Mapping Food Deserts

Report: Community-Led Resilience Insights: OpenStreetMapping Food Deserts and COVID Vulnerabilities in South Wales

Designed to be read in conjunction with Slide presentation:
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To be found linked here:
https://docs.google.com/presentation/d/13mn_KBLbzvWHVwLVE1LhuiValKtYHggSdyWZBdsfQYQ/edit#slide=id.ge8d0857324_0_68

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Part 1 Introductions:

Foreword:
This is a report on the deployment of digital community mapping techniques commonly used in humanitarian Disaster Risk Reduction (DRR) emergency and development contexts to provide better contextual/socio-economic insight to public health data in Wales.

The Mapping Food Deserts project evolved from the exploration of 'Community insights into Non-Clinical Factors Affecting COVID Vulnerability in South Wales'. This commissioned work examined the need to coordinate local and global community mapping to improve Public Health in context.

A note on OpenStreetMap

OpenStreetMap is the 'wiki-map' which is jointly-owned by the people of the world. It depends on the digital revolution to empower people within their own communities to take control of how they are represented, mapped, and seen by the outside world. The project finds its heart not in the technology or tools it uses, or commercially interested organisations backing it, but in the Open Street Map itself, the publicly owned wiki-style platform, accessible to anyone via Smartphone or Computer, to edit, use or develop.

As a humanitarian platform, it is a transparent, cost-neutral project by which donors can engage and collaborate with their field counterparts, giving time rather than money to support the production of commonly owned visualisations from satellite and field data. This enables the delivery of humanitarian assistance in the form of engineering, medical, and cultural intervention, in areas generally considered 'inaccessible' and 'precarious'.

Slide 1 Executive Summary:

As the outbreak situation has transitioned from pandemic to endemic status, understanding the wider determinants of wellbeing remain more important than ever in Public Health improvement planning. The pandemic has clarified the need for healthcare planning to better understand the factors which made its communities vulnerable, in order to mitigate against future outbreaks.

Future-proofing for Pandemic Risk Reduction

Findings from the non-clinical environmental and socio-economic factors which influenced COVID-vulnerability have become a valuable resource for longer-term risk reduction, and are of ongoing value in contextualising clinical Public Health data.

The proposed nature of this intervention was as practice-based collaborative research to fill-in missing knowledge on community behaviour and profiles, in which non-clinical COVID-19 vulnerability factors are workshopped in a practical way, producing auto-ethnographic community risk and asset data whilst co-creating the local community-owned wiki-map.

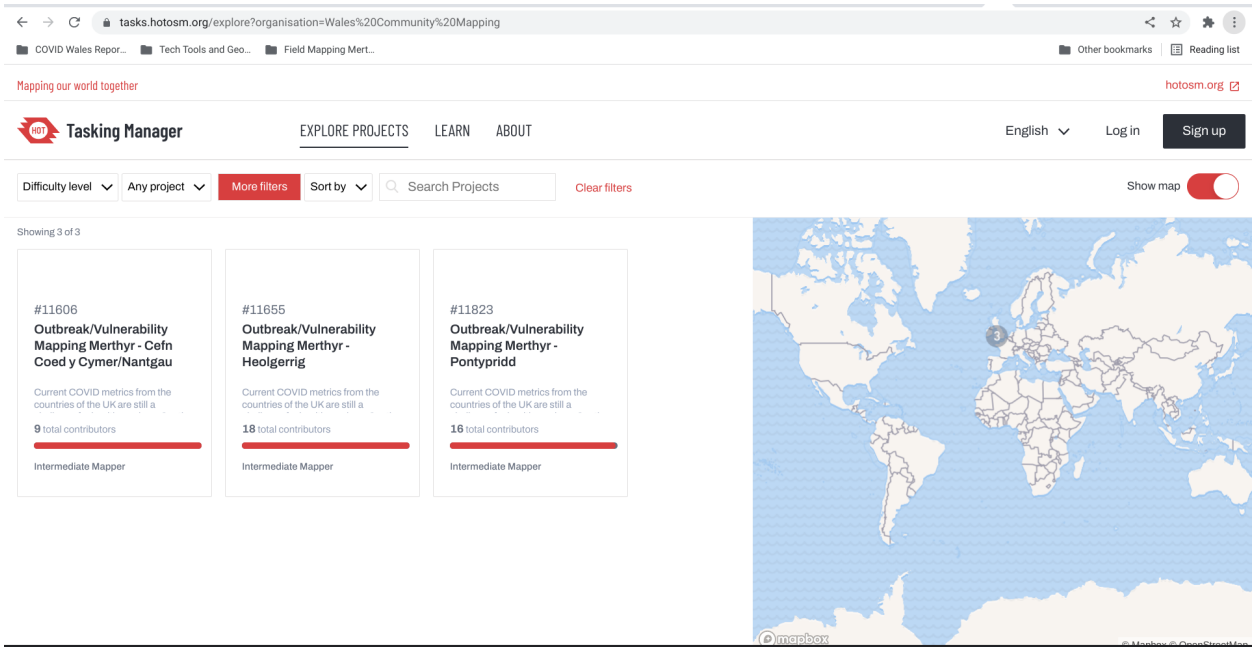

IMAGE: Humanitarian OpenStreetMap Team Tasking Manager (credit: OSM COntributors)

Replicating similar methods and tools used in comparative epidemiological settings (Uganda and Sierra Leone)[1], the 'Outbreak Vulnerability Mapping Merthyr' collaboration is an intervention supported by Humanitarian OpenStreetMap Team and by OpenStreetMap UK. The project remains part of the global OpenStreetMap movement called 'Missing Maps'.

The South Wales Covid Vulnerability Mapping project has been the focus of global remote-digitising activity since April 1st, 2021 since which time volunteers have 'traced' the entire map of Merthyr, using satellite imagery. (link: https://wiki.openstreetmap.org/wiki/South_Wales_COVID_19_Vulnerability_Mapping)

[1] In these projects, questions like 'Where is your health facility?', 'How do you get there?', and 'What are the average waiting times?' revealed public health experiences from the community perspective. The results expressed vulnerabilities per community and even per household, but also created analytics outputs for future vulnerability needs, extrapolating to environment, habits, lifestyles and creating indicators valuable for future resource allocation.

This is part of a mass ‘DIY’ crowd-sourcing activity, whose ethical credibility is couched within a comprehensive critical geography movement. Condemning global digital activities such as *data colonialism, surveillance capitalism,* scholarship is to be found in anthologies such as *Mapping Crisis; Participation, Datafication and Humanitarianism in the Age of Digital Mapping* (Specht, 2020). The Mapping Food Deserts project is documented in the public domain, under the OpenStreetMap wiki resource.

Slide 2 - **Local Context**

Metrics of vaccination/testing uptake and hesitancy are shown here (in Slide 2) by Lower Super-Output Areas (LSOAs).

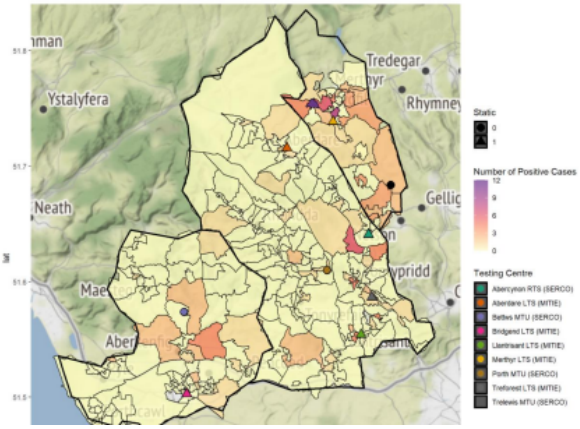

IMAGE: Public Health Analytics - CTMUHB (Ciaran Slyne)

Understanding community behaviours around socio-economic vulnerabilities and wider determinants of wellbeing is clearly the key to enabling our resilient and healthy future generations. However, ‘home-grown’ community insights around vulnerability have for many years have lacked legible articulation in the UK.

Top-down analytics (such as ONS/NHS GIS) are an essential way of understanding how COVID has been distributed, but success has been limited to analysis at relatively low-resolution, and through a specifically medical lens.

Engagement with those contextual factors lying beyond institutional and clinically-gathered metrics (e.g. mental health challenges, obesity, substance abuse, social exclusion) remains difficult for Public Health Wales, and communication between Public Health/care and the communities it serves represents an ongoing gap in Health and Social care.

Slide 3 HWHW ⇔ COVID:

These local, national, and global reports which had shaped the COVID Vulnerability study were useful in prioritising a pilot mapping area and informed a basic survey model.[2] Public Health enquiries[3] reported that people couldn't afford to test positive because of the loss of income caused by self-Isolation. This meant that many self-employed people were avoiding testing. This absence at testing and vaccination centres creates blind spots in Public Health data.

The hypothesis of the feasibility study had focussed on using community-led OpenStreetMap insights to depict these behaviours for the COVID outbreak. Whilst outputting important contextual public health data, this community intervention was expected to facilitate and devise an innovative SDG-aligned community engagement platform for empowering under-represented communities. In January 2022, the Omicron virus signalled a re-grouping of longer-term Public Health agendas.

It now became clear that Community Mapping was potentially useful in broader contextual aspects of public health, and that hyper-local indicators of overall needs, geospatially 'situated' in areas of deprivation (community assets and risks) could contextualise health planning at a more pre-emptive strategic level. The puzzle of how to map COVID vulnerability became inscribed in the survey design work of 'Mapping Food Deserts'.

Food Deserts
'Food is more than just nutrients and calories. My research shows that those who cannot afford to buy food also cannot afford to socialise. We know from other research that strong friendship networks are an important means for living better longer'. (p2, Megan Blake, 11 Sept, 2019, https://committees.parliament.uk/writtenevidence/176/pdf/)[4]

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[2] Merthyr Tydfill is identified as an area of importance for some historic reasons connected with COVID:
- Poor vaccine uptake existed across a multicultural community which was relatively unknown. This coincided with a multi-ethnic workplace outbreak.
- Pandemic non-compliance in the area of Swansea Road (Gelli-deg) coincided with a vigorous outbreak in Januarry 2021.

