# Supplementary Materials: Nutrition Transition and Biocultural Determinants of Obesity among Cameroonian Migrants in Urban Cameroon and France

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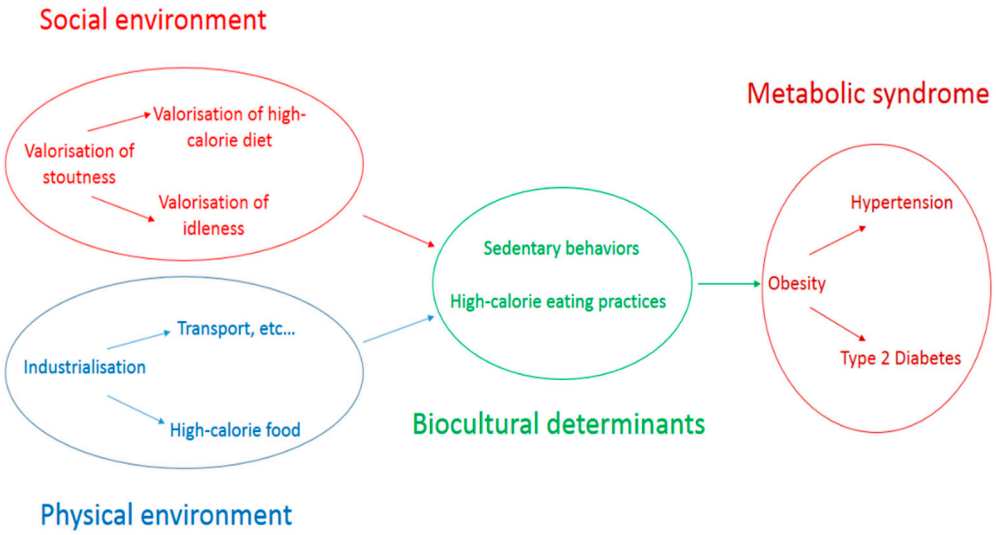


