

2138472 ACCB5027

by Arjun Ubhee

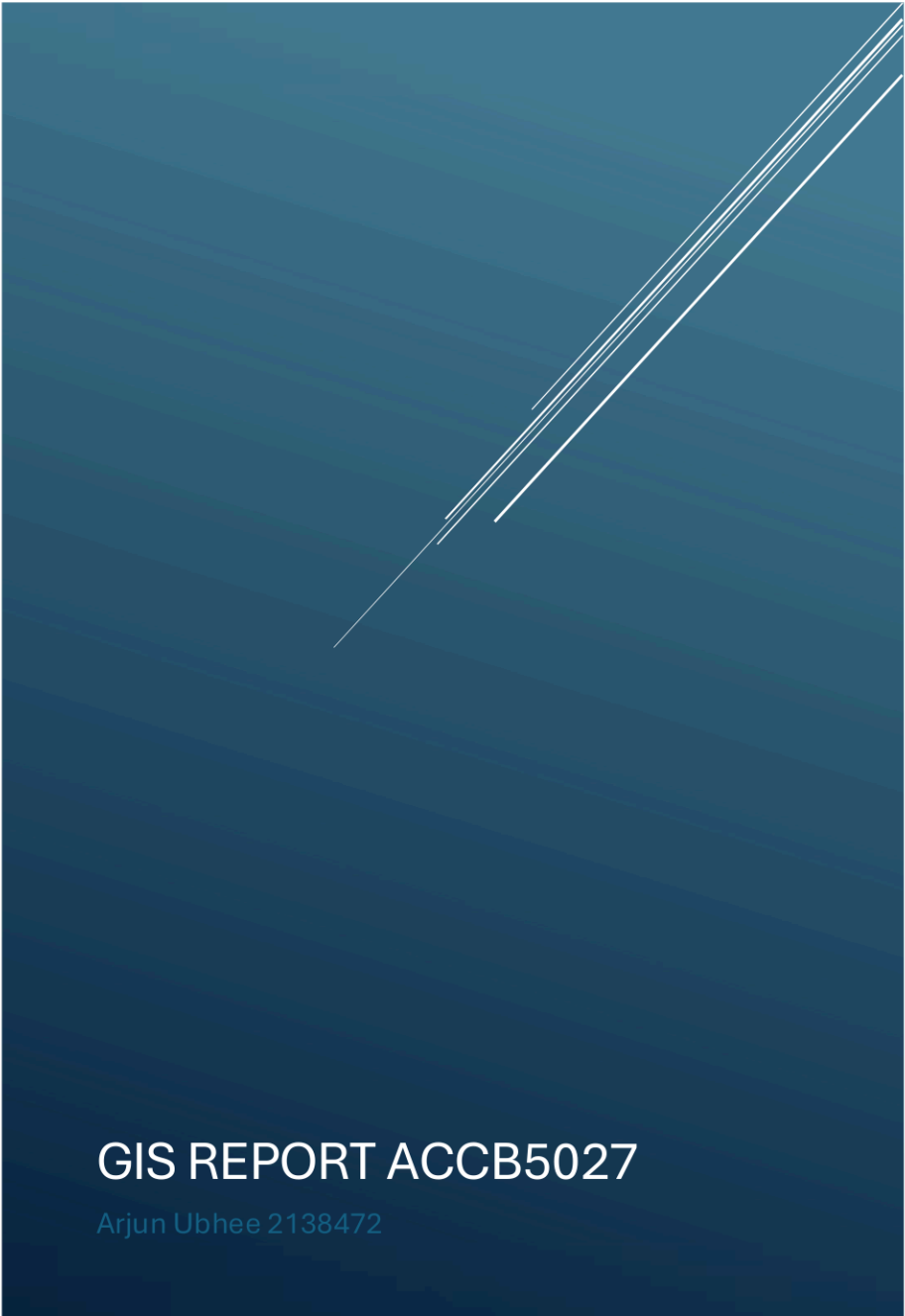
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GIS REPORT ACCB5027

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Introduction

In this report, it will discuss the GIS build that was created for the presentation. This will include the principles of thematic mapping and data visualisation within the QGIS software. A conclusion will be evaluated at the end.

Case study

In the case study, the group project sought out a link between the locations of mines and the prevalence of respiratory disease throughout Wales.

