

Introduction to Quarto Dashboards



Jeremy Selva [in](#)

@JauntyJJS [GitHub](#) [X](#) [LinkedIn](#) [Medium](#)

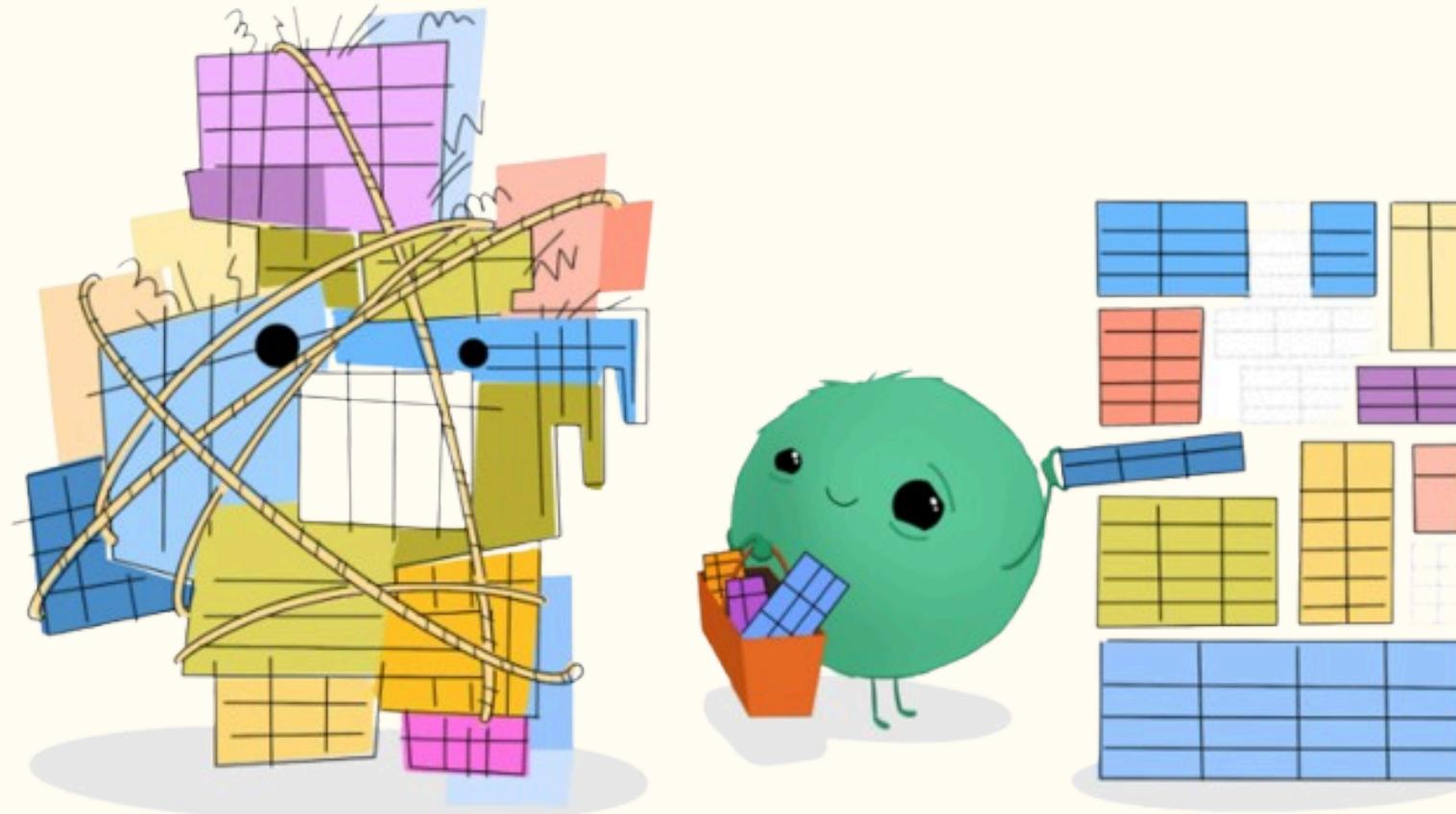
<https://jeremy-selva.netlify.app> [🔗](#)

For R User Group Singapore (RUGS) Meetup [📍](#)

29th November 2024

whoami

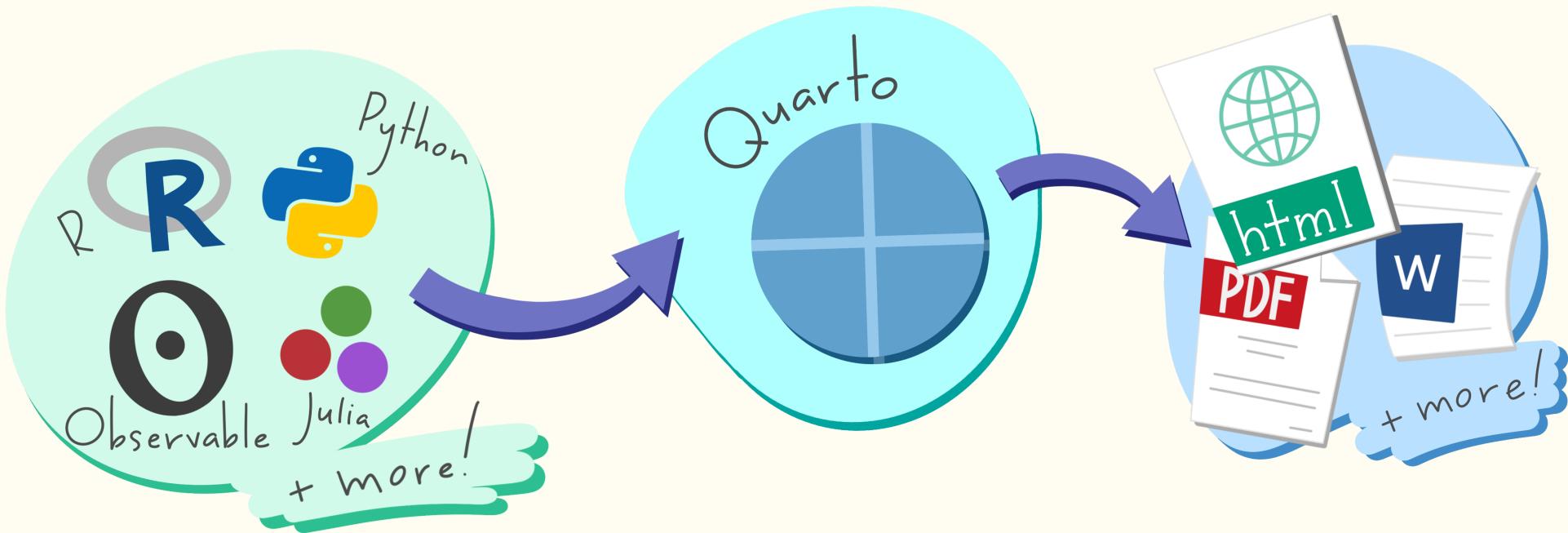
Research Officer from [National Heart Centre Singapore](#) who collects, cleans and harmonises data for a living.



