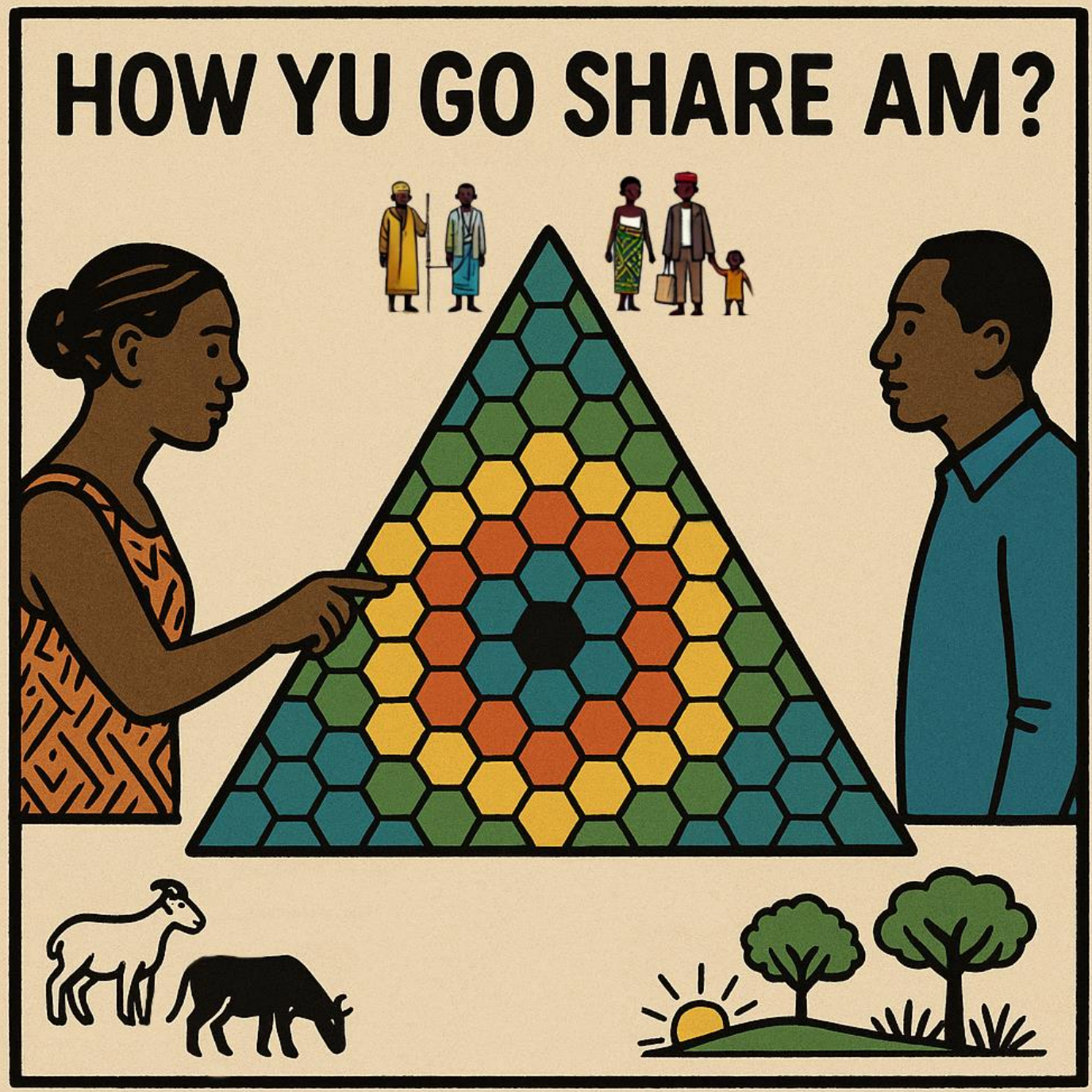


“How Are You Going to Share It?”

Capturing Reasoning in One Health Prioritisation Through a Digitally Twinned Tabletop Game & Deliberative Play

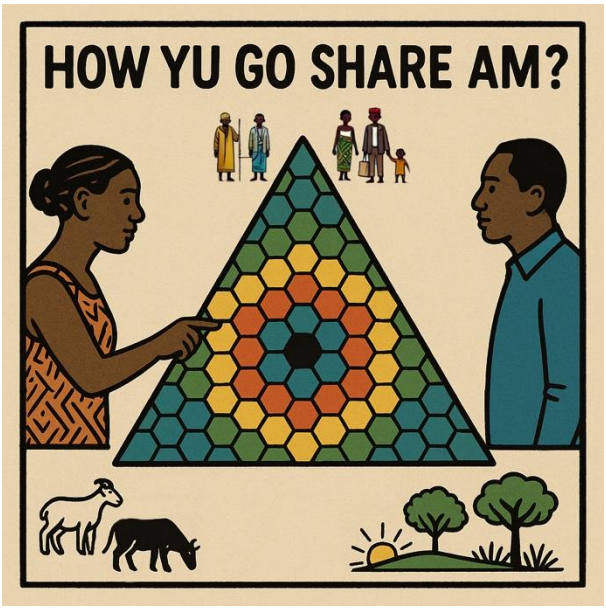
Anthony Mansaray, Melissa Parker, Luisa Enria, Chrissy Roberts

