 14.2: Cumulative Mortality Changes Equations (Advanced Scenario) for Stroke	
Cumulative mortality changes in the **Advanced Scenario**:	Example: CMC for Stroke in men under 35 years of age in the **Advanced Scenario**
$CMC_{1(Scenario\ 5)}$ = 1- {[1-(βSatFat*SatFatBaseline**G1-SatFat**Scenario5**G1]*[1-(βSalt*Salt**Baseline**G1-Salt**Scenario5**G1)]*[1-(βTransFat*TransFat**Baseline**G1-TransFat**Scenario5**G1)]*[1-(βAddedSugar*AddedSugar**Baseline**G1-AddedSugar**Scenario5**G1)]}**	CMC_1= 1- {[1-(0.018236842*-0.594612)] * [1-(0.066789474*-0.071442)] * [1-(0.082894737*-0.018038)] * [1-(0.010453333*0.0000]} = -**0.017** ➡ CMC for Stroke
$CMC_{2(Scenario\ 5)}$ = 1- {[1-(βSatFat*SatFatBaseline**G4-SatFat**Scenario5**G4]*[1-(βSalt*Salt**Baseline**G4-Salt**Scenario5**G4)]*[1-(βTransFat*TransFat**Baseline**G4-TransFat**Scenario5**G4)]*[1-(βAddedSugar*AddedSugar**Baseline**G4-AddedSugar**Scenario5**G4)]}**	CMC_2= 1- {[1-(0.018236842*2.449423)] * [1-(0.066789474*0.357852)] * [1-(0.082894737*0.3660)] * [1-(0.010453333*2.2227]} = **0.117** ➡ CMC for Stroke
$CMC_{3(Scenario\ 5)}$ =1- 1- {[1-(βSatFat*SatFatBaseline**G2-SatFat**Scenario5**G2]*[1-(βSalt*Salt**Baseline**G2-Salt**Scenario5**G2)]*[1-(βTransFat*TransFat**Baseline**G2-TransFat**Scenario5**G2)]*[1-(βAddedSugar*AddedSugar**Baseline**G2-AddedSugar**Scenario5**G2)]}**	CMC_3= 1- {[1-(0.018236842*2.902985)] * [1-(0.066789474*0.834026)] * [1-(0.082894737*0.1042)] * [1-(0.010453333*6.0169]} = **0.169** ➡ CMC for Stroke
$CMC_{4(Scenario\ 5)}$ =1- 1- {[1-(βSatFat*SatFatBaseline**G3-SatFat**Scenario5**G2]*[1-(βSalt*Salt**Baseline**G3-Salt**Scenario5**G2)]*[1-(βTransFat*TransFat**Baseline**G3-TransFat**Scenario5**G3)]*[1-(βAddedSugar*AddedSugar**Baseline**G3-AddedSugar**Scenario5**G3)]}**	CMC_4= 1- {[1-(0.018236842*2.240095)] * [1-(0.066789474*0.481719)] * [1-(0.082894737*0.2344)] * [1-(0.010453333*0.0872]} = **0.091** ➡ CMC for Stroke

Box 14.3: Non-cumulative Mortality Changes Equations (Advanced Scenario) for CHD	
Non-cumulative mortality changes in the **Advanced Scenario**:	Example: nCMC for CHD in men under 35 years of age in the **Advanced Scenario**
nCMC$_{1(Scenario\ 5)}$ **= {[(βSatFat*SatFat**Baseline**G1-SatFat**Scenario5**G1] + [(βSalt*Salt**Baseline**G1-Salt**Scenario5**G1)] + [(βTransFat*TransFat**Baseline**G1-TransFat**Scenario5**G1)] + [(βAddedSugar*AddedSugar**Baseline**G1-AddedSugar**Scenario5**G1)]}**	nCMC$_1$= {[(0.072947368*(-0.594612)] + [(0.048315789*(-0.071442)] + [(0.165789474*(-0.018038)] + [(0.010453333*0.000000)]} = -**0.050** ➡ nCMC for CHD
nCMC$_{2\ (Scenario\ 5)}$ **= {[(βSatFat*SatFat**Baseline**G4-SatFat**Scenario5**G4] [(βSalt*Salt**Baseline**G4-Salt**Scenario5**G4)] + [(βTransFat*TransFat**Baseline**G4-TransFat**Scenario5**G4)] + [(βAddedSugar*AddedSugar**Baseline**G4-AddedSugar**Scenario5**G4)]}**	nCMC$_2$= {[0.072947368*2.449423] + [0.048315789*0.357852] + [0.165789474*0.3660] + [0.010453333*2.2227]} = **0.280** ➡ nCMC for CHD
nCMC$_{3(Scenario\ 5)}$ **={[(βSatFat*SatFat**Baseline**G2-SatFat**Scenario5**G2] + [(βSalt*Salt**Baseline**G2-Salt**Scenario5**G2)] + [(βTransFat*TransFat**Baseline**G2-TransFat**Scenario5**G2)] + [(βAddedSugar*AddedSugar**Baseline**G2-AddedSugar**Scenario5**G2)]}**	nCMC$_3$= {[0.072947368*2.902985] + [0.048315789*0.834026] + [0.165789474*0.104222] + [0.010453333*6.016900]} = **0.332** ➡ nCMC for CHD
nCMC$_{4(Scenario\ 5)}$ **={[(βSatFat*SatFat**Baseline**G3-SatFat**Scenario5**G3] + [(βSalt*Salt**Baseline**G3-Salt**Scenario5**G3)] + [(βTransFat*TransFat**Baseline**G3-TransFat**Scenario5**G3)] + [(βAddedSugar*AddedSugar**Baseline**G3-AddedSugar**Scenario5**G3)]}**	nCMC$_4$= {[(0.072947368*2.240095] + [0.048315789*0.481719] + [0.165789474*0.2344] + [0.010453333*0.0872)]} = **0.226** ➡ nCMC for CHD

