UKHSA report

```
#Loading the presentation stuff

source("../R_scripts/source_data_entry.R")
```

here() starts at /Users/gabrielbattcock/Documents/LSHTM/data_challenge/data_challenge

New names:
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Rows: 52 Columns: 25
-- Column specification
--------------------------------------------------------- Delimiter: "," chr
(5): ...1, GP ILI consulation rates (all ages), ...3, ...4, ...5 lgl (20):
...6, ...7, ...8, ...9, ...10, ...11, ...12, ...13, ...14, ...15, ...
i Use `spec()` to retrieve the full column specification for this data. i
Specify the column types or set `show_col_types = FALSE` to quiet this message.
New names:
Rows: 345 Columns: 5
-- Column specification
--------------------------------------------------------- Delimiter: "," dbl
(5): ...1, flu_A, flu_B, year, week
i Use `spec()` to retrieve the full column specification for this data. i
Specify the column types or set `show_col_types = FALSE` to quiet this message.
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New names:
* `` -> `...2`
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* `` -> `...7`
* `` -> `...8`
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* `` -> `...9`
* `` -> `...10`
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```r
source("../R_scripts/source/swabs.R")
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Warning: Removed 19 row(s) containing missing values (geom_path).

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```
#For the vaccine plot
source("../R_scripts/source/vacc_plot.R")
```

Introduction

Influenza is a highly infectious and rapidly evolving respiratory virus circulating seasonally around the world (Cope 2018). The World Health Organisation (WHO) estimates that between 290000-650000 deaths occur due to the respiratory virus, not including deaths not due to secondary infections caused by influenza (**WHO2022?**). Antigenic shifts in the virus may result in uncontrolled extensive spread causing an epidemic (e.g. 1918-2009) (Cope 2018)

Seasonal influenza appear in two types, classified as A and B. A types can are further broken down into subtypes H1N1 and H3N2 ("Types of Influenza Viruses" 2022). Each year, a combination of the A subtypes and B type influenza circulate throughout the population with different proportions. There is some evidence to suggest that H3N2 subtype is more severe than H1N1, leading to higher hospitalisation rates.

Serious progression of the virus may lead to deaths in at risk groups such as children <2 y.o., pregnant women, people >65 y.o. and people with underlying medical conditions, (Zarocostas 2009). In a UK context, seasonal influenza circulation puts a burden on NHS especially hospital beds and GP services (Cope 2018). Having more data to help plan for seasonal peaks can help alleviate pressure on vital services.
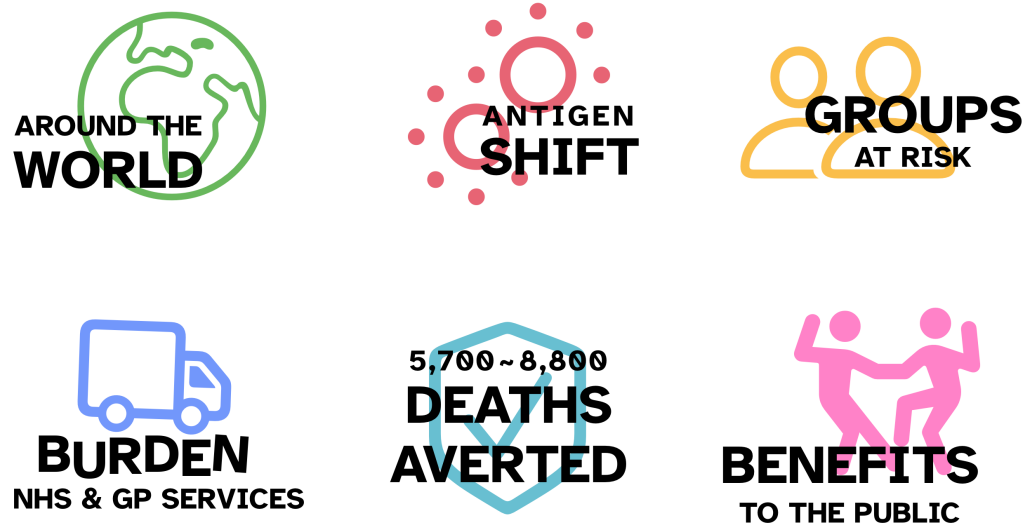
Figure 1: An infographic summarising the key points addressed in this report.

Who is UKHSA and why are they interested

