Supplementary Materials for

Amazon conservation and students’ interests for biodiversity: The need to boost science education in Brazil

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Published 26 August 2020, Sci. Adv. 6, eabb0110 (2020)
DOI: 10.1126/sciadv.abb0110

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Supplementary Materials and Methods: sampling

All data collection reported in the present article was carried out within the ROSE Project, coordinated by the University of Oslo, which has been active since the early 2000s and is scheduling a new data collection around the world in 2020-1. The first data collection of this study is called ROSE Pilot 2007 study (41), and it is much smaller than the other two subsequent samples. Due to funding problems it was adopted a quota sample by convenience combined with maximum variation sampling(42,43), applied in two schools in two strikingly different cities: Tangará da Serra (MT), in Center-West region, and São Caetano do Sul (SP), in the Southeast region, with 625 students (see Fig 1, main text). Therefore, the results of the statistical tests related with temporal tendencies should be seen with caution due to differences related to sample sizes and representativeness.

The other data collection included all regions of Brazil, and followed PISA 2009 protocol (13). The samplings of the first run were carried out in 2010-1 using the same standardized questionnaire applied before in the pilot study in Brazil and in more than 40 countries in the ROSE project (10, 11), with 245 items structured similarly to the Likert scale. As mentioned in the main text, the items were composed of a statement and students expressed their opinion in a four-point school, with two of them in the field of disinterest or disagreement and two of them in the field of interest or agreement. Thus, there was no neutral point, as in the classical Likert scale. The questionnaires were printed with optical reading technology, greatly reducing errors in the preparation of the database.

The sampling project was designed employing stratified sampling by the 26 states and the Federal District, with proportional allocation, having as sample universe the PISA 2009 sample, which comprised 535 schools (13). Those that did not have any contact records, such as postal address, telephone or e-mail, were excluded from the sample universe. This step was necessary to ensure the practical feasibility of data collection. Among the schools able to participate in the data collection, 160 schools were randomly drawn, based on canonical calculations that take into account the admitted sampling error, the normal curve value corresponding to the desired level of accuracy (95%), and the design effect (“deff”) corresponding to the school draw, taking into account the degree of intraclass correlation estimated based on previous studies and the average number of questionnaires per school, according to the protocol adopted (10). 160 schools were randomly selected, 120 of which were part of the main sample and 40 could be used for replacement, seeking to reach the goal to be achieved within the admitted sampling error (44). 2,365 students participated in the study of the first run, coming from 84 schools, from all sampled units, according to the protocol of the ROSE project (10), considering that the sample target with national and regional representativeness was reached. The North and Northeast regions had the lowest sampling error, which is reflected in the largest number of valid cases (see Table 2, main text).

Data collection took place in two phases. Between August and September 2010 the envelopes with questionnaires were sent to schools. The research ethics protocol adopted required that the school could refuse to participate in the research, even with the guarantee of confidentiality. There was an effective refusal by roughly 30% of the schools to participate, which led to the use of the schools’ replacement drawn. Thus, postal delivery
reached 157 different schools. In September 2011, the collection stage was concluded, with questionnaires received from 84 schools, among those 157 initially drawn. The North and Northeast regions had the lowest sampling error, which is reflected in the largest number of valid cases (see Table 2, main text). Schools in the Central-West and South regions participated below the planned level, with the largest sampling error, which is reflected in the lowest number of valid cases. The Southeast region remained at an intermediate level. Three rural schools only were drawn, one from South region (RS), another from the Southeast (SP) and one from the Northeast (MA). No rural school from the North region was part of the sample. Further details can be found in the Ph.D. thesis that resulted from the original research (44).

In the data collection carried out in 2014, the original questionnaire with 245 items was reduced to 73 items after a careful study of answers’ variation. Some complains were considered regarding difficulties related to the completion of the task by the students. This reduction explains the absence of the specific items used to assess the interest in biodiversity that existed in the previous survey. New sections on areas not covered in the 2010 questionnaire were added, and the application occurred concurrently in Brazil and Italy (14).

The sampling project was basically the same as the one adopted in the previous collection, with universe samples composed by the schools of PISA / 2009. The questionnaires were also printed with optical reading technology, greatly reducing errors in the making of the database. New procedures for sending and returning questionnaires were adopted, which allowed foreseeing a considerable increase in the percentage of questionnaires returned on time. Thus, 120 schools were drawn, including a group of 20 schools to replace schools that could possibly refuse to participate.