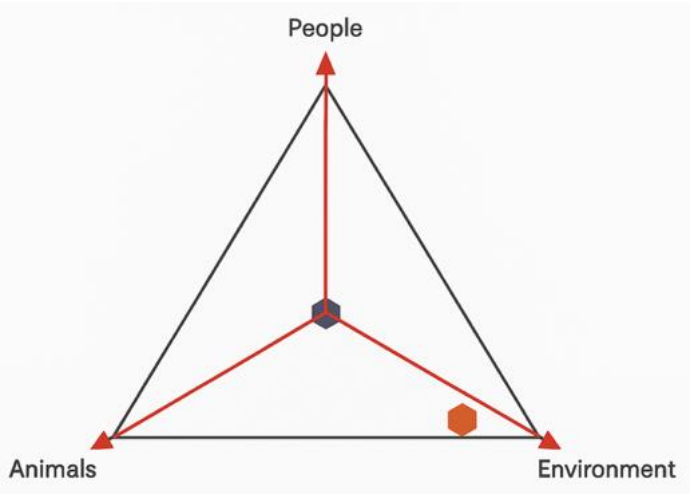
LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

How Yu Go Share Am?

Context & Roots

The game situates the player as a community member making real-world One Health decisions. Players act as themselves, drawing on their own knowledge and lived experience to allocate an unspecified but limited pool of resources across human, animal, and environmental health. At certain points, the game may invite them to imagine how others in their community might respond, or to consider decisions from the perspective of different stakeholders, but these shifts serve to broaden reflection, rather than to establish formal role-play.





The genesis of the game is rooted in the One Health paradigm of three interconnected domains in human, animal, and environmental health, where influences of change in one domain affect the other two. We explored the challenge of visually and physically embodying the relationships of the three domains. It was crucial that players (who we expected to have limited formal educational histories and few experiences of scientific abstraction) would be able to directly visualise and explore the trade-offs and interconnectedness of the three domains within the game as a fixed-sum, three-component structure. Described in simple mathematical terms, this is a three-dimensional 'barycentric' problem, where every shift in allocation to one domain necessarily reshapes the balance of the other two. In spatial terms, such three-dimensional data can be represented as a ternary plot, which is the ceonceptual basis of our triangular game board.

With a view to answering scenario questions such as "If the government had money for spending on your city, how much should they spend on each of human health, animal health and environmental health?" we conceptualised a resource management game that takes place on a playing field that embodies the barycentric nature of one health dilemmas.

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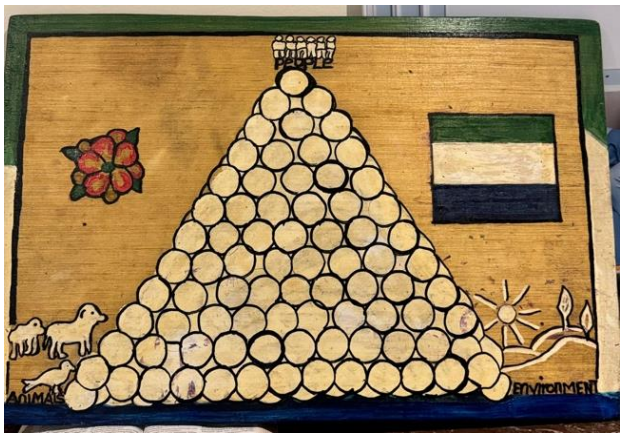
Skinning as a co-creation process

The game's skin was co-created, beginning with informal, iterative piloting in the investigator's households. Early prototypes used 3D printed boards, makeshift tokens, and improvised rules that allowed rapid feedback on usability, cognitive load, and physical interaction with the various ludemes. These insights were then explored with departmental colleagues who were familiar with community-based research in Sierra Leone. This helped to refine clarity, movement mechanics, and visual comprehension.



A key stage in development involved relocating the design process to Sierra Leone and working directly with local craftspeople. The first wooden boards were produced in this collaborative workshop, where sketched concepts were translated into painted and carved surfaces featuring locally recognisable imagery such as animals, mountains, and national flags. This ensured cultural resonance and community ownership of the visual language of the game, but reproducing a precise hex-mapped playfield proved difficult, especially with respect achieving rotational symmetry, maintaining consistent spacing, and standardising the hexagonal grid. Several attempts to use stencils or mixed media boards were trialled, but none generated reliably repeatable geometry or aesthetically pleasing results.

