**ME-NET stakeholder meetings - qualitative data**

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*This interim report (16th February, 2025) presents a synthesis of qualitative analysis conducted focusing on the first round of stakeholder Innovation Labs involved in the co-design of the ME-NET application for smart-phone and website.*

**Research question:** What user functions would improve the visibility of climate change impacts, and how deliverable are these, given data availability and quality in regions?

**METHODS**

*Design*

An iterative co-creative co-design approach was adopted, including three rounds of virtual Innovation Labs with multi-institutional and interdisciplinary stakeholders from the UK (Lincolnshire County, North/North East Lincolnshire) and Ghana (Accra and Sekondi-Takoradi), to inform the development of the Methane Early Warning Network Application (ME-NET). The ME-NET project began in July, 2024, with the first and second rounds of stakeholder Innovation Labs in August and November. This interim report addresses qualitative data compiled from these initial Innovation Labs. The final round of meetings will take place in March, 2025.

*Stakeholders*

Ethics approval was granted by the ethics committee of the University of Lincoln.

A purposive sampling method was used to recruit stakeholders from the chosen regions taking into consideration their interest and current professional or occupational affiliation. Individual stakeholders were contacted by email with a study information and consent form for the purpose of obtaining written informed consent. Participation was voluntary and with a £25 voucher as a token for their time. Table 1 presents details of stakeholders below.

