Organic Food Environment Assessment

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## Descriptive Results

### Table 1

|  | Total vendors | Higher | Middle | Lower | Mobile vendor | Stationary small vendor | Supermarket |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Brazil | | | | | | | |
| Rio de Janeiro | 60 | 14 (23%) | 18 (30%) | 28 (47%) | 1 (2%) | 42 (70%) | 17 (28%) |
| Sao Paolo | 58 | 4 (7%) | 41 (71%) | 13 (22%) | 0 (0%) | 50 (86%) | 8 (14%) |
| Sinop | 8 | 2 (25%) | 2 (25%) | 4 (50%) | 0 (0%) | 1 (12%) | 7 (88%) |
| total | 126 | 20 | 61 | 45 | 1 | 93 | 32 |
| India | | | | | | | |
| Hyderabad | 141 | 25 (18%) | 22 (16%) | 94 (67%) | 15 (11%) | 120 (85%) | 6 (4%) |
| Latur | 120 | 16 (13%) | 30 (25%) | 74 (62%) | 11 (9%) | 108 (90%) | 1 (1%) |
| Visakhapatnam | 226 | 103 (46%) | 54 (24%) | 69 (31%) | 30 (13%) | 176 (78%) | 20 (9%) |
| total | 487 | 144 | 106 | 237 | 56 | 404 | 27 |
| UK | | | | | | | |
| Birmingham | 43 | 11 (26%) | 19 (44%) | 13 (30%) | 0 (0%) | 29 (67%) | 14 (33%) |
| Edinburgh | 60 | 15 (25%) | 29 (48%) | 16 (27%) | 0 (0%) | 45 (75%) | 15 (25%) |
| London | 92 | 49 (53%) | 30 (33%) | 13 (14%) | 6 (7%) | 69 (75%) | 17 (18%) |
| total | 195 | 75 | 78 | 42 | 6 | 143 | 46 |
| total | 808 | 239 | 245 | 324 | 63 | 640 | 105 |

## 1. What is the availability of organic food in urban food environments? How does this vary across different geographic and socioeconomic contexts?

### Hypothesis 1a. Organic food availability will be highest in the United Kingdom, in larger cities within a given country, and in higher-income neighbourhoods within a given city.

#### Kruskal-Wallis rank sum test

##### Overall results (variation between countries)

##   
## Kruskal-Wallis rank sum test  
##   
## data: org\_products\_count by country  
## Kruskal-Wallis chi-squared = 25.613, df = 2, p-value = 2.743e-06

##### Country-level results (variation between cities within a given country)

###### Brazil

##   
## Kruskal-Wallis rank sum test  
##   
## data: org\_products\_count by city  
## Kruskal-Wallis chi-squared = 0.54437, df = 2, p-value = 0.7617

###### India

##   
## Kruskal-Wallis rank sum test  
##   
## data: org\_products\_count by city  
## Kruskal-Wallis chi-squared = 25.899, df = 2, p-value = 2.378e-06

###### United Kingdom

##   
## Kruskal-Wallis rank sum test  
##   
## data: org\_products\_count by city  
## Kruskal-Wallis chi-squared = 0.49793, df = 2, p-value = 0.7796

##### City-level results (variation between neighbourhoods within a given city)

###### Brazil: Rio de Janeiro

##   
## Kruskal-Wallis rank sum test  
##   
## data: org\_products\_count by circle  
## Kruskal-Wallis chi-squared = 9.7055, df = 2, p-value = 0.007807

###### Brazil: Sao Paulo

##   
## Kruskal-Wallis rank sum test  
##   
## data: org\_products\_count by circle  
## Kruskal-Wallis chi-squared = 2.6667, df = 2, p-value = 0.2636

###### Brazil: Sinop

##   
## Kruskal-Wallis rank sum test  
##   
## data: org\_products\_count by circle  
## Kruskal-Wallis chi-squared = 1, df = 1, p-value = 0.3173

###### India: Hyderabad

##   
## Kruskal-Wallis rank sum test  
##   
## data: org\_products\_count by circle  
## Kruskal-Wallis chi-squared = 4.5183, df = 2, p-value = 0.1044

###### India: Latur

##   
## Kruskal-Wallis rank sum test  
##   
## data: org\_products\_count by circle  
## Kruskal-Wallis chi-squared = 8.3769, df = 2, p-value = 0.01517

###### India: Visakhapatnam

##   
## Kruskal-Wallis rank sum test  
##   
## data: org\_products\_count by circle  
## Kruskal-Wallis chi-squared = 0.025713, df = 2, p-value = 0.9872

###### United Kingdom: Birmingham

##   
## Kruskal-Wallis rank sum test  
##   
## data: org\_products\_count by circle  
## Kruskal-Wallis chi-squared = 2.852, df = 2, p-value = 0.2403

###### UK: Edinburgh

##   
## Kruskal-Wallis rank sum test  
##   
## data: org\_products\_count by circle  
## Kruskal-Wallis chi-squared = 0.27996, df = 2, p-value = 0.8694

###### UK: London

##   
## Kruskal-Wallis rank sum test  
##   
## data: org\_products\_count by circle  
## Kruskal-Wallis chi-squared = 3.6602, df = 2, p-value = 0.1604