Box 14.4: Non-cumulative Mortality Changes Equations (Advanced Scenario) for Stroke	
Non-cumulative mortality changes in the **Advanced Scenario**:	Example: nCMC for Stroke in men under 35 years of age in the **Advanced Scenario**
CMC$_{1(Scenario\ 5)}$ = 1- {[1-(βSatFat*SatFatBaseline**G1-SatFat**Scenario5**G1]*[1-(βSalt*Salt**Baseline**G1-Salt**Scenario5**G1)]*[1-(βTransFat*TransFat**Baseline**G1-TransFat**Scenario5**G1)]*[1-(βAddedSugar*AddedSugar**Baseline**G1-AddedSugar**Scenario5**G1)]}**	nCMC$_1$= {[(0.018236842*(-0.594612)] + [0.066789474*(-0.071442)] + [0.082894737*(-0.018038)] + [0.010453333*0.0000]} = -**0.017** ➡ nCMC for Stroke
CMC$_{2(Scenario\ 5)}$ = 1- {[1-(βSatFat*SatFatBaseline**G4-SatFat**Scenario5**G4]*[1-(βSalt*Salt**Baseline**G4-Salt**Scenario5**G4)]*[1-(βTransFat*TransFat**Baseline**G4-TransFat**Scenario5**G4)]*[1-(βAddedSugar*AddedSugar**Baseline**G4-AddedSugar**Scenario5**G4)]}**	nCMC$_2$= {[0.018236842*2.449423] + [0.066789474*0.357852] + [0.082894737*0.3660] + [0.010453333*2.2227]} = **0.122** ➡ nCMC for Stroke
CMC$_{3(Scenario\ 5)}$ =1- 1- {[1-(βSatFat*SatFatBaseline**G2-SatFat**Scenario5**G2]*[1-(βSalt*Salt**Baseline**G2-Salt**Scenario5**G2)]*[1-(βTransFat*TransFat**Baseline**G2-TransFat**Scenario5**G2)]*[1-(βAddedSugar*AddedSugar**Baseline**G2-AddedSugar**Scenario5**G2)]}**	nCMC$_3$= {[0.018236842*2.902985] + [0.066789474*0.834026] + [0.082894737*0.104222] + [0.010453333*6.016900]} = **0.180** ➡ nCMC for Stroke
CMC$_{4(Scenario\ 5)}$ =1- 1- {[1-(βSatFat*SatFatBaseline**G3-SatFat**Scenario5**G2]*[1-(βSalt*Salt**Baseline**G3-Salt**Scenario5**G2)]*[1-(βTransFat*TransFat**Baseline**G3-TransFat**Scenario5**G3)]*[1-(βAddedSugar*AddedSugar**Baseline**G3-AddedSugar**Scenario5**G3)]}**	nCMC$_4$= {[0.018236842*2.240095] + [0.066789474*0.481719] + [0.082894737*0.2344] + [0.010453333*0.0872]} = **0.093** ➡ nCMC for Stroke

As there are multiple variables involved in these equations it is important to ensure that the beta value is correct for the relevant age group, gender and outcome (CHD or Stroke) that is being calculated. This applies to calculations for both CMC and nCMC.

1b.3 Estimating the reduction in deaths with cumulative and non-cumulative effects

Finally, to precisely estimate absolute figures for mortality reduction we multiplied the predicted change (CMC or nCMC) by the projected population in 2048. The projected figures used account for changes in population demographic as well as simply population size. This is important, given the distribution of CVD mortality.

Once again, generic formulas are given along with an example. The examples all apply to men under 35 years of age.