To resolve these practical constraints, the design process shifted back to the UK, using the artisanal prototype as aesthetic inspiration while re-engineering the board for precision and scalability. The triangular grid was regenerated programmatically in Python, exported as an SVG, and colourised. The colouration served the dual purposes of increasing aesthetic coherence with the original artwork, and adding functional support for gameplay, helping players navigate the board and reducing transcription errors when copying pawn positions into the digital twin.

A panel of culturally recognisable artwork representing animals, people and environments was developed using generative artificial intelligence tools.

These images were carefully curated by the project team and its co-creation partners to avoid stereotypical, colonial, or inadvertently racist representations (an issue that emerged repeatedly during iterative generations). Core elements from the original wooden design, including the Sierra Leonean flag motif, were retained to preserve continuity with the co-created prototype and to clearly delineate between the imagery of the three domains. Aluminium gameboards were then produced via a commercial printing service, providing durable, standardised and field-ready 400x400 mm play surfaces.

How Yu Go Share Am?

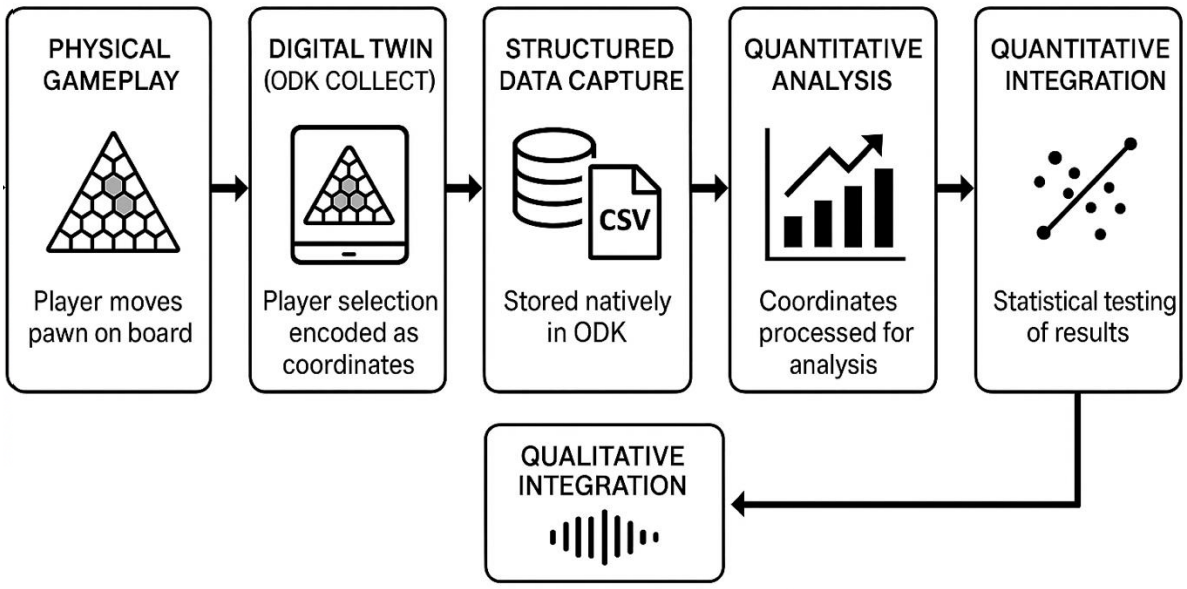
Data Flow From Gameplay to Analysis

1. Physical Gameplay

- ODK prompts the next moves with a scenario or question.
- The Player responds by moving a pawn to a position that best describes their solution.
- Each hex corresponds to a unique barycentric triplet (a, b, c) that sums to zero.
- Moves represent **embodied reasoning** and **explicit trade-offs** between *People–Animals–Environment*.

2. Digital Twin (ODK Collect)

- An SVG version of the board is embedded in an ODK form.
- Player selections on the screen map 1:1 to the physical board's hex coordinates.
- Each selection produces the same (a, b, c) triple used for quantitative analysis.
- ODK timestamps each move; optional background audio captures reasoning.
- Demographics, scenario prompts, and reflections recorded in the same instrument.



3. Structured Data Capture

- All data stored natively in ODK as:
  - **Raw barycentric coordinates of moves**
  - **Scenario ID**
  - **Timestamp**
  - **Optional timestamped audio file record of discussions**
  - **Demographics & covariates**

- Exported in standard ODK format (CSV + media folders) to R/Python.

