

Co-creating a community health research agenda with a youth advisory group in rural Cambodia: process, involvement, and outcomes

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Abstract

Background

Global health research priority-setting is frequently dominated by funders and researchers from high-income countries, with limited opportunities for meaningful input from the communities affected. The Youth Advisory Group for Health and Research Engagement (YAGHRE) have shown promise as a mechanism for bridging this gap. This study reports on a participatory process through which YAGHRE members in Siem Pang, Cambodia, co-created a community-driven research agenda based on community conversations on health priorities and challenges and opportunities for risk factor modification.

Methods

In addition to prior training in qualitative research, YAGHRE members received specific training on the topic and accompanying methodological techniques, which helped them co-develop and pilot the interview and FGD guides together with the team. One of the challenges YAGHRE members identified was that they initially perceived themselves to lack the subject-matter knowledge to ask appropriate probing questions when exploring topics iteratively, which was resolved through on-site refresher training on key health topics. YAGHRE members conducted two rounds of semi-structured individual interviews with 15 community members of diverse backgrounds. Between interview rounds, community members completed a digital diary exercise, using photographs and videos to document health-related habits and exposures. All members took part on one of three focus group discussions (FGDs) which enabled group synthesis of priority health concerns, risk factors, and future research questions. All interviews were conducted in Khmer, transcribed, translated into English, and analysed thematically using the open-source qualitative data analysis software Taguette.

Results

YAGHRE members felt they had a substantial involvement in the research exercise aimed to identifying priority health concerns, which may have given them a progressively greater sense of confidence, reflected in their subsequent discussions and data interpretation. Community members identified a dual burden of infectious diseases and non-communicable diseases (NCDs). Although typhoid fever was mentioned most frequently overall, dengue fever was perceived as the most serious infectious disease, characterised by severe illness, prolonged hospitalisation, and substantial treatment costs. Among NCDs, diabetes and hypertension were identified as rising concerns, particularly among middle-aged and older community members, with socio-cultural dietary practices (high salt and fat intake) frequently cited as contributing factors. In group-based ranking exercises (where 0 = “Not concerned, does not affect me” to 10 = “Very concerned, affects my daily life”), diabetes (9.1/10), hypertension (8.7/10), and dengue

fever (8.0/10) were most concerning. Diabetes prevalence was ranked as the highest-priority research question for the community.

Conclusions

This study demonstrates that youth advisory groups can meaningfully lead community-based participatory research processes in low-resource settings, identifying locally relevant health priorities that can inform future research agendas. The approach represents a model for shifting power in global health research priority-setting from external institutions toward the communities they serve.

Background

Power imbalances in global health mean that research priorities often reflect the interests of funders and investigators from high-income countries (HICs) rather than the perspectives and needs of populations affected in low- and middle-income countries (LMICs) [1, 2]. This inequity can result in research agendas that are misaligned with community realities, limited uptake or implementation of findings, and even the erosion of public trust in health institutions [3]. While calls for more inclusive and participatory approaches have grown louder over the past decade, translating these principles into practice remains a significant challenge, especially in low-resource, geographically remote settings [4].

Community engagement in health research encompasses activities ranging from the dissemination of study findings to the participatory co-production of knowledge [5]. In recent years, participatory approaches that engage communities and stakeholders have become increasingly integrated into national health priority-setting [6, 7]. These approaches facilitate the co-identification of health priorities, including vulnerable populations, and the co-development of strategies to reduce inequities through policy transformation [8]. At the more transformative end of this spectrum, participatory research approaches seek to enable local populations not only to participate in data collection but to shape research questions, methods, and outputs [9]. Pratt (2019) noted that without explicit attention to power dynamics, community engagement risks producing “*presence without voice and voice without influence*” [10], highlighting a role of power differentials among the stakeholders for a meaningful participation [11]. Youth advisory groups have emerged as one mechanism for mediating power imbalances: young people can act as effective and enthusiastic representatives of their community, helping to ensure local perspectives and priorities are embedded in the knowledge co-production process [12–15].

Since 2021, the Mahidol Oxford Tropical Medicine Research Unit (MORU) has partnered with secondary school students in Siem Pang District, Stung Treng Province, north-eastern Cambodia, to establish the Youth Advisory Group on Health and Research Engagement (YAGHRE) [12, 13]. Siem Pang is a remote, predominantly rural district characterised by high ethnic diversity, limited healthcare infrastructure, and historically high burdens of infectious diseases, particularly malaria [16]. The YAGHRE was conceived as a sustained community-research partnership, similar in purpose to the other Community Advisory Boards in the region that MORU supports, that would allow young people to serve as a bridge between

health researchers and their communities. Over the past three years, YAGHRE members have relayed public health messages on coronavirus disease 2019 (COVID-19), created community engagement materials on antimicrobial resistance (AMR), and informally surfaced community health concerns. However, to date, no structured assessment of community health priorities for research has taken place, particularly one involving trained youth co-researchers in a leadership role, followed by their own reflection on the process.

This paper reports on a participatory, digitally enabled project designed to address that gap. We describe how YAGHRE members were trained and supported to co-design and lead a community health priority-setting process, the challenges they encountered in this role, and their own evaluation of the experience, alongside the community-driven research agenda that resulted. YAGHRE members led individual interviews, a digital diary exercise, and focus group discussions with community members in Siem Pang with the aim of identifying leading health concerns, perspectives on risk factors, and key barriers to and opportunities for modifying these risk factors. These findings were synthesised into a community-driven research agenda to improve the representation of community voices in future public health research conducted in Siem Pang, and into co-created health promotion materials for dissemination among schools and health centres across the district.

Methods

Study setting and community partnership

The study was conducted in Siem Pang District, Stung Treng Province, north-eastern Cambodia. The setting is characterised by ethnic diversity, limited access to formal healthcare, and livelihoods centred on subsistence agriculture. This study followed the Guidance for Reporting Involvement of Patients and the Public (GRIPP2) in research (**Supplementary File 1**) [17].

The study was embedded within MORU's ongoing partnership with YAGHRE, a youth group comprising two cohorts of 10 secondary school students and young adults aged between 18 and 22 years, established in 2021 with the dual aims of building health literacy and supporting community-engaged research [12, 13, 18, 19].

Study design

We used a three-phase participatory, qualitative study design incorporating individual semi-structured interviews, a digital diary exercise, and focus group discussions (FGDs). The approach was informed by the ICARS 'Responsive Dialogues' framework, which emphasises iterative reflection between data collection rounds to deepen participants' engagement with emerging themes [20, 21]. Prior to data collection, YAGHRE members were trained in written informed consent, interviewing techniques and respecting and collecting diverse perspectives during discussions including knowledge on common diseases in the community. YAGHRE members led all data collection activities, with oversight from the local study team (ME, VH); their training and involvement in study design are described below.

YAGHRE training and involvement in study design and conduct

Prior to data collection, YAGHRE members received training in qualitative research methodology, covering written informed consent, interview guide development, interviewing techniques, and interpretation of findings, as well as background knowledge on common diseases in the community. Training was led by the local trainers at Siem Pang (ME, VH) and the lead investigator (EW), with additional input from BA. YAGHRE members were encouraged to conduct interviews in a non-judgemental manner, respectful of diverse perspectives.

Initially, YAGHRE members were unsure how their contributions related to the research question; after a couple of interviews and group discussions, they became more familiar with the topic. They were also initially reluctant to probe or ask follow-up questions during interviews, but subsequently learned to draw out deeper insights through iterative questioning and rephrasing.

Interview guides and FGD tools were first drafted by the study team (ME, VH, BA, EW). Draft tools were reviewed and discussed among the study team, then pilot-tested, first among YAGHRE members' own colleagues and subsequently with community volunteers. For example, YAGHRE members conducted three interviews with external community volunteers to evaluate the clarity, comprehensiveness, and suitability of the interview guides. This piloting helped the team ensure the final tools were fit-for-purpose. Guides were developed in Khmer. English versions of all final interview guides are presented in **Supplementary Files 2–4**.