After sending questionnaires to 100 schools, located in 87 municipalities, 78 schools from 72 municipalities from all regions of the country returned, with a total of 2,404 students. This total, reached in just over two months without the use of replacement schools, made it possible to achieve the planned goal to maintain the level of confidence in the sample, allowing studies on a national and regional basis. Further details can be obtained in the two Ph.D. thesis that resulted from this piece of research (45,46), and in Figure 1 (main text). Table S1 brings information about the sample’s localities in the North region.

INSERT TABLE S1 HERE

Table S1 Context of settlement in the North Region of Brazil. Lines in gray indicate “old” cities, lines in white indicate “new” cities (see main text). Information compiled from Brazilian Institute of Geography and Statistics (IBGE) site (47)

Figure 1 (see main text) brings a broad picture of the proximity of the indigenous peoples’ settlings, taking into account available data around the year 2000, but do not consider isolated peoples and those living in urban areas (28).

All the printed filled-in forms used for optical reading, and the databases of the three collections were incorporated into the archives of the Research Nucleus on Evolution Education, Epistemology and Outreach “Charles Darwin”, located at the School of Education of the University of São Paulo, and are available for further research under request. For the present study, the three databases were made compatible, configuring secondary use of an anonymous opinion poll database carried out more than five years ago, which dispenses, according to Brazilian laws, the application of additional ethics protocols in research.
Supplementary Materials and Methods: data analysis and statistical tests

The groupings showed in Table 1 (see main text) were constructed after analysis of eight items of Sections A and E of ROSE Brazil 2010/1 (43). The items were:

- A3: The inner part of Earth
- A15: How plants grow and reproduce themselves
- A16: How people, animals, plants and the environment depend on each other
- A27: Dangerous and venomous animals
- A28: Toxic plants in my region
- E18: Medicinal use of plants
- E24: Animals of my region
- E25: Plants of my region

In sections A and first part of section E of the questionnaire, called “What I want to learn about”, students were asked to mark one option among four, answering the question: “How interested are you in learning about the following?”. There were four squares, on the extreme left the label read “not interested” and in the extreme right “very interested”. Answers were coded 1 to 4 accordingly.

Analysis of this data was aimed at answering two questions:

- Is it possible to identify two groups of respondents (“interested” and “disinterested”) according to the general interest in relation to these items? What is the percentage of respondents, in relation to the total, that belongs to each group?
- What is the distribution of respondents, in each group, by geographic region?

All analyzes that will be presented in the next sections were made using the statistical software IBM SPSS Statistics 26. Only respondents aged 14 to 16 years old were taken into account in this analysis.

For the construction of groups of respondents, we decided to use the TwoStep Cluster algorithm, which is a method that builds groups (clusters) from categorical variables and / or at an interval scale (15, 16). As the eight items are categorical variables, TwoStep Cluster is a more suitable method for the construction of clusters concerning methods that assume that the variables are only on an interval scale (such as, for example, the K-Average and Hierarchical Cluster methods).

For data analysis, only individuals who gave valid answers to all items were considered, totaling a sample of 1,803 respondents. Figure S1 shows the relative size of each group obtained from the TwoStep Cluster method. The groups will then be described.

INSERT FIGURE S1 HERE

**Figure S1: Relative size of the groupings related to interest towards biodiversity.**

Distribution of cluster sizes related to interest in biodiversity, with Disinterested students (n=1,015) and interested students (n= 788).

Group “1” joins respondents who, for the most part, show little interest in learning about the selected items, while group “2” joins respondents interested in learning about the same items. The TwoStep Cluster algorithm allows the identification of variables (items) that are most important in grouping respondents. The importance of an item is a measure that assumes values between 0 and 1: the greater the importance, the more the values of the item are different when the groups are compared. In other words: the greater the importance, the more heterogeneous is the distribution of the item across the groups. The most important items (entries, or predictors) in the construction of the groups were the
items E25 (“The plants of my region”, x=1.0) and E24 (“The animals of my region”, x>0.8), while all other items have a relatively low importance (x<0.4) so that item A3 (“The inner part of Earth”) was the least important in the separation between the groups (x<0.2). It is worth noting that importance is a standardized measure, so that the most important variable (item) will always be equal to 1.0.