Taming the Data Beast from “[Cleaning Medical Data with R](#)” workshop by Shannon Pileggi, Crystal Lewis and Petter Higgins presented at R/Medicine 2023. Illustrated by [Allison Horst](#).

Quarto

Quarto is an open-source software that weaves narrative and programming code together to produce elegantly formatted output as documents (in HTML, Word, PDF), presentations, books, web pages, and more.



Artwork from “Hello, Quarto” keynote by Julia Lowndes and Mine Çetinkaya-Rundel, presented at RStudio Conference 2022. Illustrated by Allison Horst.

Quarto

<https://quarto.org/>

The screenshot shows the Quarto website homepage. At the top left is the Quarto logo (a blue circle with a white cross). To its right are navigation links: Overview, Get Started, Guide, Extensions, Reference, Gallery, Blog, Help (with a dropdown arrow), and social media icons for Twitter, GitHub, RSS, and a magnifying glass for search. Below the header is a banner announcing "Quarto 1.6 released! Download | Read More" with a close button (X) to its right. The main content area features a large blue header "Welcome to Quarto®" followed by the subtitle "An open-source scientific and technical publishing system". A bulleted list details the system's capabilities:

- Author using Jupyter notebooks or with plain text markdown in your favorite editor.
- Create dynamic content with Python, R, Julia, and Observable.
- Publish reproducible, production quality articles, presentations, dashboards, websites, blogs, and books in HTML, PDF, MS Word, ePub, and more.
- Share knowledge and insights organization-wide by publishing to Posit Connect, Confluence, or other publishing systems.

Quarto Dashboards (Released in Quarto 1.4)

A simple way to quickly creating dashboards from Quarto scripts using R, Python, Julia, and Observable

Publish groups of visualizations, tables, text together. See examples in
<https://quarto.org/docs/gallery/index.html#dashboards>

Dashboards

Stock Explorer Python

Stock Tracker Ty Coon

BA — The Boeing Company — <https://www.boeing.com>

Current Price \$ 179.69 Change ↑ \$0.60 Percent Change % 0.34

Price History

Last Close: 2023-10-27

Open	\$180.00
High	\$182.33
Low	\$179.01
Close	\$179.69
Volume	4,601,300

export to plotly »

Gapminder Python

Worldwide Development Gapminder Analytics Indicators Data

GDP and Life Expectancy

Population

Life Expectancy

DEMOCO Customer Churn Churn (Standard) Data

Churn rate 2022

17%

Current churn rate

14%

Churn rate goal

10%

Reason for churn by quarter

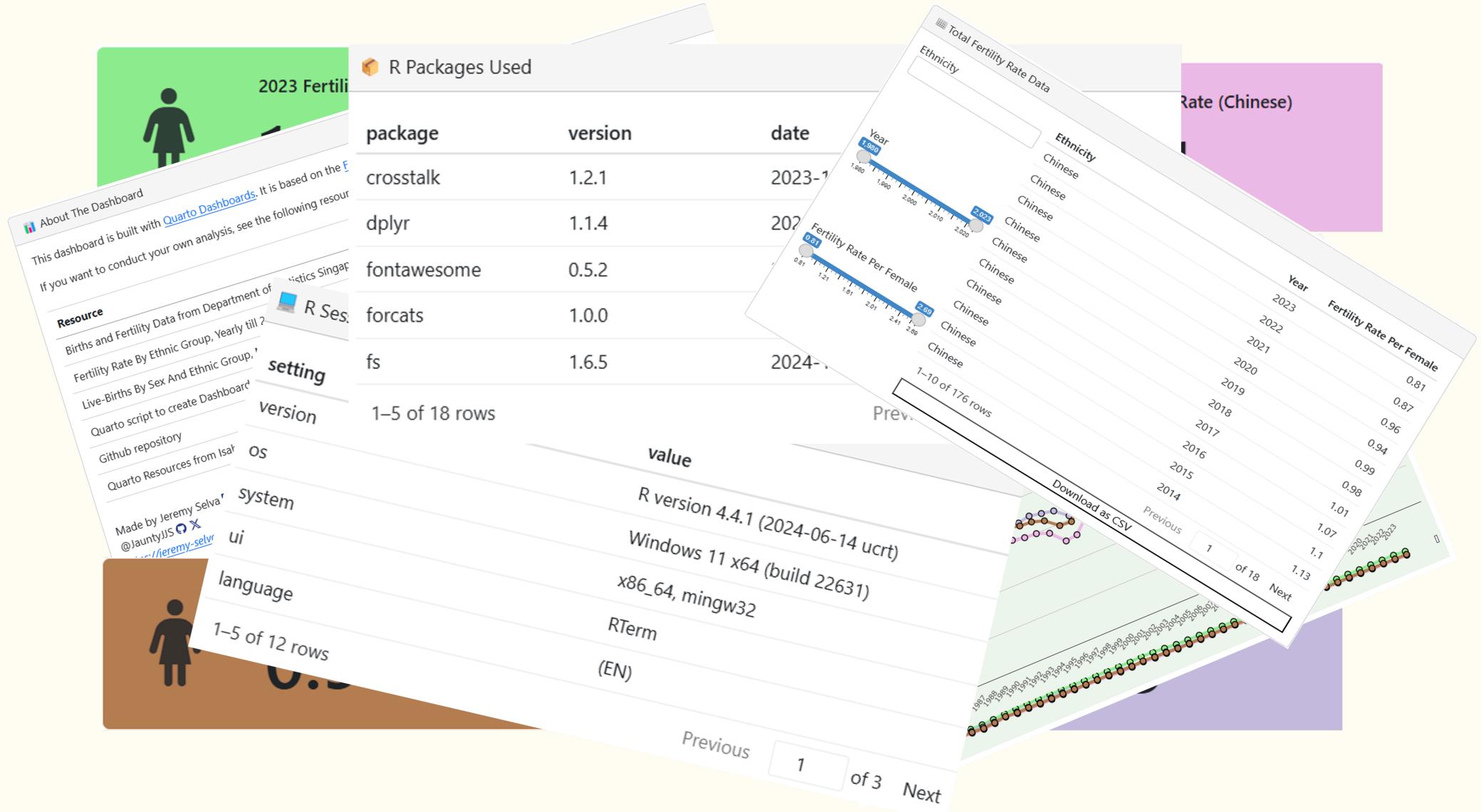
Churn by contract type and days since purchase

Purchase characteristics

Index	Contract type	Churn	Average purchase	Total transactions	Days since last purchase
2	Month-to-month	Old notchurn	\$0.14	19	138
5	Month-to-month	Churned	\$0.81	16	294
8	One-year	Old notchurn	\$0.85	2	125
11	One-year	Churned	\$0.15	2	280

Dashboard Basics

Dashboards are composed of cards of text, plot and tables in pages



Dashboard Basics

Dashboards are composed of **cards** of text, plot and tables in **pages** that need to be arranged neatly into rows and columns.

