The Relationship Among Population Number, Food Domestic Consumption and Food Consumer Expenditure for Most Populous Countries

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Abstract

The paper presents an analysis of the relationship between population number and food domestic consumption, on the one hand, and between food domestic consumption and the weight of different foods in the food and non-alcoholic beverages category as well as in disposable income, on the other hand, for the top twenty of the most populous countries in the world. The analyzed foods were meat, milk and cheese and the statistical method used was the Bravais-Pearson correlation coefficient. The obtained results validate the connections between cultural models and consumption patterns. Furthermore, several hypotheses concerning the impact of increasing the meat, milk and cheese domestic consumption on specific food world consumption for the top four countries with the highest population number were also put forth. These scenarios might be useful as a starting point in designing the strategies meant to solve the problems which occur especially when food consumption increases.

1. Introduction

When one talks about population one definitely brings up in discussion the consumption issue, since any living organism on our planet needs to consume resources in order to live and grow. Furthermore, above all, every living
organism requires specific food according to its physiological, genetic, living environment, psychological or any other kind of particularities (Peters, 2014).

Also, any species is challenged in at least two respects. Firstly, the number of individuals, which is relevant for safeguarding the future generations (Yadav, 2014) and their evolution through time by giving birth, and secondly, the challenge of ensuring the food needed for survival.

The human being is also subject to these rules. This is the reason why issues such as population growth, limited food resources, food consumption volume, income level, consumption patterns, etc., are current as well as permanent hot topics. Under these circumstances, it is important to study how the population number influences the domestic consumption of different foods, how the people’s income changes the consumption level for each food category, which is the impact on world consumption if some peoples consume more food than others, etc.

Answering these questions and more others is not a simple task, given such facts as the food products diversity, which has particular features from a country to another, the domestic consumption variation throughout a year, the consumers’ income disparities between states, different consumption patterns, etc.

1. An analysis of the relationship among population number, food domestic consumption and food consumer expenditure for the most populous countries

It is difficult to analyze all the world countries from the population number, food domestic consumption and food consumer expenditure perspectives (Criveanu and Sperdea, 2014) due both to the complexity of the study and to the current paper space limitation.

There are 253 world countries (The World Bank, 2014) and each of these has a particular population number. The food domestic consumption is different in every country depending on the type of food one focuses on. There are also 11 subcategories in the food and non-alcoholic beverages consumer expenditure category, including bread and cereals; oil and fats; fruit; vegetables; sugar and confectionery; meat; fish and seafood; milk, cheese and eggs; other food; coffee, tea and cocoa; mineral waters, soft drinks, fruit and vegetable juices (Euro monitor International Ltd, 2013, p. 30-31).

Taking into account these issues, the current study initially focuses only on the top twenty most populous countries (these countries accounted for 76.77% of the world population number in 2011 and the weight was calculated by dividing the amount of their population by the world population number in 2011). Then, the meat, milk and cheese domestic consumption was studied for the top twenty most populous countries. Last but not least, two subcategories in the food and non-alcoholic beverages consumer expenditure category were analyzed according to the food domestic consumption criterion previously mentioned, i.e. meat consumer expenditure and milk, cheese and eggs consumer expenditure.

1.1. An analysis of the relationship among population number, meat domestic consumption and meat consumer expenditure for the most populous countries

Table 1 presents an overview of population number, domestic consumption of beef, veal, pork, broiler meat and turkey and the weight of meat consumer expenditure in the food and non-alcoholic beverages consumer expenditure category and in disposable income in 2011.

The data in Table 1 emphasizes that there are significant differences among the twenty countries analyzed. Therefore, four country categories can be distinguished:

- Countries with low beef, veal, pork, broiler meat and turkey consumption per capita, and high weights of meat consumer expenditure in the food and non-alcoholic beverages consumer expenditure category and in disposable income (e.g. the Philippines);
- Countries with high beef, veal, pork, broiler meat and turkey consumption per capita, and low weights of meat consumer expenditure in the food and non-alcoholic beverages consumer expenditure category and in disposable income (e.g. Vietnam);
• Countries with low beef, veal, pork, broiler meat and turkey consumption per capita, and low weights of meat consumer expenditure in the food and non-alcoholic beverages consumer expenditure category and in disposable income (e.g. India, Indonesia, Pakistan, and Japan);

• Countries with high beef, veal, pork, broiler meat and turke y consumption per capita, and high weights of meat consumer expenditure in the food and non-alcoholic beverages consumer expenditure category and in disposable income (e.g. China, European Union 27, the United States, Brazil, Russia, and Mexico).