Respondents in the “Disinterested” group, a great majority (93.2%) had no or little interest in learning about “the plants in my region” (item E25), whereas this percentage dropped greatly (15.5 %) within the “Interested” group. Likewise, a similar picture emerged regarding learning about “the animals of my region” (item E24), as a great majority (84.3%) of the respondents in the “Disinterested” group had no or little interest, whereas this percentage dropped greatly (11.6%) in the “Interested” group. Based on these differences, it is not surprising that these two items are the most important in separating groups.

The variation observed in these items is not so evident in the other items, although it is clear that, regardless of the item analyzed, the majority of the “Disinterested” have little or no interest in learning about the respective item, while the majority of the “Interested” have some or a lot of interest in learning.

The distribution of items from the estimated average of their respective numeric codes are presented in Table 1 (see main text), showing these averages for the two groups and, besides, it displays the result of the Mann-Whitney non-parametric test (M-W), which compares the distributions of the groups by item. It is worth mentioning that the estimated average of each item is always higher in the “Interested” group compared to the average in the “Disinterested” group, indicating that the definition of group names makes sense. Almost all means of the “Disinterested” are in the field of low interest (Table 1, main text, numbers in red), with one exception (A27, “dangerous and venomous animals”) which is understandable, given the exciting subject of the item. However, the mean is significantly lower than the mean of the “Interested” group, which was actually the highest (x=3.38).

As mentioned, differences between the groups’ means are higher for items E24 and E25. For all items the descriptive level (p-value) of the Mann-Whitney test is less than 0.0005 (or 0.05%), which indicates that the distributions of the groups are statistically different.

Pearson's Chi-Square test detected a significant association between the region and the group (p-value <0.0005). This association is due to the differences between the percentages of respondents in the North, Northeast and Southeast regions for the two groups (Table S2).

**Table S2 General profile of the two groups within all regions of Brazil.**

Means of interest among all regions of Brazil the two groups. Red numbers indicate little or no interest (x>2.5), blue numbers indicate interest.

In the “Disinterested” almost all means are below 2.5, and the only regions which show blue numbers (x>2.5) are North and Northeast. The only item for which some difference was detected regardless the group was item A15 (“How plants grow and reproduce”). However, considering both groups, the North region had the highest average, signaling greater interest in learning this topic. It is worth mentioning that the two groups were analyzed not only regarding geographic distribution but also for gender differences. No major differences were found in the two interest groups. This result was confirmed by Pearson's Chi-Square test (p-value = 0.163), which did not detect a statistically significant association between gender and the classification in the interest groups.
As a concluding remark, from the respondents' level of interest in learning about the eight items selected in ROSE Brazil 2010/1, it was possible to segment the sample into two groups, considering the significant difference in the level of interest between groups. Item A15 was the only one with a different pattern in the different regions of the two groups, but the North region reached the highest score in both groups.

As for the geographic region, the profiles of the two groups are statistically different, once students from the North and Northeast regions represent the majority within the group "Interested" (50.5% and 46.9%, respectively, see Table 2, main text). The distribution of these two groups, in terms of the respondent's gender, is relatively similar, and are discussed elsewhere (44, 45, 46).

In the next step the main objective was to analyze the evolution of the responses to some selected items of the ROSE Brazil questionnaire related to the environment, considering the pilot study carried out in two localities (2007), and the two nation-wide data collections (2010/1 and 2014). We tested 14 items related to the environment, half them with negative statements about environmental problems, which were part of the C ("Me and the environmental challenges") and some items included in the second part of the E ("My opinions about Science and Technology) sections of the ROSE questionnaire. The phrasing of the items is presented in Table 3 (see main text). Table S3 brings agglutinated results, which were later fragmented.

### Table S3 Agglutinated results of the 14 selected items of all regions of Brazil.

Results of Brazilian students of all regions about the 14 selected items. Bold blue item numbers represent items stating the need of individual and collective conservation actions.