About

Total_Fertility

About The Dashboard

This dashboard is built with [Quarto Dashboards](#). It is based on the [Fertility Dashboard](#) from [Department of Statistics Singapore](#).

If you want to conduct your own analysis, see the following resources:

Resource	Link
Births and Fertility Data from Department of Statistics Singapore	Website
Fertility Rate By Ethnic Group, Yearly till 2023 in Excel	Fertility Rate By Ethnic Group, Yearly.xlsx
Live-Births By Sex And Ethnic Group, Monthly till Dec 2023 in Excel	Live-Births By Sex And Ethnic Group, Monthly.xlsx
Quarto script to create Dashboard	Quarto Script
Github repository	Source code
Quarto Resources from Isabella Velásquez	Resources

Made by Jeremy Selva 

@JauntyJJS  

<https://jeremy-selva.netlify.app> 

R Packages Used

package	version	date	source
crosstalk	1.2.1	2023-11-23	RSPM
dplyr	1.1.4	2023-11-17	RSPM
fontawesome	0.5.2	2023-08-19	RSPM
forcats	1.0.0	2023-01-29	RSPM
fs	1.6.5	2024-10-30	RSPM

1–5 of 18 rows

Previous 1 of 4 Next

R Session Info

setting	value
version	R version 4.4.1 (2024-06-14 ucrt)
os	Windows 11 x64 (build 22631)
system	x86_64, mingw32
ui	RTerm
language	(EN)

1–5 of 12 rows

Previous 1 of 3 Next

Motivation

CNA reported that Singapore's total fertility rate was below 1 for the first time.

cna Best News Website or Mobile Service • WAN-IFRA Digital Media Awards Worldwide 2022

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Singapore

Singapore's total fertility rate falls to historic low of 0.97

While Singapore's total fertility rate has been on a decline for many years, this is the first time it has fallen below 1.0.



 Natasha Ganesan

28 Feb 2024 04:09PM
(Updated: 09 Mar 2024 07:47AM)



Motivation

Data is downloaded from [Department Of Statistics Singapore](#)

The screenshot shows a web browser interface with the URL singstat.gov.sg/find-data/search-by-theme/population/births-and-fertility/latest-data in the address bar. The page title is "Detailed Statistical Time Series". A blue header bar contains the text "Births and Fertility". Below the header, there is a list of statistical series:

- Births And Fertility Rates, Annual
- Live-Births By Sex and Ethnic Group, Monthly
- Live-Births By Birth Order, Quarterly
- Live-Births By Birth Order, Annual

Motivation

Alternatively, it can be downloaded from <https://data.gov.sg/>

Fertility Rate Live Birth

https://data.gov.sg/datasets/d_e39eeaeadb571c0d0725ef1eec48d166/view

A Singapore Government Agency Website [How to identify](#) ▾

 data.gov.sg Try keywords like: 'school' or 'weather'

Help ▾ Feedback Login



Births And Fertility Rates, Annual

Data from Jan 1960 to Dec 2023 • Updated 20 days ago

[SINGSTAT \(Singapore Department of Statistics\)](#)

Source: SINGAPORE DEPARTMENT OF STATISTICS, IMMIGRATION AND CHECKPOINTS AUTHORITY

Data Last Updated: 06/06/2024

Update Frequency: Annual

Adapted from: <https://tablebuilder.singstat.gov.sg/table/TS/M810091>

Download CSV (8.1 KB)

Subscribe



Motivation

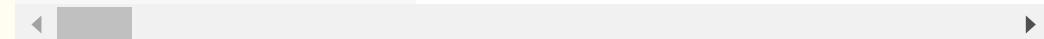
A preview of the dataset.

```
1 birth_data <- readxl::read_excel(  
2   path = here::here(  
3     "data",  
4     "Live-Births By Sex And Ethnic Group, Monthly.xlsx"  
5   )  
6 )
```

Ethnicity	Gender	2023Dec	2023Nov	2023Oct
Malays	All	608	622	679
Chinese	All	1496	1643	1867
Indians	All	310	328	316
Others	All	230	269	305
Malays	Male	321	304	331
Chinese	Male	764	841	987
Indians	Male	150	168	174
Others	Male	122	144	169

```
1 fertility_rate_data <- readxl::read_excel(  
2   path = here::here(  
3     "data",  
4     "Fertility Rate By Ethnic Group, Yearly.xlsx"  
5   )  
6 )
```

Ethnicity	2023	2022	2021
Chinese (Per Female)	0.81	0.87	0.96
Malays (Per Female)	1.65	1.83	1.82
Indians (Per Female)	0.95	1.01	1.05
All (Per Female)	0.97	1.04	1.12