Table 1. Population number, domestic consumption of beef, veal, pork, broiler meat and turkey and the weight of meat consumer expenditure in the food and non-alcoholic beverages consumer expenditure category and in disposable income in 2011

| Country       | Beef and Veal (metric tons in Carcass Weight Equivalent) | Domestic consumption | Broiler Meat (metric tons in Ready-to-Cook Equivalent) | Turkey (metric tons in Ready-to-Cook Equivalent) | Population number | Domestic consumption | Beef and Veal (kg per capita) | Broiler Meat (kg per capita) | Turkey (kg per capita) | Weight of meat consumer expenditure in: |
|---------------|-----------------------------------------------------------|----------------------|-------------------------------------------------------|------------------------------------------------|-------------------|----------------------|--------------------------|-------------------------------|--------------------------|-------------------------------------|
|               |                                                           |                      |                                                       |                                              |                   |                      |                          |                                |                          | Food and non-alcoholic beverages category (%) | Disposable income (%) |
| China         | 5,524,000                                                 | 51,108,000           | 13,015,000                                            | 40,000                                       | 1,344,130,000     | 11.1                                              | 38.02                     | 9.68                          | 0.3                        | 29.64                                | 4.39                        |
| India         | 1,976,000                                                 | 2,891,000            | n/a                                                   | n/a                                          | 1,221,156,319     | 1.6                                               | n/a                       | 2.37                          | n/a                       | 6.81                                | 1.26                        |
| European Union 27 United States | 8,034,000                              | 20,822,000           | 9,010,000                                             | 1,885,000                                    | 506,031,022       | 15.8                                              | 41.15                     | 17.81                         | 3.73                      | 22.53                                | 2.83                        |
| Indonesia     | n/a                                                       | n/a                  | 1,515,000                                             | n/a                                          | 243,801,639       | n/a                                               | n/a                       | 6.21                          | n/a                       | 6.79                                | 2.06                        |
| Brazil        | 7,730,000                                                 | 2,644,000            | 9,422,000                                             | 348,000                                       | 196,935,134       | 39.2                                              | 13.43                     | 47.84                         | 1.77                      | 21.08                                | 3.14                        |
| Pakistan      | 1,503,000                                                 | n/a                  | n/a                                                   | n/a                                          | 176,166,353       | 8.5                                               | n/a                       | n/a                          | n/a                       | 10.16                                | 4.03                        |
| Nigeria       | n/a                                                       | n/a                  | n/a                                                   | n/a                                          | 164,192,925       | n/a                                               | n/a                       | n/a                          | n/a                       | 16.45                                | 6.82                        |
| Bangladesh    | n/a                                                       | n/a                  | n/a                                                   | n/a                                          | 152,862,431       | n/a                                               | n/a                       | n/a                          | n/a                       | n/a                                 | n/a                        |
| Russia        | 2,346,000                                                 | 3,035,000            | 3,013,000                                             | 116,000                                       | 142,956,460       | 16.4                                              | 21.23                     | 21.08                         | 0.81                      | 28.93                                | 7.68                        |
| Japan         | 1,237,000                                                 | 2,522,000            | 2,104,000                                             | n/a                                          | 127,817,277       | 9.6                                               | 19.73                     | 16.46                         | n/a                       | 8.70                                 | 1.14                        |
| Mexico        | 1,921,000                                                 | 1,710,000            | 3,473,000                                             | 164,000                                       | 119,361,233       | 16.9                                              | 14.33                     | 29.10                         | 1.37                      | 21.89                                | 4.73                        |
| Philippines   | n/a                                                       | 1,432,000            | n/a                                                   | n/a                                          | 95,053,437        | 15.0                                              | n/a                       | n/a                          | n/a                       | 17.00                                | 5.96                        |
| Ethiopia      | n/a                                                       | n/a                  | n/a                                                   | n/a                                          | 89,393,063        | n/a                                               | n/a                       | n/a                          | n/a                       | n/a                                 | n/a                        |
| Vietnam       | n/a                                                       | 2,113,000            | n/a                                                   | n/a                                          | 87,840,000        | 24.0                                              | n/a                       | n/a                          | n/a                       | 13.83                                | 2.90                        |
| Egypt         | n/a                                                       | n/a                  | n/a                                                   | n/a                                          | 79,392,466        | n/a                                               | n/a                       | n/a                          | n/a                       | 25.03                                | 10.40                       |
| Iran          | n/a                                                       | n/a                  | n/a                                                   | n/a                                          | 75,424,285        | n/a                                               | n/a                       | n/a                          | n/a                       | n/a                                 | n/a                        |
| Turkey        | n/a                                                       | n/a                  | n/a                                                   | n/a                                          | 73,058,638        | n/a                                               | n/a                       | n/a                          | n/a                       | 18.24                                | 4.13                        |
| Thailand      | n/a                                                       | n/a                  | n/a                                                   | n/a                                          | 66,576,332        | n/a                                               | n/a                       | n/a                          | n/a                       | 10.96                                | 3.16                        |
| Congo, Dem. Rep. | n/a                               | n/a                  | n/a                                                   | n/a                                          | 63,931,512        | n/a                                               | n/a                       | n/a                          | n/a                       | n/a                                 | n/a                        |
| Total         | 41,917,000                                                | 93,726,000           | 58,108,000                                            | 4,826,000                                     | -                 | -                                                | -                         | -                            | -                         | -                                   | -                            |
| Other countries | 13,801,000                            ![](http://www.procedia-economics.org/)12,000 | 21,802,000 | 182,000 | - | - | - | - | - | - | - | - |
| Total         | 55,718,000                                                | 101,128,000          | 79,910,000                                            | 5,008,000                                     | -                 | -                                                | -                         | -                            | -                         | -                                   | -                            |

