

Supplementary File 1. Coding Tree

Equitable Access to NHS Health Checks in Super-Diverse Cities Among Global Majority Communities

This coding tree summarises the final analytical framework used to organise and interpret the focus group data. It was developed through Framework Analysis by combining deductive domains from the topic guide with inductive codes emerging from community and healthcare professional focus group materials. The five main themes match the manuscript findings, while subthemes and analytical codes show how the data were grouped during framework charting and comparative interpretation.

Analytical focus: Barriers, facilitators and practical solutions shaping equitable access to NHS Health Checks across Global Majority communities, disadvantaged White British participants and healthcare professional perspectives in Birmingham.

Cross-cutting comparative lenses: Ethnic group; gender; age/eligibility; previous NHS Health Check attendance; service-user versus service-provider perspective; community-led versus clinically delivered access points; and comparison with disadvantaged White British participants.

Hierarchical coding tree

1. Limited Awareness and Knowledge of NHS Health Checks

1.1 Awareness of programme existence and eligibility: Never heard of NHS Health Checks; unclear eligibility; not knowing about the five-year invitation cycle; eligible but not invited; first learning about the programme through the focus group.

1.2 Understanding of purpose and scope: Confusion between NHS Health Checks and routine GP appointments; “full body MOT” expectations; misunderstanding the focus on cardiovascular and metabolic risk; uncertainty about what tests are included.

1.3 Sources of information: GP invitation letters; text messages; word of mouth; family and friends; community organisations; social media; focus group as first meaningful source of information.

1.4 Health literacy and information needs: Need for plain English explanations; difficulty understanding risk scores; need for list of tests; need for clearer explanation of prevention, results and next steps.

1.5 Expectations before and after attendance: Expectation of broader screening; disappointment when checks felt too basic; uncertainty about whether normal results require follow-up; desire for more personalised feedback.

2. Cultural and Language Barriers in Communication

2.1 Language of invitations and materials: English-only letters; translated leaflets; bilingual resources; low literacy; need for diagrams, videos and accessible formats.

2.2 Interpreter access and communication during appointments: Limited availability of interpreters; preference for face-to-face interpreters; reliance on family members; confidentiality concerns; difficulty explaining medical terminology.

2.3 Cultural relevance of advice and communication: Generic lifestyle advice not fitting traditional diets; need for culturally appropriate diet and physical activity advice; faith-related health practices; fasting and medication concerns.

2.4 Gender, modesty and acceptability: Preference for female healthcare professionals among some women; comfort discussing sensitive issues; need for respectful and non-judgemental delivery.

2.5 Digital communication and digital exclusion: Concerns about scam texts; difficulty using online portals; preference for printed results; limited digital literacy among older adults; need for phone and face-to-face options.

3. Structural and Practical Challenges to Access

3.1 Appointment availability and booking systems: Difficulty contacting GP practices; long telephone queues; restrictive appointment times; need for evening/weekend appointments; walk-in or community booking options.

3.2 Location and physical accessibility: GP settings perceived as formal or stressful; community centres, mosques, churches, schools and workplaces as more familiar locations; transport barriers; mobility and disability access.

3.3 Work, caring and economic constraints: Time off work; loss of income; shift work; childcare responsibilities; competing family commitments; limited capacity to attend during standard hours.

3.4 Service design and workforce capacity: GPs rarely delivering checks directly due to time pressures; reliance on nurses/healthcare assistants; short appointment time; payment and resource constraints; integration with flu clinics or chronic disease reviews.

3.5 Follow-up, continuity and referral pathways: Unclear results communication; lack of follow-up; need for personalised action plans; referral to lifestyle, dietetic, smoking cessation or physical activity support; scheduled check-ins after risk assessment.

4. Attitudes, Fears and Trust in Healthcare

4.1 Fear of diagnosis and avoidance: Fear of bad news; reluctance to know risk status; anxiety about blood tests; preventive checks seen as unnecessary when asymptomatic.