##### Summary of p-values

###### Overall p-value

## [1] 2.742622e-06

###### Country-level p-values

###### City-level p-values

#### Chi-squared test

##### Overall results (variation between countries)

## 0 1  
## Brazil 100 26  
## India 332 155  
## UK 80 115

##   
## Pearson's Chi-squared test  
##   
## data: data\_matrix  
## X-squared = 60.666, df = 2, p-value = 6.708e-14

##### Country-level results (variation between cities within a given country)

###### Brazil

## 0 1  
## Rio de Janeiro 40 20  
## Sao Paolo 54 4  
## Sinop 6 2

##   
## Pearson's Chi-squared test  
##   
## data: data\_matrix  
## X-squared = 12.685, df = 2, p-value = 0.00176

###### India

## 0 1  
## Hyderabad 110 31  
## Latur 49 71  
## Visakhapatnam 173 53

##   
## Pearson's Chi-squared test  
##   
## data: data\_matrix  
## X-squared = 54.939, df = 2, p-value = 1.175e-12

###### United Kingdom

## 0 1  
## Birmingham 26 17  
## Edinburgh 28 32  
## London 26 66

##   
## Pearson's Chi-squared test  
##   
## data: data\_matrix  
## X-squared = 13.701, df = 2, p-value = 0.001059

##### Neighbourhood-level results (variation between neighbourhoods within a given city)

###### Brazil: Rio de Janeiro

## 0 1  
## Higher 3 11  
## Lower 24 4  
## Middle 13 5

##   
## Pearson's Chi-squared test  
##   
## data: data\_matrix  
## X-squared = 17.714, df = 2, p-value = 0.0001424

###### Brazil: Sao Paulo

## 0 1  
## Higher 2 2  
## Lower 12 1  
## Middle 40 1

##   
## Pearson's Chi-squared test  
##   
## data: data\_matrix  
## X-squared = 12.856, df = 2, p-value = 0.001616

###### Brazil: Sinop

## 0 1  
## Higher 1 1  
## Lower 4 0  
## Middle 1 1

##   
## Pearson's Chi-squared test  
##   
## data: data\_matrix  
## X-squared = 2.6667, df = 2, p-value = 0.2636

###### India: Hyderabad

## 0 1  
## Higher 16 9  
## Lower 83 11  
## Middle 11 11

##   
## Pearson's Chi-squared test  
##   
## data: data\_matrix  
## X-squared = 18.724, df = 2, p-value = 8.591e-05

###### India: Latur

## 0 1  
## Higher 7 9  
## Lower 33 41  
## Middle 9 21

##   
## Pearson's Chi-squared test  
##   
## data: data\_matrix  
## X-squared = 1.947, df = 2, p-value = 0.3778

###### India: Visakhapatnam

## 0 1  
## Higher 84 19  
## Lower 57 12  
## Middle 32 22

##   
## Pearson's Chi-squared test  
##   
## data: data\_matrix  
## X-squared = 11.841, df = 2, p-value = 0.002685

###### United Kingdom: Birmingham

## 0 1  
## Higher 5 6  
## Lower 11 2  
## Middle 10 9

##   
## Pearson's Chi-squared test  
##   
## data: data\_matrix  
## X-squared = 4.6963, df = 2, p-value = 0.09554

###### United Kingdom: Edinburgh

## 0 1  
## Higher 8 7  
## Lower 8 8  
## Middle 12 17

##   
## Pearson's Chi-squared test  
##   
## data: data\_matrix  
## X-squared = 0.66502, df = 2, p-value = 0.7171

###### United Kingdom: London

## 0 1  
## Higher 17 32  
## Lower 0 13  
## Middle 9 21

##   
## Pearson's Chi-squared test  
##   
## data: data\_matrix  
## X-squared = 6.1662, df = 2, p-value = 0.04582

##### Summary of p-values

###### Overall p-value

## [1] 6.707989e-14

###### Country-level p-values

###### City-level p-values

#### Table 2

##### For each neighbourhood within each city

## # A tibble: 27 × 8  
## country city circle vendors count\_org\_vendors org\_vendor\_perc  
## <chr> <chr> <fct> <int> <int> <dbl>  
## 1 Brazil Rio de Janeiro Higher 14 11 0.786   
## 2 Brazil Rio de Janeiro Middle 18 5 0.278   
## 3 Brazil Rio de Janeiro Lower 28 4 0.143   
## 4 Brazil Sao Paolo Higher 4 2 0.5   
## 5 Brazil Sao Paolo Middle 41 1 0.0244  
## 6 Brazil Sao Paolo Lower 13 1 0.0769  
## 7 Brazil Sinop Higher 2 1 0.5   
## 8 Brazil Sinop Middle 2 1 0.5   
## 9 Brazil Sinop Lower 4 0 0   
## 10 India Hyderabad Higher 25 9 0.36   
## # ℹ 17 more rows  
## # ℹ 2 more variables: median\_org\_products\_count <dbl>,  
## # iqr\_org\_products\_count <dbl>