Wales during the mid-19th to 20th century was a part of the coal mining industry. These were seen in the 'valleys' of Wales. This became central to the Welsh economy, while health and safety were seen as un-important until the harsh environment and the low wage pay were questioned. Due to these conditions, a rise of health-related matter and the formation of the National Health Service was introduced as workers were claiming ailments such as respiratory illness, heart disease as well as others were work-related. [3]

Objectives

The objective of this case study is to see whether hospital admissions correlate with high areas of deprivation such as employment and income. To create evidence, factors such as income, employment and mining areas would be considered. The base layer or the LSOA would only visualise Wales.

Data Source & explanation

The data sources that would be collected are from many data sources such as Data Maps Wales and Health Map Wales. DataMapWales provides information from the public sector with geographic information. These focus on datasets which can be displayed on the Welsh map. The website includes a data catalogue and a map viewer. Data like the LSOA boundaries and the WIMD or Welsh Index of Multiple Deprivation would be employed. [4] Health Map Wales is a Welsh Government managed site which has data for Middle Supper Output levels. This is cited as an 'interactive tool' containing data for all the health boards. These can include cancer incidence or admission. Data such as the respiratory disease admission and mortality rates. [5]

The limitation of sourcing data for the case study is that personal data is protected by policies such as GDPR (General Data Protection Act). This is a regulation in which protects personal features. Thus, only data specific to the created research is only viewed. [6] When researching health data, only county level data is viewable. This also restricts data at a specific level as well. The data for the mines are historic as locations for the mines closed in the early 21st century.

Principles of:

Thematic Mapping

In Geographical Information systems, thematic mapping is the patterns of the representation of data on a map. Using the patterns of data, analysts may identify trends and relationships on the map. Thematic maps can be layered onto each other. These can introduce the comparison of different sets of data over the map, allowing if the map displays areas with similar distributions and contours. [1]

Principles of Thematic mapping are as followed; the derivation of the base map, the purpose of the thematic mapping, integration of multiple sources, standardization and decision-making, [2]

The derivation of the base map as thematic maps needs to be based on a map. This can be a world map, a country or a section of the country. Thematic mapping must be built after as it is dependent on the framework of the map.

The thematic mapping must have a purpose when displaying the data. 5 It needs to achieve an application to an objective. This can determine the scale, requirements of the data or the level of detail on the map.

A diverse dataset allows the thematic mapping to create coherent spatial representation. A single data source does not allow the full explanation for the objective. Interpretation is also used for thematic mapping so data would need to be converted to layers. Limitations of datasets are compensated as multiple datasets take account for errors and gaps and appropriate generalizations are made.

Thematic mapping has to be consistent and dataset must be standardized. Consistent structure must be shown in the layers and symbology within the thematic mapping must be standardized. Thematic presentation includes classification schemes and recognised symbols.

Data visualisation

For clear and consistent correlation, the map must display clear and informative information. This will need to balance aesthetic, accurate and functional. The principles can be considered as accuracy, purpose, and simplicity. [7]

Accuracy can be represented as integrity. Errors such as wrong scaling can cause distortion to analytical trends for the reader. Using maps that are based on context and objective. Poor projectors of data can skew analysis. Consider the quality of the spatial data in the infographic and maintain the consistency of scales when comparing data.

Purpose allows the intent of the information to go to the correct audience. 6 There are three types; exploratory, explanatory and persuasive. Exploratory allows the data to be accessed by the user controlling the information. These can change views and variables for the analyst. Explanatory communicates finding to the readers. It focuses on key objectives to easier understanding.

Simplicity allows core evidence to be apparent to the reader. Too much information can be confusing. A minimalistic approach should be used. Getting rid of gridlines or unnecessary labels improves the simplicity of the map.

Use of:

Thematic Mapping

7 For thematic mapping, the use of size of symbols and thematic colours were used. Thematic colours that lose opacity the more deprivation is found can be seen in the WIMD sections and the symbology size that increases, the increase of rates for respiratory hospital admissions and deaths, which is called a graduated symbology as the colour or size represent the numeric value. Simple symbology such as simple markers was used only for the mine locations. This can be seen in figure 1

To improve the data visualisation and thematic mapping of this Infographic, the use of more classification methods such as a natural breaks' classification would be useful to display hospital admissions and deaths, instead of the graduated class. This would improve hotspot sightings. Creating a clearer map layout would be beneficial to the reader. Using better colour aesthetics would improve visibility and readability.

Spatial queries

For the spatial queries, the location of the mines and the hotspots of the deaths and admissions for respiratory diseases. The map shows some hotspots overlapping and correlating with mine locations as the spatial patterns are grouping near to each other in areas. This can be seen in figure 2. However, areas with a lot of deprivation with income, employment overlap within the hotspots of respiratory disease, as seen in Figure 3. This means that not only the mining industry correlates with respiratory disease admissions and deaths, but also an area's economic wellbeing.