As the 2007 sampling (41) did not follow any PISA protocol it was not nationwide and therefore could not be included in the search for clusters related to interest. Table 4 (see main text) brings results of the Amazon region, which was not included in this pilot study; hence, presents more solid results for the Kruskal-Wallis Test than Table 5 (see main text). Arrows in both tables indicate tendencies in the two nationwide samples only.

Concerning the results of the Kruskal-Wallis test, no statistically significant differences were found among the responses of the three samplings to items C29 ("I can personally influence what happens to the environment"); p-value = 0.818) and E54 (“Science and technology can solve almost all environmental problems”; p-value = 0.063). For all other items, differences amid the questionnaires were detected, so that an increase in the Brazilian mean was identified for items C30, C31, C32, and C35, indicating that the percentage of respondents who agree with the statement associated with each item related to positive actions towards taking action to solve environmental problems has increased in the period.

### Table S4 Study of tendencies of the agglutinated results of the 14 selected items of all regions of Brazil.

Results of Kruskal-Wallis Test for the agglutinated results of the means of the 14 selected items of all regions of Brazil.

Among the items with negative statements about the need for environmental protection, the same tendency was observed in the national level, but item C40 ("The threats to the environment are not my business") had an outstanding disagreement, as it presented an average of 1.84 in ROSE Pilot 2007, which was the lowest mean then. In the two subsequent nationwide samplings there was an even greater rejection, as an average of
1.69 found in ROSE Brazil 2010, with a further lowering to 1.39 in ROSE Brazil 2014. Further analysis focused on gender differences and the significance of the Kruskal-Wallis test. Results for gender are roughly the same as the general results, as no statistically significant difference was detected between the questionnaires for females in items C29 (p-value = 0.369) and E54 (p-value = 0.134), and males in items C29 (p-value = 0.686) and E54 (p-value = 0.106), and are not discussed in this paper.

Items C29 and E54, for which no differences were detected in the aggregated data among the three samples appear as significantly varying when considering respondents from the three samples of the Southeast only (Table 5, see main text). The growth trend of the averages observed at the national level for items C30, C31, and C35 is partially observed within the Southeast region since the averages of the ROSE Brazil 2014 are higher than the averages of the other two samplings, but averages grow overtime only for items C31 (“People should be more interested in protecting the environment”) and C35 (“I think each of us can make a significant contribution to protecting the environment”).

Among the items with statistically significant changes in the two runs from the North region (C31, C34, C38, C40, C41, and E65), it was observed that item C31 (“People should care more about protection of the environment”) was the only one for which the ROSE Brazil 2014 average (3.82) was higher than the ROSE Brazil 2010 average (3.66, Table 4, see main text). This fact does not mean that the support for environmental protection is weakening in that region, on the contrary. On the one hand, averages of items stating the need of individual and collective conservation actions kept at a high stable level (Table 4, see main text). On the other hand, all four items stating negative attitudes (C34, C38, C40, and C41) experienced significantly growing disagreement in the period (Table 4, see main text).

The same ROSE questionnaire used in the 2020-1 and 2014 was adopted in the year 2017 in a large sampling in one city of South Brazil (Canoas, RS) (48). Even though it was not possible to cover all twenty-six High-Schools, this was the case of the major part (19/26), with 1,331 students. Results roughly support the general pictured presented here, with a high agreement with statements about conservation actions, and disagreement with statements that tend to minimize the need for such actions. For instance, there was a strong agreement with item C31 (“People should care more about the protection of the environment”), with a score of 3.5 (SD=0.6), and strong disagreement with item C38 (“It is the responsibility of the rich countries to solve the environmental problems of the world”), with a score of 1.9 (SD=0.8) (48), confirming the tendency or earlier samples (40, 44, 45,46).

In conclusion, agglutinated data from the national level show growing support for actions towards the protection of the environment. Fragmenting data to the regional level reveals an even clearer picture, with strong growing support for actions towards the protection of the environment, especially in the Amazonian region, bringing hopes that the destruction of the rain forest meets an important obstacle in the genuine beliefs of Brazilian youngsters. The sustained support for conservation actions may rely on the improvement of educational indicators.
Supplementary Figures

Fig. S1. Relative size of the groupings related to interest in biodiversity. Distribution of cluster sizes related to interest in biodiversity, with “Disinterested” students (n=1,015) and “Interested” students (n= 788).