|  | Total vendors | Organic vendors, n(%) | Organic sentinel foods, median (IQR) |
| --- | --- | --- | --- |
| Brazil - Rio de Janeiro | | | |
| Higher | 14 | 11 (79%) | 4.0 (3.50) |
| Middle | 18 | 5 (28%) | 1.0 (0.00) |
| Lower | 28 | 4 (14%) | 2.0 (0.50) |
| total | 60 | 20 | 7 |
| Brazil - Sao Paolo | | | |
| Higher | 4 | 2 (50%) | 7.0 (5.00) |
| Middle | 41 | 1 (2%) | 1.0 (0.00) |
| Lower | 13 | 1 (8%) | 1.0 (0.00) |
| total | 58 | 4 | 9 |
| Brazil - Sinop | | | |
| Higher | 2 | 1 (50%) | 6.0 (0.00) |
| Middle | 2 | 1 (50%) | 2.0 (0.00) |
| Lower | 4 | 0 (0%) | --- (---) |
| total | 8 | 2 | 8 |
| India - Hyderabad | | | |
| Higher | 25 | 9 (36%) | 3.0 (5.00) |
| Middle | 22 | 11 (50%) | 1.0 (0.00) |
| Lower | 94 | 11 (12%) | 1.0 (0.50) |
| total | 141 | 31 | 5 |
| India - Latur | | | |
| Higher | 16 | 9 (56%) | 1.0 (1.00) |
| Middle | 30 | 21 (70%) | 1.0 (0.00) |
| Lower | 74 | 41 (55%) | 1.0 (0.00) |
| total | 120 | 71 | 3 |
| India - Visakhapatnam | | | |
| Higher | 103 | 19 (18%) | 2.0 (1.50) |
| Middle | 54 | 22 (41%) | 1.0 (1.00) |
| Lower | 69 | 12 (17%) | 1.5 (2.25) |
| total | 226 | 53 | 4 |
| UK - Birmingham | | | |
| Higher | 11 | 6 (55%) | 3.0 (3.50) |
| Middle | 19 | 9 (47%) | 2.0 (2.00) |
| Lower | 13 | 2 (15%) | 1.0 (0.00) |
| total | 43 | 17 | 6 |
| UK - Edinburgh | | | |
| Higher | 15 | 7 (47%) | 3.0 (4.50) |
| Middle | 29 | 17 (59%) | 2.0 (3.00) |
| Lower | 16 | 8 (50%) | 2.0 (2.00) |
| total | 60 | 32 | 7 |
| UK - London | | | |
| Higher | 49 | 32 (65%) | 1.0 (2.00) |
| Middle | 30 | 21 (70%) | 1.0 (2.00) |
| Lower | 13 | 13 (100%) | 3.0 (6.00) |
| total | 92 | 66 | 5 |

## # A tibble: 27 × 5  
## # Groups: country, city [9]  
## country city circle median\_org\_products\_co…¹ iqr\_org\_products\_count  
## <chr> <chr> <fct> <dbl> <dbl>  
## 1 Brazil Rio de Janeiro Higher 4 3.5  
## 2 Brazil Rio de Janeiro Middle 1 0   
## 3 Brazil Rio de Janeiro Lower 2 0.5  
## 4 Brazil Sao Paolo Higher 7 5   
## 5 Brazil Sao Paolo Middle 1 0   
## 6 Brazil Sao Paolo Lower 1 0   
## 7 Brazil Sinop Higher 6 0   
## 8 Brazil Sinop Middle 2 0   
## 9 Brazil Sinop Lower NA NA   
## 10 India Hyderabad Higher 3 5   
## # ℹ 17 more rows  
## # ℹ abbreviated name: ¹​median\_org\_products\_count

##### For each city within each country

## # A tibble: 9 × 7  
## country city vendors count\_org\_vendors org\_vendor\_perc median\_org\_products\_…¹  
## <chr> <chr> <int> <int> <dbl> <dbl>  
## 1 Brazil Rio … 60 20 0.333 2.5  
## 2 Brazil Sao … 58 4 0.0690 1.5  
## 3 Brazil Sinop 8 2 0.25 4   
## 4 India Hyde… 141 31 0.220 1   
## 5 India Latur 120 71 0.592 1   
## 6 India Visa… 226 53 0.235 1   
## 7 UK Birm… 43 17 0.395 2   
## 8 UK Edin… 60 32 0.533 2   
## 9 UK Lond… 92 66 0.717 1   
## # ℹ abbreviated name: ¹​median\_org\_products\_count  
## # ℹ 1 more variable: iqr\_org\_products\_count <dbl>

|  | Total vendors | Organic vendors, n(%) | Organic sentinel foods, median (IQR) |
| --- | --- | --- | --- |
| Brazil | | | |
| Rio de Janeiro | 60 | 20 (33%) | 2.5 (3.25) |
| Sao Paolo | 58 | 4 (7%) | 1.5 (3.50) |
| Sinop | 8 | 2 (25%) | 4.0 (2.00) |
| total | 126 | 26 | 8 |
| India | | | |
| Hyderabad | 141 | 31 (22%) | 1.0 (1.00) |
| Latur | 120 | 71 (59%) | 1.0 (0.00) |
| Visakhapatnam | 226 | 53 (23%) | 1.0 (2.00) |
| total | 487 | 155 | 3 |
| UK | | | |
| Birmingham | 43 | 17 (40%) | 2.0 (2.00) |
| Edinburgh | 60 | 32 (53%) | 2.0 (2.25) |
| London | 92 | 66 (72%) | 1.0 (3.00) |
| total | 195 | 115 | 5 |

##### For each country

## # A tibble: 3 × 6  
## country vendors count\_org\_vendors org\_vendor\_perc median\_org\_products\_count  
## <chr> <int> <int> <dbl> <dbl>  
## 1 Brazil 126 26 0.206 2  
## 2 India 487 155 0.318 1  
## 3 UK 195 115 0.590 2  
## # ℹ 1 more variable: iqr\_org\_products\_count <dbl>

##### Overall

## vendors count\_org\_vendors org\_vendor\_perc median\_org\_products\_count  
## 1 808 296 0.3663366 1  
## iqr\_org\_products\_count  
## 1 2

### Exploratory Analysis: Hypothesis 1b. The count and proportion of vendors selling multiple organic options for at least one sentinel food will be highest in the United Kingdom, in larger cities within a given country, and in higher-income neighbourhoods within a given city.