**Table 1 Details of stakeholders attending the 1st and 2nd round of Innovation Labs**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1st round of Innovation Labs: NEL (19/08/2024 & 27/08/2024), Lincolnshire (20/08/2024), Ghana (02/09/2024)** | | | | **2nd round of Innovation Labs: Lincolnshire (04/11/2024), NEL (06/11/2024), Sekondi-Takoradi (07/11/2024), Accra (19/11/2024).** | | | **3rd round of meetings:** | | |
| **ID** | **Region** | **Professional role** |  | **ID** | **Region** | **Professional role** | **ID** | **Region** | **Professional role/background** |
| 1 | North East Lincolnshire (group1) | Public health programme manager |  | 1 | Lincolnshire | Assistant director for prevention and early intervention in public health, Lincolnshire County Council |  |  |  |
| 2 | North East Lincolnshire (group1) | Social prescribing in a Charity |  | 2 | Lincolnshire | Everyone charity |  |  |  |
| 3 | North East Lincolnshire (group2) | Sustainability officer at Lincolnshire County Council |  | 3 | Lincolnshire | Children and young people, programme manager for Lincolnshire integrated care board |  |  |  |
| 4 | North East Lincolnshire (group2) | Clinical Psychologist, University of Lincoln |  | 4 | Lincolnshire | Assistant psychologist in the community mental health team from LPFT |  |  |  |
| 1 | Lincolnshire | Manager Met office |  | 5 | Lincolnshire | children's respiratory nurse |  |  |  |
| 2 | Lincolnshire | Partner of the Wellness Network |  | 6 | Lincolnshire | Professor of respiratory medicine at the University of Exeter |  |  |  |
| 3 | Lincolnshire | Assistant director at Lincolnshire County Council |  | 7 | Lincolnshire | Chief intelligence and analytics Officer for the Lincolnshire health and care system working for the ICB |  |  |  |
| 4 | Lincolnshire | Health research scientist at the Met office |  | 8 | Lincolnshire | Senior lecturer in epidemiology at the Hull and York Medical school |  |  |  |
| 5 | Lincolnshire | Children young people programme lead at the NHSICB |  | 9 | Lincolnshire | Senior health research scientist at the Met Office |  |  |  |
| 6 | Lincolnshire | Assistant psychologist at CMHT |  | 10 | Lincolnshire | County Council, also lead the Coastal Communities Alliance |  |  |  |
| 7 | Lincolnshire | GP and ICB medical director |  | 11 | Lincolnshire | Clinical psychologist, co leading psychological health and well-being research group, University of Lincoln |  |  |  |
| 8 | Lincolnshire | Partner of the Wellness Network |  | 12 | Lincolnshire | Associate professor at the university of Lincoln in the School of Creative Arts. |  |  |  |
| 9 | Lincolnshire | Covers deprivation and issues around coastal communities and national lead for Coastal Communities Alliance |  | 13 | Lincolnshire | A resident in the area. |  |  |  |
| 10 | Lincolnshire | Community conversations and facilitating those within co-production |  | 14 | Lincolnshire | A resident in the area. |  |  |  |
| 11 | Lincolnshire | Research and evaluation manager at East Midlands ambulance service |  | **15** | Lincolnshire | Public contributor affiliated to the University of Lincoln |  |  |  |
| 12 | Lincolnshire | Chief Intelligence Analytics Officer for the ICB |  | 16 | Lincolnshire | Research and evaluation manager at East Midlands ambulance service NHS Trust |  |  |  |
| 13 | Lincolnshire |  |  | 17 | Lincolnshire | Sustainability team at Lincolnshire County Council |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| 1 | Ghana | S/L department of physics, University of Ghana, work s in Air Quality |  | **1** | North East Lincolnshire | Engagements and Projects manager for Health and Care Partnership |  |  |  |
| 2 | Ghana | Climate change and mental health, University of Ghana |  | **2** | North East Lincolnshire | Centre4, head of health, well-being and community |  |  |  |
| 3 | Ghana | S/L, department of geography and resource development, University of Ghana |  | **3** | North East Lincolnshire | Operations manager at Centre4 in the health and well-being team |  |  |  |
| 4 | Ghana | Ghana Meteorological Agency |  | 4 | North East Lincolnshire | Deputy Director of Public Health in NE Lincolnshire council |  |  |  |
| 5 | Ghana | Weather Position Office |  | 5 | North East Lincolnshire | Public Health Specialty Registrar, North Lincolnshire |  |  |  |
| 6 | Ghana | Ghana meteorological society |  | 6 | North East Lincolnshire | Head of clinical networks - ICB predominantly cardiac, stroke, diabetes and respiratory |  |  |  |
| 7 | Ghana | Institute for oil and gas studies at the University of Cape Coast - climate and energy system modelling |  |  |  |  |  |  |  |
| 8 | Ghana | Principal meteorologist and external relation officer, Ghana Meteorological Agency |  | 1 | Sekondi-Takoradi, Ghana | Civil engineer and urban environment and climate change specialist, Secondi |  |  |  |
| 9 | Ghana | Paediatric Pulmonologist, Korle-Bu Teaching Hospital |  | 2 | Sekondi-Takoradi, Ghana | Mechanical engineer and technology planner, doing environmental impact assessment & management for the past 30 years |  |  |  |
| 10 | Ghana | General Paediatrician, Princess Marie Louis Children's Hospital |  | 3 | Sekondi-Takoradi, Ghana | Takoradi Metropolitan Assembly, the metropolitan officer |  |  |  |
|  |  |  |  | 4 | Sekondi-Takoradi, Ghana | Metropolitan environmental head officer for Sekondi-Takoradi |  |  |  |
|  |  |  |  | 5 | Sekondi-Takoradi, Ghana | Environmental health analyst with Sekondi-Takoradi Metro Assembly |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 1 | Ghana | Ghana Meteorological Agency, as a researcher and climate scientist and also into air quality |  |  |  |
|  |  |  |  | **2** | Ghana | General paediatrician, Princess Marie Louis Children's Hospital in Accra |  |  |  |
|  |  |  |  | **3** | Ghana | Paediatric pulmonologist. I work at Korle-Bu Teaching Hospital which is the largest hospital in Ghana |  |  |  |
|  |  |  |  | **4** | Ghana | Ghana Meteorological Agency |  |  |  |
|  |  |  |  | **5** | Ghana | Waste management and Landfill site manager |  |  |  |
|  |  |  |  | **6** | Ghana | Assistant professor in the university of Ghana, department of mental health |  |  |  |
|  |  |  |  | **7** | Ghana | Civil engineer, environment and climate change specialist |  |  |  |
|  |  |  |  | **8** | Ghana | Numerical weather prediction unit |  |  |  |
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*Data Collection*