1-8 of 12 rows

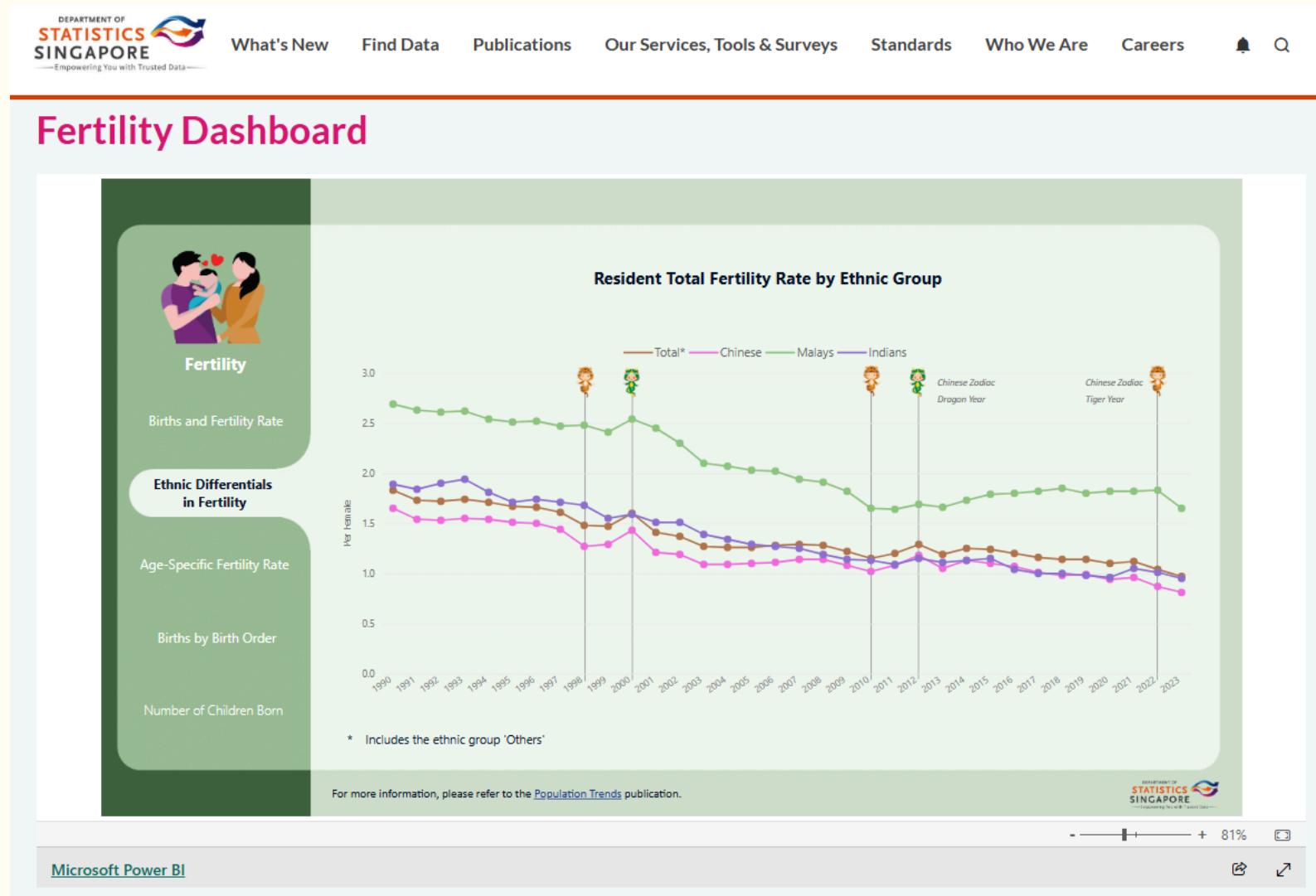
Previous

1

of 2 Next

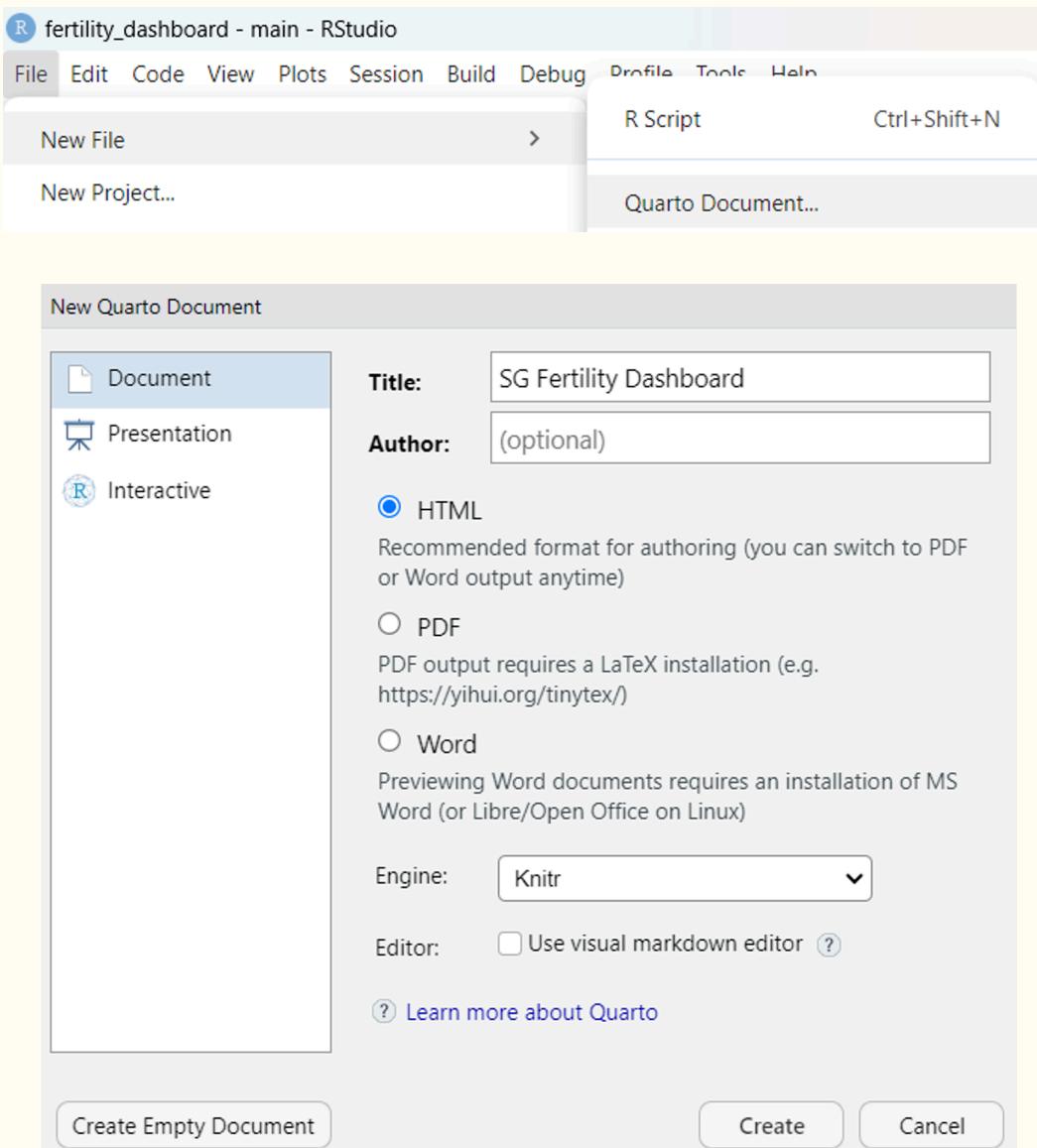
Motivation

Can Quarto Dashboard create something similar to the [Fertility Dashboard](#) from Department of Statistics Singapore ?