Participant recruitment

We recruited 15 community members using purposive sampling, with explicit efforts to achieve representation of marginalised groups including varied occupations and educational backgrounds, ethnic minorities, residents of remote villages, and youth not currently enrolled in school. Recruitment was facilitated by YAGHRE members, who leveraged their existing community networks. Locally appropriate, transparent compensation for participants' time and transport costs was provided.

Data collection

Data collection took place from March-May 2026. All interviews and FGDs were audio-recorded with consent to allow for transcription and translation into English.

Round 1 interviews

YAGHRE members conducted individual semi-structured interviews with all enrolled participants, covering self-reported health concerns, priority health issues for family and community, sources of health information, and perceived risk factors for identified conditions. Interviews started with open questions on health concerns, allowing community participants to raise key diseases or health problems spontaneously, followed by closed and subject-specific probing.

Digital diary exercise

Between interview rounds, participants were invited to document daily habits, health exposures, and risk-related behaviours using short videos and photographs, which they shared securely with the study team via Telegram. This exercise was designed to prompt critical reflection on everyday practices and to complement the self-reported data collected in interviews. Participants not in possession of a smartphone asked household members to help take photos and videos.

Round 2 interviews

A second interview round was conducted approximately one week after the first, enabling iterative reflection on themes emerging from the round 1 interviews and digital diaries. These interviews reflected on inputs from the digital diary exercise, thus exploring perceived risk factors and barriers to health behaviour change in greater depth.

Focus group discussions

Three FGDs were conducted with participants divided into groups of 5. Two collective group ranking exercise were conducted. First, participants scored fourteen health concerns from the individual interviews on a 0–10 scale (0 = “Not concerned at all, does not affect me” to 10 = “Very concerned, affects by daily life”) using a visual sticky-notes method. Secondly, participants ranked five example research questions (developed by ME, VH, BA, and EW using input from the individual interviews) according to their importance for the community (5 = Most important/urgent, 1 = Least important/urgent). Scoring was conducted individually and presented as crude average scores by summing all individual scores and dividing by the total number of participants.

Ethical considerations

Ethics approval

was obtained from both local Cambodian ethics authorities and the Oxford Tropical Research Ethics Committee (OxTREC 563 – 23). The study was designated a continuation of ongoing community-engaged research activities. YAGHRE members explained study procedures in Khmer, including the voluntary nature of participation, data use and storage arrangements, and the fact that the project focused on community-led knowledge creation with no guarantee of follow-on funded research. Visual materials were recorded only with specific consent. De-identified data were stored on a secure institutional drive accessible only to named study staff.

Data analysis

Interview and FGD transcripts were analysed thematically by EW using a hybrid (deductive and inductive) approach based on Braun and Clarke (2006)’s six-step methodology [22] and using the open-source

software, Taguette [23]. Biological categories of infectious and non-infectious diseases served as the primary deductive coding structure for health concerns, whilst other categories and sub-codes of health concerns were generated inductively. Prioritised health concerns were considered a proxy for, or parallel concept to, research priority setting. However, research priority setting is a complex, multi-stakeholder decision-making process that extends beyond simply identifying priority health concerns. Therefore, in this study, research priority setting should be interpreted with this caveat.

Risk factors were coded inductively, with strategies for risk factor modification coded deductively under 'opportunities' and 'challenges'. Both quantitative (total number of mentions, total number of participants mentioning the theme) and qualitative (selection of particularly illustrative quotes denoting the severity, urgency, or consequences) outcomes were collated for each theme (**Supplementary File 5**). Digital diary entries were reviewed and categorised by risk factor domain. A risk-factor triangulation framework was developed to map associations between identified risk factors and priority health conditions. Quantitative ranking data from FGD exercises were summed across groups to produce aggregate priority scores. These exercises finally led to co-development of health promotional materials

Co-creation of health promotion materials

YAGHRE members selected one of the community-identified health priorities as the focus for developing health promotion materials. The type and medium of the materials were guided by findings from the semi-structured interviews and FGDs of this project. The content was rooted in existing Ministry of Health health messages and reviewed by the wider research team, whilst the design was led entirely by YAGHRE members.

Results

Participant characteristics

Fifteen community members were enrolled (Table 1). The sample comprised eight women and seven men, with ages ranging from 18 to 60 years. All participants spoke Khmer; 11 of 15 also spoke at least one minority language. Participants' main occupations included farming (the most common), trading, housekeeping, and other roles including community health work, teaching, and law enforcement. Eight of fifteen participants had completed Grade 12 or higher and seven had not completed secondary education. Eight villages across five communes in Siem Pang District were represented.

Table 1
Community participant characteristics

Participant Identity Number	Gender	Age (in years)	Language(s) spoken	Village / location of residence	Main occupation or daily activities	Highest level of education (grade)
P01	Female	19	Khmer, Laos	Khes Svay village, Prek Meas commune, Siem Pang	Student	12
P02	Male	18	Khmer, Laos	Samor Village, Se Kong Commune, Siem Pang	Student	12
P03	Female	20	Khmer, Khes	Khes Svay village, Prek Meas commune, Siem Pang	Student	12
P04	Female	41	Khmer, Laos	Keng Nhai village, Sekong commune, Siem Pang	Farmer	2
P05	Female	60	Khmer, Laos	Keng Nhai village, Sekong commune, Siem Pang	Village malaria worker	9
P06	Male	52	Khmer	Lakay village, Thmor keo commune, Siem Pang	Farmer	9
P07	Female	49	Khmer	Lakay village, Thmor keo commune, Siem Pang	Farmer	4
P08	Male	35	Khmer	Siem Pang Village, Se Kong Commune, Siem Pang	Teacher	University degree
P09	Female	43	Khmer, Laos	Siem Pang Village, Se Kong Commune, Siem Pang	Seller	5
P10	Male	34	Khmer	Pong Kriel village, Prek	Assistant commune	University degree

Participant Identity Number	Gender	Age (in years)	Language(s) spoken	Village / location of residence	Main occupation or daily activities	Highest level of education (grade)
				Meas commune, Siem Pang	clerk	
P11	Male	24	Khmer, Laos	Phabang village, Thmor Keo commune, Siem Pang	Policeman	University degree
P12	Female	40	Khmer, Laos	Siem Pang Village, Se Kong Commune, Siem Pang	Seller + District Council Member	7
P13	Male	18	Khmer, Kavet	Kirivongsa Leu Village, Santepheap Commune, Siem Pang	Student	12
P14	Female	37	Khmer, Laos	Phabang village, Thmor Keo commune, Siem Pang	Civil servant	12
P15	Male	38	Khmer, Laos	Siem Pang Village, Se Kong Commune, Siem Pang	Farmer	0

Health concerns: infectious diseases

Infectious diseases featured prominently across all interview rounds, with typhoid fever, dengue fever, and malaria quantitatively representing the most commonly mentioned health concerns (Fig. 1). When assessing the qualitative depth and severity associated with each condition, however, dengue fever clearly emerged as the most serious infectious disease concern, with multiple participants describing it as severe, difficult to treat, and associated with prolonged hospitalisation and significant household economic burden.

"Dengue fever is not easy to cure, it takes 1 week to 2 weeks at hospital." – P04, female, 41 years, farmer

"If it becomes severe, I have to go to the hospital. Sometimes the fever is so high that you can become unconscious. Recently, when I had dengue fever, it cost me about 600,000 riels." – P07, female, 49 years, farmer

Typhoid fever was explicitly linked to poverty-related structural determinants including unsafe water sources and inadequate sanitation.