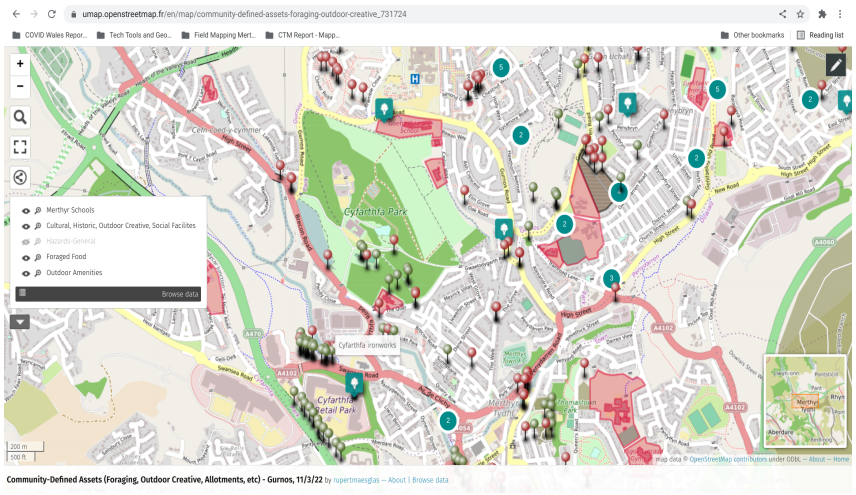
[3] CTM UHB 'Whole area testing report'

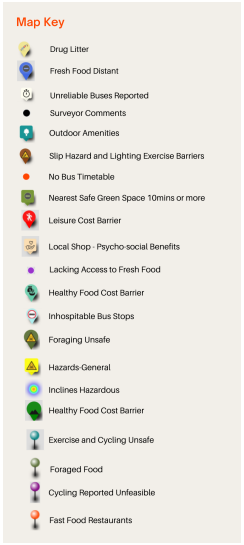
[4] Blake's findings in the Kelloggs report are that:
1) One in ten deprived areas in the UK are food deserts
2) 1.2 million people live in deprived food deserts with limited access to affordable, fresh food
3) 41 per cent of households in Great Britain living in deprived food deserts lack access to a car. This compares with 23% for Britain as a whole
4) A quarter of people think that nutritious food is unaffordable in the UK. For those with incomes of up to £10,000 and £10,001 to £20,000 this was higher, at 44% and 27%
5) One in eight people say that 'not being near a supermarket offering healthy food at low prices' was a barrier to eating more healthily
6) Unaffordable food prices have led to one in ten households cutting back on their own food consumption so that others in their family (such as children) can eat'
Megan Blake, p3, Kelloggs Report
(https://www.kelloggs.co.uk/content/dam/europe/kelloggs_gb/pdf/Kelloggs_Food_Desert_Brochure.pdf)

The Mapping Food Deserts project was initiated on 11th January 2022.

Slide 4 Community Assets

Despite deprivation statistics, Merthyr has a wealth of community assets of which community participants are proud. Feedback has led to map requests for allotments and wild food maps, bus times relating to shop openings, and 'inaccessible slope' maps relating to people of low mobility, to whom access to food sources, social contact, and realistic exercise is complicated.[5]





The above slide shows a visualisation output of the community assets (and barriers to using them) in Merthyr. This includes wild food foraging sites.

These multi-sector indicators, aligning with the Welsh Index of Multiple Deprivation, starkly correspond to the potentially ‘mappable’ psycho-social and physical vulnerability factors identified in relation to COVID vulnerability.

[5] Overall, the term 'realistic' has been a theme. Local authority realities have also been brought up - perception of allotments closing at 4.30pm, thus inaccessible to/excluding working people, shops/market stalls having to sell healthy foods at a premium because of high business rates on pitches or shops.

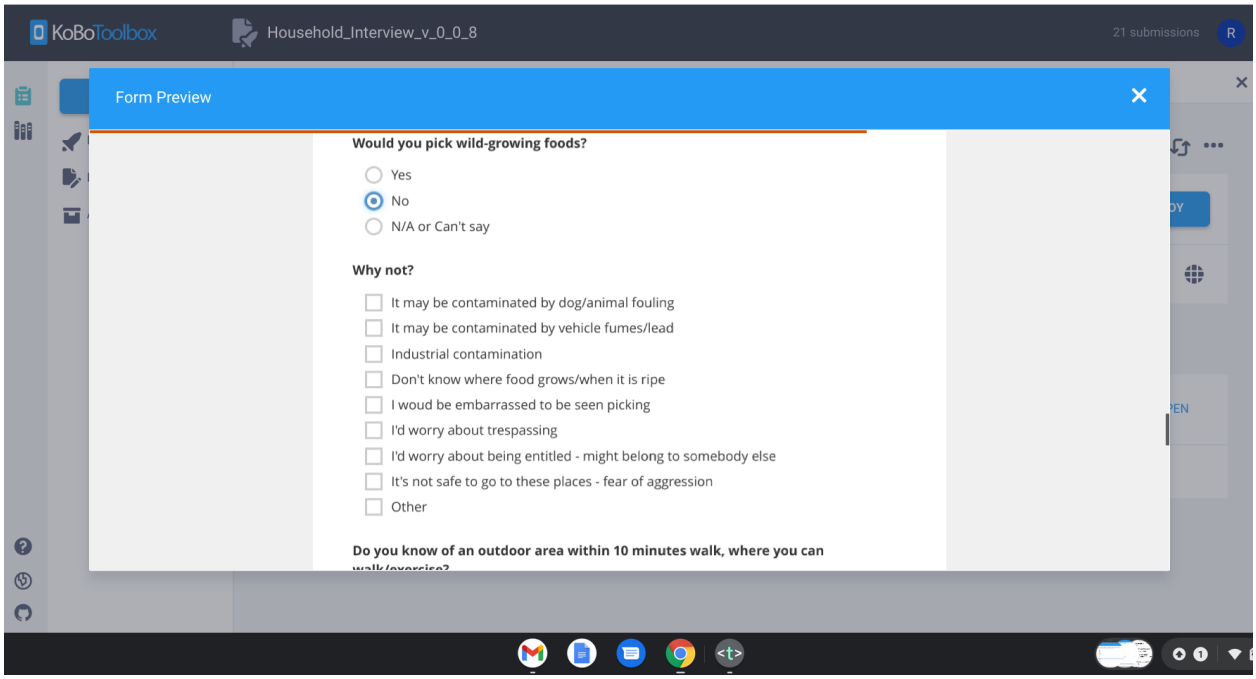


IMAGE: KoboServer showing multiple choice answers devised by community members

Several community members urged foraging sites as somewhere that people could combine the pursuit of healthy food with the enactment of healthy exercise (three out of four main contributors placing these kinds of assets (and the barriers to access) near the top of a mapping priority list). Barriers include drug litter, slip hazards, feeling unsafe to forage, and the lighting of these spaces at night.

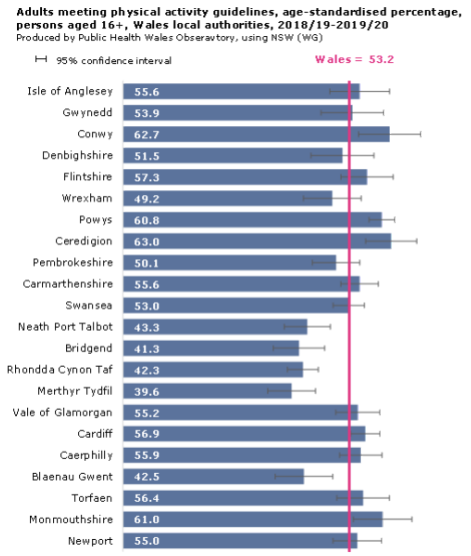
Members of the group recognised new roads with no pavements as blockers of access to exercise (Specifically Blue/Green space on the Taf Trail). Household interview data, meanwhile, cited several instances of the new A465 5-year local road development as something preventing access to exercise and also social space (walking, and footways into nearby Pant, from Galon Uchaf - where no social infrastructure exists).

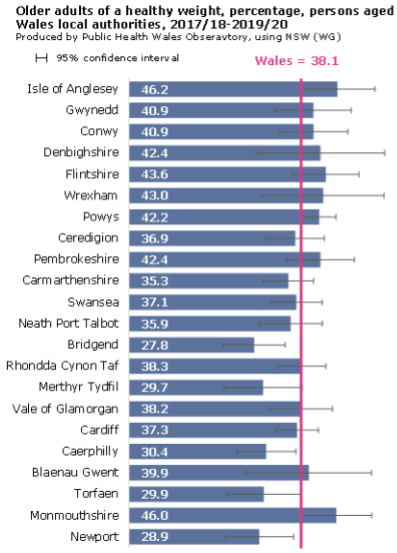
Part 2 - Project Research and Coordination