4.2 Reactive versus preventive health orientations: Belief that healthcare is for illness rather than prevention; “I am young/healthy” perceptions; limited perceived need for checks before symptoms.

4.3 Trust and mistrust in NHS/statutory services: Past negative experiences; concerns about being dismissed; perceived discrimination or cultural insensitivity; data privacy concerns; institutional mistrust.

4.4 Relational quality of care: Feeling listened to; respectful and kind staff; rushed appointments; non-judgemental discussion of weight, smoking or lifestyle; trust built through interpersonal care.

4.5 Comparative expectations and system familiarity: Comparisons with health systems in countries of origin; expectations of more comprehensive screening; uncertainty navigating NHS pathways; need for NHS orientation for newer migrants.

5. Community-Driven Facilitators and Suggestions to Improve Uptake

5.1 Trusted community messengers: Faith leaders, imams, pastors, community champions, local charities, community development workers and peer advocates as credible sources of information.

5.2 Community-based and outreach delivery: Health Checks in mosques, churches, community centres, schools, workplaces, barbershops and mobile units; bringing services closer to where people already gather.

5.3 Tailored outreach and accessible messaging: Multilingual videos; radio; WhatsApp; posters in community settings; phone calls; simple call-to-action; avoiding jargon and technical terms.

5.4 Culturally competent workforce and training: Cultural competency training; implicit bias awareness; diverse staff; gender-sensitive provision; cultural humility; listening skills; practical knowledge of community contexts.

5.5 Co-production and community capacity building: Community organisations as partners in recruitment, facilitation and interpretation; training workshops; debriefing; local ownership; limitations and learning from co-production.

5.6 Implementation and system improvement: Targeted pilot programmes; better data capture by ethnicity and gender; action plans; stronger links between Public Health, GP practices and community organisations; resourcing of outreach and follow-up.

Coding tree table

Main theme	Subtheme	Analytical codes / indicators	Illustrative data sources	Comparative use in analysis
1. Limited Awareness and Knowledge of NHS Health Checks	1.1 Awareness of programme existence and eligibility	Never heard of NHS Health Checks; unclear eligibility; not knowing about the five-year invitation cycle; eligible but not invited; first learning about the programme through the focus group.	Community FGDs; Chinese coding frameworks; Desi Diabetes coding frameworks; White British coding framework; topic guide domains.	Compared across ethnic group, gender, age/eligibility and attendance status to identify who knew about NHS Health Checks and how information was received.
1. Limited Awareness and Knowledge of NHS Health Checks	1.2 Understanding of purpose and scope	Confusion between NHS Health Checks and routine GP appointments; "full body MOT" expectations; misunderstanding the focus on cardiovascular and metabolic risk; uncertainty about what tests are included.	Community FGDs; Chinese coding frameworks; Desi Diabetes coding frameworks; White British coding framework; topic guide domains.	Compared across ethnic group, gender, age/eligibility and attendance status to identify who knew about NHS Health Checks and how information was received.
1. Limited Awareness and Knowledge of NHS Health Checks	1.3 Sources of information	GP invitation letters; text messages; word of mouth; family and friends; community organisations; social media; focus group as first meaningful source of information.	Community FGDs; Chinese coding frameworks; Desi Diabetes coding frameworks; White British coding framework; topic guide domains.	Compared across ethnic group, gender, age/eligibility and attendance status to identify who knew about NHS Health Checks and how information was received.
1. Limited Awareness and Knowledge of NHS Health Checks	1.4 Health literacy and information needs	Need for plain English explanations; difficulty understanding risk scores; need for list of tests; need for clearer explanation of prevention, results and next steps.	Community FGDs; Chinese coding frameworks; Desi Diabetes coding frameworks; White British coding framework; topic guide domains.	Compared across ethnic group, gender, age/eligibility and attendance status to identify who knew about NHS Health Checks and how information was received.
1. Limited Awareness and Knowledge of NHS Health Checks	1.5 Expectations before and after attendance	Expectation of broader screening; disappointment when checks felt too basic; uncertainty about whether normal results require follow-up; desire for more personalised feedback.	Community FGDs; Chinese coding frameworks; Desi Diabetes coding frameworks; White British coding framework; topic guide domains.	Compared across ethnic group, gender, age/eligibility and attendance status to identify who knew about NHS Health Checks and how information was received.
2. Cultural and Language Barriers in Communication	2.1 Language of invitations and materials	English-only letters; translated leaflets; bilingual resources; low literacy; need for diagrams, videos and accessible formats.	Community FGDs; Cantonese/Mandarin coding frameworks; Desi Diabetes coding frameworks; healthcare professional FGDs.	Compared across language groups, gendered acceptability concerns and service-user/provider perspectives to distinguish communication barriers from cultural acceptability issues.