To improve spatial queries, the utilisation of distance visualisation would improve the accessibility of the infographic as rough estimations of the distance between the symbols are considered. Improving the quality of the data would also increase the validity of the infographic and datasets closer to the era of the mining industry would be sufficient. Using more advanced tools such as heatmaps would also increase validity.

Conclusion

During the research, extensive evidence showing on the Infographic shows the increase of deaths and admissions for respiratory failure does not link up with the mine location, but the level of deprivation of health, income and employment.

Recent data had to be used to define the outcome. As mining declined in the early 2000s, a decrease of respiratory disease which relates to the mining industry has been recorded in the recent years. Thus, affecting respiratory disease would be the economy of the area.

To create a more accurate version of respiratory failure, data which included data closer the mining industry in Wales shutting down would be useful, thus the limitation of the dataset may view a time bias.

References & Figures

[1] P. B. Mosenthal and I. S. Kirsch, "Understanding Thematic Maps," vol. 34, no. 2, pp.136–140, 1990, Available at: <http://www.jstor.org.uwtsd.idm.oclc.org/stable/40032055>.

[2] P. Hanžl and K. Verner, Basic principles of geological and thematic mapping, Czech Geological Survey Stare Brno, Czech Republic, 2018.

[3] T. Merrill and L. Kitson, End of Coal Mining in South Wales: Lessons learned from industrial transformation, International Institute for Sustainable Development (IISD), 2022.

[4] "About DataMapWales | DataMapWales," Gov.wales, 2024. <https://datamap.gov.wales/info/what-we-do>

[5] "Health Maps Wales: 2023 | GOV.WALES," www.gov.wales, Apr. 16, 2024. <https://www.gov.wales/health-maps-wales-april-2019-onwards>

[6] GDPR, "Art. 5 GDPR – Principles Relating to Processing of Personal Data | General Data Protection Regulation (GDPR)," General Data Protection Regulation (GDPR), 2018. <https://gdpr-info.eu/art-5-gdpr/>

[7] "7 Geospatial Data Visualization – Geospatial Data Science with R," Warin.ca, 2020. https://www.warin.ca/geospatial/07-geospatial-data-visualization.html?utm_source=copilot.com (accessed May 10, 2026).

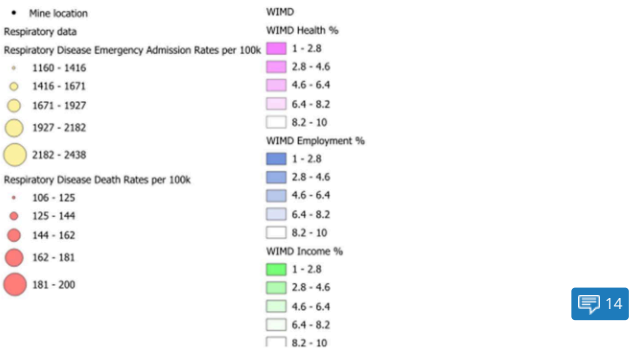


Figure 1 – Picture showing the symbology index

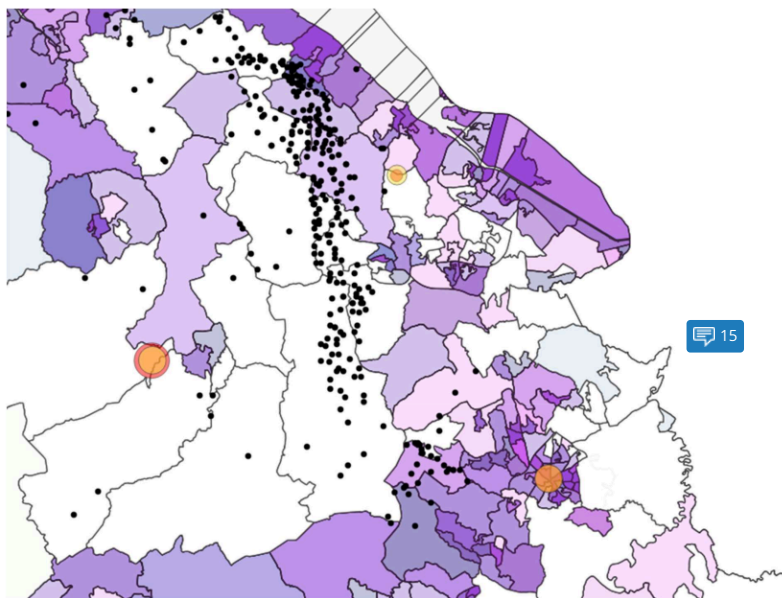


Figure 2 – Picture showing respiratory disease admissions and deaths are grouped closely with mine location