Source: Made by author based on The World Bank, 2014. Population, total in 2011. Retrieved September 10, 2014, from http://data.worldbank.org/indicator/SP.POP.TOTL and based on own calculation of data from Euromonitor International Ltd., 2013. World Consumer Income and Expenditure Patterns 2013, 13th Edition, p. 77, 175-176, United States Department of Agriculture, 2014. Foreign Agricultural Service, Beef and Veal Summary Selected Countries, Pork Summary Selected Countries, Broiler Meat Summary Selected Countries, Turkey Summary Selected Countries, Retrieved September 08, 2014, from http://apps.fas.usda.gov/psdonline/ 

These heterogeneous results are explained by the particular correlations of the analyzed data in Table 1, which can be emphasized by statistical analysis through the Bravais-Pearson coefficient. Thus, the Bravais-Pearson coefficient values of the correlation between meat domestic consumption (expressed in metric tons) and population number are shown in Table 2. First of all, the data (Lunau et al., 2013, pp. 226) underscores a positive and moderate correlation between pork domestic consumption and population number, on the one hand, and between broiler meat domestic consumption and population number, on the other hand. The explanation is that these two types of meat are consumed in proportional quantities with the countries’ population number (China, European Union 27, the United States, etc.).
Secondly, there is no correlation between beef and veal domestic consumption and population number, on the one hand, and between turkey domestic consumption and population number, on the other hand, because the two most populous countries consume small quantities when compared with other populous countries (e.g. European Union 27, the United States, Brazil, Russia, etc.), which have a higher consumption volume.

Table 2. Correlation between meat domestic consumption and population number.

| Domestic consumption | Pearson Correlation | Sig. (2-tailed) | N |
|----------------------|---------------------|-----------------|---|
| Beef and Veal        | .377                | .101            | 20|
| Pork                 | .711**              | .000            | 20|
| Broiler Meat         | .563                | .010            | 20|
| Turkey               | .121                | .611            | 20|

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Made by author based on the data in Table 1

The differences in various types of meat consumption between China and India are explained by the influences of religion on a specific culture model. Thus, China’s higher beef, veal, pork and broiler meat consumption is accounted for by the 52.2% religiously unaffiliated people (701,635,860 people) and 5.1% Christian people (68,550,630 people). It is clearly observable that other religions which prohibit or discourage the consumption of certain types of meat (Ensminger et al., 1994, p.1914, 1917), such as Buddhism (18.2%) and Islam (1.8%), have low weights in China (Central Intelligence Agency, 2014).

On the other hand, India’s non-existent pork consumption and low beef, veal and broiler meat consumption is caused by the higher weight of Hindu people (80.5%) who do not eat beef, veal and pork, Muslim people (13.4%), who reject pork, and Christian people (2.3%) who use beef, veal and broiler meat in their meals (Kittler and Sucher, 2008, p.86; Central Intelligence Agency, 2014). The same situation is encountered in Indonesia, where there are 87.2% Muslims and 1.7% Hindu people (Central Intelligence Agency, 2014).