Cluster sizes

- Cluster 1: n=1,015 (56.7%)
- Cluster 2: n=788 (43.7%)
### Supplementary Tables

**Table S1 Context of settlement in the North Region of Brazil.** Lines in gray indicate “old” cities, lines in white indicate “new” cities (see main text). For participant schools in the year 2010-1 (44), and for 2014 (45,46). Information compiled from Brazilian Institute of Geography and Statistics (IBGE) site (47).

| State | City       | Settlement | Context                                         | Founded | Indigenous population | Number of participant schools/year |
|-------|------------|------------|-------------------------------------------------|---------|-----------------------|------------------------------------|
| Acre AC | Rio Branco | 1882       | Rubber exploration                              | 1912    | Present               | 02 00                              |
|       | Feijó      | 1879       | Indigenous occupation/ Northeast Immigration    | 1938    | Present               | 01 01                              |
| Amapá AP | Oiapoque   | Beginning of 16th century | Indigenous occupation/ Portuguese colonial expansion | 1945 | Present               | 01 00                              |
|       | Macapá     | 1740       | Indigenous occupation / Military detachment     | 1856    | Present               | 00 02                              |
|       | Santana    | 1753       | Indigenous occupation/ Settlement of Portuguese mestizos | 1987 | Not declared          | 00 01                              |
| Amazonas AM | Manaus     | 1669       | Indigenous occupation/ Portuguese settlement   | 1856    | Present               | 02 02                              |
|       | Jutaí      | 17th century | Indigenous occupation/ Jesuit mission          | 1955    | Present               | 01 00                              |
|       | Manicoré   | 1637       | Indigenous occupation/ Portuguese colonial expansion | 1896 | Present               | 00 01                              |
| Pará PA | Belterra   | Around 1840 | Rubber exploration                              | 1995    | Present               | 01 00                              |
|       | Belém      | 1616       | Indigenous occupation/ Portuguese colonial expansion | 1616 | Present               | 00 01                              |
|       | Cametá     | 1635       | Indigenous occupation / Jesuit mission /Portuguese settlement | 1848 | Present               | 01 00                              |
|       | Marituba   | 1907       | Indigenous occupation / Railroad construction   | 1994    | Present               | 01 00                              |
| Location       | Date       | Event                                                                 | Year   | Status  | Progress |
|---------------|------------|----------------------------------------------------------------------|--------|---------|----------|
| Rondônia RO   | 1979       | Project of Colonization for Farming                                   | 1983   | Present | 01 00    |
| Jaru          | 1977       | Indigenous occupation/Installation of a telegraph office.             | 1977   | Present | 01 00    |
| Machadinho d’Oeste | 1982   | Project of Colonization for Farming                                   | 1988   | Present | 01 00    |
| Porto Velho   | 1907       | Harvesting of wood                                                   | 1914   | Present | 01 01    |
| Ariquemes     | Around 1900| Indigenous occupation/ Rubber exploration/ Construction of a telegraph line | 1977   | Present | 01 00    |
| Cacoal        | 1960       | Implementation of BR-364 Highway                                      | 1977   | Present | 00 02    |
| Guarajá-Mirim | End of 19th century | Rubber exploration                                                 | 1928   | Present | 00 01    |
| Roraima RR    | Boa Vista  | 19th century Farm installation                                       | 1926   | Present | 03 01    |
| Pacaraima     | 1995       | Military detachment                                                  | 1997   | Not declared | 01 |
| Tocantins TO  | Itacajá    | Indigenous occupation/ evangelizing mission                          | 1953   | Present | 01 00    |
| Miranorte     | 1958       | Farm installation / Implementation of BR-BR-14 Highway (currently BR- 153) | 1964   | Present | 01 00    |
| Araguaína     | 1876       | Indigenous occupation/ Colonization and Farming                      | 1958   | Present | 01 01    |
| Wanderlândia  | 1958       | Highway Construction                                                 | 1988   | Present | 01 01    |
| Palmas        | 1989       | Planned to be the capital city                                       | 1989   | Present | 00 01    |
| Total         |            |                                                                      |        |         | 22 17    |
Table S2. General profile of the two groups within all regions of Brazil. Means of interest among all regions of Brazil the two groups. Red numbers indicate little or no interest ($x>2.5$), blue numbers indicate interest ($n=.1,803$).