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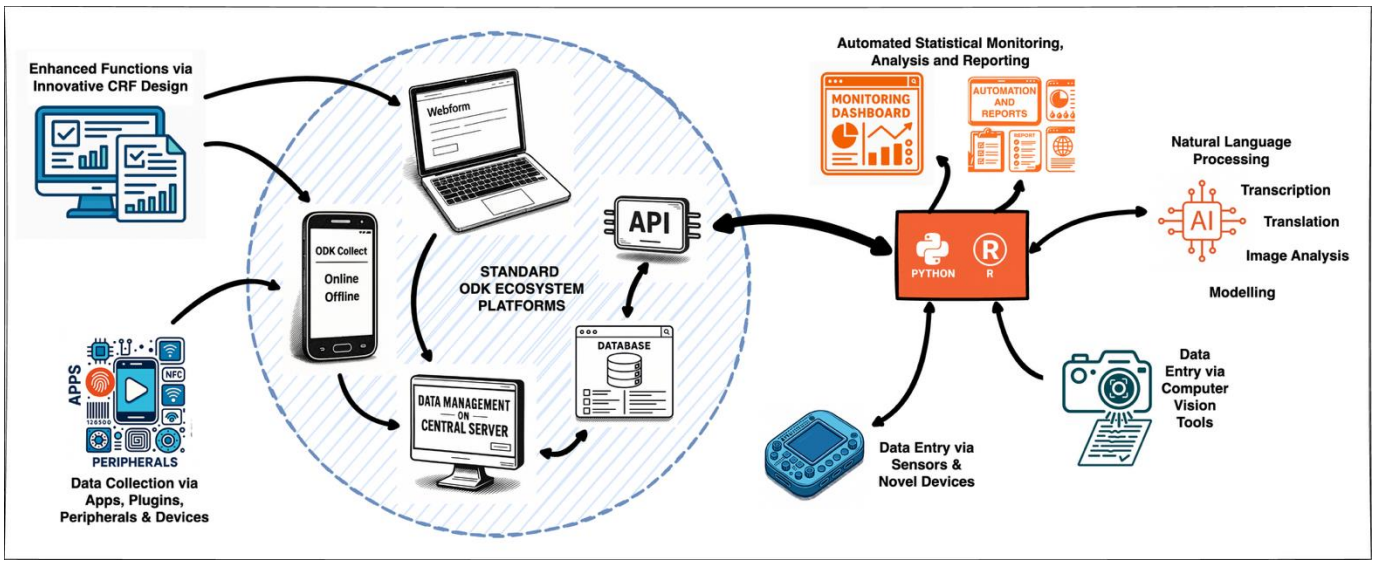
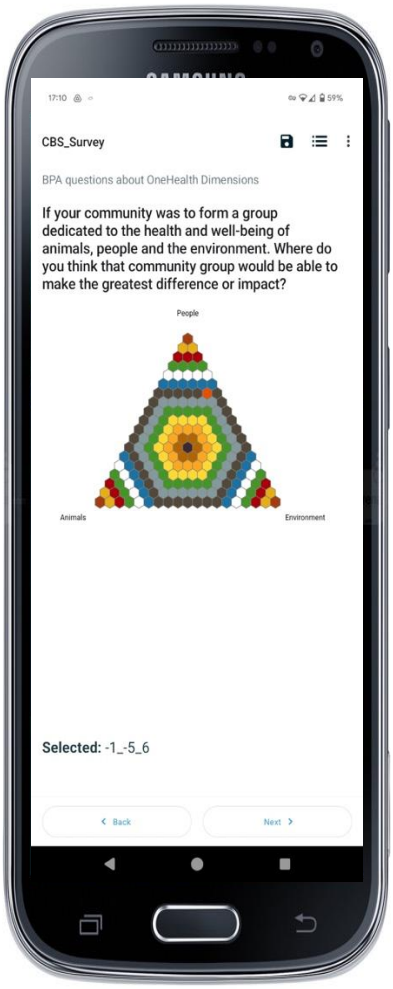
Digital Twin/Game Engine Powered by ODK, an Open-Source Electronic Data Platform





- **Electronic data on phones & tablets**
- **Collect data on a browser**
- **Deploy Standard Operating Procedures**
- **Hackable, Moddable**
- **Logical constraints**
- **Apply logical relevance “Routing”**
- **Perform calculations on the fly**
- **Embed & Record video/audio**
- **Low-literacy support**
- **Export data to Excel, R, Stata**

How Yu Go Share Am?