Reduction in CHD mortality using cumulative effects:

Expected Deaths from CHD*CMC_1+ Expected Deaths from CHD*CMC_2 +Expected Deaths from CHD*CMC_3^{i} +Expected Deaths from CHD*CMC_4^{i}

Expected Deaths for CHD = age group CHD mortality rate in 2018* projected population demographics in 2048

i – when present in the scenarios

Examples:

Reduction in CHD mortality for men under 35 years of age in the Optimistic Scenario using cumulative effects:

= [1346*(-0.222)] + (1346*0.469) + (1346*0.418) + (1346*0.249) = **1231**

Reduction in CHD mortality for men under 35 years of age in the Minimal Scenario using cumulative effects:

= [1346*(-0.050)] + (1346*0.259) = **282**

Reduction in CHD mortality for men under 35 years of age in the Modest Scenario using cumulative effects:

= (1346*0.303) + (1346*0.215) = **698**

Reduction in CHD mortality for men under 35 years of age in the Intermediary Scenario using cumulative effects:

= [1346*(-0.050)] + (1346*0.259) + (1346*0.303) = **690**

Reduction in CHD mortality for men under 35 years of age in the Advanced Scenario using cumulative effects:

= [1346*(-0.050)] + (1346*0.259) + (1346*0.303) + (1346*0.215) = **980**

Reduction in CHD mortality using non-cumulative effects:

Expected Deaths from CHD*$nCMC_1$ + Expected Deaths from CHD*$nCMC_2$ + Expected Deaths from CHD*$nCMC_3$ [i] + Expected Deaths from CHD*$nCMC_4$ [i]

Expected Deaths for CHD = age group CHD mortality rate in 2018* projected population demographics in 2048

i – when present in the scenarios

Examples:

Reduction in CHD mortality for men under 35 years of age in the Optimistic Scenario using cumulative effects:

= [1346*(-0.217)] + (1346*0.545) + (1346*0.477) + (1346*0.264) = **1439**

Reduction in CHD mortality for men under 35 years of age in the Minimal Scenario using non-cumulative effects:

= [1346*(-0.0050)] + (1346*0.280) = **310**

Reduction in CHD mortality for men under 35 years of age in Modest Scenario using non-cumulative effects:

= (1346*0.332) + (1346*0.226) = **752**

Reduction in CHD mortality for men under 35 years of age in the Intermediary Scenario using cumulative effects:

= [1346*(-0.0050)] + (1346*0.280) + (1346*0.332) = **757**

Reduction in CHD mortality for <u>men under 35 years of age in the Advanced Scenario using cumulative effects</u>:

= [1346*(-0.0050)] + (1346*0.280) + (1346*0.332) + (1346*0.226) = **<u>1062</u>**

<u>Reduction in stroke mortality using cumulative effects:</u>

Expected Deaths from stroke*CMC_1 + Expected Deaths from stroke*CMC_2 + Expected Deaths from stroke*CMC_3 [i] + Expected Deaths from stroke*CMC_4 [i]

Expected Deaths for Stroke = age group Stroke mortality rate in 2018* projected population demographics in 2048

i – when present in the scenarios

Examples:

Reduction in **stroke** mortality for men under 35 years of age in the Optimistic Scenario using cumulative effects:

= [348*(-0.076)] + (348*0.218) + (348*0.236) + (348*0.105) = **<u>168</u>**

Reduction in **stroke** mortality for men under 35 years of age in the Minimal Scenario using cumulative effects:

= [348*(-0.017)] + (348*0.117) = **<u>35</u>**

Reduction in stroke mortality for men under 35 years of age in the Modest Scenario using cumulative effects:

= (348*0.169) + (348*0.091) = **<u>90</u>**

Reduction in stroke mortality for men under 35 years of age in the Intermediary Scenario using cumulative effects:

= [348*(-0.017)] + (348*0.117) + (348*0.169) = **<u>94</u>**

Reduction in stroke mortality for men under 35 years of age in the Advanced Scenario using cumulative effects:

= [348*(-0.017)] + (348*0.117) + (348*0.169) + (348*0.091) = **125**

Reduction in stroke mortality using non-cumulative effects:

Expected Deaths from stroke*$nCMC_1$+ Expected Deaths from stroke*$nCMC_2$ + Expected Deaths from stroke*$nCMC_3$ [i] + Expected Deaths from stroke*$nCMC_4$ [i]

Expected Deaths for Stroke = age group Stroke mortality rate in 2018* projected population demographics in 2048

i – when present in the scenarios

Examples:

Reduction in stroke mortality for men under 35 years of age in the Optimistic Scenario using non-cumulative effects:

= [348*(-0.074)] + (348*0.238) + (348*0.259) + (348*0.109) = **185**

Reduction in stroke mortality for men under 35 years of age in the Minimal Scenario using non-cumulative effects:

= [348*(-0.017)] + (348*0.122) = **37**

Reduction in stroke mortality for men under 35 years of age in the Modest Scenario using non-cumulative effects:

= (348*0.180) + (348*0.093) = **95**

Reduction in stroke mortality for men under 35 years of age in the Intermediary Scenario using non-cumulative effects:

= [348*(-0.017)] + (348*0.122)) + (348*0.180) = **99**

Reduction in stroke mortality for men under 35 years of age in the Advanced Scenario using non-cumulative effects:

= [348*(-0.017)] + (348*0.122)) + (348*0.180) + (348*0.093) = **132**

The same reasoning and process is applied to all age groups and both sexes in all scenarios. The figures derived from the examples given above are shown in the following box (Box 15):

Box 15: Number of reductions in CHD and stroke deaths in Scenarios 1, 2, 3, 4 and 5 (age group under 35 male)