**Figure S1.** Biocultural determinants of obesity among Cameroonian migrants.

**Table S1.** List and consumption frequency of main dishes/foods in Cameroon.

| **Cameroon** | **Energy Value** [1] | | | | **Food Frequency** [2] | | |
|---|---|---|---|---|---|---|---|
| 100 g dry matter | | | | | | | |
| *Modern food* | Kcal | Lipid | Glucid | Protein | Rural Cameroon | Urban Cameroon | *p* |
| Roasted chicken | 263.8 | 19.8 | 0 | 21.4 | M: 73.0; W: 61.4 | M: 85.7; W: 79.3 | *** |
| Braised chicken | 263.8 | 19.8 | 0 | 21.4 | M: 53.2; W: 47.0 | M: 77.9; W: 75.4 | *** |
| Braised pork | 519.5 | 49.9 | 0 | 17.6 | M: 52.4; W: 39.4 | M: 77.9; W: 71.5 | *** |
| Braised fish | 249.8 | 15 | 0 | 28.7 | M: 74.6; W: 67.4 | M: 92.1; W: 90.0 | *** |
| Meat skewers | 281.1 | 19.9 | 0 | 25.5 | M: 50.0; W: 28.8 | M: 75.0; W: 68.7 | *** |
| Red beans | | | | | | | |
| ("Jazz sauce") | 188.2 | 7.3 | 21.8 | 8.9 | M: 80.1; W: 82.6 | M: 88.0; W: 91.6 | ** |
| Fried rice | 160 | 3.2 | 30.1 | 2.6 | M: 93.6; W: 93.1 | M: 96.4; W: 96.1 | NS |
| Mayonnaise | 761.6 | 83.6 | 0.3 | 2 | M: 44.0; W: 33.1 | M: 68.6; W: 69.3 | *** |
| Cheese | 282.7 | 22.7 | 2.8 | 16.8 | M: 18.4; W: 14.6 | M: 38.6; W: 40.2 | *** |
| Margarine | 746.9 | 82.5 | 0.3 | 0.8 | M: 50.4; W: 47.7 | M: 57.9; W: 71.5 | *** |
| Sugar [3] | 400.0 | 0 | 100.0 | 0 | M: 89.5; W: 91.6 | M: 93.6; W: 89.4 | NS |
| Chocolate | 544 | 32 | 56.5 | 7.5 | M: 58.4; W: 56.9 | M: 66.4; W: 77.1 | *** |
| Sandwich | 293.2 | 13.6 | 31.9 | 10.8 | M: 92.1; W: 94.7 | M: 95.7; W: 97.8 | * |
| Juices | 38.1 | 0.1 | 8.7 | 0.6 | M: 59.2; W: 78.5 | M: 72.9; W: 78.8 | * |
| Beer | 56.2 | 0 | 3.5 | 0.4 | M: 78.4; W: 66.2 | M: 87.9; W: 82.7 | *** |
| Whisky | 241.0 | 0 | 0 | 0 | M: 50.4; W: 16.9 | M: 60.7; W: 40.2 | *** |
| *Traditional food* | Kcal | Lipid | Glucid | Protein | Rural Cameroon | Urban Cameroon | |
| "Koki leaves/ | | | | | | | |
| peanuts pistachios" | 114.1 | 10.1 | 5.7 | 3.8 | M: 33.3; W: 28.0 | M: 12.9; W: 14.5 | *** |
| Crushed bananas/ | | | | | | | |
| beans | 252.2 | 7.3 | 36.6 | 10.1 | M: 74.6; W: 84.1 | M: 53.6; W: 53.1 | *** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bean pie | 165.9 | 7.2 | 17.5 | 7.9 | M: 94.4; W: 94.7 | M: 73.6; W: 76.0 | *** |
| "Yellow gombo | | | | | | | |
| sauce" [4] | 120.0 | 10.3 | 5.0 | 1.9 | M: 80.2; W: 88.6 | M: 83.6; W: 78.2 | NS |
| Crushed plantains/ | | | | | | | |
| beans | 252.2 | 7.3 | 36.6 | 10.1 | M: 78.6; W: 78.0 | M: 66.4; W: 71.5 | * |
| Crushed apples/ | | | | | | | |
| Beans [4] | 252.2 | 7.3 | 36.6 | 10.1 | M: 82.5; W: 72.7 | M: 74.3; W: 76.5 | NS |
| Corn peanuts/ | | | | | | | |
| Beans | 182.1 | 7.8 | 22.2 | 5.8 | M: 47.6; W: 56.1 | M: 45.0; W: 40.8 | * |

[1] Foods/dishes energy contents from FPPB (Amougou et al., in prep) and SUVIMAX (2006) [89]; [2] At least one to three times per month; [3] Urban subjects have a higher consumption than rural subjects in the total sample; [4] Rural subjects have a higher consumption than urban subjects in the total sample; M: Men; W: Women; Chi2 between the two samples, men and women aggregated: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