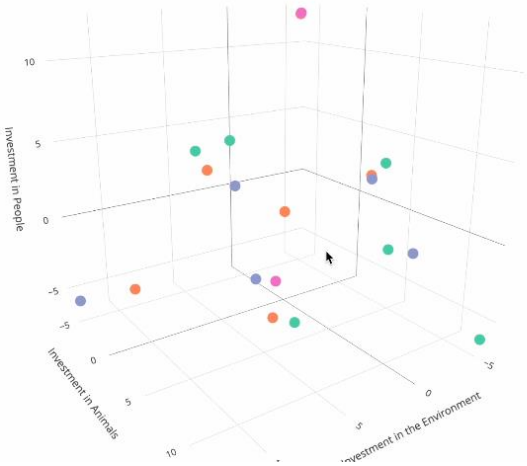
Data Flow From Gameplay to Analysis

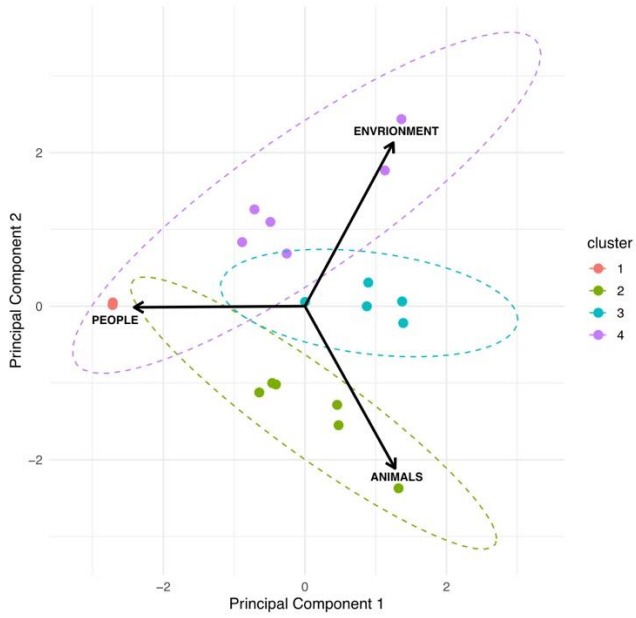
4. Data Transformation

- Barycentric triples shifted so minimum value = 0.
- Normalised to closed compositions summing to 1.
- Converted to additive log-ratio (alr) coordinates using People as reference.
- Outputs a clean, unconstrained 2D dataset suitable for MANOVA and group testing.

5. Quantitative Analysis

- PCA used to embed the theoretical barycentric plane into 2D Euclidean space.
- MANOVA tests whether prioritisation patterns differ across demographic groups.
- Per-domain deviations quantified vs population mean (FDR-corrected).
- Produces interpretable effect sizes for each group





For visualization in Euclidian space, the 3-dimensional barycentric data are losslessly decomposed to 2-dimensions using principal components analysis

6. Qualitative Integration

- Optional: time-aligned audio + ethnographic field notes.
- Supports mixed-methods analysis linking moves → reasoning → narrative.
- Enables case studies and integrated approaches

Play Story 1

Mariam

The session with 'Mariam' began on a humid afternoon by the side of her house in Rokupr. Mariam was dressed in a loose cotton fabric wrapped around her waist and a pink sleeveless T-shirt, sitting comfortably on a sturdy wooden bench. Her interviewer, a male researcher with his backpack still on, settled into a faded white plastic chair across from her. After brief introductions, he reviewed the consent form out loud, carefully explaining each section in clear Krio and pausing for confirmation.

Mariam, who holds a Junior Secondary School certificate and is literate, followed along with ease, nodding as the researcher explained her rights and reassured her about confidentiality. With a flourish, she signed the form and leaned in, ready to begin her game. The conversation took place in Krio, which has been translated to English by a native Krio speaker.

The researcher set the colourful triangular board on the bench between them (Figure 5) and explained the rules, demonstrating with the pawn . *"This triangle has three corners, one for people, one for animals, one for the environment, If you put this pawn here…"* he said, moving the pawn to the human corner, *"…that means you want everything for the people"*. Mariam barely waited for him to finish before taking up the pawn, mimicking his demonstration, first placing it sharply in the animal corner *"So if I think animals need all the money, I'll put it here,"* then shifting to humans "*and for people, here?"* she said brightly, eyes looking up for confirmation. The researcher nodded, giving another example. Mariam grinned *"I get it, really. This is easy."*

The first scenario set the tone. *"Suppose the government has some money to spend on this community."* asked the researcher, reading the scenario from the ODK form on his phone, *"How do you think they should divide it between animal, human and environmental health issues?"*. Mariam immediately pushed the pawn to the 'human' corner, her action firm and decisive. The researcher asked *"Do you understand what that means? If you go all the way to the human side, all the money goes to people, right?"*. Mariam's brow furrowed as she looked up, almost mischievously *"Oh, so I shouldn't forget about the animals or environment? If I want to give something to animals, do I move it like this?"*. She slid the pawn halfway between humans and animals, breaking into laughter. The researcher explained again, and Mariam, now playful, repeated the movement herself, confirming *"If I put it in the middle, then they all get a bit. I like this game!"*. She tried again, placing the pawn closer to humans. *"But honestly people should come first. The way children suffer here… hmm… hmm!"*. Her face grew serious for a moment, lips tightening, then she smiled shyly, *"If Allah agrees."*. The facilitator recorded her final decision on the ODK form.

The next scenario changed the perspective *"If the authorities want to create a law to protect animals, people, or the environment, which do you think needs more protection?"* read the facilitator. Mariam paused thoughtfully. *"I'll still pick humans, but sometimes the environment also needs a law. This water business isn't easy…"*. After a moment, she moved the pawn slightly toward the space between humans and the environment. *"…If the water is clean, people will be healthy,"* she said more softly.

