

Comparative analysis of multiple resources of consumption data

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Introduction

The dietary exposure assessment (DEA) is performed to scientifically estimate the safety to human health due to exposure via diet to food treated with pesticides as a role for authorization of these products. An important data basis for exposure assessment is the consumption data, provided by a national survey where the dietary habits are statistically treated. The objective of this analysis was to compare the data from Brazil (2008/2009) and Mexico (2002) with GEMS Food (2019) to understand how some differences among countries of a same cluster might affect the exposure when compared with individual national data. Processed and animal commodities were not considered in this comparison.

Evaluation of data

GEMS Food 2019:

The GEMS/Food cluster diets, developed by WHO, represent average per capita food consumption for 17 groups (grouped according their similar food consumption), where the amount of food available for consumption in each group of countries is divided by total population numbers.

Brazil

POF (Family Budget Survey) is the research carried out by IBGE (Brazilian Institute of Geography and Statistics) and one of its chapter publication refers to the data consumption of Brazilian population (older 10y) during 2 nonconsecutive days.

100 food commodities were compared and grouped in ranges, considering different percentage of increase or reduction.

Furthermore, in order to check the impact of this analysis for the exposure, the chronic assessment was performed for a total of 10 pesticides, considering the current maximum residue levels (MRLs), acceptable daily intake (ADIs) and both consumption data.

The exposure varied at maximum 20% and in any case the exposure exceeded 80% of ADI. However, it is import to emphasize, the consumption is not the only one parameter of the dietary assessment, thereby, the variation could be higher, depending on other parameters as lower ADIs and/or higher MRLs.

Mexico

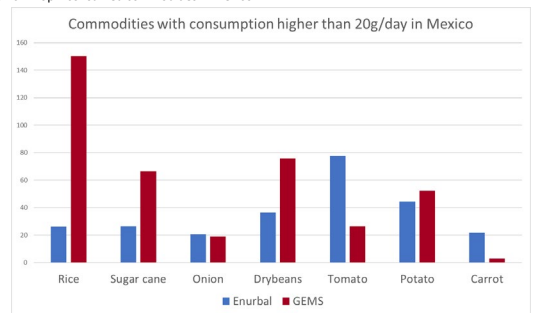
ENURBAL is the consumption survey conducted in Mexico. The data obtained from 2002 was related to the metropolitan area from Mexico City and only those families who had the low socioeconomic situation according to national census of 2000 were interviewed.

In this survey, many crops are missing or published as regional processed food what made the comparative analysis not possible. Due to this reason, only 24 raw commodities were evaluated.

Table 2: Crop grouping according its variation of consumption:

Enurbal > GEMS - % of reduction		
Low variation (n = 6)	0 – 25%	lemon, onion, pea, watermelon
	25 – 50 %	broccoli, papaya
Relevant variation (n=5)	50 – 75 %	corn, guava, peach, sweet corn, tomato
High variation (n=7)	75 – 100 %	carrot, chile, cucumber, green beans, lettuce, melon, zucchini
Enurbal > GEMS - % of increase		
Low variation (n = 2)	0 – 50%	orange, potato
	50 – 100%	grape
Relevant variation (n=3)	100 – 200%	dry beans, sugar cane
	>200%	rice

Graphic 2: Top 7 consumed commodities in Mexico:



Each group (low, relevant and high variation) comprised 33% of total of food commodities analyzed. However, differently from Brazil, 5 of 7 most consumed crops are in the relevant or high variation group.

Conclusion

- GEMS Food is an important tool available to estimate the consumption data and perfectly “fits for purpose”, mainly considering a first tier of dietary risk assessment.
- Local consumption data provides more realistic data, but to be applicable, surveys should be designed to properly represent the whole population, different habits and food varieties.
- For Brazilian data, all crops with a high variation has low consumption. Therefore, the impact expected on DEA is minimum. However, for crops with high consumption, the national data might be an important tool for refinement.
- Due to the goal of survey, the available data from Mexico do not reflect properly the consumption of whole population for DEA. So, for this purpose, it is recommended the use of GEMS Food data.
- Improvements on national researches are quite important, such as inclusion of consumption data for whole population (eg infants).

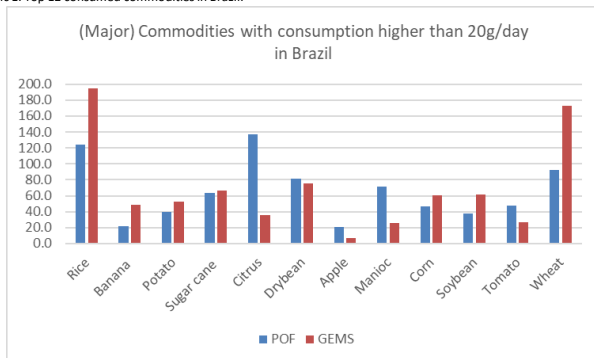
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- <https://www.who.int/data/gho/samples/food-cluster-diets>

Table 1: Crop grouping according its variation of consumption:

POF > GEMS - % of reduction		
Low variation (n = 20)	0 - 25%	Brazil nuts, dry beans, fig, grape, pepper, pumpkin, watermelon
	25 - 50%	Zucchini, garlic, custard apple, cashew, cashew nuts, cherry, guava, kiwi, papaya, quince, pear, cabbage and tomato
Relevant variation (n = 13)	50 - 75 %	Açai, oat, sweet potato, sugar beet, citrus, apricot, escarole, spinach, yam, apple, manioc, cucumber, peach
High variation (n = 17)	75 - 100%	Barbados cherry, lettuce, leek, endive, cocoa, coffee, persimmon, carrot, tea, chicory, gooseberry, linseed, passion fruit, strawberry, turnip, celery, beans with pods.
POF < GEMS - % of increase		
Low variation (n = 11)	0 - 50%	Avocado, pineapple, plum, olive, potato, sugarcane, kale, gherkin, corn, mustard and pine nut.
	50 - 100%	Rice, coconut, palm fruit, mango, nectarine, soybean, wheat
Relevant variation (n = 14)	100 - 200%	Banana, onion, green onion, barley, cauliflower, pea, lentil.
	>200%	Chard, watercress, artichoke, cotton, peanut, blackberry, asparagus, eggplant, broccoli, rapeseed, chestnut, cumin, ginger, sesame, sunflower, chickpea, melon, palm heart, sweet pepper, pistachio nut, okra, quinoa, radish, rucola, tannia leaves.

Graphic 1: Top 12 consumed commodities in Brazil:



Note: Other crops with consumption higher than 20g/day that were not considered on graphic are açai and tea.

Approximately 30% of food commodities presented a no or low variation (up to 50% of variation), 30% showed relevant variation (50 - 75% of reduction and 50 - 200% of increase), and 40% high variation (75 - 100% of reduction and higher than 200% of increase). Nevertheless, was observed that crops within the group of high variation have very low consumption, which means no considerable impact for the dietary exposure. For the group with relevant variation, 7 crops belong to the “top 12 consumed commodities” while other 5 are part of the group of low variation.