

Contraceptives across space, time and their association with various social markers

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2024-11-08

Combined 2022 prescribing data comes from every month in 2022 from the Public Health Scotland Open Prescribing Dataset. Data on Healthboards and population data on sex and age has been loaded in here.

Grouping commonly prescribed contraceptive drugs into five categories:

- Combined oral contraceptive
- Progesterone only pill
- Intrauterine contraceptives
- Contraceptive injection
- Hormone patch

The prescribed drug brand names come from NICE who list the UK brand names of drugs.

0.1 Figure 1 :

Investigating the difference in contraception prescription rate across the Scottish NHS Healthboards.

The use of 2019 Spatial Data structure files is appropriate as the borders used in 2022 were determined in 2013(CITE)and have not changed

```
joined_by_hb_name <- full_join(all_contraceptive_data, health_boards, by = join_by(hbt == hb))
sex_data <- sex_data %>%
  filter(sex != "All")
joined_with_sex <- full_join(joined_by_hb_name, sex_data, by = join_by("hbt"=="hb"))%>%
  filter(sex != "Male")

contraception_proportion <- joined_with_sex %>%
  group_by(hbt) %>%
  filter(!is.na(number_of_paid_items)) %>%
  summarise(per_hb = sum(number_of_paid_items)/mean(all_ages))

nhs_healthboard <- st_read(here("data/NHS_healthboards_2019.shp"))

## Reading layer 'NHS_healthboards_2019' from data source
## 'C:\Users\maria\OneDrive\Documents\data science\week_7\B230189\data\NHS_healthboards_2019.shp'
## using driver 'ESRI Shapefile'
## Simple feature collection with 14 features and 4 fields
## Geometry type: MULTIPOLYGON
## Dimension: XY
## Bounding box: xmin: 7564.996 ymin: 530635.8 xmax: 468754.8 ymax: 1218625
## Projected CRS: OSGB36 / British National Grid
```

```
joined_with_polygon <- full_join(nhs_healthboard, contraception_proportion, by = join_by("HBCode"=="hbt"))

contraception_distribution_hb <- joined_with_polygon %>%
  ggplot(aes(fill = per_hb))+
  scale_fill_viridis_c(name = "Contraception prescription proportion") +
  geom_sf()+
  labs(title = "Contraception Prescribed to Women Across Scotland's Healthboards",
       subtitle = "Measured Proportionally Against Each Healthboard's Female Population") +
  theme_minimal()

contraception_distribution_hb
```