#### Table 3

##### For each neighbourhood within each city

|  | organic\_vendors | Organic vendors with multiple options (>1 product), n(%) | Foods with multiple options, median (IQR) |
| --- | --- | --- | --- |
| Brazil - Rio de Janeiro | | | |
| Higher | 11 | 10 (91%) | 1.0 (3.50) |
| Middle | 5 | 3 (60%) | 0.0 (0.00) |
| Lower | 4 | 3 (75%) | 0.0 (0.00) |
| Brazil - Sao Paolo | | | |
| Higher | 2 | 2 (100%) | 1.0 (3.75) |
| Middle | 1 | 1 (100%) | 0.0 (0.00) |
| Lower | 1 | 1 (100%) | 0.0 (0.00) |
| Brazil - Sinop | | | |
| Higher | 1 | 1 (100%) | 2.0 (2.00) |
| Middle | 1 | 1 (100%) | 0.5 (0.50) |
| Lower | 0 | 0 (---) | 0.0 (0.00) |
| India - Hyderabad | | | |
| Higher | 9 | 5 (56%) | 0.0 (0.00) |
| Middle | 11 | 2 (18%) | 0.0 (0.00) |
| Lower | 11 | 0 (0%) | 0.0 (0.00) |
| India - Latur | | | |
| Higher | 9 | 1 (11%) | 0.0 (0.00) |
| Middle | 21 | 2 (10%) | 0.0 (0.00) |
| Lower | 41 | 0 (0%) | 0.0 (0.00) |
| India - Visakhapatnam | | | |
| Higher | 19 | 10 (53%) | 0.0 (0.00) |
| Middle | 22 | 13 (59%) | 0.0 (0.00) |
| Lower | 12 | 6 (50%) | 0.0 (0.00) |
| UK - Birmingham | | | |
| Higher | 6 | 3 (50%) | 0.0 (0.50) |
| Middle | 9 | 6 (67%) | 0.0 (1.00) |
| Lower | 2 | 0 (0%) | 0.0 (0.00) |
| UK - Edinburgh | | | |
| Higher | 7 | 4 (57%) | 0.0 (0.50) |
| Middle | 17 | 13 (76%) | 0.0 (1.00) |
| Lower | 8 | 5 (62%) | 0.0 (1.00) |
| UK - London | | | |
| Higher | 32 | 24 (75%) | 0.0 (1.00) |
| Middle | 21 | 14 (67%) | 0.0 (1.00) |
| Lower | 13 | 10 (77%) | 1.0 (4.00) |

##### For each city within each country

|  | organic\_vendors | Organic vendors with multiple options (>1 product), n(%) | Foods with multiple options, median (IQR) |
| --- | --- | --- | --- |
| Brazil | | | |
| Rio de Janeiro | 20 | 16 (80%) | 0 (1.00) |
| Sao Paolo | 4 | 4 (100%) | 0 (0.00) |
| Sinop | 2 | 2 (100%) | 0 (0.25) |
| India | | | |
| Hyderabad | 31 | 7 (23%) | 0 (0.00) |
| Latur | 71 | 3 (4%) | 0 (0.00) |
| Visakhapatnam | 53 | 29 (55%) | 0 (0.00) |
| UK | | | |
| Birmingham | 17 | 9 (53%) | 0 (0.00) |
| Edinburgh | 32 | 22 (69%) | 0 (1.00) |
| London | 66 | 48 (73%) | 1 (1.00) |

##### For each country

## # A tibble: 3 × 6  
## country organic\_vendors n\_multiple\_org\_binary perc\_multiple\_org\_binary  
## <chr> <int> <int> <dbl>  
## 1 Brazil 26 22 0.846  
## 2 India 155 39 0.252  
## 3 UK 115 79 0.687  
## # ℹ 2 more variables: median\_multiple\_org\_count <dbl>,  
## # iqr\_multiple\_org\_count <dbl>

##### Overall

## organic\_vendors n\_multiple\_org\_binary perc\_multiple\_org\_binary  
## 1 296 140 0.472973  
## median\_multiple\_org\_count iqr\_multiple\_org\_count  
## 1 0 0

### Exploratory Analysis: Organic versus non-organic vendor characteristics

#### Table 4

##### Country-level

## # A tibble: 6 × 14  
## country org\_vendor median\_vendor\_cashiers iqr\_vendor\_cashiers  
## <chr> <dbl> <dbl> <dbl>  
## 1 Brazil 0 1 1   
## 2 Brazil 1 3 11   
## 3 India 0 1 0   
## 4 India 1 1 0   
## 5 UK 0 1 0   
## 6 UK 1 1 2.5  
## # ℹ 10 more variables: min\_vendor\_cashiers <dbl>, max\_vendor\_cashiers <dbl>,  
## # median\_days\_open\_count <dbl>, iqr\_days\_open\_count <dbl>,  
## # min\_days\_open\_count <dbl>, max\_days\_open\_count <dbl>,  
## # median\_foods\_count <dbl>, iqr\_foods\_count <dbl>, min\_foods\_count <dbl>,  
## # max\_foods\_count <dbl>

##### Overall

## # A tibble: 2 × 6  
## org\_vendor vendor\_cashiers\_summ…¹ days\_open\_1\_3\_summary days\_open\_4\_5\_summary  
## <chr> <chr> <chr> <chr>   
## 1 Non-organic 1 (0), 1 - 11 2 (0.4%) 31 (6%)   
## 2 Organic 1 (1), 1 - 30 0 (0%) 11 (4%)   
## # ℹ abbreviated name: ¹​vendor\_cashiers\_summary  
## # ℹ 2 more variables: days\_open\_6\_7\_summary <chr>, foods\_count\_summary <chr>

## 2. How affordable is a sentinel organic food (rice) compared to a non-organic sentinel food (rice) in urban food environments? How does this vary across different geographic contexts?