| Idems | Disinterested | Interested |
|-------|---------------|------------|
|       | North | Northeast | Center-W | Southeast | South | North | Northeast | Center-W | Southeast | South | P-value (K-W Test) |
| A3    | 2.16  | 2.23      | 2.16     | 2.09      | 1.84   | 0.015 | 2.75      | 2.88      | 2.58      | 2.79   | 2.68               | 0.142 |
| A15   | 2.04  | 1.93      | 1.92     | 1.75      | 1.65   | <0.0005 | 2.94      | 2.85      | 2.67      | 2.80   | 2.53               | 0.003 |
| A16   | 2.40  | 2.39      | 2.36     | 2.28      | 2.26   | 0.462 | 3.16      | 3.20      | 3.00      | 3.05   | 3.05               | 0.096 |
| A27   | 2.56  | 2.70      | 2.39     | 2.44      | 2.48   | 0.012 | 3.38      | 3.34      | 3.51      | 3.33   | 3.33               | 0.291 |
| A28   | 2.11  | 1.96      | 2.00     | 2.00      | 1.95   | 0.407 | 3.16      | 3.05      | 3.07      | 3.06   | 3.02               | 0.709 |
| E18   | 2.19  | 2.13      | 2.05     | 2.15      | 2.02   | 0.645 | 3.28      | 3.36      | 3.15      | 3.09   | 3.26               | 0.025 |
| E24   | 1.79  | 1.81      | 1.77     | 1.78      | 1.83   | 0.964 | 3.24      | 3.33      | 3.37      | 3.35   | 3.38               | 0.359 |
| E25   | 1.62  | 1.61      | 1.51     | 1.58      | 1.50   | 0.354 | 3.20      | 3.22      | 3.17      | 3.11   | 3.16               | 0.756 |
Table S3. Agglutinated results of the 14 selected items of all regions of Brazil. Results of Brazilian students of all regions about the 14 selected items. Bold blue item numbers represent items stating the need of individual and collective conservation actions.

| Survey | Option | C29 | C30 | C31 | C32 | C33 | C35 | E65 | C28 | C34 | C37 | C38 | C40 | C41 | E54 |
|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|        | Disagree | 66  | 60  | 57  | 123 | 65  | 74  | 68  | 199 | 265 | 278 | 180 | 357 | 199 | 186 |
|        | Partially Disagree | 91  | 72  | 61  | 149 | 91  | 74  | 114 | 194 | 148 | 144 | 160 | 88  | 156 | 202 |
|        | Partially Agree | 193 | 154 | 134 | 165 | 175 | 123 | 183 | 119 | 84  | 87  | 131 | 66  | 131 | 131 |
|        | Agree | 248 | 314 | 351 | 161 | 274 | 332 | 238 | 86  | 100 | 91  | 128 | 96  | 107 | 83  |
|        | Total | 598 | 600 | 603 | 598 | 605 | 603 | 603 | 598 | 597 | 600 | 599 | 607 | 593 | 602 |

**ROSE Pilot 2007**

|        | Disagree | 223 | 102 | 58  | 293 | 173 | 79  | 224 | 754 | 984 | 1190 | 684 | 1277 | 627 | 558 |
|        | Partially Disagree | 387 | 174 | 153 | 464 | 336 | 196 | 422 | 549 | 456 | 383 | 449 | 218 | 407 | 593 |
|        | Partially Agree | 485 | 398 | 284 | 578 | 494 | 313 | 478 | 377 | 279 | 233 | 424 | 218 | 430 | 478 |
|        | Agree | 825 | 1252 | 1435 | 581 | 917 | 1345 | 803 | 250 | 199 | 119 | 379 | 229 | 460 | 266 |
|        | Total | 1920 | 1926 | 1930 | 1916 | 1920 | 1933 | 1927 | 1930 | 1918 | 1925 | 1936 | 1942 | 1924 | 1895 |