**Table S2.** List and consumption frequency of main high calorie dishes/foods in France.

| **France** | **Energy Value [1]** | | | | **Food Frequency [2]** | | |
|---|---|---|---|---|---|---|---|
| 100 g dry matter | | | | | | | |
| *Modern food* | Kcal | Lipid | Glucid | Protein | Migrants settled | New migrants | *p* |
| Sandwich | 337.5 | 16.3 | 31.5 | 16.2 | M: 58.3; W: 28.6 | M: 75.0; W: 62.5 | * |
| Hamburger | 270.1 | 12.1 | 27.6 | 12.7 | M: 58.3; W: 14.3 | M: 75.0; W: 50.0 | * |
| Pizza | 221.1 | 10.7 | 21.7 | 9.5 | M: 66.7; W: 28.6 | M: 81.3; W: 62.5 | * |
| Kebab | 203.7 | 6.5 | 26.2 | 10.1 | M: 25.0; W: 14.3 | M: 50.0; W: 50.0 | * |
| Jam | 274.0 | 0 | 68 | 0.5 | M: 33.3; W: 28.6 | M: 56.3; W: 50.0 | NS |
| Butter [3] | 747.3 | 82.5 | 0.5 | 0.7 | M: 83.3; W: 71.4 | M: 100.0; W: 50.0 | NS |
| Chocolate | 544.0 | 32 | 56.5 | 7.5 | M: 74.6; W: 57.1 | M: 92.1; W: 100.0 | * |
| Cake [3] | 289.5 | 14.7 | 34.5 | 4.8 | M: 66.7; W: 85.7 | M: 87.5; W: 75.0 | NS |
| Sugar [3] | 400.0 | 0 | 100 | 0 | M: 100.0; W: 64.3 | M: 93.8; W: 75.0 | NS |
| Juices | 38.1 | 0.1 | 8.7 | 0.6 | M: 75.0; W: 64.3 | M: 100.0; W: 100.0 | ** |
| Soda | 40.0 | 0 | 10 | 0 | M: 50.0; W: 35.7 | M: 81.3; W: 75.0 | ** |
| Beer | 56.2 | 0 | 3.5 | 0.4 | M: 50.0; W: 21.4 | M: 68.8; W: 75.0 | * |
| Alcohol (Vodka) | 238.0 | 0 | 0 | 0 | M: 50.0; W: 42.9 | M: 68.8; W: 62.5 | NS |
| *Traditional food* | Kcal | Lipid | Glucid | Protein | French youth | Cameroonian youth | |
| "Ndolé" | 176.8 | 13.8 | 6.9 | 6.3 | M: 85.7; W: 90.0 | M: 78.6; W: 75.0 | NS |
| "Kondré" | 136.5 | 6.9 | 17.4 | 1.2 | M: 92.9; W: 90.0 | M: 57.1; W: 33.3 | *** |
| Gombo [4] | 90.0 | 6.9 | 5.0 | 1.9 | M: 50.0; W: 80.0 | M: 64.3; W: 58.3 | NS |
| Peanut sauce [4] | 101.8 | 9.8 | 1.5 | 1.8 | M: 85.7; W: 60.0 | M: 71.4; W: 66.7 | NS |
| Pistachio sauce [4] | 99.1 | 9.9 | 0.8 | 1.8 | M: 71.4; W: 70.0 | M: 78.6; W: 50.0 | NS |
| "Koki" | 251.3 | 7.2 | 36.6 | 10.1 | M: 57.1; W: 80.0 | M: 42.9; W: 41.7 | NS |
| "Director general | | | | | | | |
| chicken" | 343.3 | 26.7 | 3.5 | 22.2 | M: 71.4; W: 60.0 | M: 42.9; W: 25.0 | * |
| "Yellow sauce" | 120.0 | 10.3 | 5.0 | 1.9 | M: 42.9; W: 70.0 | M: 35.7; W: 41.7 | NS |

[1] Foods/dishes energy contents from FPPB (Amougou et al., in prep) and SUVIMAX (2006) [89]; [2] At least one to three times per month; [3] New Migrants have a higher consumption than settled migrants in the total sample; [4] Migrants with a French youth have a higher consumption than migrants with a Cameroonian youth in the sample; M: Men; W: Women; Chi2 between the two samples, men and women aggregated: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

**Table S3.** Other dishes/foods used for Principal Component Analysis.

| **Food variables** | **Energy Value [1]** | | | |
|---|---|---|---|---|
| 100 g dry matter | Kcal | Lipid | Glucid | Protein |
| Peanut gombo sauce | 129.4 | 10.1 | 6.1 | 3.6 |
| Crushed vegetables | 252.2 | 7.3 | 36.6 | 10.1 |
| Peanuts beans | 165.9 | 7.2 | 17.5 | 7.9 |
| Palm beans | 188.2 | 7.3 | 21.8 | 8.9 |
| Mbongo | 135.7 | 10.0 | 7.5 | 4.0 |
| Nkwi | 216.7 | 2.3 | 14.5 | 34.5 |

| | | | | |
|---|---|---|---|---|
| Dairy products | 33.4 | 0.2 | 4.6 | 3.3 |
| Milk | 62.7 | 3.5 | 4.6 | 3.2 |
| Plantain | 128.7 | 0.3 | 30.5 | 1.1 |
| Bread | 275.0 | 1.3 | 57.4 | 8.5 |

**Table S4.** Discrimination measures on main dimensions (eigen values > 1) of Multiple Factorial Correspondence Analyses 1.