Age group < 35 Male	Reduction in CHD deaths Scenarios					Reduction in Stroke Deaths Scenarios				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
With cumulative effects	1231	282	698	690	980	168	35	90	94	125
With non-cumulative effects	1439	310	752	757	1062	185	37	95	99	132

1c Describing the probabilistic sensitive analysis (PSA)

Every model involves uncertainty. To explore the potential effects of reducing consumption of UPF on risk factors and CVD deaths we performed a probabilistic sensitivity analysis. Simulations were performed using the Monte Carlo methodology. This allowed stochastic variation of parameters based on the sizes of the effects obtained from the literature. Using this technique, we were able to recalculate the model iteratively. Confidence intervals of 95% were generated for the median using the bootstrap percentile method. The model simulation was implemented using MS Excel with the addition of the package Ersatz (www.epigear.com).

Box 16. shows the distribution of values used for each nutrient/food input.

Box 16: Standard distribution function used in the model	
Nutrient/food	Distribution used
Salt	Erpert *= (lower confidence interval, mean, upper confidence interval)
Saturated Fat	Erpert *= (lower confidence interval, mean, upper confidence interval)
Trans-fat	Erpert *= (lower confidence interval, mean, upper confidence interval)
Added sugar	Erpert *= (lower confidence interval, mean, upper confidence interval)

*Erpert = Pert standard distribution function

Section 2. RESULTS

2.a Nutrient level in different food groups

Table 1 shows the average nutrient intake from each food group for the entire sample population (males and females of all age groups).

Table 1: Nutrient level in different food groups in Brazil 2017/2018. **Food/Nutrient**	**G1 Mean (SD)**	**G2 Mean (SD)**	**G3 Mean (SD)**	**G4 Mean (SD)**
Salt intake (g/day)	0.91 (0.49)	2.75 (1.27)	1.90 (1.49)	1.60 (1.05)
Saturated Fat (g/day)	8.04 (3.83)	3.33 (2.51)	3.22 (3.60)	5.30 (3.41)
Trans Fat (g/day)	0.22 (0.13)	0.12 (0.11)	0.36 (0.30)	0.51 (3.24)
Added sugar (g/day)	NA	17.14 (20.39)	0.51 (3.24)	11.14 (10.35)

Tables 2 and 3 show salt from G1 and G2, G3 and G4, respectively. Results are stratified by age group and gender.

Table 2: Salt inputs by age and gender in G1 and G2 – Baseline

	SALT in Group 1 (g)			SALT in Group 2 (g)		
Age and gender	**Mean**	**LIC 95%**	**UIC 95%**	**Mean**	**LIC 95%**	**UIC 95%**
25-34 M	1.0311	1.0115	1.0506	3.3361	3.2863	3.3859
25-34 F	0.8655	0.8507	0.8803	2.4910	2.4572	2.5248
35-44 M	1.0288	1.0111	1.0465	3.3615	3.3143	3.4088
35-44 F	0.8453	0.8329	0.8577	2.4062	2.3762	2.4363
45-54 M	1.0093	0.9901	1.0285	3.2967	3.2473	3.3461
45-54 F	0.8590	0.8458	0.8722	2.3527	2.3208	2.3847
55-64 M	1.0088	0.9880	1.0297	3.1603	3.1081	3.2126

55-64 F	**0.8633**	**0.8487**	**0.8778**	**2.2744**	**2.2399**	**2.3090**
65-74 M	0.9990	0.9713	1.0266	2.9446	2.8841	3.0051
65-74 F	0.8746	0.8553	0.8938	2.2519	2.2062	2.2976
75-84 M	1.0146	0.9780	1.0513	2.8646	2.7789	2.9504
75-84 F	0.9128	0.8856	0.9399	2.1946	2.1343	2.2549
85+ M	1.0498	0.9767	1.1229	2.6120	2.4494	2.7746
85+ F	0.9077	0.8663	0.9491	2.1788	2.0681	2.2895

Table 3: Salt inputs by age and gender in G3 and G4 - Baseline

	SALT in Group 3 (g)			SALT in Group 4 (g)		
Age and gender	**Mean**	**LIC 95%**	**UIC 95%**	**Mean**	**LIC 95%**	**UIC 95%**
25-34 M	1.9235	1.8630	1.9839	1.9053	1.8598	1.9508
25-34 F	1.6005	1.5598	1.6411	1.6060	1.5751	1.6370
35-44 M	1.8860	1.8301	1.9419	1.7422	1.7031	1.7814
35-44 F	1.6056	1.5664	1.6447	1.4728	1.4461	1.4994
45-54 M	1.8470	1.7941	1.8998	1.6246	1.5859	1.6634
45-54 F	1.5575	1.5180	1.5971	1.3710	1.3448	1.3971
55-64 M	1.8833	1.8166	1.9500	1.4694	1.4308	1.5080
55-64 F	1.5624	1.5185	1.6063	1.2543	1.2266	1.2821
65-74 M	1.7800	1.7005	1.8596	1.3515	1.3054	1.3977
65-74 F	1.5662	1.5036	1.6288	1.1837	1.1497	1.2177
75-84 M	1.7838	1.6671	1.9005	1.1887	1.1355	1.2420
75-84 F	1.5640	1.4848	1.6432	1.0799	1.0398	1.1199
85+ M	1.6755	1.4761	1.8750	1.0976	1.0135	1.1818
85+ F	1.4651	1.2884	1.6418	1.0411	0.9694	1.1127

Tables 4 and 5 show saturated fat from G1 and G2, G3 and G4, respectively, stratified by age group and gender. Tables 6 and 7 show added sugar and trans-fat from G1, G2, G3 and G4 stratified by age group and gender.