Open A Quarto Document

Create a Quarto document



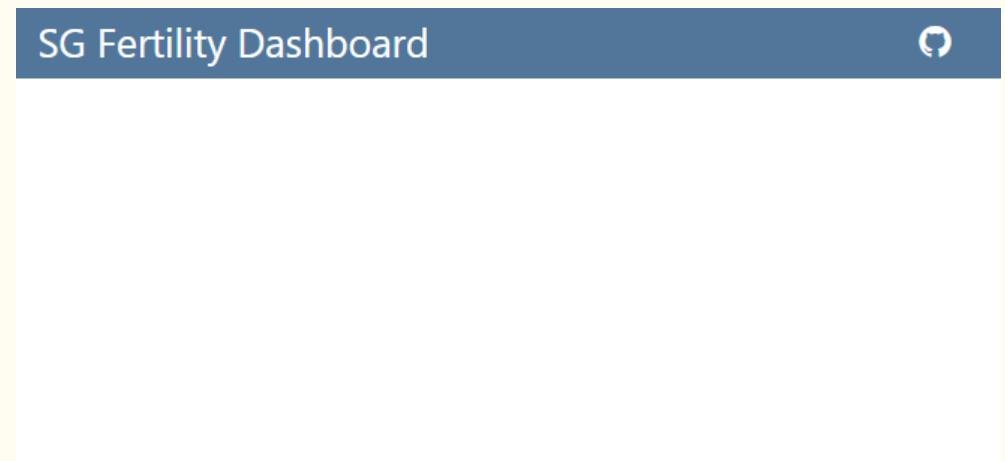
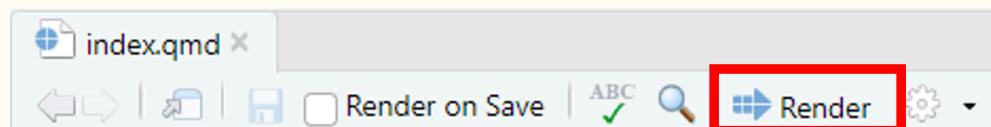
The screenshot shows the Quarto editor interface with the title bar "Untitled1". The "Source" tab is active, displaying the following Quarto document code:

```
1 ---  
2 title: "SG Fertility Dashboard"  
3 format: html  
4 ---  
5  
6 ## Quarto  
7  
8 Quarto enables you to weave together content and  
9 executable code into a finished document. To learn  
10 more about Quarto see <https://quarto.org>.  
11  
12 ## Running Code  
13  
14 ```{r}  
15 1 + 1  
16 ````  
17  
18 You can add options to executable code like this  
19  
20 ```{r}  
21 #| echo: false  
22 2 * 2  
23 ````  
24  
25 The `echo: false` option disables the printing of  
26 code (only output is displayed).
```

Open A Quarto Document

Clear everything in file and type the following **yaml** header (surrounded by **---**) and click “Render”

```
index.qmd
1 ---
2 title: "SG Fertility Dashboard"
3 format:
4   dashboard:
5     nav-buttons: [github]
6     github: https://github.com/JauntyJJS/fertility_dashboard
7 ---
```



Code Chunks

R codes are to be placed in between the ````{r}` and ````` code chunks.

R code

In code chunk

```
1 library(here) # A Simpler Way to Find Your Files Posit RPSM v1.0.1
2 library(readxl) # Read Excel Files Posit RPSM v1.4.3
3 library(tibble) # Simple Data Frames Posit RPSM v3.2.1
4 library(fs) # Cross-Platform File System Operations Based on 'libuv' Posit RPSM v1.6.5
5 library(rmarkdown) # Dynamic Documents for R Posit RPSM v2.28
6 library(yaml) # Methods to Convert R Data to YAML and Back Posit RPSM v2.3.10
7 library(quarto) # R Interface to 'Quarto' Markdown Publishing System Posit RPSM v1.4.4
8 library(sessioninfo) # R Session Information Posit RPSM v1.2.2
9 library(dplyr) # A Grammar of Data Manipulation Posit RPSM v1.1.4
10 library(tidyr) # Tidy Messy Data Posit RPSM v1.3.1
11 library(forcats) # Tools for Working with Categorical Variables (Factors) Posit RPSM v1.0.0
12 library(glue) # Interpreted String Literals Posit RPSM v1.8.0
13 library(plotly) # Create Interactive Web Graphics via 'plotly.js' Posit RPSM v4.10.4
14 library(htmltools) # Tools for HTML Posit RPSM v0.5.8.1
15 library(reactable) # Interactive Data Tables for R Posit RPSM v0.4.4
16 library(crosstalk) # Inter-Widget Interactivity for HTML Widgets Posit RPSM v1.2.1
17 library(fontawesome) # Easily Work with 'Font Awesome' Icons Posit RPSM v0.5.2
```

Pages

The text of the level 1 headings `#{Page Title}` helps to create pages in the navigation bar.

```
index.qmd
```

```
1 ---
2 title: "SG Fertility Dashboard"
3 format:
4   dashboard:
5     nav-buttons: [github]
6     github: https://github.com/JauntyJJS/fertility_dashboard
7 ---
8
9 # Fertility Rate {orientation="rows" scrolling="true"}
10
11 # Live Birth {orientation="rows" scrolling="true"}
12
13 # About {orientation="columns" scrolling="true"}
```

SG Fertility Dashboard

Fertility Rate

Live Birth

About



Layout for About

The `orientation="columns"` settings ensures cards are first laid out by columns and then by rows. Column space can be allocated using level 2 headings `## Column`

```
index.qmd
```

```
1 # About {orientation="columns" scrolling="true"}  
2  
3 ## Column {width="60%"}  
4  
5 ## Column {width="40%"}
```

`## Column {width="60%"}
Column {width="40%"}`

Cards for About

To create cards that has text or markdown, it is better to use the `::: {.card title="Your title"}` block.

```
index.qmd
1 # About {orientation="columns" scrolling="true"}
2
3 ## Column - About the Dashboard {width="60%"}
4
5 ::: {.card title="📊 About The Dashboard"}
6
7 Your markdown text here
8
9 :::
10
11 ## Column - R Session and Packages Used {width="40%"}
```

The screenshot shows a dashboard interface titled "SG Fertility Dashboard". The top navigation bar includes links for "Fertility Rate", "Live Birth", and "About". The "About" tab is currently active. Below the navigation, there is a card titled "About The Dashboard" which contains the text "Your markdown text here". The overall layout is clean and modern, typical of a data visualization tool like R Shiny.

Cards for About



Code

Output

To create cards that uses R codes, use ````{r}` code chunks.

```
index.qmd
1 # About {orientation="columns" scrolling="true"}
2
3 ## Column - About the Dashboard {width="60%"}
4
5 :::: {.card title="📊 About The Dashboard"}
6
7 Your markdown text here
8
9 ::::
10
11 ## Column - R Session and Packages Used {width="40%"}
12
13 ```{r}
14 #| label: R Package Used
15 #| title: "R Packages Used"
16
17 head(sessioninfo::package_info())
18
19 ```
20
21 ```{r}
22 #| label: R Session Info
```

Cards for About



Code

Output

Here are the contents to create the About the dashboard chunks.