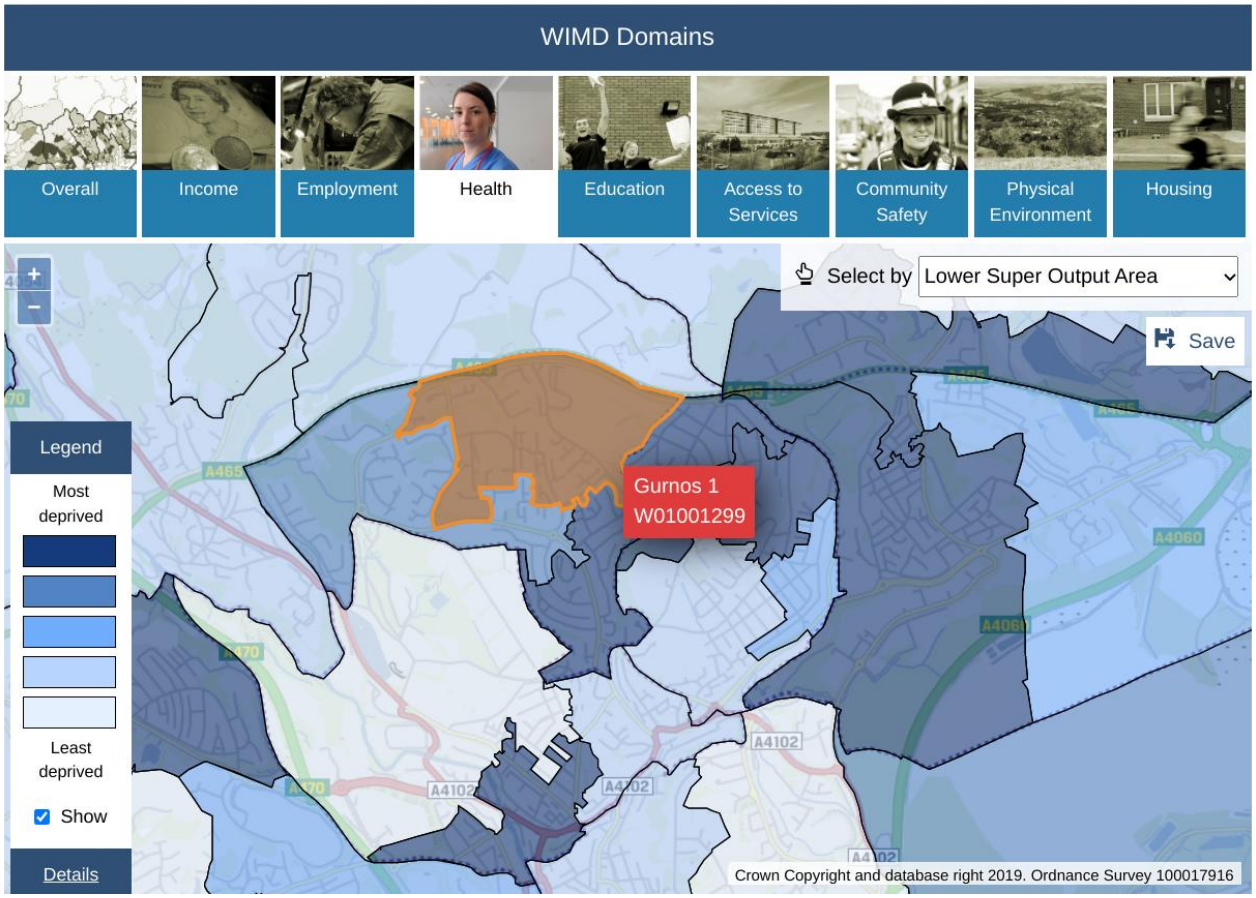
Slide 5

Data Modelling for Health Weights:

It is worth considering how such an area appears in the statistical indices of Multiple Deprivation:







South Wales, and particularly Merthyr, have always featured high-up in national vulnerability metrics.
IMAGE: WIMD Domains from PHW Observatory

Research across many workstreams had been undertaken during the 'sensitisation' campaign, presenting the concept of Community Mapping in working group and team meetings across the health board.[6]

Global contextual vulnerability indicators, too, seemed to cluster around mental health and psychosocial factors affecting testing and vaccination uptake as well as comorbidities affecting clinical vulnerability.[7] These were used to create basic survey templates (i.e. access/entitlement to physical exercise, healthy and nutritious food, and physical application in society or the workplace (healthy behaviours).

Devising what data to collect, it was useful to consider COVID Vulnerability as existing in two tiers:

- Social vulnerability - Wellbeing: mental health, loneliness and isolation, social exclusion, deprivation
- Clinical vulnerability - more people presenting with symptoms; clinically more vulnerable (respiratory, heart, etc)

Resources corresponding to these needs could be framed in terms of access to fresh/healthy food, access to healthy exercise, access to social hubs, access to work/financial inclusion.

A note on 'Deprivation' and Intervention Fatigue:
Communities in these locations have long been the subject of well-meaning interventions, and scholars and health practitioners have suggested that the 'intervention fatigue' deriving from ill-advised or unsustainable socio-economic reforms may have led to resistance or hesitance to testing and vaccination campaigns in certain areas.

The nuances of data indicators depicting this became a subject handled with care in designing/workshopping eventual survey questions around vaccination hesitancy, and careful attention was paid to cultural studies, history and anthropological scholarship.[8]

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[6] Some findings on COVID-related Behaviour Issues: Gambling, Hoarding, Social Anxiety, Self-harm, Eating Disorders, Manic bedroom exercise, Going without food, Grief over loss of way of life (as well as actual deaths), Financial insecurity, Home schooling pressures, Loss of confidence (especially going through life changes - e.g. puberty). - Cwm Taf Morgannwg Public Health Behavioural Insights group, October 2021.

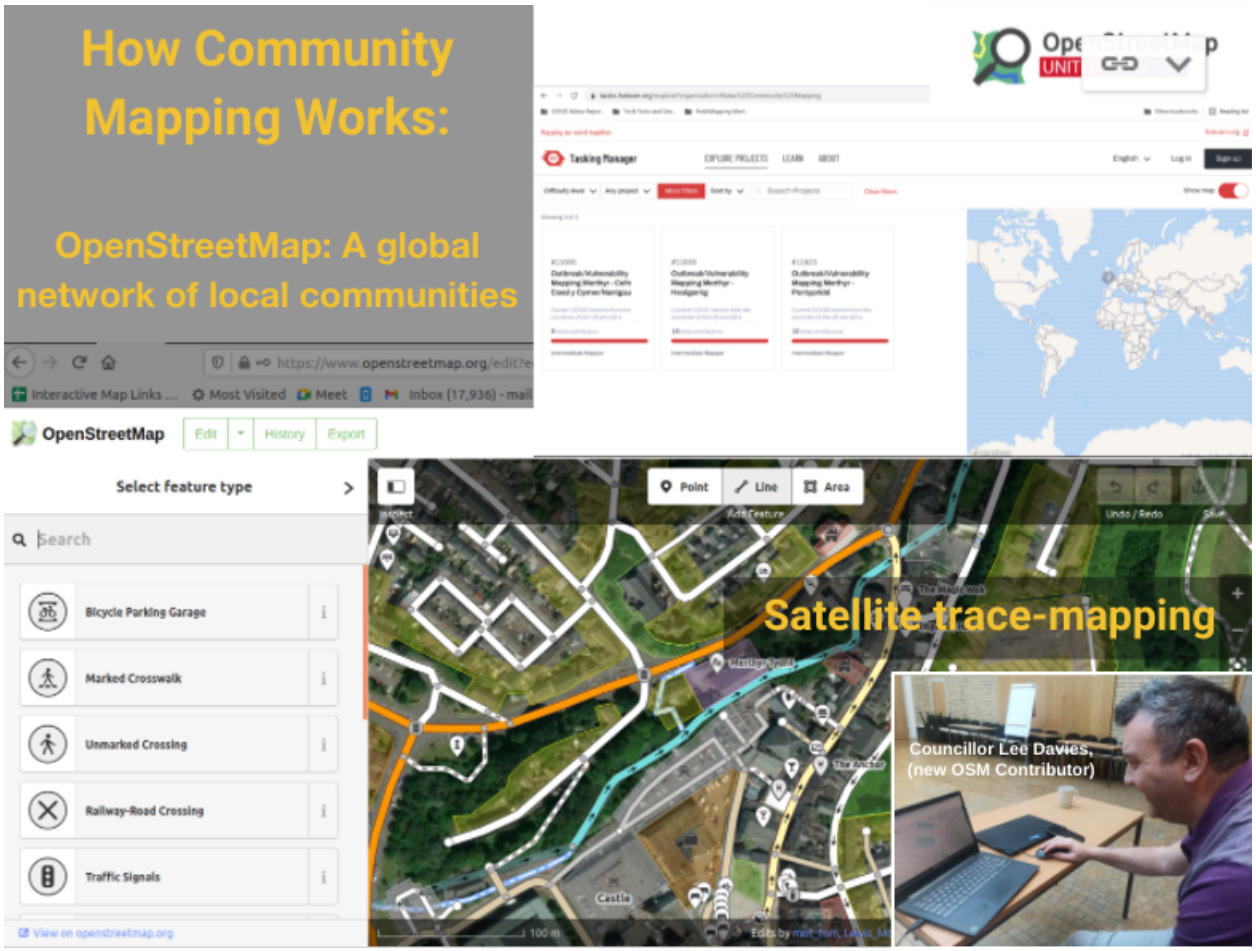
[7] On April 27th 2020, Douglas et al. released a summary of 'Groups at particular risk from responses to covid-19' in the British Medical Journal.

[8] 'there has been an explosion in the use of mapping tools to quantify and assess the needs of those in crisis, including those affected by climate change and the wider neo-liberal agenda. Yet, while there has been a huge upsurge in the data produced around these issues, the representation of people remains questionable. Some have argued that representation has diminished in humanitarian crises as people are increasingly reduced to data points. In turn, this data has become ever more difficult to analyse without vast computing power, leading to a dependency on the old colonial powers to refine the data collected from people in crisis, before selling it back to them.' (Specht, 2020, Cover Notes)

The ‘decolonial’ potential enabled by OpenStreetMapping (its locally-owned non-institutional data and community-derived empowerment) turns this around. It has successfully represented (whilst protecting) vulnerable community interests worldwide. For Merthyr, empowering local interest groups to ‘have their say’ on *their own terms* similarly gave OpenStreetMap game-changing potential: the community themselves could make choices about data expressed, and how their own health reform might take shape.[9]

Slide 6

How Community Mapping Works - A community-led resilience approach.