The Innovation Labs, lasing two hours with breaks, were held online via Microsoft Teams. Sessions were recorded and later transcribed verbatim. The first round of Innovation Labs were held online with stakeholders from the following regions and corresponding dates: North East Lincolnshire, UK (19/08/2024 and 27/08/2024), Lincolnshire, UK (20/08/2024), and Accra, Ghana (02/09/2024). The second round of Innovation Labs were also held online: Lincolnshire, UK (04/11/2024), North East Lincolnshire, UK (06/11/2024), Sekondi-Takoradi, Ghana (07/11/2024), and Accra, Ghana (19/11/2024).

The first round of Innovation Labs consisted of the ME-NET project lead (HM) presenting prototype material co-developed with Common Knowledge, including an ozone ‘early warning’ system, respiratory and mental health self-reporting to establish links between ozone, methane, and health outcomes, educational ‘module’ about the impact of methane and ozone on health outcomes, an interactive map displaying environmental and health data, profile characteristics, and proposed design and functionality features of the ME-NET application for smart-phone and website. After protype presentation, stakeholders were invited to discuss suitability, accessibility, and feasibility of design features, including using real-time surveys to anonymously capture concerns (e.g., about ozone alerts creating panic). After the initial round of Innovation Labs, participants were encouraged to complete a follow-up survey consisting of quantitative and qualitative questions to capture stakeholder perspectives and views.

The second round of Innovation Labs involved the presentation of additional ME-NET features, including detailed characteristics of the environment and health app co-designed by Common Knowledge, and proposed features for enabling health self-reporting.

*Data Analysis*

Qualitative data analysis was conducted for Innovation Lab transcripts, as well as data collated using social surveys during and after virtual sessions.

The audio recorded meetings were transcribed verbatim, and transcripts were analysed following the procedure of Braun and Clarke (2006) which included five steps. Step 1 involved familiarization with the data by repeatedly reading the transcripts. In step 2, one researcher performed the initial coding in NVivo. A second researcher then checked the initial codes and validated them against the transcripts. In step 3, codes were grouped into common themes based on coherent patterns. In step 4, the themes were reviewed through several discussions between the researchers. In step 5, the themes were defined by eliminating redundant themes. In the results section that follows below, quotes from stakeholders are used to support the contextualisation of the themes.

**RESULTS**

**First round of Innovation Labs**

Following analysis of qualitative data from the first set of stakeholder Innovation Labs across the selected regions, the following themes emerged. These are presented with the respective questions that were asked to prompt appropriate responses from stakeholders.

**1.What do you think of when you think of methane? - perceptions about methane**

**Cows/cattle: …**

*I think of cows! And cow flatulence! I'm sure you've probably heard of that before*: 1ST meeting, Stakeholder 1-North East Lincolnshire (NEL)

What comes to mind when I think of methane, is mostly cows, I think: 1st meeting Stakeholder 3-NEL

*When I think of anything, it is very similar to what others have said, the first thing that came to my mind was cows*: 1st meeting, Stakeholder 12-Lincolnshire

*The first thing that I think is cows when we talk about methane*: 1st meeting, Stakeholder 5-Lincolnshire

**Gas/Unpleasant gas: …..**

*I think of the gas given off by rotten material*: 1st meeting, Stakeholder 2-NEL

*As far as methane is concerned, I guess the only thing that springs to mind is gas*: 1st meeting, Stakeholder 1-NEL

*An unpleasant substance. There is the connotation of it not being very nice:*1st meeting, Stakeholder 7-Lincolnshire

**A greenhouse gas, global warming and Climate change: ………**

*When I think of methane, I think of global warming potential, cattle grazing and deforestation, and it takes me back to my science and climate change background:* 1st meeting, Stakeholder 2-NEL

*When I think of methane, I think of greenhouse gases and climate change*: 1st meeting, Stakeholder 6-Lincolnshire