Play Story 1

Mariam

When asked what people in her community cared most about, Mariam pursed her lips. *"Hmm, most will say people's lives first, but now everything is connected… …sometimes animals even help us… …goat money is even school fees! But for me…"* She shifted the pawn a few times, back and forth. She chuckled, *"This pawn could get tired! I've changed my mind twice already!"*. The researcher laughed along, *"Don't worry, that's the idea."*.

At every turn, Mariam was eager to explain her reasoning. She often weighed her first instincts against new reflections, moving her pawn as she thought out loud and laughing at herself *"I put it like this… No, leave it here. But if the animals are sick, we won't have food… I don't know, honestly!"*. Throughout the game, Mariam remained highly engaged and talkative, often weaving proverbs or jokes into her answers, sometimes mentioning Allah, and frequently asking the researcher clarifying questions *"If I change my mind later, should I tell you?"*. At one point, she said with a laugh, *"This game makes you realise how your heart works!"*. Another time, after struggling to summarise her priorities, she declared *"I wish government people could play this game."*. As the session ended and the researcher packed up the board, Mariam offered to recruit her friends to play, before bidding him farewell with a broad smile.

Mariam's Reflections

After playing the game, Mariam lingered on the bench, still glowing with positive energy. The observer approached to thank her for her participation. Leaning forward, she confided, *"I really enjoyed this tool! It's so much fun. The way you present these stories, I understand them all. These are the same things we see here every day, sick children, dirty water, and sometimes sick chickens… it's real stuff."*. Her laughter was infectious, and it was clear she felt seen and understood by the scenarios. She continued *"It's easy to understand too, there's no complicated language, it's the kind of game anyone would love to play. You don't need to be literate; you just need to listen and speak your mind."*. She gazed thoughtfully across the yard, then turned back, *"I'm happy we had the chance to talk about this."*. It was clear that Mariam had grasped the tool quickly and eagerly mapped it onto her own lived experience, a testament to the accessibility and local relevance of play as a mechanism for communication of ideas.

ETHICS INFORMATION *Participant recruitment followed a regulated process of informed consent that was approved by the London School of Hygiene & Tropical Medicine research ethics committee (31229) and the Sierra Leone Ministry of Health Ethics and Scientific Review Committee (017/09/24). All data captured via the game were anonymous. Information sheets, consent forms and study tools were provided in English, not translated into the local languages because written forms of these languages are seldom used in Sierra Leone. The field team consisted exclusively of professional Sierra Leonean researchers who were trained to orally translate the information into local languages, which was considered culturally appropriate. All names of players have been changed. For more information contact Chrissy.Roberts@LSHTM.ac.uk*

Play Story 2

Karim Bangura

The session with Karim Bangura unfolded on a quiet afternoon, at the back of his family home, not far from where a pair of goats grazed beneath a sprawling mango tree. The atmosphere was peaceful but formal; Karim, a tall, weathered man of 58, wore a faded shirt and long trousers and sat upright on a battered wooden long bench shared with the researcher. He was reserved and almost solemn at first. He lives with his wife and five of his eleven children, the others, he explained, “don big now, dem don go Freetown.” (“They’re grown up now, they’ve gone to the city.”)

Recognising that Karim never attended school and is not literate, the consent process was handled with special care. An independent person trusted by Karim and fluent in the same dialect (Themne) sat in, helping to explain each detail of the exercise and clarify participant rights. The researcher walked through the script methodically in simplified Krio, pausing at every clause. Karim listened intently, nodding slowly, his face serious. Only after the witness confirmed (in the local dialect) that Karim understood did they proceed, with Karim marking his consent with a broad thumbprint.

The session began with a few demographic and health questions. Karim answered quietly, his Krio measured and unhurried, sometimes searching for the right word or glancing toward the witness for reassurance. With the introduction of the game, the mood shifted. The researcher laid out the colourful triangular board on a bench between them and demonstrated the pawn, initially moving it from one corner to another: "Dis corner na for people, dis one for animals, dis for the environment.” Karim watched attentively, his hands on his knees, brow furrowed. “Dis wan na game?” he asked, voice deep with curiosity. (“Is this a game?”) When the researcher nodded and assured him, Karim’s lips flickered in a brief smile.

For the first scenario, Karim gripped the pawn, hesitated, and then placed it carefully just off-centre, clearly nearer to the human corner, but not at the extreme. “People dem need pass, but animal en we bush den sef nor bad,” he said quietly. (“People need it more, but animals and our bushes are not unimportant.”) At this, one of his younger sons, who had wandered over, whispered something in their dialect. Karim grinned faintly but replied, “Ah go do watin a sabi,” (“I will do it my own way,”) and kept the pawn where it was.

As the next scenario played out, about legal protections, Karim asked for the scenario to be repeated twice, then moved the pawn only slightly towards “humans,” but still close to the centre. This time, his stance seemed firmer, and he muttered a proverb under his breath, which the witness loosely translated: “if bush nor fine motalman nor go eat.” (“If bushes is not good humans cannot eat.”) The researcher gently prompted: “So Karim, you mean if the environment is not good, people nor go well?” (“So Karim, you mean if the environment is not okay, people won’t be healthy?”) Karim nodded with a serious look, “Yes, na all join together.” (“Yes, it is all connected.”)