Mapping campaigns organise how the map gets traced by splitting an area of the digital layer (https://wiki.openstreetmap.org/wiki/Tasking_Manager) into grid-squares and indexing them

[9] This work drew strongly on cultural imperialism expertise in post-colonial cultural/spatial theory, and consultation with critical thinkers and specific reference to Wales critical writing canon (Raymond Williams, Peter Lord, Meic Stevens, David R. Edwards, and Saunders Lewis), as well as the field-intimate perspectives of local historians and community members. A practical expertise in Merthyr-related manufacturing crafts and skills (metalwork, structural/architectural engineering, mining history, industrial folk narratives) was also an asset in community-entry.

with online editing instructions, support and management. Contributors can participate under their username, using online and offline editing/GIS softwares.

To add values to the lines, shapes and dots which are traced, local knowledge of what they represent is needed. Eligibility to contribute this 'value-tagging' data depends on local knowledge, and must be undertaken by locals. It can happen in various ways, but for specific projects, free OpenSource ge-surveying tools are an effective way of organising project-specific data collection.

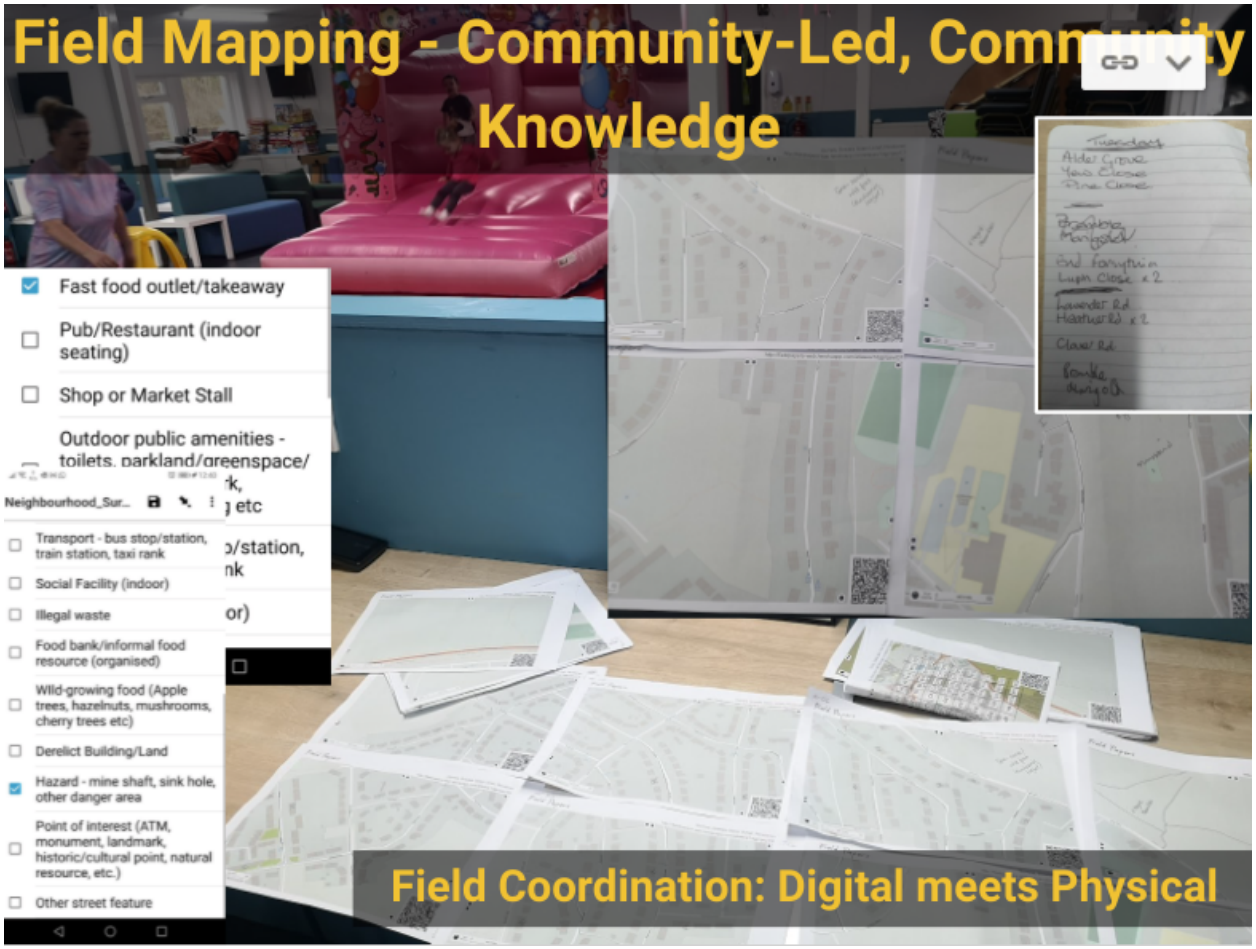
OpenStreetMap and Community Co-production

Adoptive/Adaptive Data:

Experience has shown that the best way to initiate a project is demonstratively. It is done through trialling and refinement of an enquiry-based survey practice, and implemented in a social constructivist (Piaget, 1932)[10] model which references the 'reflective practice' teaching theories of Donald Schon (1991) and Lev Vygotsky, where 'through the process of working with others, learners create an environment of shared meanings with peers' [11]. Having initiated a *proposed* schedule, the first valuable component of co-design started happening. It quickly emerged that two survey methods (qualitative - household, quantitative - neighbourhood) should be implemented concurrently.

Survey designs were informed by research in multiple Public Health workstreams. Community surveyors were encouraged to test-out, critique, and re-devise the survey questions, updating workshopped Public Health themes with their own priorities. The digital prototype forms were then trialed, examined, and refined by interventional feedback amongst community surveyors-practitioners, who, as stakeholders in both process and subject matter, became invested, interested, and responsible.

[10] 'His theories indicate that humans create knowledge through the interaction between their experiences and ideas.' (Brau, B. (2018). Constructivism. In R. Kimmons, The Students' Guide to Learning Design and Research. EdTech Books. Retrieved from https://edtechbooks.org/studentguide/constructivism; p1)
[11] Ibid. 1



Slide 7 Field Training/Mapping Coordination:

Twyn Community Hub: Background

In January 2022, Twyn Community Hub had stepped forward as a collaborator. Twyn had been a dynamic community resource throughout the pandemic, delivering 220 meals on wheels daily across the town wards, and providing care and mentorship for community members throughout the lockdown.

Mapping Food Deserts - Data Modelling specifics:

‘In some parts of Great Britain, accessing fresh, nutritious food can be very difficult, especially for those people on a tight budget… poor diet, and associated health outcomes, is likely to be a contributing factor to some of the widening health inequalities that exist in Britain today… ‘food deserts’ – areas which are poorly served by food stores, particularly those selling fresh, healthy products.’ (Megan Blake, Kelloggs Report, p4 ‘What is a Food Desert?’)

With this working definition of Food Deserts, food security surveys focused on provision of health foods, with the intention of mapping both food supply and waste chains.

Interview Surveys were developed around Cafes, Restaurants/Pubs, shops and market stalls, including important factors such as ‘veg chiller present’ to indicate fresh food, and ‘Does your menu include healthy options?’ to encompass supply and demand of better nutritional aspiration. World food types, (Halal, Indian, Portuguese, etc) were asked, as well as questions about lockdown business effects, languages spoken in the neighbourhood, and personal attitudes (e.g. hesitancy) towards vaccination/immunisation.

Research into the public health landscape had confirmed a need for this community-indexed information-gathering, and prototype surveys were written on the basis of reports[12] and meetings held with health, public and third sector practitioners over the course of three months. Main areas of interest were in practical access to services, awareness of services, vaccine hesitancy and the background conditions leading to clinical vulnerability (NCDs, overweight, etc.).

A1 | type

	A	B	C	D	E	F
1	type	name	label	hint	requi	relevant
41	text	first_language_other	We missed one. What language is this?			${first_language}="other"
42	select_one yes_no	home-cooking	Do you cook?			
43	select_one yes_no	fresh_food_need	Would you like better access to fresh foods?			
44	select_one yes_no	wild_food_appetite	Would you pick wild-growing foods?			
45	select_multiple wf_hesitancy	wild_food_hesitancy	Why not?			${wild_food_appetite}="no"
46	select_multiple food_improvement	fresh_food_improvement	What could help with better food access?			${fresh_food_need}="yes"
47	text	food_publicity	What kind?			${fresh_food_improvement}="healthfood_comms"
48	text	food_improvement_other	What other things would help?			${fresh_food_improvement}="other"
49	select_one yes_no	muga_awareness	Do you know of an outdoor area within 10 minutes walk,			
50						
51	select_one yes_no	exercise_group_locally	Are you aware of any social exercise groups that are run			
52	text	local_group	If so, what?			
53	select_multiple exercise_barriers	barriers_to_exercise	What factors make exercise difficult?			
54	text	barriers_to_exercise_other	Please name any other things that stop you, too.			${barriers_to_exercise}="other"
55	select_one employment_status	empl_status	What is your employment status?			
56	text	emply_status_other	Please describe			${empl_status}="other"
57	select_one yes_no	interviewee_covid	This is anonymous info about attitudes and COVID understanding. Can you answer vacc-related questions?			
58	begin_group	covid_personal_experience	These questions around COVID are for PHW to understand vaccine uptake ONLY.			${interviewee_covid}="yes"
59	select_one yes_no	testing_centre_awareness	Do you know where your local testing centre is?			
60	select_one yes_no	vacc_centre_awareness	Do you know where your local vaccination centre is?			
61	select_one yes_no	covid_helpline_aware	Were you aware of the COVID phone helpline?			
62	select_one yes_no	vacci_taxi_awareness	Were you aware of the taxi service provided for COVID testing/vacc			
63	select_one yes_no	been_vaccinated	Have you been vaccinated?			
64	select_one yes_no	intend_to_vaccinate	Do you intend to?			${been_vaccinated}="no"

IMAGE: Household Interview Skip Logic questions

Surveys were written in Spreadsheets which could be filled-in by swiping through pages on a standard, free-to-use (FOSS) smartphone data collection app called OpenDataKit (ODK). Participants learned to use their own handsets, to edit and contribute to the forms, to

[12] For example, Intelligence to Inform Community Testing at local level: https://docs.google.com/document/d/1y90Qrmcv2M1wU2L4VU4OTxvIg50JnQ0q/edit, COVID/ Whole Area Testing: https://cwmtafmorgannwg.wales/whole-area-testing-estimated-to-have-prevented-hundreds-of-cases-of-covid-19/), Health Inequality Reports at National/Regional Levels: https://health-inequalities.eu/toolbox/jwddb/

understand how to use an online server (Kobo) where blank forms could be downloaded, filled-in, and returned containing data, and the overall process of geospatial data creation.