index.qmd

```
1 # About {orientation="columns" scrolling="true"}  
2  
3 ## Column - About the Dashboard {width="60%"}  
4  
5 :::: {.card title="📊 About The Dashboard"}  
6  
7 This dashboard is built with [Quarto Dashboards](https://quarto.org/docs/dashboards/){target="\_blank"}. It is based on the [Fertility Data](https://www.singstat.gov.sg/find-data/search-by-theme/population-and-fertility).  
8  
9 If you want to conduct your own analysis, see the following resources:  
10  
11 +-----+  
12 | Resource | Link  
13 +-----+  
14 | Births and Fertility Data | [<i class='bi bi-globe'></i> Website](https://www.singstat.gov.sg/find-data/search-by-theme/population-and-fertility)  
15 | Department of Statistics Singapore |  
16 +-----+  
17 | Fertility Rate By Ethnic Group, Yearly from | [<i class='bi bi-globe'></i> Website](https://data.gov.sg/datasets/d\_e39eeaeadb571c0d0725ef1eed)  
18 | [data.gov.sg](https://data.gov.sg/) |  
19 +-----+  
20 | Live-Births By Sex And Ethnic Group, Monthly from | [<i class='bi bi-globe'></i> Website](https://data.gov.sg/datasets/d\_d05c760928eb5eaa58006d8346)  
21 | Group, Monthly from |  
22 +-----+
```

Layout and Cards for Fertility Rate

The `orientation="rows"` settings ensures cards are first laid out by rows and then by columns.

Indicating `#| content: valuebox` in the R code chunk will give out a value box.

index.qmd

```
1 # Fertility Rate {orientation="rows" scrolling="true"}
2
3 ## Row - 2023 Fertility Value Boxes
4
5 ````{r}
6 #| label: Value Box 1
7 #| content: valuebox
8 #| title: "2023 Fertility Rate (Total*)"
9
10 list(
11   icon = "person-standing-dress",
12   color = "#b67e54",
13   value = "A Value"
14 )
15
16 ````{r}
17 #| label: Value Box 2
18 #| content: valuebox
19 #| title: "2023 Fertility Rate (Chinese)"
20
21 ````{r}
22 #| label: Value Box 3
23 #| content: valuebox
24 #| title: "2023 Fertility Rate (Malays)"
```

The dashboard features a top navigation bar with tabs: SG Fertility Dashboard, Fertility Rate (selected), Live Birth, and About. Below the navigation are four cards, each representing a different ethnic group's fertility rate:

- 2023 Fertility Rate (Total*)**: A brown card with a female icon and the placeholder value "A Value".
- 2023 Fertility Rate (Chinese)**: A pink card with a female icon and the placeholder value "A Value".
- 2023 Fertility Rate (Malays)**: A green card with a female icon and the placeholder value "A Value".
- 2023 Fertility Rate (Indians)**: A purple card with a female icon and the placeholder value "A Value".

At the bottom of the dashboard, there are two sections:

- A left section containing a plot area with the message "[1] "a plot"".
- A right section containing a table area with the message "[1] "a table"".

Tables and Plots for Fertility Rate Page

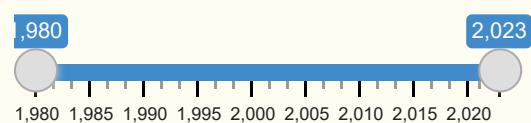
Table

Source

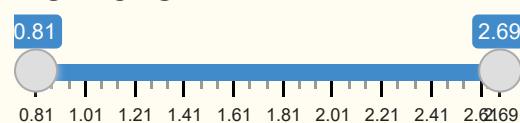
Ethnicity



Year



Fertility Rate Per Female



Ethnicity

Year

Fertility Rate Per Female

Ethnicity	Year	Fertility Rate Per Female
Chinese	2023	0.81
Chinese	2022	0.87
Chinese	2021	0.96
Chinese	2020	0.94
Chinese	2019	0.99
Chinese	2018	0.98
Chinese	2017	1.01
Chinese	2016	1.07
Chinese	2015	1.1
Chinese	2014	1.13

1-10 of 176 rows

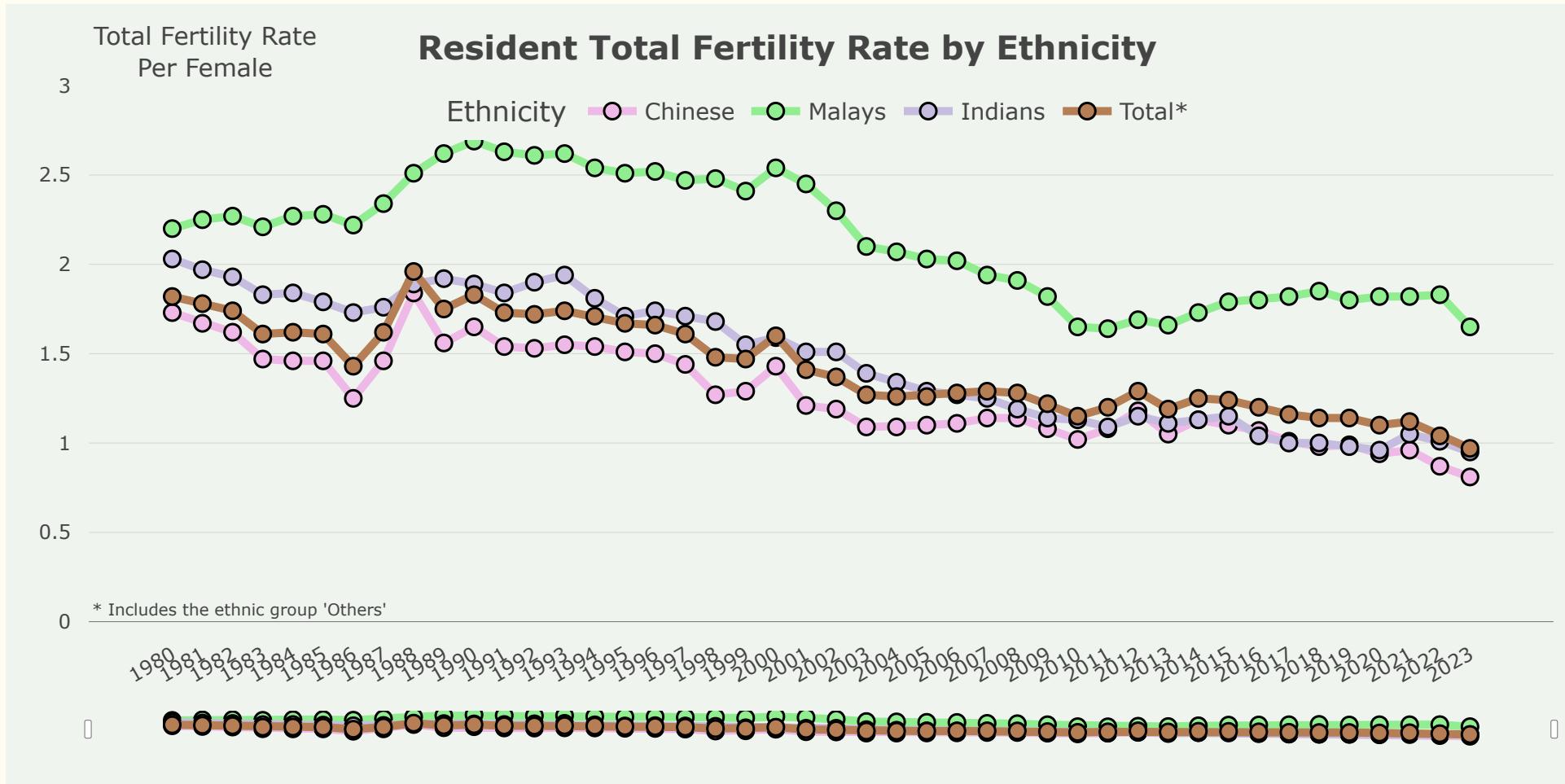
Previous 1 of 18 Next

[Download as CSV](#)