In Table 3 are presented the Bravais-Pearson coefficient values of the correlation between the meat domestic consumption (expressed in kg per capita) and the weight of meat consumer expenditure in the food and non-alcoholic beverages consumer expenditure category and in disposable income. Firstly, there is a positive and moderate correlation between pork domestic consumption and the weight of meat consumer expenditure in the food and non-alcoholic beverages category. Secondly, there is a positive and weak correlation between beef and veal domestic consumption and the weight of meat consumer expenditure in the food and non-alcoholic beverages category, on the one hand, and between broiler meat domestic consumption and the weight of meat consumer expenditure in the food and non-alcoholic beverages category, on the other hand. This means that the higher weight of beef, veal, pork and broiler meat consumer expenditure in the food and non-alcoholic beverages category is, the higher domestic consumption of these types of meat will be. Thirdly, there is no correlation between turkey domestic consumption and the weight of meat consumer expenditure in the food and non-alcoholic beverages category due to the low proportion of turkey in meat consumption and in food expenditure. Fourthly, there is no correlation between beef, veal, pork, broiler meat and turkey domestic consumption and the weight of meat consumer expenditure in disposable income as a result of differences among meat consumption volume, disposable income level, etc.

Table 3. Correlation between meat domestic consumption and the weight of meat consumer expenditure in the food and non-alcoholic beverages category and in disposable income.

| Domestic consumption | Weight of meat consumer expenditure in: |
|----------------------|----------------------------------------|
|                      | Food and non-alcoholic beverages        |
|                      | Disposable income                       |
| Beef and Veal        | .446                                   |
|                      | -.010                                  |
| Pork                 | .628*                                  |
|                      | .093                                   |
| Broiler Meat         | .470*                                  |
|                      | -.008                                  |
| Turkey               | .343                                   |
|                      | -.114                                  |

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Made by author based on the data in Table 1
Taking into account the influence of the population number on meat domestic consumption, it is necessary to measure the impact of increasing the beef, veal, pork, broiler meat and turkey consumption on the specific food world consumption (Fig. 1). Only the top four countries with the highest population number (China, India, European Union 27 and the United States) were selected because these countries have a meat consumption average weight of 64.68% of the world meat consumption and of 48.78% for beef and veal, of 77.84% for pork, of 48.28% for broiler meat and of 83.83% for turkey, individually speaking.

Fig. 1. Impact of increasing the beef, veal (a), pork (b), broiler meat (c) and turkey (d) consumption in China, India, EU 27 and US on the specific food world consumption

Source: Made by author based on the data in Table 1

An increase in the 2011 beef and veal consumption by 50%, as long as the world beef and veal consumption remains constant, would bring on a situation where China, India, European Union 27 and the United States would account for almost three-quarters (73.17%) of the world beef and veal consumption. In other words, the entire domestic consumption in Brazil (7,730,000 metric tons), Pakistan (1,503,000 metric tons), Russia (2,346,000 metric tons), Japan (1,237,000 metric tons) and Mexico (1,921,000 metric tons) would have to be transferred to China, India, European Union 27 and the United States to cover their domestic consumption, which would rise up to 40,770,000 metric tons. Supposing that the 2011 beef and veal consumption for China, India, European Union 27 and the United States doubles, then these countries will account for 97.56% (i.e. 54,360,000 metric tons) of the 2011 world beef and veal consumption. Out of this weight, the United States benefits from 41.8% and European Union 27 from 28.84%.
In the case of pork, the rise of the 2011 consumption by 50%, while the world pork consumption continues to remain at the same level, implies that China, European Union 27 and the United States will exceed the world pork consumption by 16.76%, reaching 120,405,000 metric tons. This means that the other world countries will no longer consume pork and the world pork production will rise by at least 16.76%.

Assuming that China’s, European Union’s 27’s and the United States’ 2011 pork consumption surges 100%, then their weight will be 155.69% (160,540,000 metric tons) out of the 2011 world pork consumption. In this case, China’s 2011 pork consumption alone will represent 99.13% of the 2011 world pork consumption.