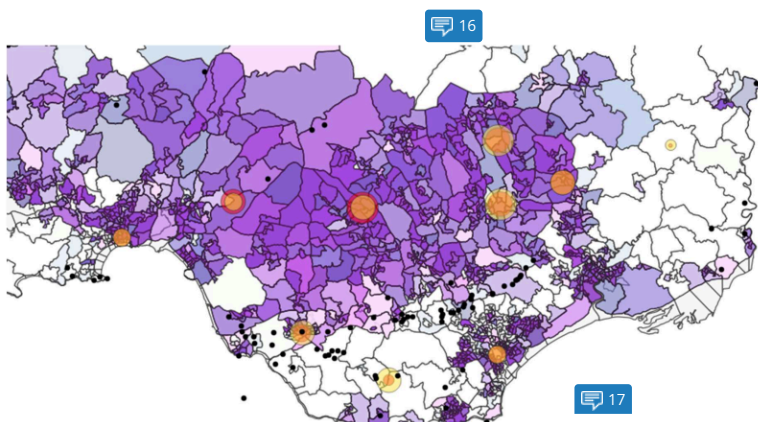


Figure 3 – hotspots of respiratory disease admissions and deaths overlapping with the WIMD data

FINAL GRADE

30/100

GENERAL COMMENTS

Dear Arjun,

Your

report has a number of genuine positives that deserve recognition. The historical context section using Merrill & Kitson is the best-sourced. The conclusion's identification of economic deprivation — rather than mine proximity alone — as the dominant correlate of respiratory disease shows genuine intellectual discernment.

However, the report has critical weaknesses that prevent it from reaching a higher standard.

More detailed feedback can be found inside the comments.

Best Wishes

PAGE 1

PAGE 2



Comment 1 | Transferable Skills(10)

Section names and page numbers are listed clearly.

PAGE 3



Comment 2 | Transferable Skills(10)

there is insufficient content to demonstrate engagement with the assessment requirements.



Comment 3 | Literature (25)

limitation on personal health data availability shows awareness of a real-world legal constraint on spatial data



Comment 4 | Transferable Skills(10)

some of the sentences are grammatically incorrect doesn't follow academic style of writing

PAGE 4



Comment 5 | Knowledge&Understanding(20)

Without any process screenshots, there is no evidence of how the GIS was built, what tools were used, or what settings were applied.



Comment 6 | Cognitive and Intellectual(25)

No engagement with why deprivation mediates.



Comment 7 | Knowledge&Understanding(20)

The report says natural breaks *would have been* useful, but what method was applied to the existing maps is never stated.

PAGE 5



Comment 8 | Knowledge&Understanding(20)

QGIS screenshots showing the layer panel, symbology dialogue, join configuration, and attribute table for at least one dataset should be added



Comment 9 | Cognitive and Intellectual(25)

additional dataset is not identified



Comment 10 | Cognitive and Intellectual(25)

contradiction between the spatial queries section and the conclusion section should have been resolved



Comment 11 | Literature (25)

Replace the blog post with a peer-reviewed academic source



Comment 12 | Literature (25)

Two references on thematic mapping are cited



Comment 13 | Literature (25)

References are cited but never connected analytically to actual decisions made in the GIS build

PAGE 6



Comment 14 | Transferable Skills(10)

Embed all figures inline, immediately after the text that references them.

PAGE 7



Comment 15 | Practical Application (20)

maps show mine location points



Comment 16 | Knowledge&Understanding(20)

The report mentions LSOA in the objectives section and Local Authority level in the limitations — it is unclear which was actually used in the analysis.



Comment 17 | Practical Application (20)

Without a whole-country map, the full spatial distribution of mines, respiratory disease, and WIMD across Wales cannot be assessed



Comment 18 | Practical Application (20)

no evidence of the GIS build process

GRADING FORM: GIS

ARJUN UBHEE

30

LITERATURE (25)



9

KNOWLEDGE&UNDERSTANDING(20)



6

COGNITIVE AND INTELLECTUAL(25)



3

PRACTICAL APPLICATION (20)



8

TRANSFERABLE SKILLS(10)



4