2. Cultural and Language Barriers in Communication	2.2 Interpreter access and communication during appointments	Limited availability of interpreters; preference for face-to-face interpreters; reliance on family members; confidentiality concerns; difficulty explaining medical terminology.	Community FGDs; Cantonese/Mandarin coding frameworks; Desi Diabetes coding frameworks; healthcare professional FGDs.	Compared across language groups, gendered acceptability concerns and service-user/provider perspectives to distinguish communication barriers from cultural acceptability issues.
2. Cultural and Language Barriers in Communication	2.3 Cultural relevance of advice and communication	Generic lifestyle advice not fitting traditional diets; need for culturally appropriate diet and physical activity advice; faith-related health practices; fasting and medication concerns.	Community FGDs; Cantonese/Mandarin coding frameworks; Desi Diabetes coding frameworks; healthcare professional FGDs.	Compared across language groups, gendered acceptability concerns and service-user/provider perspectives to distinguish communication barriers from cultural acceptability issues.
2. Cultural and Language Barriers in Communication	2.4 Gender, modesty and acceptability	Preference for female healthcare professionals among some women; comfort discussing sensitive issues; need for respectful and non-judgemental delivery.	Community FGDs; Cantonese/Mandarin coding frameworks; Desi Diabetes coding frameworks; healthcare professional FGDs.	Compared across language groups, gendered acceptability concerns and service-user/provider perspectives to distinguish communication barriers from cultural acceptability issues.
2. Cultural and Language Barriers in Communication	2.5 Digital communication and digital exclusion	Concerns about scam texts; difficulty using online portals; preference for printed results; limited digital literacy among older adults; need for phone and face-to-face options.	Community FGDs; Cantonese/Mandarin coding frameworks; Desi Diabetes coding frameworks; healthcare professional FGDs.	Compared across language groups, gendered acceptability concerns and service-user/provider perspectives to distinguish communication barriers from cultural acceptability issues.
3. Structural and Practical Challenges to Access	3.1 Appointment availability and booking systems	Difficulty contacting GP practices; long telephone queues; restrictive appointment times; need for evening/weekend appointments; walk-in or community booking options.	Community FGDs; healthcare professional FGDs; provider thematic notes; Birmingham NHS Health Check service documents.	Compared across work/caring roles, disability/mobility needs, age groups, White British disadvantaged participants and provider capacity constraints.
3. Structural and Practical Challenges to Access	3.2 Location and physical accessibility	GP settings perceived as formal or stressful; community centres, mosques, churches, schools and workplaces as more familiar locations; transport barriers; mobility and disability access.	Community FGDs; healthcare professional FGDs; provider thematic notes; Birmingham NHS Health Check service documents.	Compared across work/caring roles, disability/mobility needs, age groups, White British disadvantaged participants and provider capacity constraints.
3. Structural and Practical Challenges to Access	3.3 Work, caring and economic constraints	Time off work; loss of income; shift work; childcare responsibilities; competing family commitments; limited capacity to attend during standard hours.	Community FGDs; healthcare professional FGDs; provider thematic notes; Birmingham NHS Health Check service documents.	Compared across work/caring roles, disability/mobility needs, age groups, White British disadvantaged participants and provider capacity constraints.
3. Structural and Practical Challenges to Access	3.4 Service design and workforce capacity	GPs rarely delivering checks directly due to time pressures; reliance on nurses/healthcare assistants; short appointment time; payment and resource constraints; integration with flu clinics or chronic disease reviews.	Community FGDs; healthcare professional FGDs; provider thematic notes; Birmingham NHS Health Check service documents.	Compared across work/caring roles, disability/mobility needs, age groups, White British disadvantaged participants and provider capacity constraints.
3. Structural and Practical Challenges to Access	3.5 Follow-up, continuity and referral pathways	Unclear results communication; lack of follow-up; need for personalised action plans; referral to lifestyle, dietetic, smoking cessation or physical activity support; scheduled check-ins after risk assessment.	Community FGDs; healthcare professional FGDs; provider thematic notes; Birmingham NHS Health Check service documents.	Compared across work/caring roles, disability/mobility needs, age groups, White British disadvantaged participants and provider capacity constraints.