Tables and Plots for Fertility Rate Page

Plot

Source



Layout and Cards for Live Birth

The `{.tabset}` settings allow cards to have tabs to provide multiple views of data.

index.qmd

```
1 # Live Birth {orientation="rows" scrolling="true"}
2
3 ## Row - Live Birth Plot and Table
4
5 ### Column - Live Birth Plot {.tabset}
6
7   ``{r}
8   #| label: Total Live Birth by Ethnicity Plot
9   #| title: ">All"
10
11 print("a plot for all gender")
12
13
14
15   ``{r}
16   #| label: Total Male Live Birth by Ethnicity Plot
17   #| title: "Male"
18
19 print("a plot for male")
20
21
22
```

The screenshot shows a dashboard with a dark blue header containing the text "SG Fertility Dashboard", "Fertility Rate", "Live Birth", and "About". On the far right of the header is a small circular icon with a white question mark. Below the header is a card with three tabs at the top: "All" (selected), "Male", and "Female". The "All" tab has a subtitle "[1] "a plot for all gender"" and the "Male" tab has a subtitle "[1] "a table"".

Tables and Plots for Live Birth

[Table](#)[Source](#)

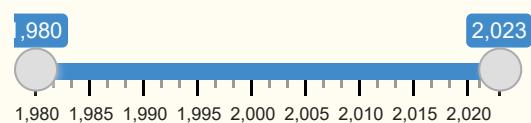
Ethnicity



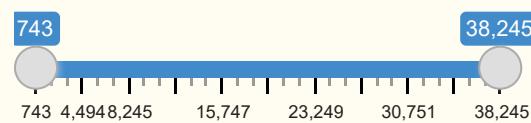
Gender

- All
- Female
- Male

Year



Total Live Birth



Ethnicity	Gender	Year	Total Live Birth
Malays	All	2023	7212
Malays	All	2022	7958
Malays	All	2021	7852
Malays	All	2020	7814
Malays	All	2019	7615
Malays	All	2018	7592
Malays	All	2017	7315
Malays	All	2016	7143
Malays	All	2015	6961
Malays	All	2014	6468

1–10 of 528 rows

Previous

1

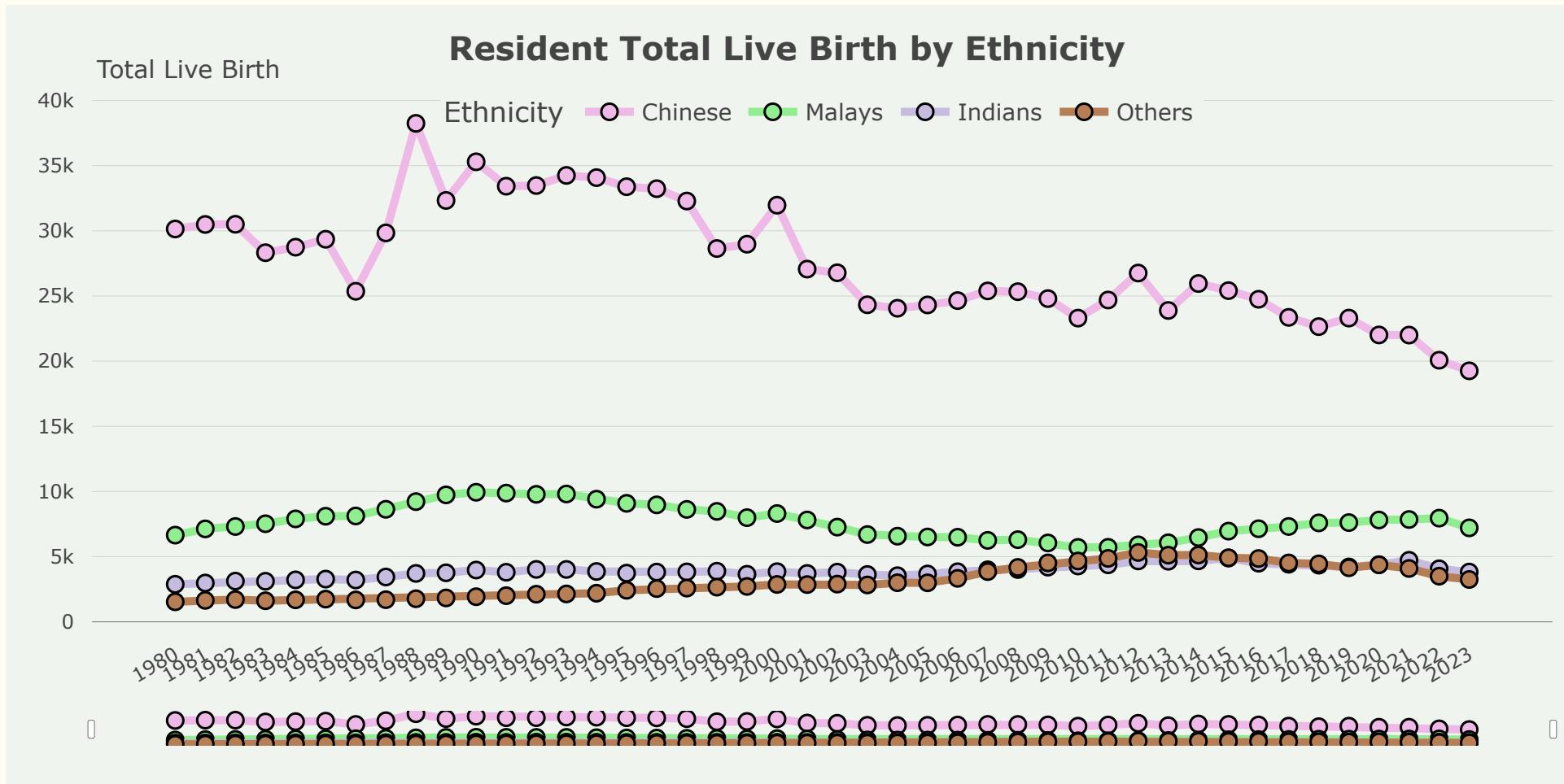
of 53 Next

[Download as CSV](#)