### Hypothesis 2a. The price of organic rice will be significantly higher than the price of non-organic rice overall and at the country level.

#### Wilcoxon Rank-Sum Test / Mann-Whitney U test

##### Overall results

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: price by type  
## W = 15310, p-value = 4.432e-12  
## alternative hypothesis: true location shift is greater than 0

## Overall Mann-Whitney U test p-value (one-tailed): 2.215894e-12

##### Country-level results: Brazil

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: price by type  
## W = 1018.5, p-value = 0.0004403  
## alternative hypothesis: true location shift is greater than 0

## Overall Mann-Whitney U test p-value (one-tailed): 0.000220161

##### Country-level results: India

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: price by type  
## W = 3026, p-value = 1.708e-08  
## alternative hypothesis: true location shift is greater than 0

## Overall Mann-Whitney U test p-value (one-tailed): 8.540138e-09

##### Country-level results: UK

##   
## Wilcoxon rank sum test with continuity correction  
##   
## data: price by type  
## W = 1467, p-value = 1.238e-07  
## alternative hypothesis: true location shift is greater than 0

## Overall Mann-Whitney U test p-value (one-tailed): 6.191321e-08

#### Table 5

##### City-level

|  | Organic sample size (n) | Conventional sample size (n) | Organic median (IQR), min-max (US$) | Conventional median (IQR), min-max (US$) |
| --- | --- | --- | --- | --- |
| Brazil | | | | |
| Rio de Janeiro | 10 | 40 | 2.88 (0.34), 2.11-4.61 | 1.23 (0.32), 0.77-3.55 |
| Sao Paolo | 1 | 32 | 2.83 (0.00), 2.83-2.83 | 1.14 (0.21), 0.36-1.64 |
| Sinop | 6 | 7 | 1.07 (0.02), 1.03-1.18 | 1.07 (0.02), 1.03-1.18 |
| total | 17 | 79 | — | — |
| India | | | | |
| Hyderabad | 2 | 59 | 1.01 (0.29), 0.73-1.30 | 0.69 (0.12), 0.36-1.03 |
| Latur | 0 | 74 | --- (---), Inf--Inf | 0.61 (0.12), 0.24-0.73 |
| Visakhapatnam | 14 | 74 | 1.10 (0.32), 0.61-3.20 | 0.64 (0.17), 0.36-2.69 |
| total | 16 | 207 | — | — |
| UK | | | | |
| Birmingham | 2 | 25 | 5.24 (0.69), 4.54-5.93 | 3.02 (0.74), 0.69-5.68 |
| Edinburgh | 4 | 28 | 4.02 (2.05), 3.46-11.34 | 2.13 (1.00), 0.51-7.37 |
| London | 12 | 39 | 7.03 (4.30), 4.75-11.95 | 3.94 (2.34), 1.64-8.80 |
| total | 18 | 92 | — | — |

##### Country-level

|  | Country | Organic sample size (n) | Conventional sample size (n) | Organic median (IQR), min-max (US$) | Conventional median (IQR), min-max (US$) |
| --- | --- | --- | --- | --- | --- |
|  | Brazil | 17 | 79 | 2.69 (1.80), 1.03-4.61 | 1.14 (0.30), 0.36-3.55 |
|  | India | 16 | 207 | 1.10 (0.37), 0.61-3.20 | 0.61 (0.18), 0.24-2.69 |
|  | UK | 18 | 92 | 5.75 (4.57), 3.46-11.95 | 2.97 (2.13), 0.51-8.80 |
| total | — | 51 | 378 | — | — |

##### Overall

| Organic sample size (n) | Conventional sample size (n) | Organic median (IQR), min-max (US$) | Conventional median (IQR), min-max (US$) |
| --- | --- | --- | --- |
| 51 | 378 | 2.83 (3.71), 0.61-11.95 | 0.78 (1.03), 0.24-8.80 |

### Hypothesis 2b. The price of organic rice will be significantly higher than the price of non-organic rice when sold at the same vendor location.

#### Wilcoxon Signed Rank Test

##### Overall results

##   
## Wilcoxon signed rank test with continuity correction  
##   
## data: wsr\_rice\_prices\_data\_overall$rice\_price\_org\_kg\_usd and wsr\_rice\_prices\_data\_overall$rice\_price\_conv\_kg\_usd  
## V = 620, p-value = 3.058e-07  
## alternative hypothesis: true location shift is greater than 0

## Overall Wilcoxon Signed Rank test p-value (one-tailed): 1.528882e-07

##### Country-level results: Brazil

##   
## Wilcoxon signed rank test with continuity correction  
##   
## data: wsr\_rice\_prices\_data\_brazil$rice\_price\_org\_kg\_usd and wsr\_rice\_prices\_data\_brazil$rice\_price\_conv\_kg\_usd  
## V = 55, p-value = 0.002945  
## alternative hypothesis: true location shift is greater than 0