**ROSE Brazil 2010/1**

|        | Disagree | 261 | 63  | 37  | 326 | 281 | 73  | 316 | 706 | 1308 | 1233 | 1198 | 1620 | 822 | 548 |
|        | Partially Disagree | 422 | 135 | 82  | 435 | 353 | 180 | 438 | 600 | 372 | 394 | 391 | 168 | 424 | 663 |
|        | Partially Agree | 438 | 401 | 185 | 650 | 499 | 330 | 514 | 460 | 174 | 204 | 228 | 112 | 338 | 514 |
|        | Agree | 917 | 1451 | 1734 | 604 | 1870 | 1459 | 735 | 277 | 171 | 201 | 215 | 137 | 448 | 308 |
|        | Total | 2038 | 2050 | 2038 | 2015 | 2003 | 2042 | 2003 | 2043 | 2025 | 2032 | 2032 | 2037 | 2032 | 2033 | 2033 |
Table S4. Study of tendencies of the agglutinated results of the 14 selected items of all regions of Brazil. Results of Kruskal-Wallis Test for the agglutinated results of the means of the 14 selected items of all regions of Brazil.

| Items | ROSE Pilot 2007 | ROSE Brazil 2010/1 | ROSE Brazil 2014 | Total | p-value (K-W Test) |
|-------|-----------------|-------------------|-----------------|-------|-------------------|
|       | Mean  | S.D.  | Valid cases | Mean  | S.D.  | Valid cases | Mean  | S.D.  | Valid cases | Mean  | S.D.  | Valid cases |          |
| C28   | 2.15  | 1.04  | 598       | 2.06  | 1.05  | 1.930      | 2.15  | 1.04  | 2.043       | 2.11  | 1.05  | 4.571       | 0.010    |
| C29   | 3.04  | 1.00  | 598       | 3.00  | 1.05  | 1.920      | 2.99  | 1.08  | 2.038       | 3.00  | 1.06  | 4.556       | 0.008    |
| C30   | 3.20  | 1.00  | 600       | 3.45  | 0.86  | 1.926      | **3.58**  | 0.75  | 2.050       | 3.48  | 0.84  | 4.576       | < 0.0005 |
| C31   | 3.29  | 0.99  | 603       | 3.60  | 0.76  | 1.930      | **3.77**  | 0.60  | 2.038       | 3.64  | 0.75  | 4.571       | < 0.0005 |
| C32   | 2.61  | 1.09  | 598       | 2.76  | 1.05  | 1.916      | **2.76**  | 1.05  | 2.015       | 2.74  | 1.06  | 4.529       | **0.008** |
| C33   | 3.09  | 1.01  | 605       | **3.12**  | 1.00  | 1.920      | 2.98  | 1.08  | 2.003       | 3.05  | 1.04  | 4.528       | < 0.0005 |
| C34   | **2.03**  | 1.12  | 597       | 1.84  | 1.02  | 1.918      | 1.61  | 0.96  | 2.025       | 1.76  | 1.02  | 4.540       | < 0.0005 |
| C35   | 3.18  | 1.06  | 603       | 3.51  | 0.84  | 1.933      | **3.55**  | 0.80  | 2.042       | 3.49  | 0.86  | 4.578       | < 0.0005 |
| C37   | 1.99  | 1.10  | 600       | 1.63  | 0.92  | 1.925      | 1.69  | 1.00  | 2.032       | 1.70  | 0.99  | 4.557       | < 0.0005 |
| C38   | **2.35**  | 1.12  | 599       | 2.26  | 1.14  | 1.936      | 1.73  | 1.03  | 2.032       | 2.04  | 1.12  | 4.567       | < 0.0005 |
| C40   | **1.84**  | 1.14  | 607       | 1.69  | 1.07  | 1.942      | 1.39  | 0.87  | 2.037       | 1.58  | 1.01  | 4.586       | < 0.0005 |
| C41   | 2.25  | 1.10  | 593       | **2.38**  | 1.17  | 1.924      | 2.20  | 1.19  | 2.032       | 2.28  | 1.17  | 4.549       | < 0.0005 |
| E54   | 2.18  | 1.02  | 602       | 2.24  | 1.03  | 1.895      | **2.29**  | 1.02  | 2.033       | 2.25  | 1.02  | 4.530       | 0.063    |
| E65   | **2.98**  | 1.02  | 603       | 2.97  | 1.05  | 1.927      | 2.83  | 1.09  | 2.003       | 2.91  | 1.07  | 4.533       | < 0.0005 |
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