UK Health Security Agency (UKHSA) was created as a successor to Public Health England in April 2021 cite. Set up during the height of the COVID-19 pandemic, the UKHSA's main priority is to tackle national health threats through the use of data analytics and developing vaccines cite.

Understanding the data of how flu is spread can help assist in planning vaccination roll-out. Vaccination is greatly beneficial as it averts between 180,000 and 626,000 cases of influenza per year in England, helping prevent between 5,678 and 8,800 premature deaths (Franklin and Hochlaf 2018). Furthermore, every death averted due to vaccination is estimated to save the NHS £50,610 (Franklin and Hochlaf 2018).

In the UK there are three main ways that influenza is reported: through primary care data, hospitalisation and through swabbing programmes. Having three separate data sources is a valuable to compare whether the peak in the seasonal spread is in the same week or whether any of the data sources lag the others - identifying a possible prediction of a peak in hospitalisations for example. It also may be beneficial to know the strains are and what age group is being hit by the flu initially may be useful to bla bla bla.

Research question and hypothesis

What is the temporal relationship between different influenza data sources (lab-confirmed infections, GP consultations, hospitalisations) in the UK, and have these changed in 2022/3 compared to the pre-pandemic years 2016-2019?

We defined our Qs to address these issues.

Hypothesis - There could be a time delay betw one source of surveillance and another. And the scale of the one that peaks earlier might be predictive of the later ones. There are changes in reporting procedures for resp infections post-covid. Children may precede adults due to mixing .

Methods

methods for R nought (or effective) can be cited from Lipsitch
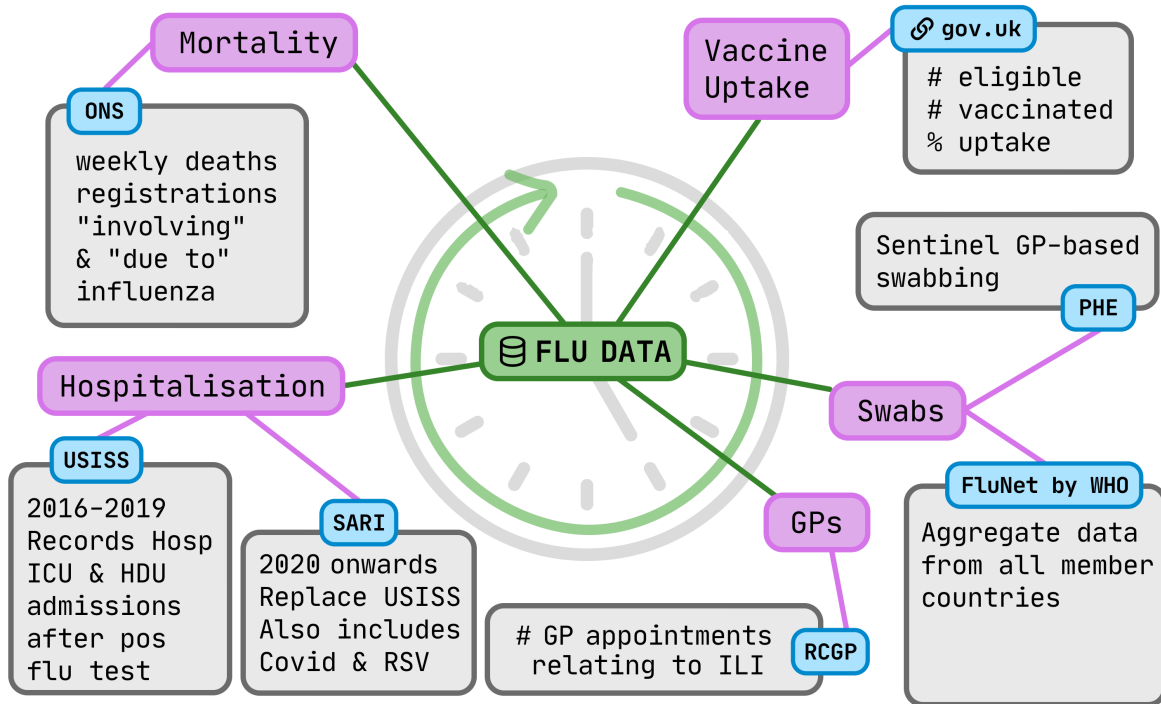
Figure 2: The data being used comes from various places and has been sourced through differ-
ence resources.

Data sources and extraction

Results

```r
source("../R_scripts/source/primary_care_vis.R")
source("../R_scripts/source/hospitalisation_plots.R")
source("../R_scripts/source/swabs.R")
```

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```
# gp_cases
# hospital_plot
# combined_plot
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Source

Season

Log graphs and R_0 value

Stratified by Flu strain type

Discussion

Conclusion

References

Cope, Joshua V. AND Chilver, Robert C. AND Ross. 2018. "Characterising Seasonal Influenza Epidemiology Using Primary Care Surveillance Data." *PLOS Computational Biology* 14 (8): 1–21. https://doi.org/10.1371/journal.pcbi.1006377.

Franklin, Ben, and Dean Hochlaf. 2018. "An Economic Analysis of Flu Vaccination." The International Longevity Centre - UK.

"Types of Influenza Viruses." 2022. *Centers for Disease Control and Prevention.* Centers for Disease Control; Prevention. https://www.cdc.gov/flu/about/viruses/types.htm.

Zarocostas, John. 2009. "WHO Recommends Early Antiviral Treatment for at Risk Groups with Suspected Swine Flu." *BMJ (Clinical Research Ed.)* 339: b4831. https://doi.org/10.1136/bmj.b4831.