## Overall Wilcoxon Signed Rank test p-value (one-tailed): 0.001472318

##### Country-level results: India

##   
## Wilcoxon signed rank exact test  
##   
## data: wsr\_rice\_prices\_data\_india$rice\_price\_org\_kg\_usd and wsr\_rice\_prices\_data\_india$rice\_price\_conv\_kg\_usd  
## V = 45, p-value = 0.04199  
## alternative hypothesis: true location shift is greater than 0

## Overall Wilcoxon Signed Rank test p-value (one-tailed): 0.02099609

##### Country-level results: UK

##   
## Wilcoxon signed rank exact test  
##   
## data: wsr\_rice\_prices\_data\_uk$rice\_price\_org\_kg\_usd and wsr\_rice\_prices\_data\_uk$rice\_price\_conv\_kg\_usd  
## V = 120, p-value = 3.052e-05  
## alternative hypothesis: true location shift is greater than 0

## Overall Wilcoxon Signed Rank test p-value (one-tailed): 1.525879e-05

#### Table S1

##### City-level

|  | Organic sample size (n) | Conventional sample size (n) | Organic median (IQR), min-max (US$) | Conventional median (IQR), min-max (US$) |
| --- | --- | --- | --- | --- |
| Brazil | | | | |
| Rio de Janeiro | 9 | 9 | 2.88 (0.25), 2.11-4.61 | 1.10 (0.17), 0.88-1.34 |
| Sao Paolo | 1 | 1 | 2.83 (0.00), 2.83-2.83 | 1.13 (0.00), 1.13-1.13 |
| Sinop | 6 | 6 | 1.07 (0.02), 1.03-1.18 | 1.07 (0.02), 1.03-1.18 |
| total | 16 | 16 | — | — |
| India | | | | |
| Hyderabad | 1 | 1 | 1.30 (0.00), 1.30-1.30 | 0.83 (0.00), 0.83-0.83 |
| Visakhapatnam | 9 | 9 | 1.02 (0.45), 0.61-3.20 | 0.82 (0.38), 0.49-1.31 |
| total | 10 | 10 | — | — |
| UK | | | | |
| Birmingham | 2 | 2 | 5.24 (0.69), 4.54-5.93 | 3.09 (0.06), 3.03-3.15 |
| Edinburgh | 3 | 3 | 3.97 (0.31), 3.46-4.08 | 2.10 (0.11), 1.98-2.21 |
| London | 10 | 10 | 7.62 (5.07), 4.92-11.95 | 3.93 (1.97), 1.78-8.04 |
| total | 15 | 15 | — | — |

##### Country-level

|  | Country | Organic sample size (n) | Conventional sample size (n) | Organic median (IQR), min-max (US$) | Conventional median (IQR), min-max (US$) |
| --- | --- | --- | --- | --- | --- |
|  | Brazil | 16 | 16 | 2.68 (1.80), 1.03-4.61 | 1.08 (0.11), 0.88-1.34 |
|  | India | 10 | 10 | 1.10 (0.42), 0.61-3.20 | 0.82 (0.33), 0.49-1.31 |
|  | UK | 15 | 15 | 5.63 (4.64), 3.46-11.95 | 3.15 (2.02), 1.78-8.04 |
| total | — | 41 | 41 | — | — |

##### Overall

| Organic sample size (n) | Conventional sample size (n) | Organic median (IQR), min-max (US$) | Conventional median (IQR), min-max (US$) |
| --- | --- | --- | --- |
| 41 | 41 | 2.88 (3.74), 0.61-11.95 | 1.13 (1.56), 0.49-8.04 |

## 3. What are the marketing characteristics of organic food in urban food environments? How does this vary across different geographic and socioeconomic contexts?

### Terminologies - Table 6

## # A tibble: 16 × 11  
## country category cat\_org\_count term\_organic term\_natural term\_chemfree  
## <chr> <chr> <int> <chr> <chr> <chr>   
## 1 Brazil beverages 33 27 (82%) 6 (18%) 2 (6%)   
## 2 Brazil fresh produce 32 29 (91%) 1 (3%) 0 (0%)   
## 3 Brazil other 27 25 (93%) 3 (11%) 6 (22%)   
## 4 Brazil Total 92 81 (88%) 10 (11%) 8 (9%)   
## 5 India beverages 112 13 (12%) 101 (90%) 0 (0%)   
## 6 India fresh produce 21 8 (38%) 16 (76%) 0 (0%)   
## 7 India other 131 59 (45%) 67 (51%) 4 (3%)   
## 8 India Total 264 80 (30%) 184 (70%) 4 (2%)   
## 9 UK beverages 181 135 (75%) 45 (25%) 1 (1%)   
## 10 UK fresh produce 59 52 (88%) 7 (12%) 0 (0%)   
## 11 UK other 95 92 (97%) 3 (3%) 2 (2%)   
## 12 UK Total 335 279 (83%) 55 (16%) 3 (1%)   
## 13 Overall beverages 326 175 (54%) 152 (47%) 3 (1%)   
## 14 Overall fresh produce 112 89 (79%) 24 (21%) 0 (0%)   
## 15 Overall other 253 176 (70%) 73 (29%) 12 (5%)   
## 16 Overall Total 691 440 (64%) 249 (36%) 15 (2%)   
## # ℹ 5 more variables: term\_pestfree <chr>, term\_bioprod <chr>, term\_bio <chr>,  
## # term\_eco <chr>, term\_gmo <chr>