4. Attitudes, Fears and Trust in Healthcare	4.1 Fear of diagnosis and avoidance	Fear of bad news; reluctance to know risk status; anxiety about blood tests; preventive checks seen as unnecessary when asymptomatic.	Community FGDs; healthcare professional FGDs; handwritten analytical notes; provider reflections on mistrust and relational care.	Compared between participant accounts of fear/mistrust and provider perceptions of engagement, including contrasts between community groups and previous experience of services.
4. Attitudes, Fears and Trust in Healthcare	4.2 Reactive versus preventive health orientations	Belief that healthcare is for illness rather than prevention; "I am young/healthy" perceptions; limited perceived need for checks before symptoms.	Community FGDs; healthcare professional FGDs; handwritten analytical notes; provider reflections on mistrust and relational care.	Compared between participant accounts of fear/mistrust and provider perceptions of engagement, including contrasts between community groups and previous experience of services.
4. Attitudes, Fears and Trust in Healthcare	4.3 Trust and mistrust in NHS/statutory services	Past negative experiences; concerns about being dismissed; perceived discrimination or cultural insensitivity; data privacy concerns; institutional mistrust.	Community FGDs; healthcare professional FGDs; handwritten analytical notes; provider reflections on mistrust and relational care.	Compared between participant accounts of fear/mistrust and provider perceptions of engagement, including contrasts between community groups and previous experience of services.
4. Attitudes, Fears and Trust in Healthcare	4.4 Relational quality of care	Feeling listened to; respectful and kind staff; rushed appointments; non-judgemental discussion of weight, smoking or lifestyle; trust built through interpersonal care.	Community FGDs; healthcare professional FGDs; handwritten analytical notes; provider reflections on mistrust and relational care.	Compared between participant accounts of fear/mistrust and provider perceptions of engagement, including contrasts between community groups and previous experience of services.
4. Attitudes, Fears and Trust in Healthcare	4.5 Comparative expectations and system familiarity	Comparisons with health systems in countries of origin; expectations of more comprehensive screening; uncertainty navigating NHS pathways; need for NHS orientation for newer migrants.	Community FGDs; healthcare professional FGDs; handwritten analytical notes; provider reflections on mistrust and relational care.	Compared between participant accounts of fear/mistrust and provider perceptions of engagement, including contrasts between community groups and previous experience of services.
5. Community-Driven Facilitators and Suggestions to Improve Uptake	5.1 Trusted community messengers	Faith leaders, imams, pastors, community champions, local charities, community development workers and peer advocates as credible sources of information.	Community FGDs; healthcare professional FGDs; FGP training/debrief materials; handwritten analytical notes on co-production and community partnerships.	Compared by community setting, trusted messenger, provider role and feasibility of service-delivery changes.
5. Community-Driven Facilitators and Suggestions to Improve Uptake	5.2 Community-based and outreach delivery	Health Checks in mosques, churches, community centres, schools, workplaces, barbershops and mobile units; bringing services closer to where people already gather.	Community FGDs; healthcare professional FGDs; FGP training/debrief materials; handwritten analytical notes on co-production and community partnerships.	Compared by community setting, trusted messenger, provider role and feasibility of service-delivery changes.
5. Community-Driven Facilitators and Suggestions to Improve Uptake	5.3 Tailored outreach and accessible messaging	Multilingual videos; radio; WhatsApp; posters in community settings; phone calls; simple call-to-action; avoiding jargon and technical terms.	Community FGDs; healthcare professional FGDs; FGP training/debrief materials; handwritten analytical notes on co-production and community partnerships.	Compared by community setting, trusted messenger, provider role and feasibility of service-delivery changes.