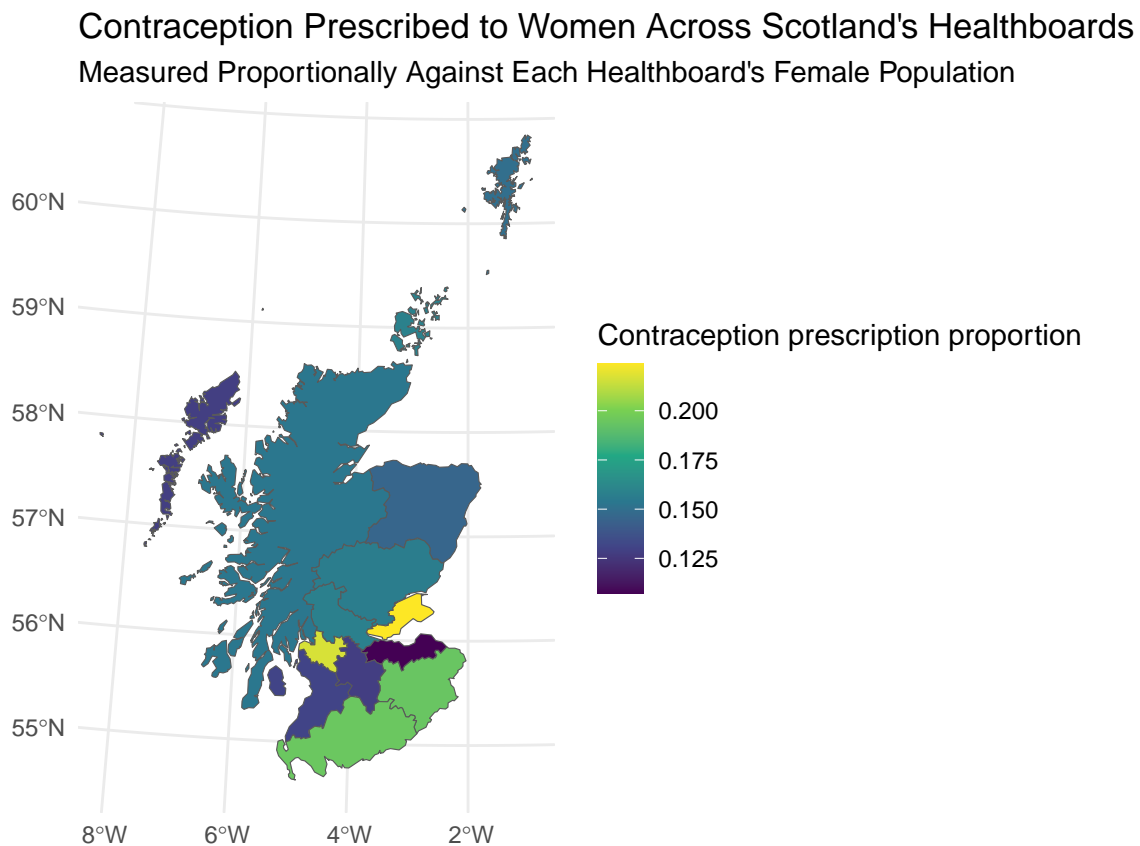


Figure 1: The distribution shows highest rates of contraception prescription in Lothian and Glasgow & Clyde, may be because these healthboards contain Scotland's two most densely populated, big cities, and lowest rates in Tayside. There is a general trend of higher levels in the South compared to the North.