| **Variables** | **Dimensions** | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** |
| Living area | 0.**331** | 0.072 | 0.155 | 0.003 | 0.053 |
| Urban duration | 0.087 | 0.127 | 0.340 | 0.002 | 0.138 |
| Red beans | 0.087 | 0.009 | 0.025 | 0.197 | 0.250 |
| Sandwich | 0.051 | 0.131 | 0.010 | 0.042 | 0.171 |
| Braised fish | **0.278** | 0.008 | 0.025 | 0.054 | 0.073 |
| Braised pork | **0.400** | 0.058 | 0.049 | 0.027 | 0.002 |
| Braised chicken | **0.339** | 0.081 | 0.059 | 0.033 | 0.000 |
| Roasted chicken | 0.101 | 0.077 | 0.061 | 0.008 | 0.064 |
| Meat skewers | **0.414** | 0.068 | 0.001 | 0.005 | 0.057 |
| Fried rice | 0.050 | 0.066 | 0.056 | 0.007 | 0.002 |
| Sugar | 0.072 | 0.185 | 0.050 | 0.043 | 0.076 |
| Beer | 0.073 | 0.139 | 0.074 | 0.256 | 0.005 |
| Juices | 0.098 | 0.252 | 0.049 | 0.000 | 0.041 |
| Whisky | 0.119 | 0.075 | 0.047 | 0.364 | 0.009 |
| Margarine | **0.311** | 0.184 | 0.040 | 0.011 | 0.020 |
| Mayonnaise | **0.330** | 0.042 | 0.097 | 0.040 | 0.052 |
| Cheese | **0.263** | 0.052 | 0.085 | 0.006 | 0.036 |
| Chocolate | **0.258** | 0.187 | 0.001 | 0.005 | 0.008 |
| Active Total | 3.662 | 1.813 | 1.224 | 1.105 | 1.056 |

In bold, discrimination measures > 0.2 on dimension 1.

**Table S5.** Discrimination measures on main dimensions (eigen values > 1) of Multiple Factorial Correspondence Analyses 2.

| **Variables** | **Dimensions** | | |
|---|---|---|---|
| | **1** | **2** | **3** |
| Living area | **0.296** | 0.333 | 0.029 |
| Urban duration | **0.218** | 0.341 | 0.012 |
| Yellow gombo sauce | 0.139 | 0.122 | 0.001 |
| Crushed plantains_beans | **0.310** | 0.173 | 0.202 |
| Bean pie | **0.335** | 0.004 | 0.309 |
| Crushed bananas_beans | **0.441** | 0.048 | 0.200 |
| Corn_peanuts beans | 0.178 | 0.059 | 0.003 |
| Crushed apples_beans | **0.274** | 0.129 | 0.295 |
| Koki leaves_Peanuts pistachios | 0.163 | 0.038 | 0.017 |
| Want to gain weight | 0.088 | 0.098 | 0.003 |
| Active Total | 2.443 | 1.345 | 1.070 |

In bold, discrimination measures > 0.2 on dimension 1.

**Table S6.** Discrimination measures on main dimensions (eigen values > 1) of Multiple Factorial Correspondence Analyses 3.

| **Variables** | **Dimensions** | | | | |
|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** |
| Migrant status | **0.360** | 0.027 | 0.138 | 0.027 | 0.165 |
| Youth living area | 0.064 | 0.161 | 0.260 | 0.061 | 0.144 |
| Hamburger | **0.528** | 0.100 | 0.135 | 0.008 | 0.009 |
| Sandwich | **0.575** | 0.051 | 0.045 | 0.011 | 0.000 |

| | | | | | |
|---|---|---|---|---|---|
| Kebab | **0.313** | 0.147 | 0.007 | 0.026 | 0.255 |
| Pizza | **0.633** | 0.053 | 0.141 | 0.034 | 0.003 |
| Butter | **0.292** | 0.043 | 0.017 | 0.310 | 0.122 |
| Cake | 0.174 | 0.141 | 0.014 | 0.003 | 0.226 |
| Chocolate | **0.238** | 0.324 | 0.124 | 0.018 | 0.016 |
| Jam | 0.176 | 0.219 | 0.005 | 0.143 | 0.017 |
| Sugar | 0.053 | 0.098 | 0.006 | 0.442 | 0.000 |
| Juices | 0.219 | 0.237 | 0.024 | 0.247 | 0.000 |
| Soda | 0.415 | 0.015 | 0.073 | 0.062 | 0.132 |
| Beer | 0.127 | 0.130 | 0.437 | 0.012 | 0.006 |
| Alcohol | 0.117 | 0.241 | 0.281 | 0.035 | 0.073 |
| Active Total | 4.284 | 1.988 | 1.708 | 1.437 | 1.168 |

In bold, discrimination measures > 0.2 on dimension 1.

