

Beyond Deaths per Capita:

An Example (Brazil), part A

Patrick Heuveline, Ph.D. and Michael Tzen, M.S.

California Center for Population Research (CCPR)

University of California, Los Angeles (UCLA)

This file and associated Excel spreadsheet illustrate the calculations of the indicators for Brazil

Fixed demographic parameters (Part B in Technical Appendix)

Section 1: Mid-2020 Population Size

Step 1.1: From the source <https://population.un.org/wpp/Download/Standard/CSV/>
Get the file for Total Population, All variants
Keep the estimates for 2020, medium variant, all countries and territories

Example: For Brazil, 1 number

Total population, 2020 See spreadsheet, row 15

Step 1.2: From the source <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/>
Determine date of first CoViD-19 death for all UN countries and territories

Example: For Brazil, 1 date (month, day, year)

Date of first death See spreadsheet, row 19

Step 1.3: From the source <https://population.un.org/wpp/Download/Standard/CSV/>
Get the file for Population by Age and Sex, Medium variant, annual from 1950 to 2100

Keep the estimates for 2020, all countries and territories

Example: For Brazil, 2 vectors

Males, 2020 See spreadsheet, row 24

Females, 2020 See spreadsheet, row 25

Step 1.3.a: From the source <https://population.un.org/wpp/Download/Standard/CSV/>
Get the file for Population by Age and Sex, Medium variant, annual projections from 2020 to 2100

Keep the estimates for infants (age <1) & 2020, all countries and territories

Example: For Brazil, 2 numbers

Male infants, 2020 See spreadsheet, row 30

Female infants, 2020 See spreadsheet, row 31

Step 1.3.b: Get children 1-4 from children 0-4 & infants

Example: For Brazil, 2 numbers

Males 1-4, 2020 See spreadsheet, row 34

Females 1-4, 2020 See spreadsheet, row 35

Step 1.3.c: Get population 5-84 in 10-year age groups

Example: For Brazil, 2 vectors

Males 5-74, 2020 See spreadsheet, row 38

Females 5-74, 2020 See spreadsheet, row 39

Step 1.3.d: Get population 85+

Example: For Brazil, 2 numbers

Males 85+, 2020 See spreadsheet, row 42

Females 85+, 2020 See spreadsheet, row 43

Section 2: Calendar-Year-2020 Period Life Table Values

Step 2.1: From the source <https://population.un.org/wpp/Download/Standard/CSV/>
Get the file for Life Table, Medium variant

Keep the estimates for lx & ex, periods 2015-20 & 2020-25, all countries and territories

Example: For Brazil, 8 vectors

lx, males, 2015-20 See spreadsheet, row 49

lx, females, 2015-20 See spreadsheet, row 50

lx, males, 2020-25 See spreadsheet, row 51

lx, females, 2020-25 See spreadsheet, row 52

ex, males, 2015-20 See spreadsheet, row 53

ex, females, 2015-20 See spreadsheet, row 54

ex, males, 2020-25 See spreadsheet, row 55

ex, females, 2020-25 See spreadsheet, row 56

Step 2.1.a: Get npx from lx

Example: For Brazil, 4 vectors (10 values for x=0, 1, 5, 15, 25, 35, 45, 55, 65 & 75)

npx, males, 2015-20 See spreadsheet, row 59

npx, females, 2015-20 See spreadsheet, row 60

npx, males, 2020-25 See spreadsheet, row 61

npx, females, 2020-25 See spreadsheet, row 62

Step 2.1.b: Get npx for 2020 from npx for 2015-20 & npx for 2020-25

Example: For Brazil, 2 vectors

npx, males, 2020 See spreadsheet, row 65

npx, females, 2020 See spreadsheet, row 66

Step 2.2

Step 2.2.a: Get nm_x from lx & ex

Example: For Brazil, 4 vectors (11 values for x=0, 1, 5, 15, 25, 35, 45, 55, 65, 75 & 85)

nm_x, males, 2015-20 See spreadsheet, row 70

nm_x, females, 2015-20 See spreadsheet, row 71

nm_x, males, 2020-25 See spreadsheet, row 72

nm_x, females, 2020-25 See spreadsheet, row 73

Step 2.2.b: Get nm_x for 2020 from nm_x for 2015-20 & nm_x for 2020-25

Example: For Brazil, 2 vectors

nm_x, males, 2020 See spreadsheet, row 76

nm_x, females, 2020 See spreadsheet, row 77

Updated Mortality Indicators (Part A in Technical Appendix)

Note: indicators below based on 1/1/2021 data updates

Section 1: *CCDR*

Step 1.1: From the source <https://coronavirus.jhu.edu/>

Get current estimate date & cumulative number of covid-19 deaths

Keep the estimates for all UN countries and territories

Example: For Brazil, 1 number & 1 date (month/day/year)