"As for community toilets or my house, there are not enough toilets. Some houses have no toilet. When I want to defecate, I go to the forest or ask to use someone's toilet." – P13, male, 18 years, student

By contrast, malaria (historically the dominant infectious disease concern in the region and the main focus of MORU-led research activities in the past) was described by many participants as having substantially declined in recent years, reflecting improved vector control and treatment access.

"I heard that people often had malaria, but now not anymore" – P06, male, 52 years, farmer

Health concerns: non-communicable diseases

Non-communicable diseases (NCDs) were a prominent and growing concern, with hypertension, diabetes and gastritis closely following infectious diseases in terms of total number of mentions (Fig. 1). Diabetes was perceived as particularly threatening, with potentially lethal consequences.

"Diabetes worries me the most. It is a non-infectious disease often called the 'silent killer'." – P08, male, 35 years, teacher),

Hypertension was seen as a common condition in the community, especially among older individuals.

"People in Siem Pang, especially those over 40 or 50 years old, are often concerned about high blood pressure and diabetes. These are the main health issues they worry about". – P09, female, 43 years, seller

"As people get older and do not exercise regularly, they may develop high blood pressure." – P10, male, 34 years, commune clerk

Although gastritis was not a deadly concern, it was viewed as highly burdensome due to its substantial impact on daily life.

"My husband has gastritis almost every day... It's difficult to treat" – P04, female, 41 years, farmer

Sources of health information

Health centres and trained healthcare professionals were identified as the most trusted sources of health information by the majority of participants, who valued the professional training and institutional oversight they represented.

"The information from the health centre is based on training and guidance from higher levels. They are properly trained and share accurate information with the community." – P10, male, 34 years, commune clerk

All participants reported exposure to informal information sources, particularly Facebook and other social media platforms. However, many expressed scepticism toward these channels, recognising the

potential for misinformation.

"When I check on Facebook, there can be fake news that is not true." – P01, female, 19 years, student

A minority of participants reported trusting informal sources equally or indiscriminately alongside formal ones, illustrating heterogeneity in information appraisal skills within the community.

"I trust all of them, including TV, phone, and doctors." – P14, female, 37 years, civil servant

Risk factors and pathways

Participants generally demonstrated accurate knowledge of the risk factors underpinning their priority health concerns. For vector-borne diseases, the role of stagnant water in mosquito breeding was widely understood, with participants identifying uncovered water jars, plastic waste, and old tyres as specific hazards for the collection of stagnant water.

"In some corners of the house there may be garbage or old tires, which can become places where mosquitoes live and breed." – P02, male, 18 years, student

Forest-going and night-time social gatherings were also recognised as high-risk behaviours for mosquito exposure.

"In the evening, when men gather to drink alcohol, they often remove their shirts, which increases exposure to mosquito bites." – P01, female, 19 years, student

For health concerns linked to water and sanitation, such as typhoid fever specifically and diarrhoeal disease more generally, participants described risk pathways via unsafe water consumption (either drinking contaminated water directly or using it to wash fruits and vegetables) and open defecation behaviours. Drinking from unsafe water sources was noted to be particularly common among farmers, who are unable to bring enough boiled drinking water with them and therefore obtain drinking water from canals or ponds. Open defecation was linked to insufficient access to toilets in the community.

"Using pond water for drinking or washing vegetables and fruits can expose people to various health risks and diseases, such as typhoid fever." – P03, female, 20 years, student

"Sometimes they live in the countryside and drink water from wells or ponds that are dug to make canals or ponds. They do not boil water for drink, as sometimes they go to the fields to feed cows and buffaloes, they do not bring water with them, so they only drink all this kind of water." – P12, female, 40 years, seller

"As for community toilets or my house, there are not enough toilets. Some house no toilet. When I want to defecate, I go to the forest or ask to use someone's toilet." – P13, male, 18 years, student

Socio-cultural dietary habits and practices impacting food hygiene were frequently identified as contributors to NCD risk through four pathways: consumption of sugary beverages and sweet foods was

associated with diabetes (*"I also have a habit of eating sweet foods. Even when I eat noodles, I also add sugar... Because of these habits, my body eventually developed diabetes."* – P08, male, 35 years, teacher); salty foods such as traditional fermented fish paste, *prahok*, were linked to hypertension (*"too much salty food can increase blood pressure."* – P06, male, 52 years, farmer); consumption of raw meat and raw vegetables was associated with diarrhoeal disease and typhoid fever (*"Eating unwashed or improperly washed vegetables that may contain dirt or parasite eggs, which can lead to diarrhoea."* – P05, female, 60 years, village malaria worker); and spicy, fatty food and irregular eating patterns were linked to gastritis (*"[Regarding risk factors for gastritis:] Because we don't eat in the morning and it causes stomach pain then it gets worse. Eating too much chili makes it worse. Eating fat makes it worse."* – P04, female, 41 years, farmer).

Plastic pollution in the environment was a commonly-cited risk factor linked by community participants to several health conditions, via three different pathways: burning of plastic producing toxic smoke was believed to lead to cancer and respiratory diseases (*"When people burn garbage in the corner of the house, it produces smoke that we inhale, which can affect our health."* – P04, female, 41 years, farmer); stagnant water collection in plastic waste providing a breeding ground for mosquito vectors of dengue and malaria (*"If we don't keep our environment clean, mosquitoes can breed. For example, containers like cans, coconut shells, tires, or water jars can collect water. We should clean them regularly and cover them properly so mosquitoes cannot lay eggs."* – P09, female, 43 years, seller); and serving hot food in plastic containers was thought to contribute to cancer and gastro-intestinal/digestive issues (*"This picture shows hot food placed in a plastic container. This can have many harmful effects, such as cancer, releasing rubber chemicals that may cause poisoning and effect our health."* – P12, female, 40 years, seller).

Digital diary entries corroborated interview findings across all four risk-factor domains. Participants documented uncovered water jars, plastic waste burning, collection of water from natural sources, consumption of salt-rich traditional foods, and alcohol use (**Supplementary File 6**).

Opportunities for and challenges to risk factor modification

The triangulation of health concerns, risk pathways, and context-specific opportunities and challenges for risk factor modification are summarised in Fig. 2a-c.

Plastic use and pollution

Opportunities for reducing the use and disposal of plastic in the environment (Fig. 2a) centred on collective community action and behavioural alternatives: participants suggested communal clean-up efforts and the substitution of plastic containers with reusable or traditional alternatives such as metal utensils or banana leaves.

"Join together to clean up and manage garbage properly" – P13

"Switch to reusable or metal utensils instead" – P03

However, challenges to modification were substantial. The convenience and low cost of plastic were consistently cited as barriers, as was a perceived lack of community awareness of the associated health risks.

"I pack lunch for my children every day and [plastic wrap] is convenient." – P07

The practices of food vendors were identified as a particularly entrenched challenge, given that individual consumers have limited control over vendor packaging choices. Critically, participants highlighted the complete absence of formal waste collection infrastructure as a structural barrier that compels plastic burning as the default disposal method.

"I personally burn garbage... because there are no garbage collection services" – P14

Unsafe water sources

To improve the safety of available water sources (Fig. 2b), participants suggested opportunities such as covering and regularly cleaning water storage jars, using Abate larvicide, and boiling water before drinking.

"We must put Abate in water jar to kill mosquito larvae." – P05

Participants also noted several challenges to modification. Economic constraints limited access to bottled or purified water (*"We do not have enough money to buy clean water for daily consumption." – P02*). Occupational demands during the rice farming season reduced attention to water hygiene practices (*"Especially during the rainy season, we are busy working in the rice fields, so we don't pay much attention to the water jugs." – P01*). Cultural norms also presented a barrier, with some community members holding traditional beliefs about the placement of water storage containers that were incompatible with covering practices (*"Some people believe in old tradition that keeping water containers in front of their house can make a peaceful and happy home environment." – P12*).