0.2 Figure 2 :

Observing whether or not there is a trend between age group and choice of contraceptive method

```
collapsed_coc <- paste(birth_control_coc, collapse = "|")
collapsed_p <- paste(birth_control_prog, collapse = "|")
collapsed_iuc <- paste(iuc, collapse = "|")
```

```

# Renaming bnf_item_description column so I can group by the contraceptive categories
grouped_contraceptive_data <- joined_with_sex %>%
  mutate(bnf_item_description = if_else(str_starts(bnf_item_description, collapsed_coc), "combined_pill", bnf_item_description),
         bnf_item_description = if_else(str_starts(bnf_item_description, collapsed_p), "progesterone", bnf_item_description),
         bnf_item_description = if_else(str_starts(bnf_item_description, collapsed_iuc), "iuc", bnf_item_description),
         bnf_item_description = if_else(str_starts(bnf_item_description, "EVRA"), "hormone_patch", bnf_item_description),
         bnf_item_description = if_else(str_starts(bnf_item_description, "DEPO-PROVERA"), "injection", bnf_item_description))

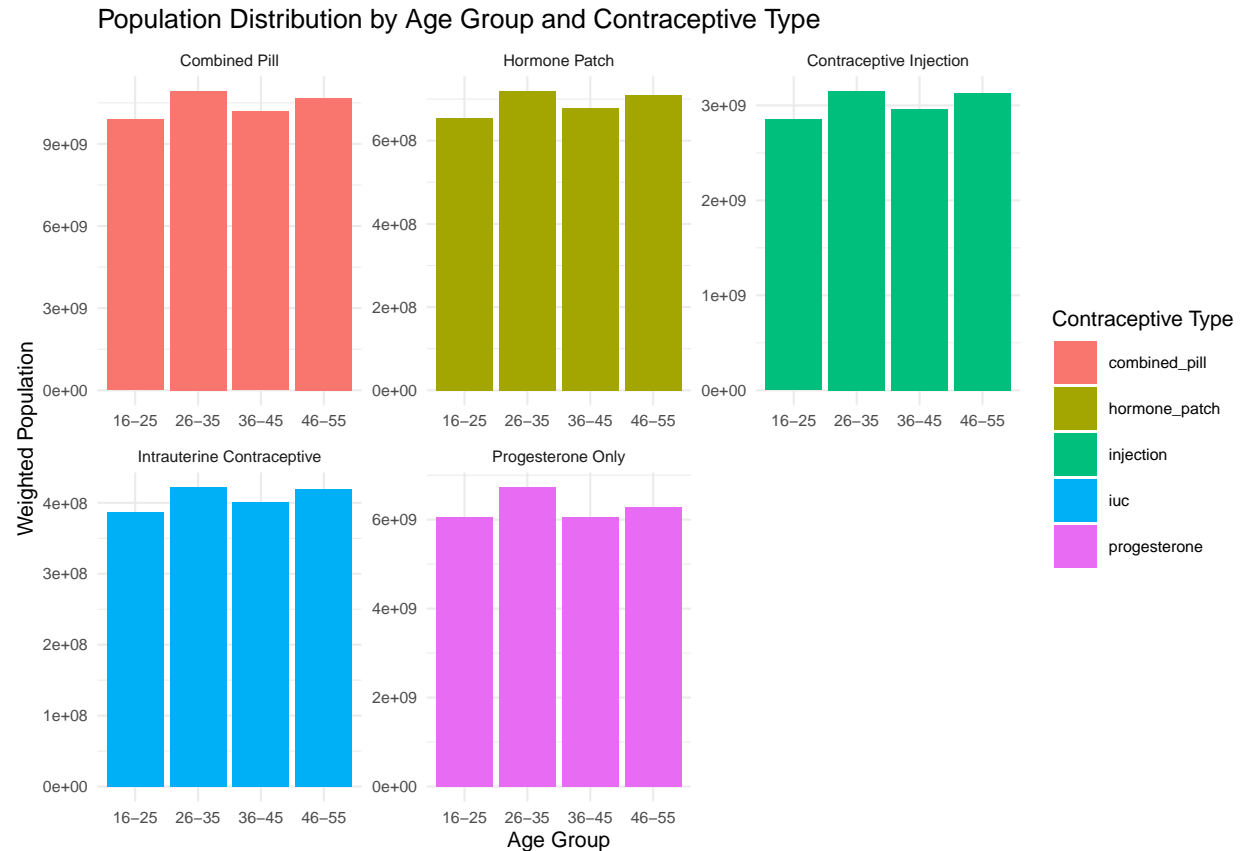
#does multiplying it by number_of_paid_items this way multiply all of the ones in on bnf_item description

grouped_contraceptive_data <- grouped_contraceptive_data %>%
  group_by(bnf_item_description) %>%
  summarize(
    "16-25" = sum(rowSums(across(age16:age25) * number_of_paid_items), na.rm = TRUE),
    "26-35" = sum(rowSums(across(age26:age35) * number_of_paid_items), na.rm = TRUE),
    "36-45" = sum(rowSums(across(age36:age45) * number_of_paid_items), na.rm = TRUE),
    "46-55" = sum(rowSums(across(age46:age55) * number_of_paid_items), na.rm = TRUE)
  )

grouped_contraceptive_data <- grouped_contraceptive_data %>%
  pivot_longer(cols = `16-25`:`46-55`, values_to = "weighted_pop", names_to = "age")

grouped_contraceptive_data %>%
  filter(!is.na(bnf_item_description)) %>%
  ggplot(aes(x = age, y = weighted_pop, fill = bnf_item_description)) +
  geom_col() +
  facet_wrap(~ bnf_item_description, scales = "free", labeller = labeller(bnf_item_description = c(
    "combined_pill" = "Combined Pill",
    "progesterone" = "Progesterone Only",
    "injection" = "Contraceptive Injection",
    "hormone_patch" = "Hormone Patch",
    "iuc" = "Intrauterine Contraceptive"
  ))) +
  labs(title = "Population Distribution by Age Group and Contraceptive Type",
       x = "Age Group",
       y = "Weighted Population",
       fill = "Contraceptive Type") +
  theme_minimal(base_size = 8)

```



A Limitation to this graph is that direct, person-specific comparisons between age and contraception rates were not possible so these graphs show a correlation between age distribution in healthboards and choice of contraception

I will do it proportionally to the population of each age group? otherwise could j be showing difference in populations of different age categories.

0.3 Idea for Figure 3 is to make a line chart showing contraceptive rate across scotland changing over time and view it alongside factors contraception influences such as female employment rate, abortion rate, maternal mortality etc.?

0.4 Figure 4 - a table showing different rates of contraceptive prescription to different age groups (expecting older population nearing menopause to have less and idk what else) and the cost per person each age group has for contraceptive prescription or maybe with something like

#table of some sort