Table 4: Saturated fat inputs by age and gender in G1 and G2 - Baseline

	SAT FAT in Group 1 (% of energy)			SAT FAT in Group 2 (% of energy)		
Age and gender	**Mean**	**LIC 95%**	**UIC 95%**	**Mean**	**LIC 95%**	**UIC 95%**
25-34 M	8.5817	8.4963	8.6671	11.6119	11.4323	11.7916
25-34 F	8.8741	8.7980	8.9503	11.5793	11.4253	11.7333
35-44 M	8.6601	8.5768	8.7434	11.6238	11.4650	11.7826
35-44 F	8.9566	8.8833	9.0298	11.6246	11.4727	11.7765
45-54 M	8.6847	8.5978	8.7716	11.7108	11.5452	11.8764
45-54 F	8.9169	8.8409	8.9930	11.5693	11.4152	11.7235
55-64 M	8.6674	8.5682	8.7666	11.5689	11.3889	11.7489
55-64 F	8.9487	8.8602	9.0373	11.5452	11.3213	11.7691
65-74 M	8.9103	8.7830	9.0375	11.3967	11.1539	11.6395
65-74 F	9.1335	9.0157	9.2513	11.2512	11.0291	114733
75-84 M	9.3213	9.1298	9.5128	11.0630	10.7129	11.4132
75-84 F	9.5399	9.3675	9.7123	11.0039	10.6867	11.3210
85+M	9.5728	9.2040	9.9417	10.8035	10.1951	11.4119
85+F	9.9630	9.6327	10.2933	10.4955	9.8870	11.1041

Table 5: Saturated fat inputs by age and gender in G3 and G4 - Baseline

	SAT FAT in Group 3 % of energy			SAT FAT in Group 4 % of energy		
Age and gender	**Mean**	**LIC 95%**	**UIC 95%**	**Mean**	**LIC 95%**	**UIC 95%**
25-34 M	8.9446	8.6498	9.2393	13.0415	12.8679	13.2151
25-34 F	9.9938	9.7276	10.2600	12.9047	12.7674	13.0420
35-44 M	8.7407	8.4556	9.0259	13.3310	13.1569	13.5051
35-44 F	10.0874	9.8252	10.3496	13.1218	12.9859	13.2577
45-54 M	8.6579	8.3626	8.9532	13.4529	13.2701	13.6356
45-54 F	10.1690	9.8960	10.4419	13.2124	13.0695	13.3553
55-64 M	8.3832	8.0556	8.7109	13.2968	13.0852	13.5085
55-64 F	9.9033	9.5999	10.2066	13.1620	13.0040	13.3199
65-74 M	8.8964	8.4563	9.3365	13.1975	12.9480	13.4470
65-74 F	10.1008	9.6830	10.5185	12.8949	12.6864	13.1034
75-84 M	8.0728	7.4542	8.6914	13.0157	12.6426	13.3888
75-84 F	9.6739	9.0985	10.2492	12.8083	12.4985	13.1181
85+M	8.6161	7.3687	9.8636	12.9831	12.3311	13.6351
85+F	10.5627	9.3750	11.7503	11.8000	11.2489	12.3511