Nutritional risk factors

Participants identified several opportunities for modification of dietary- and food preparation habits, emphasising the importance of gradual, sustainable behaviour change rather than a sudden and complete change in behaviour (Fig. 2c). Changes to food preparation methods were suggested, including substituting fried for grilled fish and shifting from raw to cooked food (*"Instead of fried fish, we could choose grilled fish." – P02*). Some participants described already implementing incremental reductions in sugar-sweetened beverage consumption, suggesting that gradual habit change is achievable within this community (*"We used to drink sweet beverages, but now we try to reduce it to one or two cans per week." – P09*). Regulatory measures were also proposed, including restrictions on the sale of sweetened beverages in schools (*"Food stalls should not be selling [sweetened beverages] in schools" – P09*). Participants placed strong emphasis on the role of awareness and authoritative health information as an

enabler of behaviour change, with explicit reference to the Ministry of Health as a trusted source (*"I would like the Ministry of Health to come and provide education"* – P07).

Challenges to modification included limited market access constrained dietary diversity, with healthier food options requiring significantly more time and travel to obtain (*"If I want to eat healthier food like vegetables, I have to spend more time travelling and searching for them"* – P03). Deeply ingrained taste preferences and dietary habits were identified as a major barrier, with participants acknowledging the gap between knowledge and behaviour (*"Even when we tell people, they don't listen because it is already their habit"* – P09). Low health literacy around NCD causation was also noted as a challenge maintaining unhealthy dietary behaviours (*"In the community, high blood pressure is mainly caused by a lack of understanding about health issues."* – P08).

Research priority-setting

In the FGD ranking exercises (Fig. 3), the health concerns receiving the highest crude average scores across all participants diabetes (9.1/10), high blood pressure (8.7/10), dengue fever (8.0/10), stomach problems (7.0/10), and depression (7.0/10). Malnutrition received the lowest mean aggregate score (4.3/10).

Participants were asked to rank five research questions: (1) What are the main causes of stomach problems in the Siem Pang community? (2) What is the impact of burning plastic waste on lung health? (3) How can community waste disposal practices be improved to reduce plastic pollution in the Siem Pang environment? (4) What proportion of the community in Siem Pang has diabetes? (5) What is the impact of a typhoid vaccine on preventing typhoid fever in Cambodia?

Among the five example research questions ranked from 5 (most important/urgent) to 1 (least important/urgent), the question of diabetes prevalence in Siem Pang received the highest mean ranking score (4.1/5), substantially above the second-ranked question regarding the impact of burning plastic on lung health (3.0/5) (Fig. 4). The effectiveness of typhoid vaccination and improving community habits around garbage disposal were deemed to be equally as important/urgent (2.8/5) while questions about the causes of stomach problems received the lowest score (2.3/5).

Evaluation of the project by community participants

Overall, satisfaction with participation in the project was high among community participants. Participants reported numerous concrete benefits from participating in the project. First, participants commented on an increase in knowledge and awareness about their health concerns through the data collection process (*"Participating in this project has changed my thinking about health, being more careful about diseases and disease risks."* – P02, male, 18 years, student). Second, participants specifically reported the value of the FGD in enabling knowledge exchange between community members (*"I appreciated the group discussions and the opportunity to share knowledge about health problems."* – P10, male, 34 years, commune clerk). Third, participants commented on the benefits of discussing and

comparing diverse health concerns, rather than focussing on one specific disease (e.g. malaria) (*"I like it because the project is about various health problems."* – P03, female, 20 years, student). Finally, some participants even reported a change in their own habits and behaviours and those of their family as a result of participating in this project:

"Participating in this project has led to significant changes in my lifestyle, including improvements in my diet and daily habits, transforming unhealthy behaviours into healthier ones for my family." – P08, male, 35 years, teacher

"This project changed my attitude toward health a lot. It encouraged me to reduce unhealthy food consumption, educate my family, and share health knowledge with my community." – P11, male, 24 years, policeman

Suggestions for improvement of the project primarily focussed on how the impact of this project could be continued, expanded, or enhanced. Some participants requested further work on increasing the awareness between lifestyle habits and different health outcomes (*"I would suggest expanding the project to include additional diseases and continuing these awareness activities in the future, so that we can further improve our lifestyle habits."* – P08, male, 35 years, teacher). Other participants requested that the project should be accompanied with activities to increase awareness and education around health (*"It is difficult because some people in my community still follow traditional beliefs and do not pay much attention to their health. The community also has limited knowledge about health. More education and wider awareness campaigns should be provided."* – P11, male, 24 years, policeman).

YAGHRE members' reflections on their role as co-researchers

YAGHRE members reflected that participating as co-researchers helped them develop practical research skills and gain new experiences. They contributed to refining and adapting the interview guides, including making questions simpler and more appropriate to the local context. Although some members were hesitant at the beginning, they gradually became more familiar with the topics and gained experience in interviewing, conducting focus group discussions, data collection, critical thinking, and designing health promotion materials. They also reported learning more about health problems and their risk factors among families in Siem Pang district. Some members described becoming more confident in communicating with people outside their usual social groups.

At the beginning, the most common challenge was asking appropriate follow-up or probing questions. Some members relied mainly on the prepared interview questions and found it difficult to ask additional questions that participants could easily understand and that could enrich the discussion. Others reported difficulties explaining concepts clearly in Khmer, managing time during group discussions, and feeling confident when interviewing participants.

Members reported that these difficulties improved through practice, additional training, mock interviews, and guidance from the study team. These opportunities helped them improve their questioning skills and

become more comfortable communicating with participants. As one member reflected, *“I had never done this before, but after participating in this project, I gained new knowledge and experiences I never had before, which also made me courageous enough to ask questions to interviewees.”* Another similarly described how participation *“made me more courageous than before and taught me how to communicate with new people.”*

Co-created health promotion materials

YAGHRE members chose to focus on nutritional risk factors – specifically, excess consumption of salt, fat, and sugar – for the health promotion materials. The co-creation process yielded three posters and a leaflet (**Supplementary File 7**). One of each poster and 500 leaflets were distributed among the four health centres in Siem Pang district, whilst one of each poster and a leaflet for every student were distributed among all seven secondary/high schools in the district.

Discussion

This study demonstrates that a youth advisory group in a remote, resource-limited setting in north-eastern Cambodia can successfully lead a structured, multi-method community engagement process to identify health priorities and co-create a local research agenda. The findings yield several substantive insights about community health priorities in Siem Pang to help guide future research studies, while also advancing the methodological literature on participatory research in LMIC settings. This participatory work is likely to inform a digital, scalable model eliciting and mapping out community health concerns to inform health research priorities.

Central to this study was the training and involvement of YAGHRE members as community-embedded co-researchers, from tool design and piloting through to data collection and thematic mapping, rather than as intermediaries applying a fixed protocol. YAGHRE members have previously contributed input and feedback on research protocols, interview guides, and engagement materials, as demonstrated by the recent AMR-Circus engagement project [18, 19]. Interviews conducted by trusted community peers in participants’ preferred language are likely to have facilitated more candid disclosure than those conducted by external researchers [24]. YAGHRE members’ contextual knowledge (for e.g. familiarity with the topic, language, and diseases affecting their communities) also contributed meaningfully to instrument development, thematic analysis, and the interpretation of findings. This study therefore offers an empirical contribution to the growing literature on the value of peer-to-peer and community-led research approaches in global health [25]. From a methodological standpoint, the use of iterative, two-round interviews enabled progressive deepening of participants’ engagement with health themes and allowed emerging findings to inform subsequent data collection. Digital diary exercises using Telegram were feasible, well-accepted, and yielded contextually rich visual data that complemented interview narratives. This approach was context-appropriate and accessible for participants, requiring only a basic smartphone, and may have particular value in other settings where face-to-face research encounters are logistically constrained.