The original training plan, which was adjusted around attendance, weather, team COVID outbreaks, daylight-saving, and other seasonal disruptions, was publicised as follows.

Project Plan:

A classroom-based outdoor activity, requiring a 1 month (4 week) commitment, 4 days per week.
Payment at cost of a living wage, to be administered by Twyn Community Hub.
Some understanding of how to use Android based smartphones, an interest in improving your neighbourhood, and willingness to contribute ideas for positive change around healthier lifestyles. Basic level of fitness and willingness to work outdoors, weather-dependent.
Meals provided.

Training (on the job) :
Shortlisted applicants will be invited to attend a one day selection process.
One the job training will commence.
1 day classroom and practice
Day 2 close neighbourhood mapping.
Day 3 further afield neighbourhoods and workshopping new features to map
Day 4 'Explore your neighbourhood' mapping - coordinate where we are missing.

Coverage was coordinated using Field Papers (see slide) - a paper-and-pen mode of updating OpenStreetMap - and each street which was covered was logged by hand. Surveyors carried the papers relating to their daily survey area.

The Community Mapping (OpenStreetMap) process works on a trial-and-review basis. Through proposal, iteration and re-iteration, participants have the all-important opportunity to evaluate survey processes, understand health information needs through practical survey engagement.

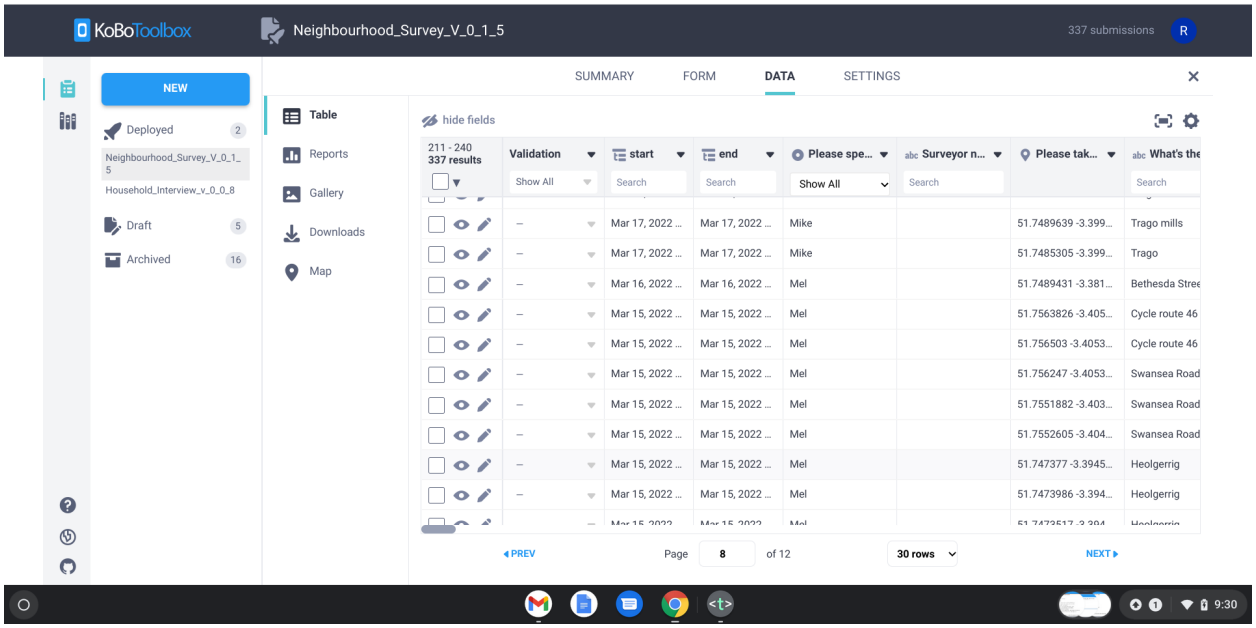


IMAGE: Survey data populating KoboServer live. Raw metrics can also be viewed in dashboard graphs etc.

The collection process can be viewed as surveys appearing on the online KOBOserver, and teams can re-design, co-produce and prioritise community-derived factors ‘live’, publishing adjusted/adapted surveys to refine a more united interaction between Pubic Health and its user-base.

A1 | type

	A	B	C	D	E	F
1	type	name	label	hint	requi	relevant
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63	select_one yes_no	been_vaccinated	Have you been vaccinated?			
64	select_one yes_no	intend_to_vaccinate	Do you intend to?			${been_vaccinated}="no"

IMAGE: Reversioning survey questions using spreadsheets

The final phase of co-design happened during the data collection process, incorporating the choices and voices of interviewees, re-versioning becoming informed by found circumstances in the field.

Slide 8 Research Analytics

Some outputs of community co-production and agile adaptive data management:

This project was piloted in Gurnos, Gellideg/Swansea Road, Penydarren and Lower Dowlais. Broad and rich multi-sector surveys were trialed aiming to capture physical geography (geo-referenced reports on assets and hazards such as playgrounds, recycling facilities, social centres, food outlets).

Meanwhile, household-level quantitative surveys gathered per street, recording attitudes, perceptions of safety, indicators of empowerment, access to local resources, and blockers to healthy food and exercise.

Excerpt from Community-Led Geo-Specific Interview:

How many households on this street?
Out of those, how many don't have a car?
And how many have regular supermarket home delivery?
Do you have full cooking facilities and a fridge?
Do you have a garden?
Would you like better access to an allotment?
Is affordable fresh veg available to buy within a five minute walk?
Distance to nearest affordable fresh veg for sale
What generally stops you getting healthy foods?
Something else?
Local shop needs
If a local shop selling affordable veg was here, how would you be healthier?
What other ways?
Has lockdown made you worry about your mental health?
Is there delivery/emergency vehicle access to this property?
Do people cook for eachother on this street?
If so, is it fresh foods or cooked foods?
What kind of food is this?
Please name all the languages are spoken by people living on this street

IMAGE: Smartphone App ODK - Future-Proof, Sustainable, Inclusive (Free and OpenSource Software)

These could then be compared as 'perception vs reality', to investigate awareness and communication effectiveness.

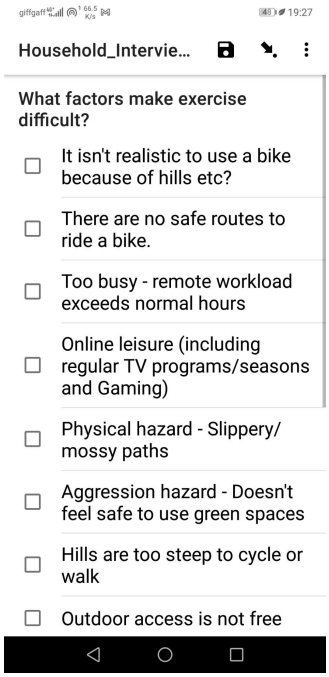


IMAGE: OpenDataKit (ODK)

During the project, many interviewees confirmed that it could change their life to have a local shop within 5 minutes, and such a community hub was part of a positive life-change conceptualisation including getting a dog, and tackling social exclusion.

Other analytic hypotheses were tested within the Qualitative (KI) Household survey.. For instance, an assumption that more neighbours might cook for eachother from ethnically diverse groups than english-speaking was refuted when a sample showed that from 93 ‘other language’ reports, 13 reported food-sharing, but in the same data sample, from 89 solely english language neighbourhoods, 12 reported food sharing.

Slide 9 - Participation Outcomes

OpenStreetMap contributor participation in public health data has historically had bilateral benefits, enabling individuals to potentially ‘have a say’ in their own healthcare provision and ‘socially prescribing’ them a productive and therapeutic activity. Digital inclusion (outdoor social activism and learning).

Community mappers are excited to express site-specific community behavioural insights. The practical nature of project work gives clear understandings of what are and are not actionable data for contextual analysis.

Overlaying clinical data on top of human geography for social improvement is interesting work, and the entitlement, privilege and value of this citizen science has clear benefits for individual self-esteem.

Some examples of this ‘human-data dialogue’ were immediately clear when workshopping with community members. Some local history was immediately discovered about the effects of lockdown: homeless people, for whom there is a shortage of single personal accommodation, were housed by the council during lockdown in individual hotel rooms (covid-safe). As well as meals on wheels for housebound, local charity groups have been taking 57 meals a night to these individuals - foods that can be cooked in toasters and kettles - as they are only provided with rooms.