Table 6: Added sugar inputs by age and gender in G1, G2, G3 and G4

	ADDED SUGAR in G1			ADDED SUGAR in G2			ADDED SUGAR in G3			ADDED SUGAR in G4		
Age/gender	**Mean**	**LIC 95%**	**UIC 95%**	**Mean**	**LIC 95%**	**UIC 95%**	**Mean**	**LIC 95%**	**UIC 95%**	**Mean**	**LIC 95%**	**UIC 95%**
25-34 M	0.00	0.00	0.00	24.0676	22.9539	25.1813	0.3480	0.2650	0.4311	11.8343	11.5180	12.1506
25-34 F	0.00	0.00	0.00	26.6584	25.7266	27.5902	0.5149	0.4179	0.6118	12.2294	11.9565	12.5023
35-44 M	0.00	0.00	0.00	22.3557	21.4600	23.2513	0.4399	0.3404	0.5395	11.4936	11.1921	11.7951
35-44 F	0.00	0.00	0.00	25.2301	24.4137	26.0465	0.5572	0.4650	0.6494	12.0946	11.8190	12.3701
45-54 M	0.00	0.00	0.00	21.6645	20.7781	22.5509	0.4145	0.3300	0.4990	11.3630	11.0399	11.6861
45-54 F	0.00	0.00	0.00	25.2896	24.4306	26.1486	0.6205	0.5236	0.7174	12.0760	11.7815	12.3706
55-64 M	0.00	0.00	0.00	22.5492	21.4923	23.6061	0.6164	0.4980	0.7348	11.5710	11.1546	11.9874
55-64 F	0.00	0.00	0.00	25.0936	24.1473	26.0399	0.7657	0.6516	0.8798	12.0620	11.7241	12.3999
65-74 M	0.00	0.00	0.00	23.4027	22.1181	24.6873	0.7747	0.6046	0.9448	11.6290	11.1174	12.1405
65-74 F	0.00	0.00	0.00	26.4178	25.1408	27.6948	0.9676	0.8004	1.1348	11.9756	11.5224	12.4288
75+ M	0.00	0.00	0.00	27.8567	25.4865	30.2269	1.0377	0.7467	1.3288	11.6443	10.9001	12.3884
75+ F	0.00	0.00	0.00	29.1066	27.0597	31.1535	1.1700	0.9019	1.4381	12.4052	11.7195	13.0910
85+M	0.00	0.00	0.00	31.1723	26.8092	35.5354	1.3044	0.6081	2.0008	11.4668	10.1503	12.7834
85+F	0.00	0.00	0.00	36.0346	325345	39.5346	1.4001	0.8972	1.9031	13.6855	12.4764	14.8945

Table 7: Trans-fat inputs by age and gender in G1, G2, G3 and G4.

	TRANS-FAT in G1			TRANS-FAT in G2			TRANS-FAT in G3			TRANS-FAT in G4		
Age/gender	**Mean**	**LIC 95%**	**UIC 95%**	**Mean**	**LIC 95%**	**UIC 95%**	**Mean**	**LIC 95%**	**UIC 95%**	**Mean**	**LIC 95%**	**UIC 95%**
25-34 M	0.26	0.26	0.26	0.42	0.41	0.43	0.94	0.92	0.95	1.95	1.91	1.99
25-34 F	0.26	0.25	0.26	0.41	0.41	0.42	0.99	0.98	1.01	2.02	1.99	2.05
35-44 M	0.26	0.25	0.26	0.41	0.41	0.42	0.93	0.91	0.95	2.00	1.96	2.04
35-44 F	0.25	0.25	0.26	0.41	0.41	0.42	1.02	1.00	1.03	2.07	2.04	2.10
45-54 M	0.25	0.25	0.26	0.41	0.41	0.42	0.93	0.91	0.95	2.05	2.01	2.09
45-54 F	0.24	0.24	0.25	0.40	0.40	0.41	1.02	1.00	1.04	2.06	2.03	2.09
55-64 M	0.24	0.24	0.25	0.41	0.40	0.41	0.93	0.91	0.96	2.05	2.00	2.09
55-64 F	0.24	0.23	0.24	0.40	0.39	0.41	1.02	1.00	1.04	2.11	2.07	2.15
65-74 M	0.24	0.24	0.25	0.40	0.39	0.41	0.97	0.94	1.00	2.11	2.05	2.17
65-74 F	0.23	0.23	0.24	0.38	0.37	0.39	1.05	1.02	1.08	2.12	2.07	2.17
75+ M	0.24	0.23	0.25	0.39	0.37	0.40	0.96	0.93	1.00	2.14	2.06	2.22
75+ F	0,23	0.23	0.24	0.38	0.37	0.39	1.04	1.00	1.08	2.12	2.05	2.19
85+M	0.24	0.23	0.26	0.38	0.35	0.40	0.97	0.90	1.05	2.19	2.05	2.33
85+F	0.22	0.21	0.23	0.37	0.34	0.40	1.04	0.97	1.11	1.89	1.77	2.01

2b Expected mortality reduction

Baseline

In 2018, **115,229** CHD deaths and **99,799** stroke deaths were reported in Brazil, according to Ministry of Health (Mortality Information System). By carrying out a negative binomial projection to 2048, approximately **371,993** CVD deaths will occur (Table 8).

The results for the scenarios are illustrated in Table 9. Predictions have been made assuming both *cumulative effect* and *non-cumulative effects*.

Tables 10, 11, 12, 13 and 14 show the predicted number of deaths prevented or postponed in **Scenarios 1, 2, 3, 4** and **5,** respectively, with stochastic outputs using *cumulative* and *non-cumulative* effects by gender and age group.