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Play Story 2

Karim Bangura

Midway through, noise swelled at the periphery. A teenage boy, his other son, joined, followed by a friend. They watched and occasionally commented in the local dialect, at times pointing at the board and offering unsolicited suggestions. “Put am ya na people!” (“Put it here, for people!”) the friend called out. Karim kept his composure, but was visibly considering their input; often, his answers were accompanied by a silent nod or glance toward his son.

The researcher diplomatically intervened once, smiling, “This na Karim in game, leh we make e do watin day na e mind,” (“This is Karim’s game, let’s let him make his own decisions,”) and everyone laughed, diffusing any tension. Despite the interruptions, Karim managed to keep the pawn mostly around the central space, albeit leaning closer to “humans.”

Across the subsequent questions about community priorities and possibilities for forming groups to take action, Karim reflected at length, pausing to think, sometimes muttering to himself in the Themne, sometimes asking the researcher to clarify a word or phrase. His answers remained consistent: always the pawn near the centre, but a shade towards “humans”.

For the transition to Module Two, the board was swapped for the governance actors, Government, Community, and Companies. Karim waited as this was explained, nodding more freely now. Asked who should be responsible for human health, he nudged the pawn between “Government” and “Community.” “Government get money, but na we dey suffer,” he said firmly. (“The government has money, but we are the ones who suffer.”) To gentle teasing from his son’s friend, he smiled shyly but kept to his answer. On animal health, after some debate among the small crowd, Karim settled closer to “Community” but kept glancing at his son, eventually saying, “If cow sick, na we loss.” (“If the cow is sick, it’s our loss.”). For environmental responsibility, with both son and friend urging their points in Themne, Karim hesitated before firmly declaring, “Na all man,” (“It’s everyone’s responsibility”) and set the pawn at the mid-point.

Karim’s Reflections

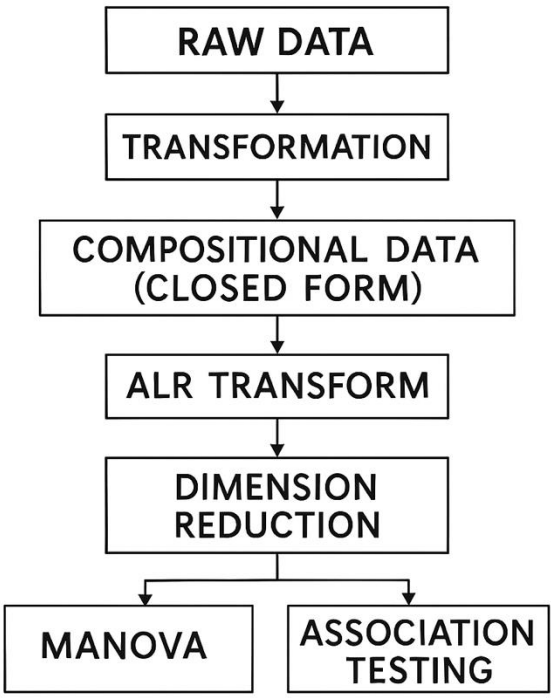
At the beginning Karim was less articulate but very focused, but by the later stages became more expressive, occasionally recalling memories from his past. When the researcher congratulated him for completing the session, Karim’s face broke into a real smile. “Dis wan na game way make man think. Na lek we play draughts dem tèm we small,” (“This is a game that makes you think. It’s like when we used to play checkers in the old days,”) he said, voice growing livelier. Later, when asked if he enjoyed the session, he replied, “E good, e mek man think boku, tenki.” (“It’s good, it makes a man use his head, thank you.”)

As the session wound down and the observers and family members dispersed, Karim remained seated, reflecting quietly. Before the researcher left, Karim remarked to him in mixed Krio and Themne, “Dis game nor hard, e sweet, but e make a crack mi head small,” (“This game isn’t hard, it’s fun, but it made me think deeply,”) then he gestured proudly at the board.

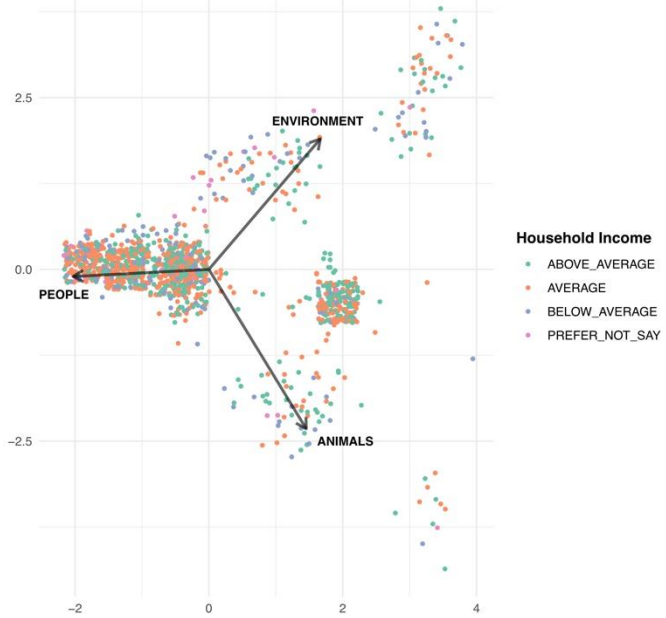
How Yu Go Share Am?