### Brands - Table 7

|  |  |  |  |
| --- | --- | --- | --- |
| food | Brazil | India | UK |
| ban\_org\_brand\_new 1 | Bio Vida (2, 33.33%) | Pure O Natural (2, 33.33%) | Tesco (4, 19.05%) |
| ban\_org\_brand\_new 2 | sÃ­tio liberdade (2, 33.33%) | NA | Co-op (3, 14.29%) |
| ban\_org\_brand\_new 3 | Brasnica (1, 16.67%) | NA | Sainsbury’s (3, 14.29%) |
| chic\_org\_brand\_new 1 | Korin (3, 60%) | 24 Mantra (2, 16.67%) | Mr. Organic (5, 27.78%) |
| chic\_org\_brand\_new 2 | Mae Terra (2, 40%) | Organic India (2, 16.67%) | Biona Organic (4, 22.22%) |
| chic\_org\_brand\_new 3 | NA | ATR Healthy heart (1, 8.33%) | Suma (3, 16.67%) |
| cof\_org\_brand\_new 1 | Native (5, 55.56%) | Araku (4, 80%) | Cafe Direct (10, 28.57%) |
| cof\_org\_brand\_new 2 | 3 coracoes (1, 11.11%) | Dhimsa (1, 20%) | Waitrose (3, 8.57%) |
| cof\_org\_brand\_new 3 | Almazen (1, 11.11%) | NA | Clipper (2, 5.71%) |
| daal\_org\_brand\_new 1 | Korin (2, 66.67%) | 24 Mantra (6, 28.57%) | Aashirvaad (2, 14.29%) |
| daal\_org\_brand\_new 2 | cooper Natural (1, 33.33%) | Organic Tattva (2, 9.52%) | Suma (2, 14.29%) |
| daal\_org\_brand\_new 3 | NA | Pro Nature (2, 9.52%) | Waitrose (2, 14.29%) |
| fj\_org\_brand\_new 1 | Native (4, 30.77%) | B Natural (7, 87.5%) | Innocent (9, 25%) |
| fj\_org\_brand\_new 2 | Aurora Orgânico (1, 7.69%) | Raw Pressery (1, 12.5%) | Pip (8, 22.22%) |
| fj\_org\_brand\_new 3 | Green people e suco do talho (1, 7.69%) | NA | Daily Dose (4, 11.11%) |
| leaf\_org\_brand\_new 1 | Rio de Una (4, 57.14%) | Pure O Natural (1, 33.33%) | M&S (3, 13.04%) |
| leaf\_org\_brand\_new 2 | Bio Vida (1, 14.29%) | NA | Sainsbury’s (3, 13.04%) |
| leaf\_org\_brand\_new 3 | Organicos Solo Vivo (1, 14.29%) | NA | Tesco (3, 13.04%) |
| man\_org\_brand\_new 1 | Bio Vida (2, 50%) | Pure O Natural (2, 28.57%) | NA |
| man\_org\_brand\_new 2 | Rio Bonito (1, 25%) | NA | NA |
| man\_org\_brand\_new 3 | benassi (1, 25%) | NA | NA |
| man\_org\_brand\_new NA | NA | NA | NA (NA, NA%) |
| milk\_org\_brand\_new 1 | Timbauba (1, 100%) | Natural (64, 85.33%) | Sainsbury’s (7, 17.07%) |
| milk\_org\_brand\_new 2 | NA | Heritage (4, 5.33%) | Grahams (6, 14.63%) |
| milk\_org\_brand\_new 3 | NA | Visakha dairy (2, 2.67%) | Co-op (5, 12.2%) |
| mill\_org\_brand\_new 1 | Korin (1, 100%) | Manna (2, 9.52%) | Infinity Foodss (1, 33.33%) |
| mill\_org\_brand\_new 2 | NA | Pro Nature (2, 9.52%) | Just Natural (1, 33.33%) |
| mill\_org\_brand\_new 3 | NA | 24 Mantra (1, 4.76%) | Whole Foods (1, 33.33%) |
| nut\_org\_brand\_new 1 | Jasmine (1, 20%) | Haldirams (10, 45.45%) | Sainsbury’s (3, 14.29%) |
| nut\_org\_brand\_new 2 | Mae Terra (1, 20%) | 24 Mantra (1, 4.55%) | Tesco (3, 14.29%) |
| nut\_org\_brand\_new 3 | Nacao Verde (1, 20%) | Dry fruit house (1, 4.55%) | Waitrose (3, 14.29%) |
| rice\_org\_brand\_new 1 | Tio Joao (4, 36.36%) | 24 Mantra (6, 40%) | Biona Organic (5, 27.78%) |
| rice\_org\_brand\_new 2 | Korin (3, 27.27%) | Ayush (1, 6.67%) | Waitrose (3, 16.67%) |
| rice\_org\_brand\_new 3 | Mae Terra (1, 9.09%) | Balaji Grand Bazaar (1, 6.67%) | Sainsbury’s (2, 11.11%) |
| tea\_org\_brand\_new 1 | Chas Campo Verde (3, 37.5%) | Organic India (9, 37.5%) | Pukka (tea) (18, 26.47%) |
| tea\_org\_brand\_new 2 | Kampos de ervas (1, 12.5%) | Lipton (4, 16.67%) | Twinings (17, 25%) |
| tea\_org\_brand\_new 3 | Organicos blessing (1, 12.5%) | Red Label - Natural Care (3, 12.5%) | Clipper (14, 20.59%) |
| tom\_org\_brand\_new 1 | Rio Bonito (2, 22.22%) | Pure O Natural (2, 40%) | Tesco (5, 35.71%) |
| tom\_org\_brand\_new 2 | Rio de Una (2, 22.22%) | NA | Waitrose (2, 14.29%) |
| tom\_org\_brand\_new 3 | Natural da Terra (1, 11.11%) | NA | Legros Bio (1, 7.14%) |
| wht\_org\_brand\_new 1 | Mae Terra (1, 50%) | Aashirvaad (27, 69.23%) | Dove’s Farm (8, 38.1%) |
| wht\_org\_brand\_new 2 | Mirella (1, 50%) | 24 Mantra (7, 17.95%) | Waitrose (3, 14.29%) |
| wht\_org\_brand\_new 3 | NA | Bambino - Nutraawell (1, 2.56%) | Aashirvaad (2, 9.52%) |