Table 8: Number of deaths by CHD and Stroke in 2018 and results for binomial projection in 2048

	2018				**2048**			
	Number of Deaths **CHD**		Number of Deaths **Stroke**		Number of Deaths **CHD**		Number of Deaths **Stroke**	
AGES	Men	Women	Men	Women	Men	Women	Men	Women
25-34	2,785	1,369	723	640	1,346	449	348	261
35-44	2,606	1,145	1,374	1,342	2,263	679	918	755
45-54	7,627	3,241	3,858	3,211	9,110	2,710	3,393	2,359
55-64	14,749	7,170	9,420	6,993	22,132	7,455	10,207	6,145
65-74	17,556	11,065	12,728	9,612	35,651	16,028	18,514	11,971
75-84	14,368	12,823	13,937	14,022	37,609	24,495	26,059	22,767
85+	7,678	11,047	8,618	13,321	26,165	29,796	21,499	30,908
Total	**67,369**	**47,860**	**50,658**	**49,141**	**134,276**	**81,613**	**80,938**	**75,166**

Table 9: Estimated CHD and Stroke deaths prevented or postponed by achievement of scenarios 1, 2, 3, 4 and 5 in specific food policy options by sex in Brazil.

	CHD		STROKE	
	Men Deaths prevented (95% CI)	**Women** Deaths prevented (95% CI)	**Men** Deaths prevented (95% CI)	**Women** Deaths prevented (95% CI)
OPTIMISTIC SCENARIO				
With cumulative effects	79,586 (64,474-94,225)	49,795 (40,015-60,649)	33,571 (28,627-38,798)	33,484 (27,858-39,186)
With non-cumulative effects	87,847 (69,807-105,701)	54,781 (43,356-67,274)	35,220 (29,799-40,867)	35,140 (29,019-41,441)
MINIMAL SCENARIO				
With cumulative effects	16,749 (12,984-20,492)	9,494 (7,075-11,923)	6,141 (4,875-7,427)	5,230 (3,822-6,681)
With non-cumulative effects	17,739 (13,602-21,937)	10,013 (7,374-12,700)	6,312 (4,986-7,665)	5,369 (3,902-6,891)
MODEST SCENARIO				
With cumulative effects	42,417 (31,793-52,732)	27,695 (19,839-36,050)	17,257 (13,556-21,155)	18,338 (13,812-23,107)
With non-cumulative effects	44,667 (33,171-55,990)	29,235 (20,789-38,252)	17,735 (13,863-21,828)	18,924 (14,173-23,949)
INTERMEDIARY SCENARIO				
With cumulative effects	46,698 (37,241-55,832)	29,390 (23,211-35,638)	20,274 (16,488-24,291)	20,398 (15,914-25,066)
With non-cumulative effects	49,685 (39,119-60,016)	31,254 (24,333-38,356)	20,883 (16,914-25,115)	21,072 (16,356-25,999)
ADVANCED SCENARIO				
With cumulative effects	59,336 (46,153-72,504)	37,091 (28,024-46,971)	23,477 (19,101-28,012)	23,514 (18,516-28,767)
With non-cumulative effects	62,622 (48,240-77,186)	39,146 (29,322-49,943)	24,133 (19,535-28,926)	24,237 (19,020-29,768)

Table 10: Stochastic Outputs for the Probabilistic Sensitive Analysis in relation to number of deaths reduction by CHD and Stroke in the Optimistic Scenario.

	Cumulative effects				**Non-cumulative effects**			
	Number of Deaths **CHD**		Number of Deaths **Stroke**		Number of Deaths **CHD**		Number of Deaths **Stroke**	
AGES	Men	Women	Men	Women	Men	Women	Men	Women
25-34	1,231	384	169	123	1,440	450	185	134
35-44	2,060	634	436	354	2,405	738	478	387
45-54	6,549	2,008	1,365	955	7,418	2,269	1,470	1,025
55-64	13,053	4,543	3,720	2,290	14,478	5,031	3,947	2,421
65-74	18,993	8,838	6,706	4,545	20,773	9,650	7,031	4,753
75-84	21,715	14,453	11,277	10,139	23,841	15,860	11,818	10,596
85+	15,985	18,935	9,899	15,078	17,491	20,784	10,291	15,823
Total	**79,586**	**49,795**	**33,571**	**33,484**	**87,847**	**54,781**	**35,220**	**35,140**

Table 11: Stochastic Outputs for the Probabilistic Sensitive Analysis in relation to number of deaths reduction by CHD and Stroke in the Minimal Scenario.

	Cumulative effects				**Non-cumulative effects**			
	Number of Deaths **CHD**		Number of Deaths **Stroke**		Number of Deaths **CHD**		Number of Deaths **Stroke**	
AGES	Men	Women	Men	Women	Men	Women	Men	Women
25-34	282	93	35	26	310	102	37	27
35-44	480	143	91	74	527	157	95	78
45-54	1,498	441	278	191	1,613	475	289	199
55-64	2,887	971	729	441	3,065	1,031	753	455
65-74	4,004	1,777	1,259	819	4,217	1,871	1,293	840
75-84	4,300	2,838	1,922	1,735	4,532	2,993	1,972	1,780
85+	3,297	3,231	1,828	1,945	3,475	3,384	1,873	1,990
Total	**16,749**	**9,494**	**6,141**	**5,230**	**17,739**	**10,013**	**6,312**	**5,369**

Table 12: Stochastic Outputs for the Probabilistic Sensitive Analysis in relation to number of deaths reduction by CHD and Stroke in the Modest Scenario.