The dual burden of infectious diseases and NCDs that emerged from this study reflects strong community awareness of the broader epidemiological transitions underway across much of rural South-East Asia [26]. While infectious disease control efforts in Cambodia, particularly for malaria, have achieved substantial gains in recent decades [27], the incidence of dengue fever has increased dramatically over recent years [28], posing a serious threat to public health. Community perspectives that typhoid fever is closely linked to persistent structural deficits in water and sanitation infrastructure can be corroborated by the wider literature, which suggests that access to clean water within households is protective against infection [29]. Simultaneously, NCDs are a rising concern for which communities feel poorly equipped: diabetes in particular was framed by participants as a ‘new’, potentially lethal disease that was not well understood or effectively managed, signalling a need for both health promotion and service strengthening. Targeted outreach programmes and digital health interventions could be particularly well-suited to remote, rural communities such as Siem Pang [30].

The observation that community members possessed accurate and nuanced knowledge of risk factors (such as understanding of vector breeding conditions, waterborne transmission pathways, and dietary contributors to NCD risk), as well as context specific insights on their impact and mitigation strategies may reflect successful past health promotion activities and is an important asset for future health promotion efforts which can build upon this foundational understanding. At the same time, although participants noted the importance of increasing knowledge and understanding of risk factors, they also highlighted that structural barriers to risk factor modification exist. These structural barriers were linked by participants to entrenched cultural practices, absence of infrastructure, and competing priorities in resource-constrained daily lives. This is consistent with evidence from other LMIC settings [31] and points to the importance of community-co-designed interventions that work with rather than against existing knowledge and social norms. At the same time, it provides evidence for the value of policies to strengthen health systems and to alleviate poverty for overall community health improvement [32].

Several notable gaps in the health concerns mentioned by participants can be identified when placing our findings in the context of epidemiological studies. Interestingly, although metabolic diseases such as diabetes and hypertension were among the leading causes for concern, participants did not specifically mention stroke – by far, the leading cause of death among both men and women in Cambodia [33]. Moreover, neither liver cancer nor viral hepatitis were raised as health concerns, despite the total number of cases and deaths from liver cancer showing an increasing trend [34] and despite an estimated 3.0% and 1.6% of the population living with chronic hepatitis B and C, respectively, in 2017 [35]. This may reflect minimal awareness of these conditions as a result of limited screening and diagnosis in remote rural settings; such gaps in community perceptions and established epidemiological findings in themselves represent an opportunity for guiding health education and promotion activities. Finally, although tuberculosis (TB) continues to cause 22.3 deaths per 100,000 population in Cambodia, it was not mentioned at all, possibly reflecting the substantial reductions in TB burden over recent decades especially in rural areas [36].

The nuanced information landscape revealed by this study (in which formal health services are trusted but social media is encountered daily) has important implications for health communication. While most participants appropriately distinguished between reliable and unreliable sources, a minority trusted formal and informal sources of information and advice equally. As social media penetration deepens in rural Cambodia and similar settings, the risk of health misinformation warrants proactive engagement from health authorities and community organisations.

In addition to addressing the key aims of our study, we also set out to evaluate community members' experiences of participating in the project. The high levels of satisfaction reported by community participants, and the range of perceived benefits they attributed to participation, are consistent with evidence that health priority-setting exercises can carry intrinsic value beyond the research outputs they generate [37]. Participatory processes have been shown to enhance health knowledge, self-efficacy, and capacity for collective action [24, 38], and several participants described concrete changes in their own dietary habits and health behaviours, and those of their families, as a direct result of taking part. This co-benefit is consistent with the concept of "research as intervention"[39], in which structured group reflection on health risks can itself function as a health-promoting activity. The breadth of health topics discussed was also explicitly valued, suggesting that community members welcome opportunities to engage with health holistically, including the social determinants of health, rather than through a vertical, disease-specific lens. More broadly, this participatory approach recognizes community members as producers of knowledge (through their lived experience) rather than merely sources of data, representing a small but important step toward addressing the epistemic indebtedness that continues to characterize much of global health research [14, 40].

At the same time, participants' request for the continued presence and input from MORU points to a key ethical challenge of global health research of ensuring that expectations around the sustainability of current activities are discussed in a transparent way. In this study, the YAGHRE's continued existence as a community-embedded structure provides some protection against abrupt withdrawal, but the sustainability of this work beyond current funding cycles is not guaranteed. Moreover, MORU – historically focussing primarily on infectious diseases and maternal and child health – may not have the appropriate expertise to launch a research study on NCDs such as hypertension and diabetes. Awareness and careful management of community expectations remains an imperative for maintaining the trust that underpins the partnership between MORU and the Siem Pang community. Overall however, giving a voice to community representatives as to their own health concerns and research priorities and disseminating these findings with institutions who would be better-placed to conduct relevant research is an important step in addressing epistemic injustices that currently afflict much of global health research [40, 41]. To this end the methods and tools used in this pilot will be iteratively developed for scale up in other CABs in MORU's network and beyond.

However, several limitations should also be acknowledged. The sample of 15 participants, while appropriate for an exploratory qualitative study, does not permit claims of representativeness; some community subgroups were not represented or represented by only one individual. Awareness of plastic

pollution as a health-relevant concern may have been primed by prior YAGHRE community engagement activities focusing on this topic, though the depth and specificity of participants' perspectives on environmental contamination appeared to go beyond simple priming effects. Finally, expectation management, while explicitly addressed in the consent process, remained a challenge, as many participants expressed strong desire for ongoing MORU and YAGHRE engagement and potential future interventions; this enthusiasm, while a testament to community trust in the partnership, may have introduced social desirability effects. In addition, although the community-prioritised health concerns provide valuable insight into locally perceived needs, they should not be interpreted as equivalent to formal research priority setting, which is a broader, multi-stakeholder process involving scientific, ethical, policy, and resource considerations beyond community perspectives alone.

Conclusions

This youth-led study on community health priorities highlighted community perceptions of a dual burden of communicable and non-communicable diseases in rural north-eastern Cambodia. Dengue fever, typhoid fever, diabetes, and hypertension were priority concerns, their risk factors often structurally embedded and less amenable to individual behaviour change. Diabetes prevalence was identified as the single highest-priority research question by community members, a finding that should inform future research agenda development in the region. This study also demonstrates that youth advisory groups can successfully lead participatory research processes in remote, low-resource settings. The iterative multi-method approach used in this study was feasible, culturally appropriate, and yielded rich, contextually grounded data. The model merits further evaluation and adaptation in other settings to enhance the representation of community voices in research agenda-setting.

Abbreviations

AMR
Antimicrobial resistance
COVID-19
Coronavirus disease 2019
FGD
Focus group discussion
HIC
High-income country
ICARS
International Centre for Antimicrobial Resistance Solutions
LMIC
Low- and middle-income country
MORU
Mahidol Oxford Tropical Medicine Research Unit
NCD

Non-communicable disease
OxTREC
Oxford Tropical Research Ethics Committee
TB
Tuberculosis
YAGHRE
Youth Advisory Group on Health and Research Engagement.

Declarations

Ethics approval and consent to participate

Ethics approval was obtained from relevant Cambodian local ethics authorities and the Oxford Tropical Research Ethics Committee (OxTREC reference 563-23). All participants provided written informed consent prior to enrolment. YAGHRE members explained study procedures in Khmer.

Consent for publication

Not applicable. No individually identifiable data are presented.

Availability of data and materials

Due to concerns regarding participant confidentiality and the potential risk of identification, the data underlying this study cannot be made publicly available. However, data may be accessed upon reasonable request to the Mahidol Oxford Tropical Medicine Research Unit (MORU) Data Access Committee, in accordance with the Unit's data access policy (<http://www.tropmedres.ac/data-sharing>).