An increase in the 2011 broiler meat consumption by 50%, supposing that the world broiler meat consumption remains constant, leads to China, India, European Union 27 and the United States accounting for approximately three-quarters (72.42%) of the world broiler meat consumption. In terms of consumption volume, countries such as Indonesia (1,515,000 metric tons), Brazil (9,422,000 metric tons), Russia (3,013,000 metric tons), Japan (2,104,000 metric tons), and Mexico (3,473,000 metric tons) would then have to cut off their entire domestic consumption to ensure the increase in the top four countries’ domestic consumption. Moreover, if the 2011 broiler meat consumption for China, India, European Union 27 and the United States doubles, then these countries will reach 96.56% (77,162,000 metric tons) of the 2011 world broiler meat consumption. Out of this weight, the United States account for 34.2% and China for 32.57%. A 50% rise in the 2011 turkey consumption, assuming that the world turkey consumption is stable, would involve that China, European Union 27 and the United States would go beyond the world turkey consumption level by 25.74%, up to 6,297,000 metric tons. Thus, the other world countries will no longer consume turkey and the world turkey production will increase by at least 25.74%.

However, if China’s, European Union 27’s and the United States’ 2011 turkey consumption should increase by 100%, then their weight would be 167.65% (8,396,000 metric tons) of the 2011 world turkey consumption. In this case, the United States would account for 90.77% and European Union 27 for 75.28%.

1.2. An analysis of the relationship among population number, milk and cheese domestic consumption and milk, cheese and eggs consumer expenditure for the most populous countries

The overview of population number, production, domestic consumption of milk and cheese and the weight of milk, cheese and eggs consumer expenditure in the food and non-alcoholic beverages consumer expenditure category and in disposable income in 2011 is shown in Table 4.

In a similar way, four country categories can be identified by analyzing the data in Table 4:

- Countries with low milk and cheese consumption per capita, and high weights of milk, cheese and eggs consumer expenditure in the food and non-alcoholic beverages consumer expenditure category and in disposable income (e.g. Mexico);
- Countries with high milk and cheese consumption per capita, and low weights of milk, cheese and eggs consumer expenditure in the food and non-alcoholic beverages consumer expenditure category and in disposable income (e.g. the United States);
- Countries with low milk and cheese consumption per capita, and low weights of milk, cheese and eggs consumer expenditure in the food and non-alcoholic beverages consumer expenditure category and in disposable income (e.g. China, Japan, and the Philippines);
- Countries with high milk and cheese consumption per capita, and high weights of milk, cheese and eggs consumer expenditure in the food and non-alcoholic beverages consumer expenditure category and in disposable income (e.g. India, European Union 27, Brazil, and Russia).

Table 5 contains the Bravais-Pearson coefficient values of the correlation between the milk and cheese domestic consumption (expressed in metric tons) and population number. The data shows a positive and moderate correlation between milk domestic consumption and population number, on the one hand, and no correlation between cheese domestic consumption and population number, on the other hand. These results are different due to China’s and India’s people, who consume milk but do not consume cheese.

The Chinese people do not eat cheese for culture-related reasons (Sokolov, 1993, pp. 99; Coe, 2009, pp. 61). Indeed, most of the Asia and Pacific countries’ population has a low percent of lactase persistence (8-24% for the
Chinese and 36-39% for the Indians) due to genetic, evolutionary, physiological, or other factors. As a solution, during the cheese manufacturing and aging process, the lactose is submitted to multiple chemical reactions (Tunick, 2014, p. 17-45) so that the final cheese should not contain it.

Table 4. Population number, production, domestic consumption of milk and cheese and the weight of milk, cheese and eggs consumer expenditure in the food and non-alcoholic beverages consumer expenditure category and in disposable income in 2011