Data Outcomes:

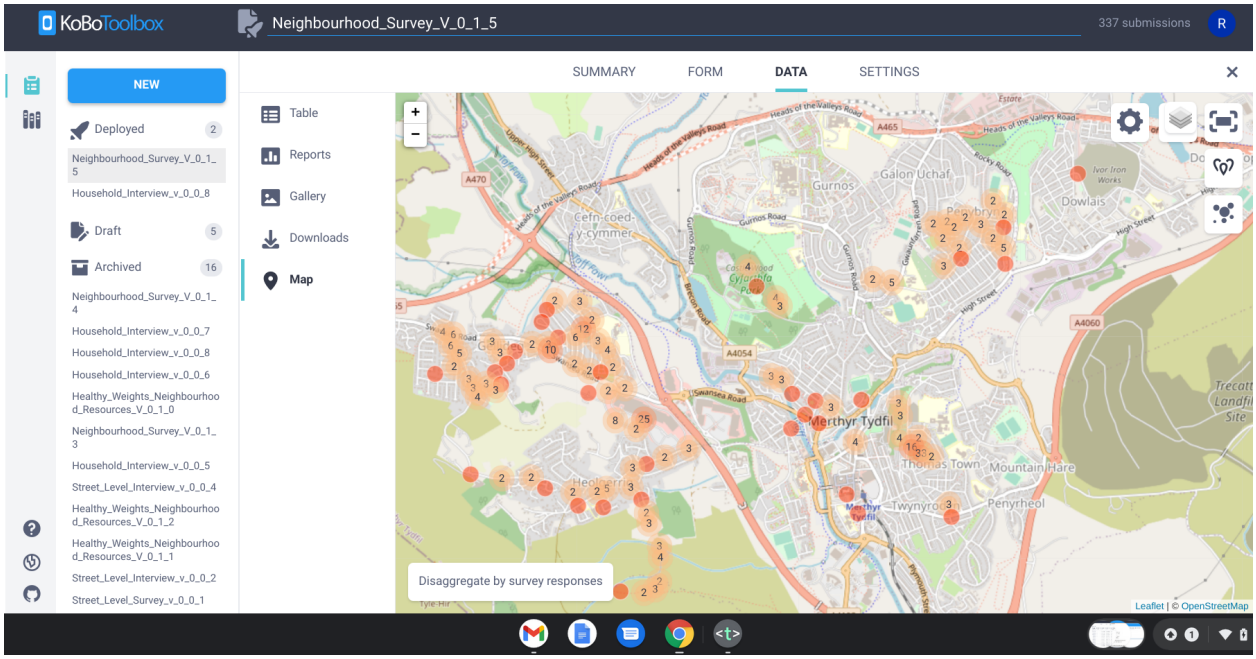


IMAGE: Live Data Monitorung on the KoboServer (credit Kobo and OSM Contributors)

This co-production process of ‘Mapping Food Deserts’ has capacitated a core of key community participants who are confident in using and sharing their data collection skills with partners and PH staff alike, one of whom is capable of potentially leading on the scaling of similar work across the South Wales regional Public Health landscape.

Skills have developed in advocacy, community entry and outreach. Replicating/re-locating this skill set across locales has proven transferrable between under-represented communities in other settings (e.g. surveyors from one refugee settlement being welcomed in another), and so

the scaling of this project has good potentials, depending on Public Health participation on the ground.

Potential Use Cases:
Uses of this community layer of data are widespread, but as food for thought, OpenStreetMap data might clearly be useful to inform care packages for patients leaving health settings, and where demographic, individual socio-economic conditions may be analysed around community and infrastructural support.

Community profiles geospatially rendered by this process are multi-use, and these survey formats, (as a prototype) now represent some good insights in their own right. This process epitomises the human-centred design paradigm, where field-mapping incorporates an interdependent symbiosis of qualitative and quantitative datasets, collected - without exception - at geographical point of source. The incorporation of human geographical perspectives in community-led ontologies of neighbourhood assets (litter/recycle/dog waste bins, streetlighting) creates a super-enriched background on which clinical data can be overlaid.

Slide 10 The Fast Food Trap

Data outputs are expressed in the universal spatial language of the map, and are not hard to read. This slide shows how children leaving the Pen-y-Dre high school in Gurnos at lunchtime are faced with only fast food eatery choices when hungry. The A465 development also shows here as a community hazard, as expressed by many locals:

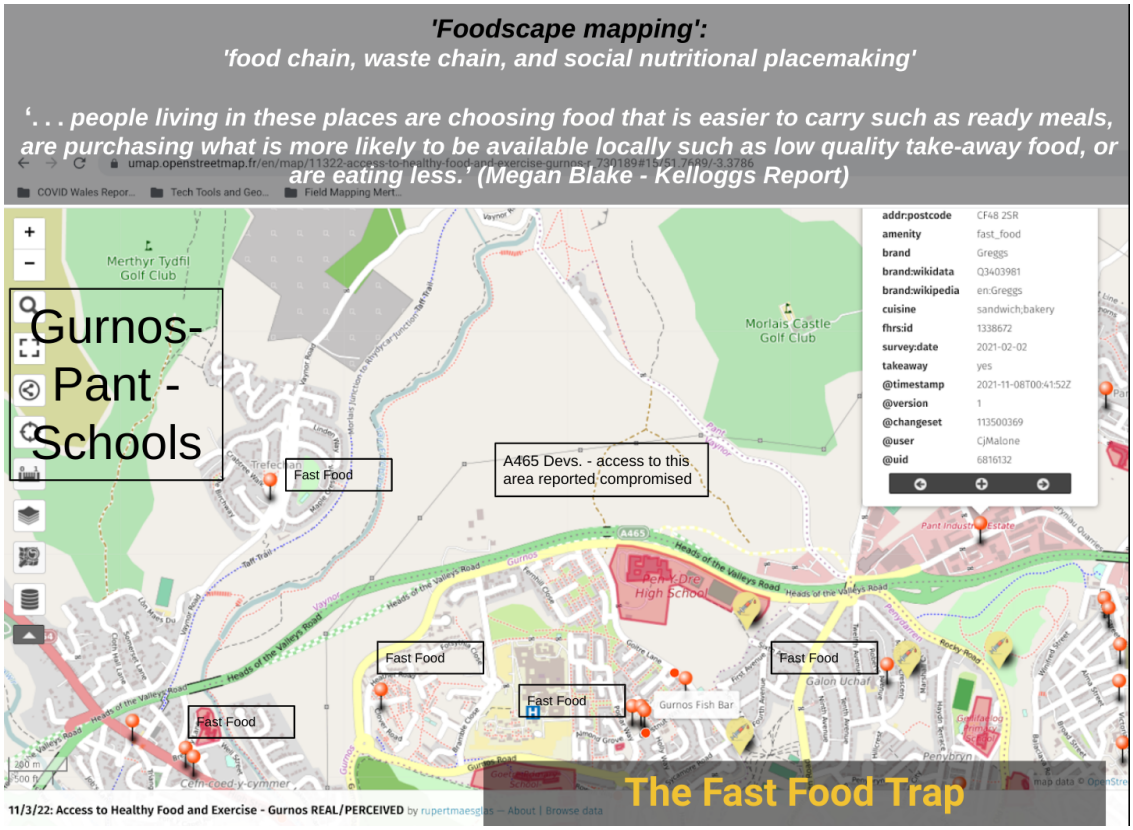
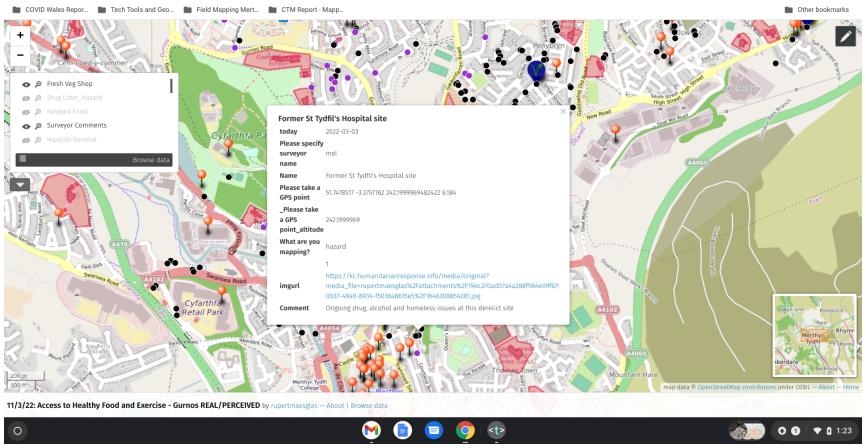


IMAGE: The Fast Food Trap (credit: OSM Contributors)

Incidentally, the map also shows drug litter hazards which students might be dangerously exposed-to, and the visualisation below clarifies where, for the central secondary school in Merthyr, publically-accessible drug-use littering can be found in an accessible area which lies between young people and their 'lunch'.

Another visualisation:



The URL in this metadata leads to this image of drug paraphernalia, and this can also be visualised as an in-map pop-up. This kind of ‘hazard exposure-mapping’ depicts statistics in a narrative not available without geo-spatial visualisation.

Slide 11

Perhaps the most important reason for using Community Mapping is the fact that it renders empirical information on *actual* real-life experience, rather than the *intentions* of health and social care interventions. Community contributors throughout Merthyr talked about the infeasibility of using public transport. It is not until steep hills, heavy weather exposure, lack of bus stop benches and shelters, and out-of-date timetables come together with metrics around carless families and personal mobility issues, that the ‘disinclination’ decision between fresh-food shopping and ordering a takeaway can be understood as a perenial ‘lifestyle choice’ problem. Geospatial visualisation, however, depicts such public transport problems, which are invisible in statistical number-lists.