Competing interests

The authors declare no competing interests.

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Authors' contributions

ME, BA, YL, PC and EW conceptualised the study and ME, BA, YL, and EW secured study funding. EW designed the study, led data analysis, and drafted the first version of manuscript. ME and VH co-developed study instruments, led data collection, and contributed to analysis. BA and PYC provided methodological oversight and expert advice. YAGHRE members underwent training completion, tool design/piloting input, data collection, thematic mapping, leading the health promotion materials, and review/approval of the sections describing their involvement including actively participating in interviews and discussions, thus they are qualified to be group authors. All authors read and approved the final manuscript. YAGHRE members conducted all individual interviews and focus group discussions and participated in thematic mapping sessions.

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Figures

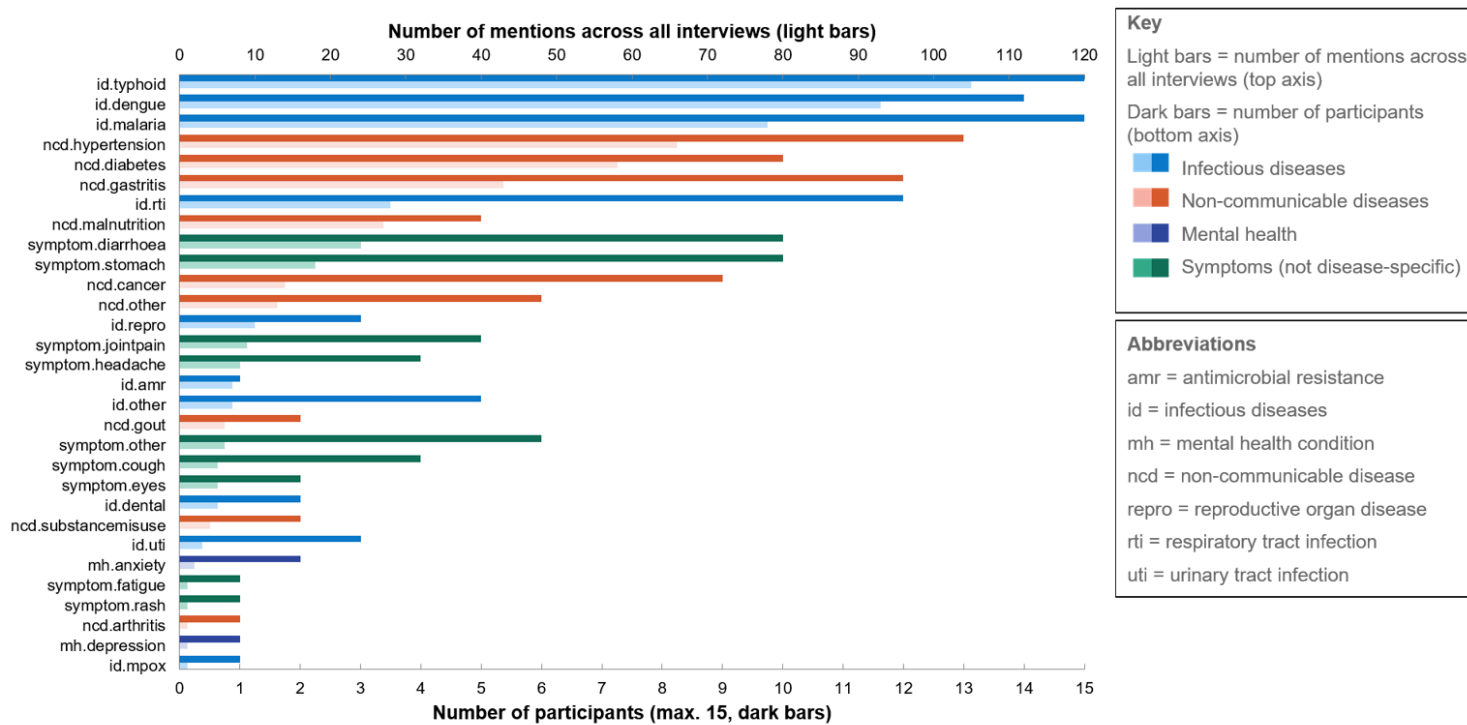


Figure 1

Health concerns mentioned during semi-structured interviews, by total number of mentions and by number of participants

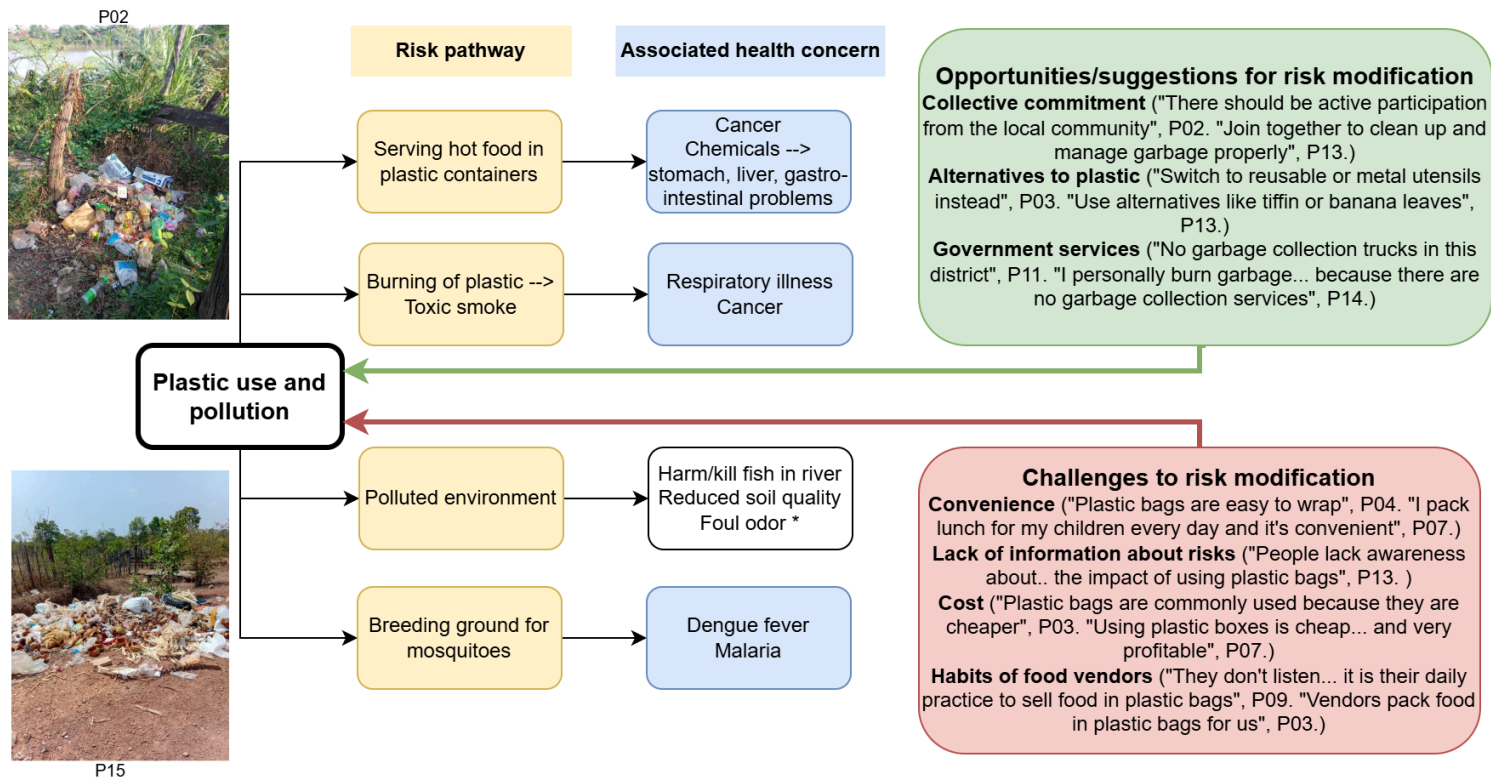


Figure 2

Figure 2a. Relationship and risk pathways between plastic use/pollution and health concerns, with associated opportunities and challenges for risk factor modification