| Country         | Production | Domestic consumption | | Disposable income (%) |
|-----------------|------------|----------------------|-----------------|-----------------------|
| China           | 30,700,000 | 12,600,000           | 1,344,130,000   | 9.09                  |
| India           | 53,500,000 | 51,660,000           | 1,221,156,319   | 41.03                 |
| European Union  | 138,220,000| 33,870,000           | 506,031,022     | 64.92                 |
| United States   | 88,978,000 | 28,436,000           | 311,582,564     | 88.52                 |
| Indonesia       | n/a        | n/a                  | 243,801,639     | n/a                   |
| Brazil          | 30,715,000 | 11,429,000           | 196,935,134     | 56.29                 |
| Pakistan        | n/a        | n/a                  | 176,166,353     | n/a                   |
| Nigeria         | n/a        | n/a                  | 164,192,925     | n/a                   |
| Bangladesh      | n/a        | n/a                  | 152,862,431     | n/a                   |
| Russia          | 31,646,000 | 11,650,000           | 142,956,460     | 79.04                 |
| Japan           | 7,474,000  | 4,058,000            | 127,817,277     | 30.79                 |
| Mexico          | 11,046,000 | 4,100,000            | 119,361,233     | 33.32                 |
| Philippines     | 17,000     | 61,000               | 95,053,437      | 0.62                  |
| Ethiopia        | n/a        | n/a                  | 89,393,063      | n/a                   |
| Vietnam         | n/a        | n/a                  | 87,840,000      | n/a                   |
| Egypt           | n/a        | n/a                  | 79,392,466      | n/a                   |
| Iran            | n/a        | n/a                  | 75,424,285      | n/a                   |
| Turkey          | n/a        | n/a                  | 73,058,638      | n/a                   |
| Thailand        | n/a        | n/a                  | 66,576,332      | n/a                   |
| Congo, Dem. Rep.| n/a        | n/a                  | 63,931,512      | n/a                   |
| Subtotal        | 392,296,000| 157,864,000          | 15,186,000      | n/a                   |
| Other countries | 61,431,000 | 15,309,000           | 1,333,000       | n/a                   |
| TOTAL           | 453,727,000| 173,262,000          | 16,539,000      | n/a                   |

*Note: The following formula was used to calculate the domestic consumption in liter per capita:

\[
\text{Milk ml} = \text{Milk kg} \times \frac{1 \text{ ml}}{1.031 \text{ kg}}
\]

Source: Made by author based on The World Bank, 2014.Population, total in 2011, Retrieved September 10, 2014, from http://data.worldbank.org/indicator/SP.POP.TOTLand based on own calculation of data in Euromonitor International Ltd, 2013.World Consumer Income and Expenditure Patterns 2013, 13th Edition, p. 77, 175-176, United States Department of Agriculture, 2014.Foreign Agricultural Service, Cows Milk Production and Consumption: Summary For Selected Countries, Retrieved September 07, 2014, from http://apps.fas.usda.gov/psdonline/

China’s and India’s milk consumption can be explained by the fact that population with lactose intolerance use lactose-reduced or lactose-free milk with lactase enzyme ($\beta$-D-galactosidase) added. This enzyme is responsible for splitting lactose into glucose and galactose molecules in the human small intestine and has the same function in milk when it is added (Ur-Rehman, 2009, pp. 99; Batt, 2014, pp. 390; O’Mahony and Fox, 2014, pp.29).

Furthermore, in India, some of the dairy products such as ghee do not contain milk components, which are removed in the clarifying process (Morris and Rossiter, 2011, pp. 273), or these products are permanently avoided by strict Hindus, who are vegetarians (Ensminger et al., 1994, pp.1916).
It is important to highlight that these consumption patterns evolve according to various factors such as population number evolution, changes in people’s purchasing power (Hoen, 2014), availability of food resources, transformation of traditional food into an industrialized food diet (Ene, 2009, pp. 162), and so on.

Table 5: Correlation between milk and cheese consumption and population number.

| Domestic consumption | Pearson Correlation | Sig. (2-tailed) | N |
|----------------------|---------------------|-----------------|---|
| Milk                 | .702**              | .001            | 20 |
| Cheese               | .138                | .562            | 20 |

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Made by author based on the data in Table 4

Table 6: Correlation between milk and cheese consumption and the weight of milk, cheese and eggs consumer expenditure in the food and non-alcoholic beverages category and in disposable income.

| Domestic consumption | Weight of milk, cheese and eggs consumer expenditure in: |
|----------------------|--------------------------------------------------------|
|                      | Food and non-alcoholic beverages category | Disposable income |
| Milk                 | Pearson Correlation | .362 | -.046 |
| Sig. (2-tailed)      | .117 | .847 |
| N                    | 20 | 20 |
| Cheese               | Pearson Correlation | .182 | -.142 |
| Sig. (2-tailed)      | .443 | .549 |
| N                    | 20 | 20 |

Source: Made by author based on the data in Table 4

The Bravais-Pearson coefficient values of the correlation between the milk and cheese domestic consumption (expressed in liter or kg per capita, as the case may be) and the weight of milk, cheese and eggs consumer expenditure in the food and non-alcoholic beverages consumer expenditure category and in disposable income are presented in Table 6. Thus, the values indicate that there is no correlation both for milk and cheese to underscore the differences among countries concerning both the purchase prices for the two products and the disposable income level. The same top four countries with the highest population number were chosen with a view to measuring the impact of increasing the milk and cheese consumption on the specific food world consumption (Fig. 2). This particular selection has been made to facilitate the comparison of the results with the ones in the previous analysis, equally taking into account their higher consumption weight (76.12% on average, 73.05% for milk and 79.15% for cheese) in the specific food world consumption.