5. Community-Driven Facilitators and Suggestions to Improve Uptake	5.4 Culturally competent workforce and training	Cultural competency training; implicit bias awareness; diverse staff; gender-sensitive provision; cultural humility; listening skills; practical knowledge of community contexts.	Community FGDs; healthcare professional FGDs; FGP training/debrief materials; handwritten analytical notes on co-production and community partnerships.	Compared by community setting, trusted messenger, provider role and feasibility of service-delivery changes.
5. Community-Driven Facilitators and Suggestions to Improve Uptake	5.5 Co-production and community capacity building	Community organisations as partners in recruitment, facilitation and interpretation; training workshops; debriefing; local ownership; limitations and learning from co-production.	Community FGDs; healthcare professional FGDs; FGP training/debrief materials; handwritten analytical notes on co-production and community partnerships.	Compared by community setting, trusted messenger, provider role and feasibility of service-delivery changes.
5. Community-Driven Facilitators and Suggestions to Improve Uptake	5.6 Implementation and system improvement	Targeted pilot programmes; better data capture by ethnicity and gender; action plans; stronger links between Public Health, GP practices and community organisations; resourcing of outreach and follow-up.	Community FGDs; healthcare professional FGDs; FGP training/debrief materials; handwritten analytical notes on co-production and community partnerships.	Compared by community setting, trusted messenger, provider role and feasibility of service-delivery changes.

Cross-cutting comparative matrix

Analytic lens	Purpose in the analysis	Examples of comparison
Ethnic/community group	To identify shared and group-specific barriers without treating Global Majority communities as homogeneous.	Comparison of South Asian, Somali, Chinese, Nigerian, Ghanaian, Arab, Black Caribbean and disadvantaged White British accounts.
Gender	To examine differences in awareness, access, acceptability and caring/work constraints.	Female staff preferences, childcare responsibilities, men's work/time barriers, and gendered patterns of reported uptake.
Age and eligibility	To distinguish views of eligible attendees, eligible non-attendees and those approaching eligibility.	People aged 40–74, those approaching eligibility, and participants with previous or no NHS Health Check experience.
Attendance status	To compare positive/negative experiences of attendees with barriers and expectations among non-attendees.	Attended, not attended, and unsure/future attendance groups.
Service-user/provider perspective	To compare community-reported barriers with frontline delivery constraints and provider-suggested solutions.	Patient concerns about letters, trust and follow-up compared with provider accounts of interpreter access, staffing, appointment time and follow-up capacity.
Disadvantaged White British comparison	To examine whether barriers were ethnicity-specific, deprivation-related or shared across underserved groups.	Appointment access, mistrust, GP communication and practical barriers compared with language/cultural barriers among Global Majority groups.

Coding process note

Initial coding: Codes were generated from topic-guide domains and from repeated issues in the focus group materials, including awareness, expectations, invitation, access, language, cultural acceptability, trust, follow-up and recommendations.

Framework charting: Codes were grouped into subthemes and mapped under the five manuscript themes. Healthcare professional data were used both as a separate provider perspective and as contextual evidence for service delivery barriers and implementation feasibility.

Comparative interpretation: The final stage compared themes across community groups, gender, age/eligibility, attendance status, disadvantaged White British participants and provider accounts. This allowed the analysis to distinguish common barriers from group-specific and intersectional barriers.