*I think methane is one of those greenhouse gases that contributes a lot to what we call climate change:* 1st meeting,Stakeholder 1-Ghana

*Methane is one of the greenhouse gases leading to global warming:* 1st meeting,Stakeholder 8-Ghana

*I suppose methane for me, and something I've not thought about until you just mentioned it there, it would actually be reflecting back at Immingham. Growing up as a child, my dad worked on the docks, I'm quite a lot of time we would go in the car and pick him up with my mom. The same as you, you would see the flames coming out of the big chimneys, and being on the dockside itself, was incredible, an incredible vision. I suppose for me, it would also be about, and I don't know if this is right or wrong, I would probably in my brain, is telling me, would have an impact on the climate change* – 2nd meeting, NEL Stakeholder 2

**Cooking**:….

*The first thing that comes to my mind when I think about methane is my gas cooker, it being powered by natural gas which is mostly methane*: 1st meeting, Stakeholder 1-Lincolnshire

**Compost: ……….**

*For methane, he is I have been trying to make my own compost for my organic farm. So that's how I got to know about this meeting:*1st meeting,Stakeholder 9-Ghana

**Waste:….**

*I'm not so good at getting my cooking waste and peelings down to my allotment, so I put it in black bags, and every time I open those black bags, an absolute stink, which I think is methane*: 1st meeting, Stakeholder 11-Lincolnshire

**Health impact/** **Not feeling very well!:** Effects on respiratory health. Dangerous to our health ……

*When I think of methane, I think of not feeling very well! Just a bit woozy and dizzy and not good*: 1st meeting, Stakeholder 2-Lincolnshire

*I believe it's one of the pollutants causing a lot of respiratory risk and other related health issues:* 1st meeting, Stakeholder 3-Ghana

*For methane, I have been trying to make my own compost for my organic farm…, apart from learning about the effects on respiratory health and having three papers on it so I can pass my exam:* 1st meeting,Stakeholder 9 -Ghana

*I don't know much about methane; I just know that it's dangerous to our health:* 1st meeting,Stakeholder 10-Ghana

**2. ‘Red flags’ and unintended consequences related to the ozone educational module content - unintended consequences**

**Anxiety: ……..**

*I think it is a very valid concern. A lot of people who are prone to reacting to these environmental changes, people with chronic illnesses, and they're already overburdened. So I can really understand this adding to their anxiety. So, I can really understand this adding to their anxiety:* 1st meeting,Stakeholder 9 – Ghana

*If I know the concentration of methane in the environment, and my app is telling me that it's pretty high, what do I do next? And to me, that is the most important thing. If people don't know what to do with the information that they're processing, then we are going to increase their anxiety and make them more devastated with the information that they're consuming then before:* 1st meeting,Stakeholder 2 – Ghana

**Unattractive without empowerment**: …….

*It's not enough for residents to know that methane is emitted through the sun and blah, blah, blah. It's also about - What can we do as communities. What is the urgency to act:* 1st meeting,Stakeholder 11-Ghana

*So if you just create the urgency and the fear and the importance of methane and gas and blah, blah, blah, and you don't really empower people to change what you are asking about, then it becomes a bit unattractive:* 1st meeting,Stakeholder 11-Ghana

**Overburdening communities**: ……

*We need to be a bit measured in how we integrate some of these interventions on the ground, so that it doesn't become too heavy for communities to digest and use*: 1st meeting,Stakeholder 11-Ghana

*Currently in some of the areas that I work in, we're beginning to have a lot of education and capacities and campaigns and pictures around air pollution. Now we include methane and then it becomes very complex for community people to appreciate*: 1st meeting,Stakeholder 11-Ghana

**3. Discussion on ‘ozone and your health’ content and what should go in the App –**

**Accessibility, inclusion:**

Bring the disabled in/ Improving accessibility for the disabled: …….