Fig. 2. Impact of increasing the milk (a) and cheese (b) consumption in China, India, EU 27 and US on the specific food world consumption

Source: Made by author based on the data in Table 4

A 50% increase in the 2011 milk consumption, assuming that the world milk consumption remains constant, means that China, India, European Union 27 and the United States will supplement the world milk consumption by 9.57% and their domestic consumption volume will be 189,849,000 metric tons. Thus, all the other world countries such as Brazil, Russia, Japan, Mexico, the Philippines, etc. should stop consuming milk to ensure the top four countries’ consumption. In this case, the world milk production will have to rise by at least 9.57%.
If, however, China’s, India’s, European Union 27’s and the United States’ 2011 milk consumption should double, then their weight would be 146.1% (253,132,000 metric tons) of the 2011 world milk consumption. In this case, 59.63% is attributable to India and 39.1% to European Union 27.

In the case of cheese, the 50% rise of the 2011 consumption, provided that the world cheese consumption remains constant, implies that European Union 27 and the United States will exceed the world cheese consumption by 18.72%, reaching 19,635,000 metric tons. So, Brazil’s (715,000 metric tons), Russia’s (759,000 metric tons), Japan’s (260,000 metric tons), Mexico’s (344,000 metric tons), the Philippines’ (18,000 metric tons), and other countries’ (1,353,000 metric tons) domestic consumption is not enough to cover the European Union 27’s and the United States’ increase in consumption. Likewise, the world cheese production should rise by at least 18.72%.

However, if the 2011 cheese consumption for European Union 27 and the United States should move up by 100%, then their weight would be 158.29% (26,180,000 metric tons) of the 2011 world cheese consumption. In this case, European Union 27’s 2011 cheese consumption alone would be 101.26% of the 2011 world cheese consumption.

2. Conclusions

In the future, the domestic consumption of food will continue to go up, as the population number will rise as well (Mulligan, 2015), taking into account that food covers the physiological needs according to Maslow’s hierarchy of needs. The trend will be set by the most populous countries, on account of their higher weight in the world population number.

There is a significant difference among country categories with respect to beef, veal, pork, broiler meat, turkey, milk and cheese consumption due to such particular issues as population number, domestic consumption volume, disposable income level, consumption patterns, cultural model, etc.

The disparities in correlations between different types of domestic consumption of meat and population number are explainable by the fact that, firstly, most people of the world’s most populous countries consume more pork and broiler meat than beef, veal and turkey. In the case of cheese, the genetic and physiological aspects have a strong influence over the people’s consumption behavior. Secondly, each country’s cultural model influences the consumption patterns through the principles of each religion that make reference to the types of food to be consumed.

If China, European Union 27 and the United States boost their 2011 pork consumption by 50%, an important world food crisis would emerge because the world pork production would be driven up by 16.76%. The same situation is valid for turkey consumption, with the difference that the excess percent for the world turkey production would be 25.74%.

A similar consequence would be brought about by a 50% increase in milk consumption, only that India would be involved in this along with the other three countries previously mentioned and their domestic consumption would exceed the world milk production by 9.57%; likewise, for cheese consumption, European Union 27’s and the United States’ domestic consumption alone would rise and the world cheese production would be surpassed by 18.72%.

Conversely, a 50% rise in the 2011 beef, veal and broiler meat consumption in China, India, European Union 27 and the United States would affect the world beef, veal and broiler meat consumption as a result of the approximate three-quarters weight for both types of meat in the world beef, veal and broiler meat consumption, but it would not generate a world food crisis. Supposing that the consumption doubled distinctly for all the analyzed foods, it would produce major changes in the specific food world consumption. Thus, the countries with the higher weight in the specific food world consumption would be: the United States (41.8%) for beef and veal, China (99.13%) for pork, the United States (34.2%) for broiler meat, the United States (90.77%) for turkey, India (59.63%) for milk and European Union 27 (101.26%) for cheese.

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