Death estimate See spreadsheet, row 84

Date of estimate See spreadsheet, row 85

For USA, 1 number & 1 date (month/day/year)

Death estimate See spreadsheet, row 88

Date of estimate See spreadsheet, row 89

Step 1.2: From fixed demographic indicators

Get date of first CoViD-19 death and total mid-2020 population size for all locations in (1.1)

Example: For Brazil, 1 number & 1 date (month/day/year)

Total population, 2020 See spreadsheet, row 93 (from row 15)

Date of first death See spreadsheet, row 94 (from row 19)

Example: For USA, 1 number & 1 date (month/day/year)

Total population, 2020 See spreadsheet, row 96

Date of first death See spreadsheet, row 97

Note: Number & date for USA obtained as described above for Brazil

Step 1.3: Calculate exposure in person-years for all locations in (1.1)

Example: For Brazil, 1 number

Person-years See spreadsheet, row 100

Example: For USA, 1 number

Person-years See spreadsheet, row 102

Note: The number of days was calculated using the ISOdate function in R

Step 1.4: Calculate the estimated period Crude Covid-19 Death Rate (*CCDR*) for all locations in (1.1)

Example: For Brazil, 1 number

CCDR See spreadsheet, row 105

Section 2: *CCMR*

Step 2.1: From the source <https://data.cdc.gov/NCHS/Provisional-COVID-19-Death-Counts-by-Sex-Age-and-S/9bhg-hcku>

Get report date and number of reported covid-19 deaths by sex and age group

Example: 2 vectors & 1 date (month/day/year)

Male deaths See spreadsheet, row 110

Female deaths See spreadsheet, row 111

Date of estimate See spreadsheet, row 112

Step 2.2: From fixed demographic indicators

Get the mid-2020 population size by age groups for all locations in (1.1)

Example: For Brazil, 2 vectors

Males by age group, 2020 See spreadsheet, row 111 (from rows 30, 34, 38 & 42)

Females by age group, 2020 See spreadsheet, row 112 (from rows 31, 35, 39 & 43)

For USA, 2 vectors

Males by age group, 2020 See spreadsheet, row 119

Females by age group, 2020 See spreadsheet, row 120

Note: Vectors for USA obtained as described above for Brazil

Step 2.3: Calculate age-and-sex-specific covid-19 death rates for the USA

Example: For USA, 2 vectors

Male rates See spreadsheet, row 123

Female rates See spreadsheet, row 124

Step 2.4: Calculate estimated counterfactual numbers of covid-19 deaths for all locations in (1.1)

Example: For Brazil, 2 vectors

Male deaths by age group See spreadsheet, row 127

Female deaths by age group See spreadsheet, row 128

- Step 2.5: Calculate the Comparative Covid-19 Mortality Ratio (CCMR) for estimated numbers of covid-19 deaths for all locations in (1.1)
- Example: For Brazil, 1 number
- CCMR See spreadsheet, row 131
- Section 3: Estimated Reduction in 2020-Life Expectancies
- Step 3.1: From fixed demographic indicators
Get period life-table age-specific death rates (nmx) and survival probabilities (npx) for year-2020 for each country in (1.1)
- Example: For Brazil, 4 vectors
- npx, males, 2020 See spreadsheet, row 136 (from row 65)
- npx, females, 2020 See spreadsheet, row 137 (from row 66)
- nmx, males, 2020 See spreadsheet, row 138 (from row 76)
- nmx, females, 2020 See spreadsheet, row 139 (from row 77)
- Step 3.2: Calculate the age-specific ratio of updated to previously projected deaths from all causes in 2020 for each country in (1.1)
- Example: For Brazil, 2 vectors
- nRx, males See spreadsheet, row 142
- nRx, females See spreadsheet, row 143
- Step 3.3: Calculate age-specific survival probabilities in the new projected year-2020 life table for each country in (1.1)
- Example: For Brazil, 2 vectors
- *npx, males See spreadsheet, row 146
- *npx, females See spreadsheet, row 147
- Step 3.4: Calculate the age-specific number of years lived after age x for individuals dying in the age interval in the new projected year-2020 life table for each country in (1.1)
- Example: For Brazil, 2 vectors
- *nax, males See spreadsheet, row 150
- *nax, females See spreadsheet, row 151
- Step 3.5: Calculate new values of life expectancies (e_x^o values) in the year-2020 life table for all locations in (1.2)
- Example: For Brazil, 2 vectors
- ex, males See spreadsheet, row 154
- ex, females See spreadsheet, row 155
- Step 3.6: Calculate the difference between the new values of life expectancies in year-2020 life table and the original values
- Example: For Brazil, 3 vectors
- Diff in ex, males See spreadsheet, row 154
- Diff in ex, females See spreadsheet, row 155
- Diff in ex, both sexes See spreadsheet, row 156