*For the disabled, it would be good to bring them also, have an interaction with them. Yes, maybe a group that can be your voice might be better, but maybe from their own experience what could be more comfortable for them to be able to access this information and interpret it better:*1st meeting,Stakeholder 8-Ghana

*Some of the folks here at the university, I think they have developed something like an app for people who as you know, visually disabled:* 1st meeting,Stakeholder 1-Ghana

*We can add AI to be able to transcribe what is written into sound, so that others who cannot read, would be able to understand this:* 1st meeting,Stakeholder 1-Ghana

Consider a local language: …..

*I wanted to comment on the language, but I think that M has done justice to it. So, we are good to go. French is not predominantly used in Ghana. We can go for the native language:*1st meeting,Stakeholder 6-Ghana

*In terms of the languages, we need to consider a local language maybe taking those areas that we're looking to for consideration. If there is a language that is a common one, then we look at that and see how it can be leveraged for other areas. So that's what I would like to say:*1st meeting,Stakeholder 8-Ghana

Consider co-production: ……

*So we need to go co-production, most of us on this course, we need user inclusivity. We want them to use this, for them to share their own experience with us and tell us what they want, and we can combine that with our expert views to develop the project. I think that would be the best way for this discussion, for the best result for us to get:*1st meeting,Stakeholder 8-Ghana

**Educational content:**

A form of educating them; …..

*How would the app help me mitigate and it just to adapt to the impact of maintaining the environment or the zoning environment:*1st meeting,Stakeholder 2-Ghana

*If people understand where these sources are coming from, in their day-to-day activity, they need to take some actions to reduce the production of things that are leading to the increase of this ozone methane in the society or community:*1st meeting,Stakeholder 8-Ghana

A function of your audience: ……

*Context really matters, depending on the audience that we seek to influence, so it's a function of your audience. So once you know your audience and your target, then you are able to pull through the mix; that really has impact:*1st meeting,Stakeholder 11-Ghana

**Mitigating anxiety**:

Addressing anxieties and concerns: …….

*We also need to embed into it the overtime, information will be collected about the levels and analysed and people will be engaged, so that they see that something is being done about it:*1st meeting,Stakeholder 9-Ghana

Link it with the economics of the day: …….

*Given my role of dedication for knowing the health impacts of methane, it's very, very useful, if we are able to link that with the economics of the day, how it affects people's lives now you have to spend money at the hospital and how you the health bill:*1st meeting,Stakeholder 11-Ghana

**4. Any other stakeholder content related comments - Other comments**

**Being measured integrating the interventions**

*We need to be a bit measured in how we integrate some of these interventions on the ground, so that it doesn't become too heavy for communities to digest and use:*1st meeting,Stakeholder 11-Ghana

**Consider having a perception survey**

*So whilst we do the perception survey, we get to know what they know already about methane, the environment, pollution and all of that. That becomes a very useful starting point for even developing all of these messaging and all the types of intervention we want to do*: 1st meeting,Stakeholder 11-Ghana

**Ensuring data security**

*We're going to collect personal data, there would be a need to see what the access is about, this type of app that we're going to use*: 1st meeting,Stakeholder 1-Ghana

**How to measure methane**

*How to measure methane - I want to believe that we are discussing using equipment- gadgets, scientific gadgets. Is that the conversation:*1st meeting,Stakeholder 11-Ghana

**Now I know, what do I do next**

*How would the app help me mitigate and it just to adapt to the impact of maintaining the environment or the zoning environment:* 1st meeting,Stakeholder 2-Ghana

**Second round of Innovation Labs (In Progress)**

*GMET need for methane monitoring*

*Why people think the project is important*

*People’s concerns about the impact of methane on health*

**References**

Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol 2006 Jan;3(2):77-101

Comparing and contrasting dashboard functionality between regions will reveal design challenges associated with data availability, socio-cultural context, and science literacy. Understanding regional characteristics will allow our UX/UI designers (Ethical Design Co.) to co-produce innovative modular solutions that promote data trustworthiness, science literacy, encourage self-reporting, and facilitate inclusive, accessible dashboard use.