**Table S7.** Discrimination measures on main dimensions (eigen values>1) of Multiple Factorial Correspondence Analyses 4.

| **variables** | **Dimensions** | | | |
|---|---|---|---|---|
| | **1** | **2** | **3** | **4** |
| Migrant status | 0.100 | 0.076 | 0.445 | 0.113 |
| Youth living area | **0.247** | 0.001 | 0.452 | 0.084 |
| Stoutness perception | 0.087 | 0.052 | 0.044 | 0.358 |
| Ndole | **0.488** | 0.208 | 0.029 | 0.038 |
| Gombo | **0.263** | 0.123 | 0.035 | 0.284 |
| Koki | **0.440** | 0.082 | 0.000 | 0.022 |
| Kondre | **0.601** | 0.000 | 0.031 | 0.025 |
| Director General chicken | **0.474** | 0.008 | 0.015 | 0.095 |
| Yellow sauce | **0.345** | 0.315 | 0.019 | 0.002 |
| Pistachio sauce | 0.177 | 0.183 | 0.136 | 0.075 |
| Peanut sauce | 0.116 | 0.436 | 0.066 | 0.090 |
| Active Total | 3.338 | 1.484 | 1.271 | 1.186 |

In bold, discrimination measures > 0.2 on dimension 1.

**Table S8.** Factor loadings of principal components above the elbow on the screen plot.

| **Variables** | Factor 1 | Factor 2 | Factor 3 |
|---|---|---|---|
| Ndolé | −0.163 | 0.286 | −0.025 |
| Mbongo | **−0.484** | 0.245 | 0.034 |
| Nkwi | −0.0829 | 0.559 | −0.120 |
| Koki | **−0.352** | 0.237 | −0.169 |
| Kondre | **−0.308** | 0.309 | 0.128 |
| Director General chicken | **−0.606** | 0.032 | 0.267 |
| Yellow Gombo Sauce | −0.150 | 0.518 | 0.020 |
| Pistachio Sauce | −0.290 | 0.292 | 0.191 |
| Peanut Gombo Sauce | −0.283 | 0.368 | −0.067 |
| Crushed vegetables | −0.032 | 0.242 | −0.411 |
| Peanuts Beans | **−0.414** | 0.194 | −0.018 |
| Palm Beans | −0.048 | 0.483 | −0.277 |
| Bread | −0.128 | 0.039 | −0.256 |
| Fried Rice | −0.224 | −0.180 | −0.177 |
| Red beans | **−0.350** | 0.253 | 0.092 |
| Sandwich | −0.187 | 0.317 | −0.449 |
| Braised fish | **−0.494** | −0.134 | 0.059 |
| Braised pork | **−0.617** | −0.030 | 0.297 |
| Braised chicken | **−0.550** | −0.138 | 0.367 |
| Meat skewers | **−0.610** | 0.102 | 0.251 |
| Sugar | −0.293 | −0.068 | −0.433 |
| Beer | −0.239 | 0.226 | 0.196 |
| Juices | −0.294 | −0.196 | −0.437 |
| Whisky | −0.297 | −0.005 | 0.255 |

| | | | |
|---|---|---|---|
| Margarine | **−0.535** | −0.254 | −0.351 |
| Dairy products | **−0.468** | −0.481 | −0.032 |
| Milk | **−0.506** | −0.220 | −0.104 |
| Cheese | **−0.438** | −0.511 | −0.053 |
| Chocolate | **−0.460** | −0.222 | −0.375 |
| Plantain | −0.249 | 0.088 | −0.035 |

In bold, factor loadings > 0.3 on principal component 1.