Tables and Plots for Live Birth

Plots

Source



Current Output

Deploy using [Github pages](#)

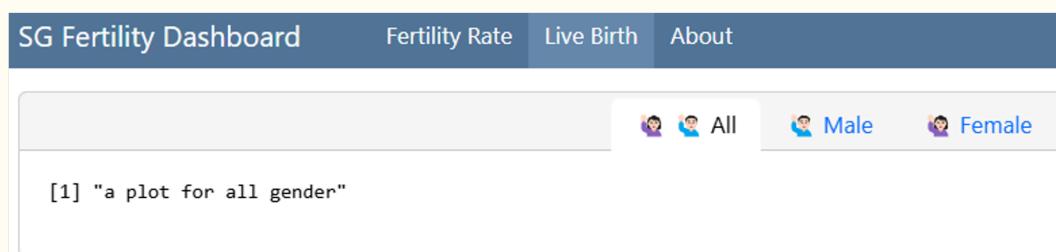
- https://jauntyjjs.github.io/fertility_dashboard/



Summary

This introduction has covered

- Navigation Bar and Pages
- Card Layout using Rows, Columns and Tabs
- Data display using plots, tables and value boxes



The "About" section provides information about the dashboard's build, resources, and links. It includes a table of resources with columns for Resource, Link, and Description.

Resource	Link
Births and Fertility Data Department of Statistics Singapore	Website
Fertility Rate By Ethnic Group, Yearly from data.gov.sg	Website
Live-Births By Sex And Ethnic Group, Monthly from data.gov.sg	Website
Fertility Rate By Ethnic Group, Yearly till 2023 in Excel	Fertility Rate By Ethnic Group, Yearly.xlsx
Live-Births By Sex And Ethnic Group, Monthly till Dec 2023 in Excel	Live-Births By Sex And Ethnic Group, Monthly.xlsx
Quarto script to create Dashboard	Quarto Script
Github repository	Source code
Quarto Resources from Isabella Velásquez	Resources
Quarto Tutorials from Mine Çetinkaya-Rundel	1: Hello, Dashboards! 2: Components 3: Theming and Styling

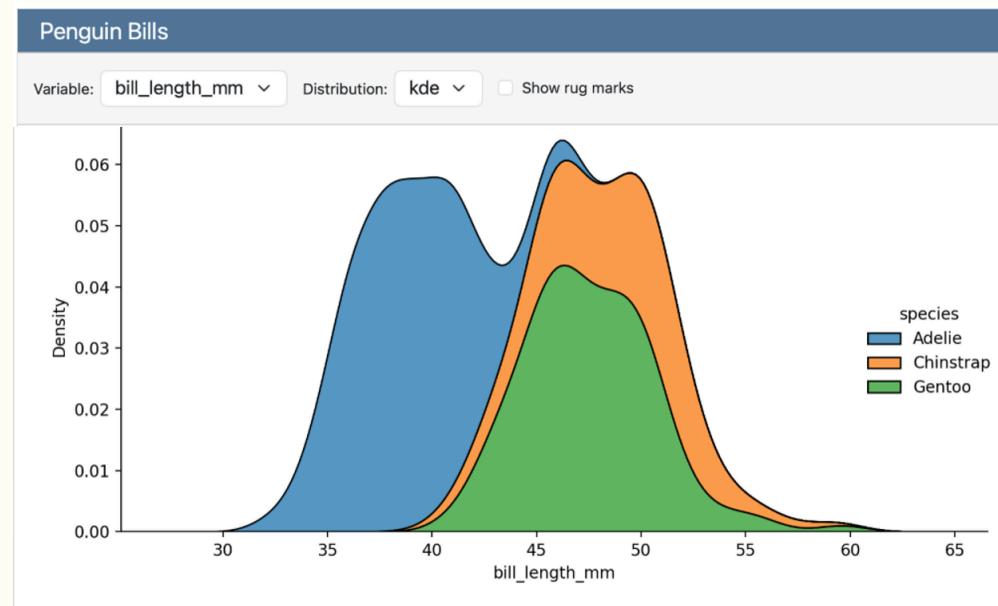
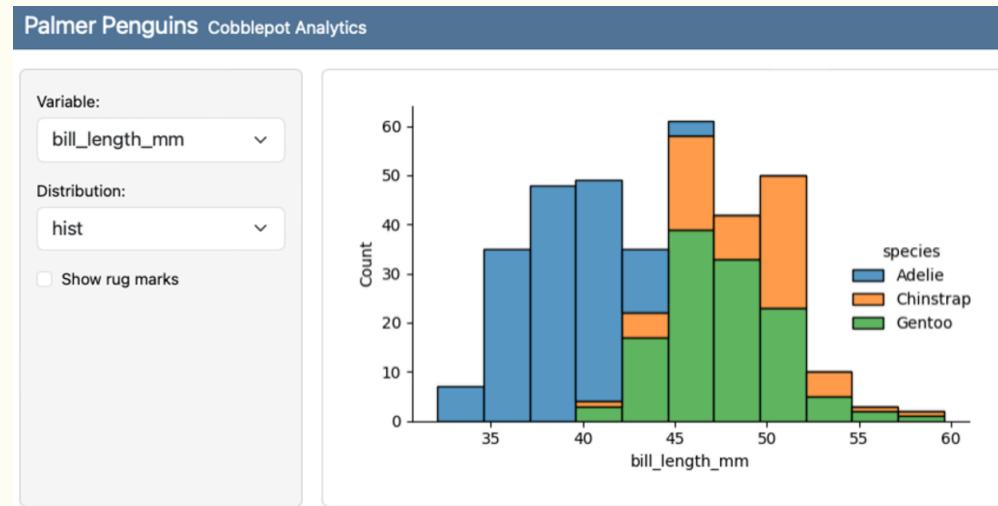
Births And Fertility Rates, Annual and Live-Births By Sex And Ethnic Group data were accessed on 25 November 2024 from <https://data.gov.sg/>. Data is made available under the terms of [Singapore Open Data Licence version 1.0](#).

Made by Jeremy Selva [LinkedIn](#)
@JauntyJJS [GitHub](#) [X](#)
<https://jeremy-selva.netlify.app>

Summary

Other features (not covered)

- Other forms of data display like Shiny component: `bslib`
- Sidebar and Toolbar
- Theming and customization
- Deployment



Learn more

- Quarto Dashboard Documentation 
- Quarto Resources from Isabella Velásquez 
- Quarto Dashboard Tutorial Videos from Mine Çetinkaya-Rundel
 - 1: Hello, Dashboards! 
 - 2: Components 
 - 3: Theming and Styling 
- Spotify dashboard for 2024 Posit Table Contest submission using Quarto from Melissa Van Bussel
 - Walkthrough 
 - Source Code 
 - Spotify Dashboard 