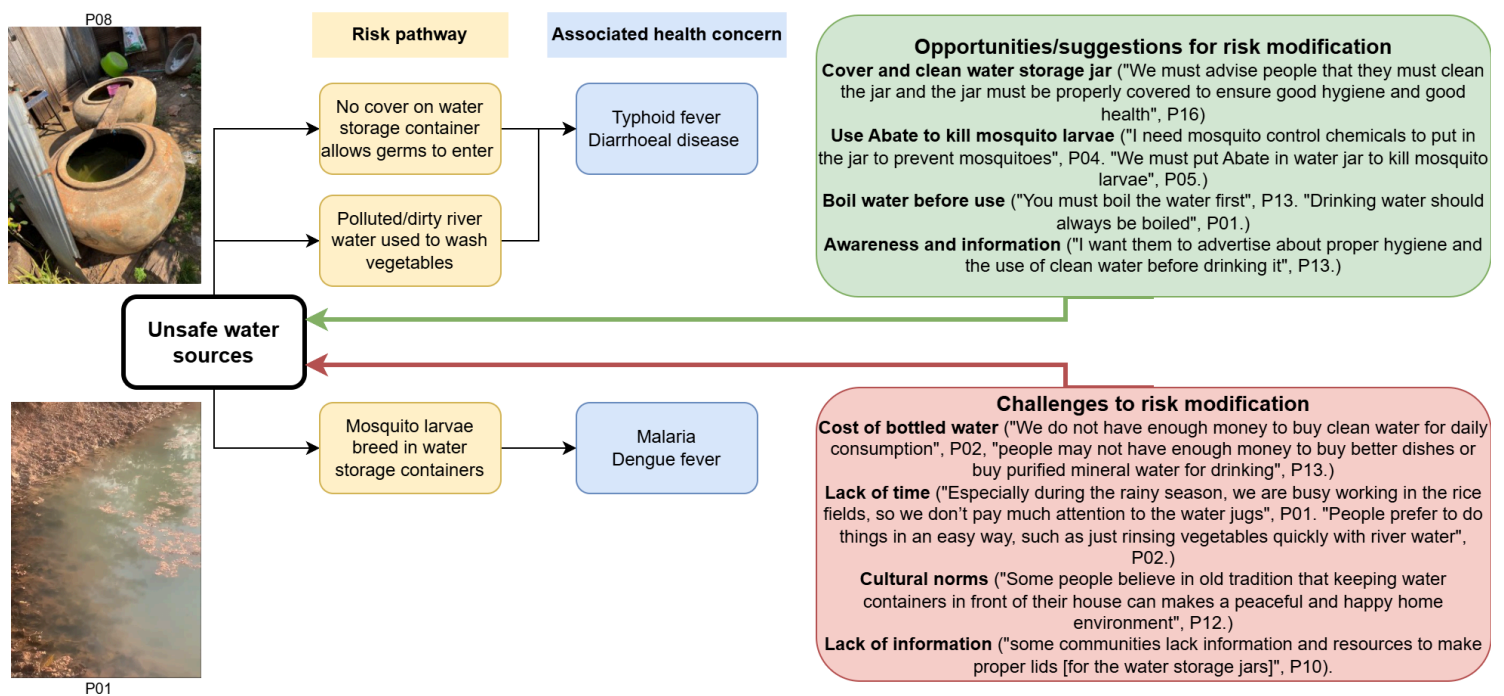


Figure 3

Figure 2b. Relationship and risk pathways between unsafe water sources and health concerns, with associated opportunities and challenges for risk factor modification

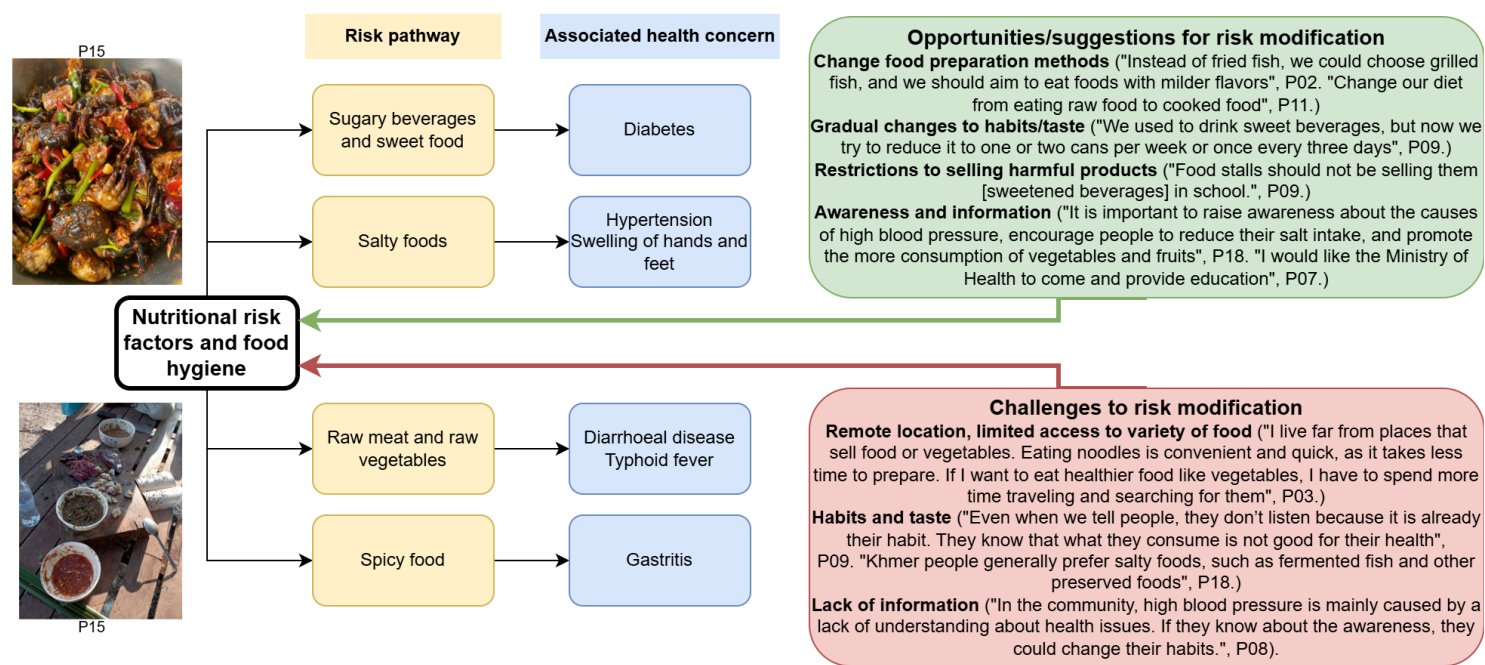


Figure 4

Figure 2c. Relationship and risk pathways between nutrition and food hygiene and health concerns, with associated opportunities and challenges for risk factor modification