Quantitative Visualisations & Analyses

Overview of Data Transformations



PCA Game Data

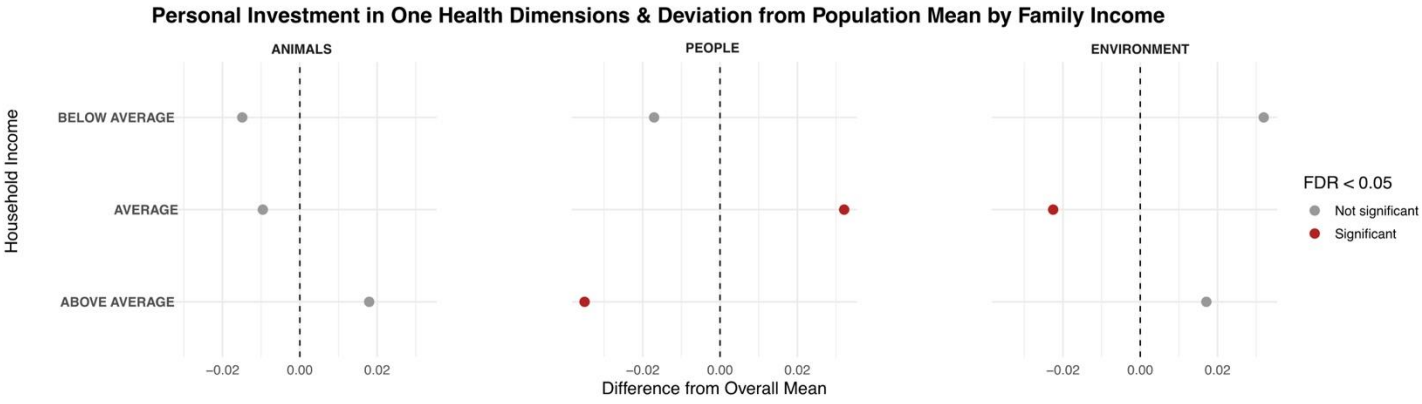


PCA embedded Play Data From 1305 games, by household income

Example Transformations

Stage	**Data Representation**
Raw data	(12, –6, –6)
Shifted non-negative	(18, 0, 0)
Closed composition	(1, 0, 0)
ALR (ε=1e-6)	(–13.82, –13.82)
PCA (example)	(0, –0.5)
Association testing	Used in MANOVA and per-domain deviation tests

Association Results



Meet Our Team

Anthony Mansaray
PhD Student & Commonwealth Scholar

I study the post-Ebola, post-COVID policy & practice landscape of surveillance in Sierra Leone, centred on community-based one-health surveillance, system-level policy landscapes and infrastructures at national, district and community level. Knowledge generated from this enquiry will inform a community participatory approach to develop a model for contextually and culturally feasible and practical Community-based Comprehensive One Health Surveillance which could inform future emergency preparedness efforts.

Associate Prof Chrissy Roberts

My work focuses on the integration of embedded mixed methods, emerging technologies, and cross-disciplinary health sciences to advance equitable and impactful public health research. I work across clinical, laboratory, field, social, and analytical domains to develop and apply pragmatic tools, including software, hardware, methodologies, education tools and data systems. My portfolio spans operational research, humanitarian & epidemic response, clinical trials, public health surveillance, and implementation science.

Associate Prof Luisa Enria

My work applies approaches from political anthropology to studying community experiences of epidemic preparedness and response and humanitarian emergency interventions. I am also interested in the integration of social science perspectives in biomedical interventions and scientific research, and in particular the tensions and possibilities of interdisciplinary collaborations. I currently hold a UKRI Future Leaders Fellowship for a project titled "Crisis of Confidence: the Politics of Evidence and (Mis)Trust in Epidemic Preparedness and Response".

Prof Melissa Parker

My research builds on a multi-disciplinary training. Research questions typically emerge from extensive periods of ethnographic fieldwork, and engage with contemporary ideas in social, medical and political anthropology. Where appropriate, findings are used to both critique and enhance public health policies and practice. Topics investigated include: epidemic preparedness and response; mental health and healing in war zones; social and political legacies of mass forced displacement; medical humanitarianism, and biosocial approaches to the control of neglected tropical diseases in Sudan, Uganda and Tanzania.