IMAGE: Bus stops are clearly not useable for elderly or vulnerable who need shelter and a bench

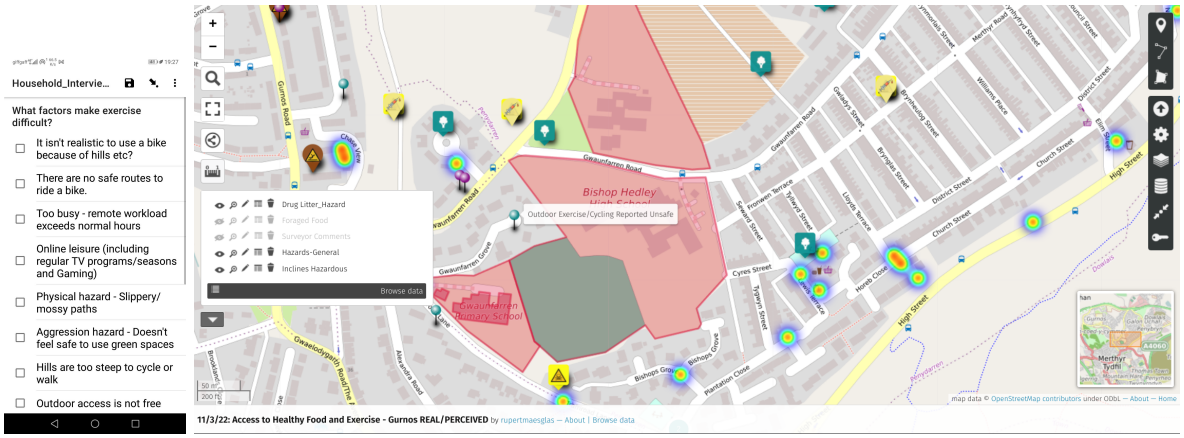
Bearing in mind BMI statistics and ‘Food Desert’ statistics, a glance at the geospatial findings demonstrated in this map tell a different story from the one told by public transport providers meeting council-stipulated deliverables. ‘Access’ is defined by convenience, incentive, social inclusion/anxieties, socio-economics, financial inclusion, etc…

Slide 12

The PHW Healthy Weights Healthy Wales agenda is about access to nutritious healthy food and access to exercise and outdoor activity. Working with and in the neighbourhoods of Merthyr, it quickly became clear that there is a great deal of greenspace openly available to the community. The environmental regeneration of brownfield ex-industrial sites has been comprehensive, and some of the ways in which the community identify with these spaces is through the wildlife, nature and food foraging potentials.

As the map of Merthyr has evolved, these areas can clearly be seen. The question of why these spaces aren't used more is clearly not just to do with physical distance from a local shop or simple proximal access to community assets, and more to do with other behavioural nuances.

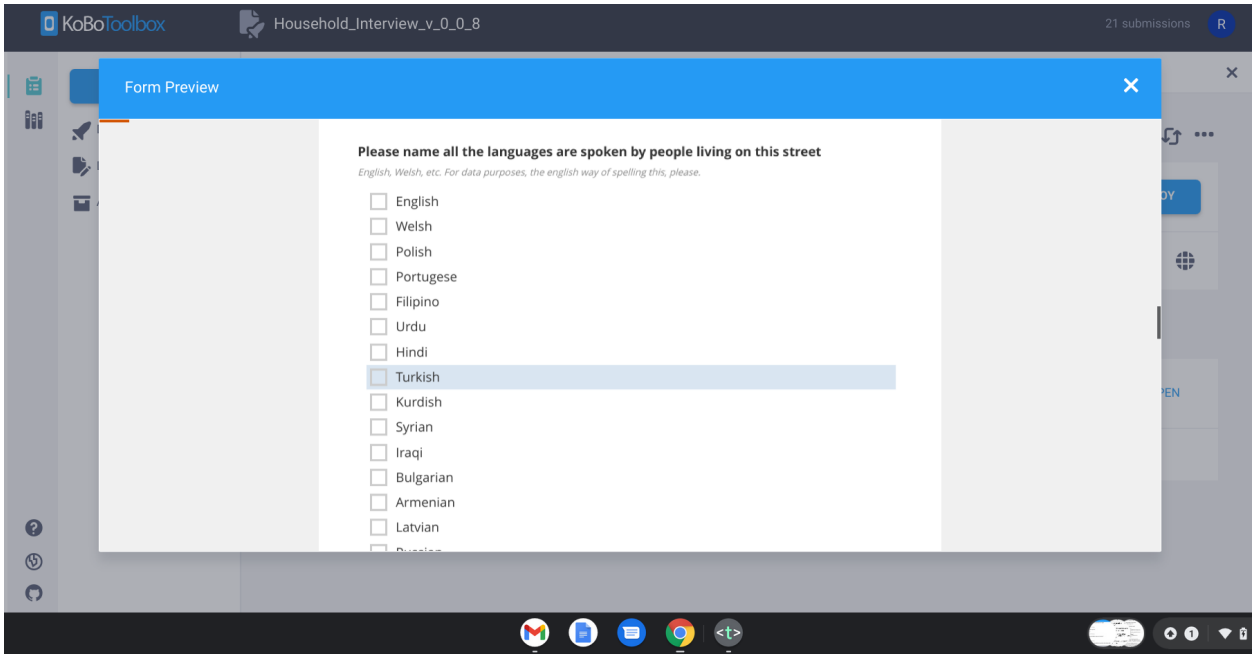
Community workshopping of survey questions with our key surveyors revealed important insights. Asked to identify barriers to physical health and nutrition, the community cited public transport gaps and mental health empowerment.



ODK Interview Questions: Perceived Barriers to Exercise

Part 3 Conclusions

Vacc Hesitancy by-products:
In Gurnos, identifying nutritional diversity and alternative food behaviours by 'neighbourhood knowledge' of 'world food outlets' has helped to render metrics and some understanding of ethnic presence through a market/consumer uptake (per street-level) locale. Ethnicity has also been associated there with Vaccine Hesitancy.



Languages reportedly spoken on the street hve been visualised from some of the data collected, and the map shows some interesting proximities:

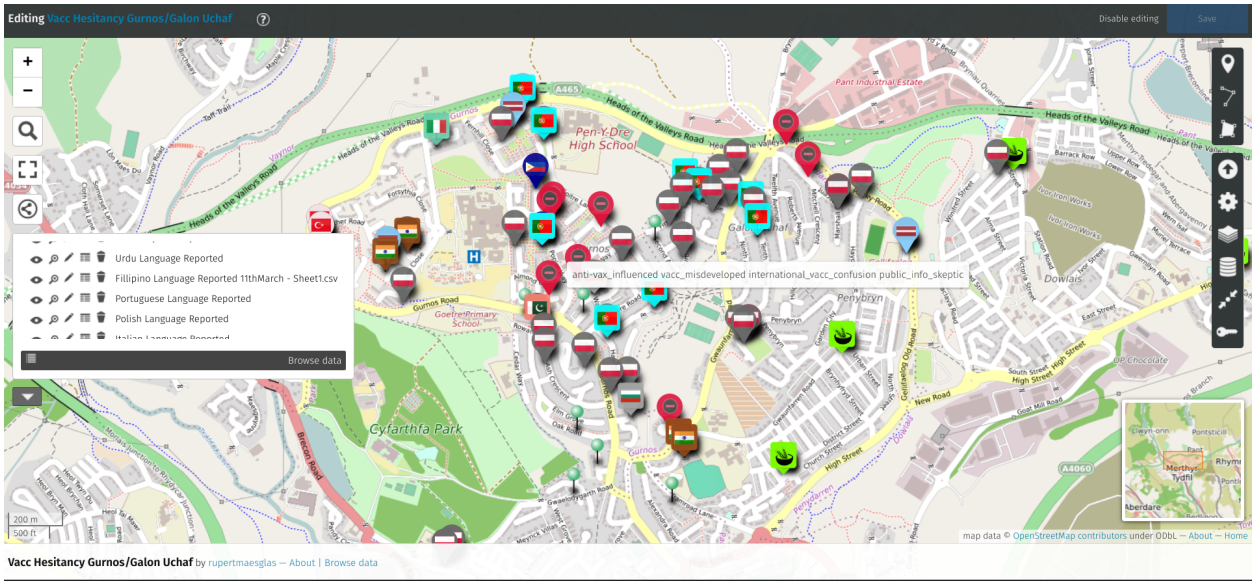


IMAGE: Vaccine Hesitancy reasons visualised against reported languages spoken in Gurnos

Data analytics are currently emerging as the field data populates around the Merthyr map. However, certain wards are now covered extensively, and interesting insights are visible from the comparison of the quantitative surveys with qualitative key informant (KI) interviews.

F!

Appendix: Project Deliverables

Deliverables: *Mapping to contextualise spatial and anthropogenic factors affecting COVID vulnerability in Community Public Health contexts in South Wales*

The original deliverables for this project are found below. Despite encountering challenges around participation and seasonal timing, these deliverables have been met, with the exception that we still hope to train public health workers from CTM UHB on 30th March 2022, and in subsequet training opportunities which have been offered. These have been offered and available throughout the past six months, but there has not yet been uptake.

- **Launch global Remote Mapping response - sensitize global mapping community to CTM priorities**
  All of Merthyr Tydfil is now remote-mapped in detail, with contributions from international and national teams. Link:
- **(Establish access to CTM Public Health teams and) produce *Field Mapping Feasibility Study* - incl. multi-stakeholder consultations**
  Feasibility study available in draft form - revised deliverable being Mapping Food Deserts project initiated 11/1/22. Output: Field Mapping and Report
- **Develop and write context-specific Community Mapping methodology, establishing partnership between MapUganda and CTM Public Health groups**
  - **Concept involving cross-cultural skillshare and Disaster Risk Reduction mapping techniques -** *Concept and proposal available HERE*
  - **Concept including budget -** *Budget available HERE*
- **Identify field-mapping sensitisation campaign strategy** - *See Mapping Food Deserts Report - Annex: Mapping Sensitisation Campaign Materials*
- **Develop and produce community-indexed COVID vulnerability survey forms/co-designed data collection materials**

Tooling: Survey forms found here:

Neighbourhood Survey:
https://docs.google.com/spreadsheets/d/1iV_P18OeGG_9zZmBVjO8c_BWEpPnUBuRxtc326y5qVY/edit?ouid=110991779343657420540&usp=sheets_home&ths=true

Household Interview:
https://docs.google.com/spreadsheets/d/1CGvtENeaUcbrrUytWohA8FME4GGIguDw_9OHL3TNAcU/edit?ouid=110991779343657420540&usp=sheets_home&ths=true

- **Subject to Field project budget and COVID Restrictions, initiate participatory field training and mapping in Merthyr Tydfil or otherwise prioritised area**

See 'Mapping Food Deserts Presentation' -
https://docs.google.com/presentation/d/13mn_KBLbzvWHVwLVE1LhuiValKtYHggSdyWZBdsfQYQ/edit#slide=id.ge8d0857324_0_16

Additional Capacitation:
The above 'dual' modes of Desktop and field/survey mapping, using the master-form/tool have been learned by 8 key community members, and around 15 remote-mapping collaborators, who have each become OpenStreetMap contributors under their own username. Weekly workshops, running since the beginning of the project (March 2021) have seen the training of 13 third sector partners, 6 ugandan (NGO) data cleaners, and 10 community contributors.