	Cumulative effects				Non-cumulative effects			
	Number of Deaths CHD		Number of Deaths Stroke		Number of Deaths CHD		Number of Deaths Stroke	
AGES	Men	Women	Men	Women	Men	Women	Men	Women
Under 35	699	208	91	65	753	224	96	69
35-44	1,055	364	209	190	1,100	391	216	199
45-54	3,556	1,119	711	500	3,780	1,189	741	520
55-64	6,927	2,463	1,899	1,174	7,309	2,596	1,966	1,213
65-74	9,992	4,757	3,377	2,326	10,486	4,990	3,476	2,390
75-84	11,557	7,752	5,824	5,230	12,182	8,165	5,998	5,374
85+	8,632	11,032	5,147	8,853	9,058	11,681	5,242	9,160
Total	**42,417**	**27,695**	**17,257**	**18,338**	**44,667**	**29,235**	**17,735**	**18,924**

Table 13: Stochastic Outputs for the Probabilistic Sensitive Analysis in relation to number of deaths reduction by CHD and Stroke in the Intermediary Scenario.

	Cumulative effects				Non-cumulative effects			
	Number of Deaths CHD		Number of Deaths Stroke		Number of Deaths CHD		Number of Deaths Stroke	
AGES	Men	Women	Men	Women	Men	Women	Men	Women
Under 35	690	227	94	68	757	249	100	72
35-44	1159	346	242	193	1,269	379	257	204
45-54	3,692	1,101	773	535	3,983	1,187	811	560
55-64	7,447	2,537	2,150	1,315	7,945	2,706	2,234	1,363
65-74	10,958	5,032	3,960	2,677	11,600	5,325	4,083	2,756
75-84	12,983	8,615	6,842	6,128	13,781	9,139	7,054	6,305
85+	9,769	11,532	6,213	9,480	10,322	12,270	6,344	9,812
Total	**46,698**	**29,390**	**20,274**	**20,398**	**49,658**	**31,254**	**20,883**	**21,072**

Table 14: Stochastic Outputs for the Probabilistic Sensitive Analysis in relation to number of deaths reduction by CHD and Stroke in the Advanced Scenario.

	Cumulative effects				**Non-cumulative effects**			
	Number of Deaths **CHD**		Number of Deaths **Stroke**		Number of Deaths **CHD**		Number of Deaths **Stroke**	
AGES	Men	Women	Men	Women	Men	Women	Men	Women
Under 35	980	301	125	91	1,062	326	132	96
35-44	1,638	507	324	263	1,772	548	341	276
45-54	5,053	1,561	988	692	5,392	1,665	1,031	720
55-64	9,812	3,433	2,625	1,615	10,372	3,626	2,717	1668
65-74	13,980	6,530	4,628	3,142	14,685	6,856	4,760	3227
75-84	15,907	10,548	7,781	6,943	16,768	11,114	8,006	7131
85+	11,965	14,211	7,005	10,767	12,571	15,011	7,146	11118
Total	**59,336**	**37,091**	**23,477**	**23,514**	**62,622**	**39,146**	**24,133**	**24,237**

APPENDIX

Table A. Population and data sources used in the UPF IMPACT model

Information	Source
Population data	
Population counts by age and sex 2018 and population projection 2048.	Brazilian Institute of Geography and Statistics – Demographic Census (http://www.ibge.gov.br)
Number of deaths by CHD and Stroke	
CHD and Stroke deaths stratified by age and sex	Mortality Information System (MIS). Ministry of Health. Brazil. (www.datasus.gov.br) Coronary heart disease (CHD) - (I20-I25) Stroke - (I60-I69)

Table B. Data sources for Nutrient profile indicators of the food groups

Information	Source
Fatty Acids Saturates: grams per day and mean of % food energy.	IBGE. Brazilian Household Budget Survey (2017/2018). Food Consumption Analysis. (6)
Sodium/salt: grams per day.	IBGE. Brazilian Household Budget Survey. (2017/2018)(6)
Trans Fatty Acids: grams per day and mean of % food energy.	IBGE. Brazilian Household Budget Survey (2017/2018). Food Consumption Analysis. (6)
Added sugar: grams per day and mean of % food energy.	IBGE. Brazilian Household Budget Survey (2017/2018). (6)

Table C. Data sources for effects estimates

Information	Source
Replacement of 5% energy of SAT FAT by PUFAs	Jakobsen *et al.* (2009). Major types of dietary fat and risk of coronary heart disease: a pooled analysis of 11 cohort studies. (11)
5g change in daily salt intake	Strazzulo *et al.* (2009). Salt intake, stroke, and cardiovascular disease: meta-analysis of prospective studies.(13)
Replacing 1% of energy from trans-fat with unsaturated fats reduces CHD risk by 12 % (5.5% to 18.5%)	Mozaffarian & Clarke (2009). Quantitative effects on cardiovascular risk factors and coronary heart disease risk of replacing partially hydrogenated vegetable oils with other fats and oils. (14)
38% risk reduction of CVD by consuming 8%/day of added sugar	Yang *et al.* (2014). Added sugar intake and cardiovascular diseases mortality among us adults. (15)

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