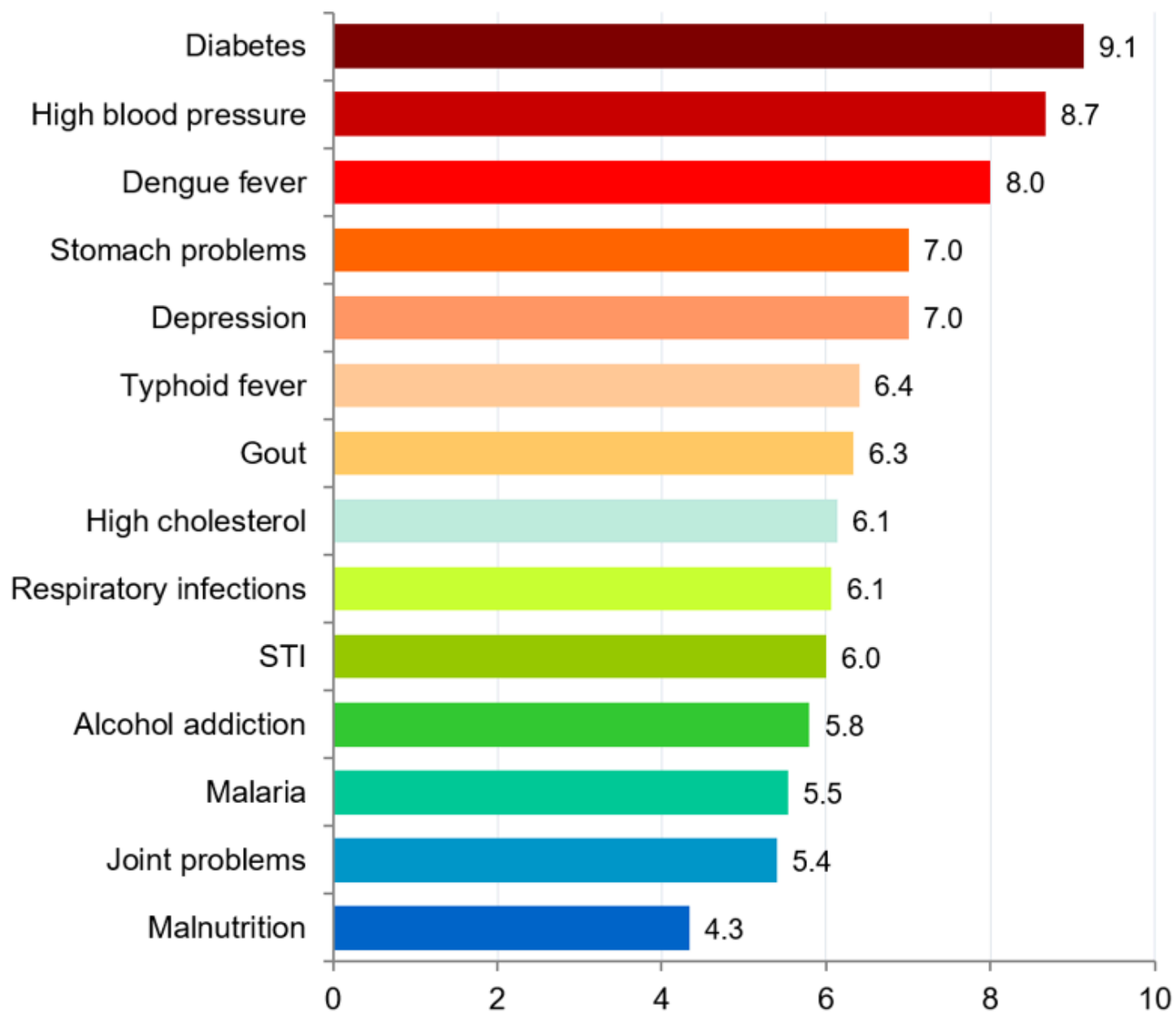


Figure 5

Figure 3. Mean ranked score of community health priorities

Participants asked to give a score out of 10 for each health concern, where: 0 = *Not at all concerned, does not affect me* and 10 = *Very concerned, affects my daily life*.

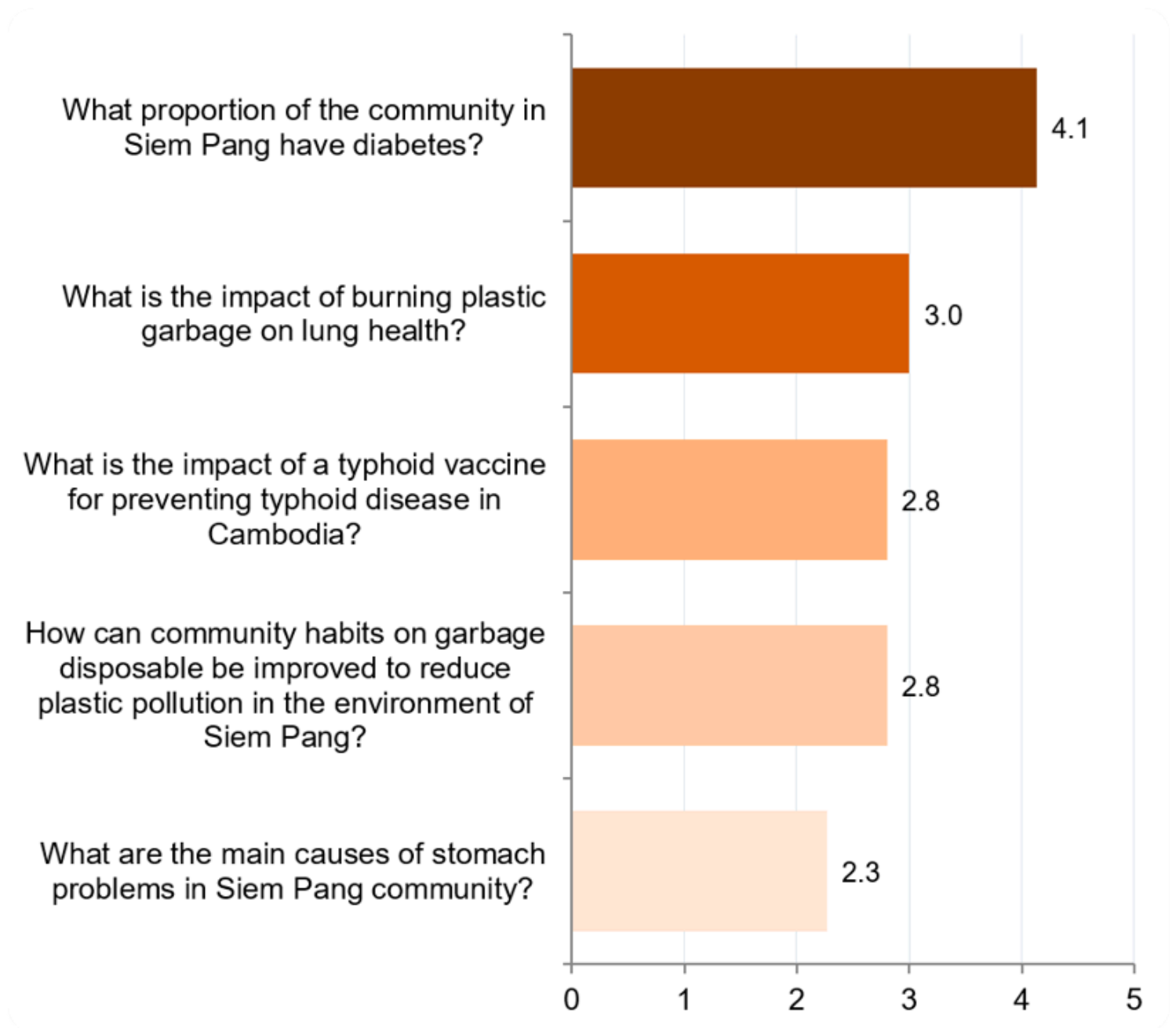


Figure 6

Figure 4. Mean ranked score of example research questions

Participants asked to rank all five example research question in order of importance, with highest number given to the most important question.

Supplementary Files

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