Links to training resources can also be found in the online wiki resource here:
https://wiki.openstreetmap.org/wiki/South_Wales_COVID_19_Vulnerability_Mapping

Data:
Data is lodged securely on a KOBOserver and in a googledrive. This will also be lodged as an NHS Wales resource. See author for access.

Advocacy has been undertaken multilaterally, with several local councillors introduced to the project. Presentations have so far been widespread, with participation and awareness-raising taking place in PHE and Open University workshop settings.

Subsequent scaling areas: Aberfan environmental projects, RCT Community Hub interests, Outdoor Exercise groups, etc.

Lessons Learned:

This was an intervention using Public Health indexes and PHW seconded staff, but also combining community-led resilience insights, to investigate Contextual Public Health through

mapping of environmental factors attendent on the COVID-19 vulnerabilities seen in the South Wales Valleys.

During the project, the offer to train the NHS has been made within the public health team, and during difficult times, training uptake has been minimal. Community Mapping teams have been built and trained, however, as have remote mapping systems and partnerships (e.g. global engagement from the Humanitarian OpenStreetMap community (HOT Tasking Manager), an MoU with OSM Uganda, and collaboration with OpenStreetMap UK).

Challenges:

The Omicron outbreak, weather, capacity and illnesses, were challenging. HR has been a major challenge as a result, from incentivising surveyors to lack of NHS collaborators. Field coordination, advocacy and reporting, data cleaning and map production are all managed from one position. This makes efficiency in each of these roles compromised. Many other challenges have been encountered and can be documented. However, the adaptive and adoptive nature of OpenStreetMap and some prior experiences of similar challenges could be leveraged to mitigate many of these.

Recommendations:

Further projects are dependent on certain premises which are unavoidavel. It is perhaps more useful to voice these in terms of recommendations:

1) Software: recommendations - it has become clear that this software system, being in the public domain, and part of the creative commons OpenData movement, can only sit outside of NHS information systems, serving to complement and enhance clinical public health data. It is recommended that a data integration officer be employed within NHS Information Management, with a remit to manage software and hardware issues arising from NHS incompatibility with external information systems.
2) HR recommendations continue with the recommendation that all staff at every pay-band are designated geospatial OpenStreetMap training, to enhance decision-making awarenes around contemporary and developing digital development potentials within their work area. This could take place in the form of ‘Team-Building Mapathon’ events as a preliminary measure.
3) This would be part of an ongoing strategic/systemic delegation of digital-geospatial engagement from top to bottom in PHW roles, delivered by an NHS - three-person OSM training team (to be employed). HR - TBC
4) Communications - internal (Teams, Outlook, Sharepoint)
5) Communications - external - TBC

A note on Google:
Google maps grow through commercially linked consumer information which is 'mined' from human behaviour. Google maps of the northern hemisphere appear dynamic and comprehensive (not so not for the global south), but anyone who has used Strava will know OpenStreetMap - capable of much more human geography detail - to be sparsely populated in some areas of the UK. OpenStreetMap is generally made up of deliberately contributed data, and this, as a social responsibility, has been overlooked in the global north. This shared authorship is an intrinsic condition of the map which, like Wikipedia, is owned and created solely by its contributors.

Sample Maps/Data Visualisations:

Real/Perceived Access to Health Food and Exercise:
https://rupertallan.com/11-3-22-access-to-healthy-food-and-exercise-gurnos-real-perceived/

Community-Defined Assets (Foraging, Outdoor Creative, Allotments, etc):
http://u.osmfr.org/m/731724/

Healthy Food Realities: http://u.osmfr.org/m/732080/

Vacc Hesitancy/Languages, etc: http://u.osmfr.org/m/721876/

Project Documentation:

Training Resources (Playbook):
Training resources, documentation and workflows are lodged in the public domain online, freely accessible here:
https://drive.google.com/drive/folders/19CexnhfD1fbxLJ9HL7pUr1ATwwhkSCzW?usp=sharing

This resource also includes:
Copy of Merthyr OSM Press Release - 22_11_21 (2):
https://docs.google.com/document/d/1N_gIoIObIlNXiHBE0M8rSo_hNaCscqPeyYpSwHz7w0A/edit#heading=h.6najiq2qbcqt
Copy of General HR and training landscape:
https://docs.google.com/document/d/1YxGoRygtko8lEZMa9BaBt1_bHVZjR7xgBddH7ZOr3po/edit

Deliverables - General description:
https://docs.google.com/document/d/1XaEfXNfRgsmjkxYsfSshDBn-FVRccCrZN4NVxLzejXs/edit
Data Cleaning Workflow for Interactive Map Making:
https://docs.google.com/document/d/1UUW_bXtaq811iUunqd26D3dINbKEAQ1k_863ly37Whk/edit
Participant Feedback (Mel Evans-Jenkins):
https://docs.google.com/document/d/1YD5Mb3X9AwNTuScNqpzu3onngcWpuQnfSPV6qsV6EdY/edit

NB, for further documentation and resources, please contact Lisa Jones at CTM UHB, or Rupert Allan at mail@rupertallan.com

Bibliography:

- TECHNICAL REPORT: COVID-19 clusters and outbreaks in occupational settings in the EU/EEA and the UK. Stockholm: ECDC; 2020. © European Centre for Disease Prevention and Control, Stockholm, 2020, Aug 11, 2020
- Chicago. Schon, Donald A. 1991. The Reflective Practitioner. Farnham, England: Ashgate Publishing.
- OSM - how to map for COVID
- Wang et al, 2018: Elsevier: An exploration of solutions for improving access to affordable fresh food with disadvantaged Welsh communities - ScienceDirect
- Food Deserts: Megan Blake - The Kelloggs Report: https://www.kelloggs.co.uk/content/dam/europe/kelloggs_gb/pdf/Kelloggs_Food_Desert_Brochure.pdf
- Y Lab - data innovation in South Wales: https://ylab.wales/index.php/resources
- Whole Area Testing Report (CTMUHB):
- https://cwmtafmorgannwg.wales/whole-area-testing-estimated-to-have-prevented-hundreds-of-cases-of-covid-19/
- COVID-19 Community Response
- Evaluation of the Lateral Flow Device Testing Pilot for COVID-19 in Merthyr Tydfil and the lower Cynon Valley
- Glossary - Public Health Wales

Other Links:

South Wales police incidents per ward:
https://www.south-wales.police.uk/area/your-area/south-wales/mid-glamorgan/

GURNOS:
https://www.south-wales.police.uk/area/your-area/south-wales/mid-glamorgan/gurnos/about-us/crime-map

GALON UCHAF:
https://www.south-wales.police.uk/area/your-area/south-wales/mid-glamorgan/penydarren/about-us/crime-map

Merthyr Grit Bins:
https://gist.github.com/Cj-Malone/0b2fd86b30e445e07a722ea1c3386bab

Lidar Layer:
http://lle.gov.wales/Catalogue/Item/LidarCompositeDataset/?lang=en

Ordnance Survey Topo-layers:
https://www.ordnancesurvey.co.uk/business-government/products/terrain-5

Wales Index of Multiple Deprivation Gov Data:
https://datamap.gov.wales/layergroups/inspire-wg:WelshIndexOfMultipleDeprivationWIMD2019/metadata_detail

WIMD (deprivation). Domains interactive map:
https://wimd.gov.wales/explore?lang=en#domain=services&&z=13&lat=51.7302&lng=-3.3538

[Appendix A]

COVID-related Behaviour Issues (from Public Health notes):
Gambling
Hoarding
Social Anxiety
Self-harm
Eating Disorders
Manic bedroom exercise(!)
Going without food.
Grief over loss of way of life (as well as actual deaths)
Financial insecurity
Home schooling pressures
Loss of confidence (especially going through life changes - e.g. puberty)

Some positive outcomes wih more immediate digital engagement and mental health services becoming better.
Technophobia, online, and also loss of tactile - ‘Not all services translate online or over the phone’. It is dangerous to assume they do translate, dangerous to consider online/tech as magic bullet solution. (False solution, potentially risking exclusion/forgetting of clients.)

Emerging Community-Identified needs (from Public Health notes):
Physical contact is desperately needed.
Respite care opportunities needed.
Hybrid support (remote and physical) is clearly a possibility.
Social re-entry support. How can we make this happen? (without creating dependency)
Befriending has clearly saved lives. How can it happen more?
Preventative measures- e.g.people are approaching (but not presenting as) problematic (e.g. borderline alcoholic due to COVID)
Unclear guidances - confusing/socially dischordant, also lockdown restriction leqading to frustration/othering/animosity.
Health strategy needs to readjust to change commissioning practices.
Mental Health stigma - in work force and public sector
Stop carrying out surveys. LISTEN, and have a conversation.
Let staff decide on referral routes - they are on the ground. Know the territory.

In previous projects, where there was little up-to-date geospatial data, and a more open remit to formulate community-originated emergency data-layers, questions like ‘Where is your health facility?’, ‘How do you get there?’, and ‘What are the average waiting times?’ revealed public health experiences from the community perspective. The results expressed vulnerabilities per community and even per household, but also created analytics outputs for future vulnerability needs, extrapolating to environment, habits, lifestyles and creating indicators valuable for future resource allocation.

[Appendix B]

Relevant (United Nations)SDGs:
(1) No Poverty,
(2) Zero Hunger,
(3) Good Health and Well-being,
(4) Quality Education,
(5) Gender Equality,
(6) Clean Water and Sanitation,
(7) Affordable and Clean Energy,
(8) Decent Work and Economic Growth,
(9) Industry, Innovation and Infrastructure,
(10) Reducing Inequality,
(11) Sustainable Cities and Communities,
(12) Responsible Consumption and Production,
(13) Climate Action