### Certification frequency - Table 8

|  |  |  |  |
| --- | --- | --- | --- |
| country | Certified | Total | Proportion |
| Brazil | 82 | 92 | 89.13 |
| India | 89 | 264 | 33.71 |
| UK | 262 | 335 | 78.21 |
| Total | 433 | 691 | 62.66 |

|  |  |  |  |
| --- | --- | --- | --- |
| vendor\_type | Certified | Total | Proportion |
| Mobile vendor | 4 | 9 | 44.44 |
| Stationary small local vendor | 128 | 325 | 39.38 |
| Supermarket | 301 | 357 | 84.31 |

|  |  |  |  |
| --- | --- | --- | --- |
| food | Certified | Total | Proportion |
| ban\_cert | 28 | 34 | 82.35 |
| chic\_cert | 30 | 35 | 85.71 |
| cof\_cert | 37 | 50 | 74.00 |
| daal\_cert | 30 | 38 | 78.95 |
| fj\_cert | 29 | 58 | 50.00 |
| leaf\_cert | 25 | 35 | 71.43 |
| man\_cert | 6 | 13 | 46.15 |
| milk\_cert | 56 | 117 | 47.86 |
| mill\_cert | 15 | 25 | 60.00 |
| nut\_cert | 26 | 48 | 54.17 |
| rice\_cert | 35 | 45 | 77.78 |
| tea\_cert | 64 | 101 | 63.37 |
| tom\_cert | 19 | 30 | 63.33 |
| wht\_cert | 33 | 62 | 53.23 |

### Certification types - Table 9

### Themes - Table 10

### Promotional materials - Table 11

### Product positioning - Table 12

## # A tibble: 15 × 13  
## product Overall\_clustered Overall\_dispersed Overall\_mostlyorg  
## <chr> <chr> <chr> <chr>   
## 1 tom 11 (36.67%) 11 (36.67%) 8 (26.67%)   
## 2 leaf 8 (22.86%) 18 (51.43%) 9 (25.71%)   
## 3 ban 4 (11.76%) 26 (76.47%) 3 (8.82%)   
## 4 man 5 (38.46%) 3 (23.08%) 5 (38.46%)   
## 5 fj 6 (10.34%) 45 (77.59%) 7 (12.07%)   
## 6 milk 1 (0.85%) 111 (94.87%) 5 (4.27%)   
## 7 cof 5 (10%) 34 (68%) 11 (22%)   
## 8 tea 10 (9.9%) 81 (80.2%) 10 (9.9%)   
## 9 mill 6 (24%) 8 (32%) 11 (44%)   
## 10 chic 9 (25.71%) 18 (51.43%) 8 (22.86%)   
## 11 daal 13 (34.21%) 12 (31.58%) 13 (34.21%)   
## 12 wht 5 (8.06%) 48 (77.42%) 9 (14.52%)   
## 13 rice 7 (15.56%) 27 (60%) 10 (22.22%)   
## 14 nut 5 (10.42%) 31 (64.58%) 12 (25%)   
## 15 Total 95 (50%) 473 (50%) 121 (50%)   
## # ℹ 9 more variables: Brazil\_clustered <chr>, Brazil\_dispersed <chr>,  
## # Brazil\_mostlyorg <chr>, India\_clustered <chr>, India\_dispersed <chr>,  
## # India\_mostlyorg <chr>, UK\_clustered <chr>, UK\_dispersed <chr>,  
## # UK\_mostlyorg <chr>

### Product positioning - Table 13

## # A tibble: 3 × 9  
## Store\_Position Overall\_count Overall\_perc Brazil\_count Brazil\_perc India\_count  
## <chr> <dbl> <dbl> <dbl> <dbl> <dbl>  
## 1 front 117 16.9 13 14.1 49  
## 2 mid 358 51.8 43 46.7 142  
## 3 back 214 31.0 35 38.0 72  
## # ℹ 3 more variables: India\_perc <dbl>, UK\_count <dbl>, UK\_perc <dbl>

## # A tibble: 3 × 9  
## Shelf\_Position Overall\_count Overall\_perc Brazil\_count Brazil\_perc India\_count  
## <chr> <dbl> <dbl> <dbl> <dbl> <dbl>  
## 1 upper 143 20.7 26 28.3 25  
## 2 mid 418 60.5 45 48.9 194  
## 3 lower 129 18.7 21 22.8 44  
## # ℹ 3 more variables: India\_perc <dbl>, UK\_count <dbl>, UK\_perc <dbl>

### Discounts - Table 14