

# Informal health care providers in Nigerian slums: perspectives on how to link them with the formal health system

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Accepted on 11 September 2025

## Abstract

Informal healthcare providers (IHPs) play a crucial role in healthcare delivery in urban slums, but the lack of linkages between IHPs and the formal healthcare system results in fragmented, low-quality care. Integrating IHPs into the formal healthcare system poses challenges that are common across such settings. This study explores the perceptions of healthcare providers and consumers in Nigerian urban slums regarding linking IHPs to the formal healthcare system, while also aiming to identify stakeholder perceptions on how the linkage might best work. Using cross-sectional consumer and provider surveys, we collected data via questionnaires from 1024 households and 255 providers, purposively selected from eight urban slums in Anambra and Enugu states, southeast Nigeria. We estimated overall and subgroup-specific percentages, percentage-point differences, and associated 95% confidence intervals for question responses using logistic regression models and marginal effects methods. Most consumers were female (96%), with a median age of 31 years, reflecting the sampling design and focus on females in households with women of childbearing age and/or young children, and 63% were employed in the informal sector, reflecting the setting. Most providers were IHPs (93%) and private (94%), with the most common job title being patent medicine vendors (54%). We found that 92% (95% CI: 84%, 96%;  $n/N = 943/1025$ ) of consumers and 87% (95% CI: 60%, 97%;  $n/N = 221/255$ ) of providers supported linking IHPs to the formal health system. Both groups of respondents primarily favoured (i) training, supervision, and referral as the main strategies and aspects of services to be linked, (ii) having the Ministry of Health lead the linkage, and (iii) managing the linkage through government legislation. There was little evidence for any large differences in consumer or provider views across subgroups based on key sociodemographic characteristics or provider attributes. The study findings offer guidance for future policymaking.

**Keywords:** informal healthcare providers; urban slums; linkages; formal health system; integration

## Key messages

- Both consumers (92% [95% CI: 84%, 96%]) and providers (87% [95% CI: 60%, 97%]) strongly support linking informal healthcare providers to the formal healthcare system for improved healthcare delivery.
- Training, supervision, and referral systems were most favoured by both consumers and providers as key strategies for successfully linking IHPs to the formal health system, aligning with the World Health Organization's Integrated People-Centred Health Services focus on patient-centred care.
- A total of 92% (95% CI: 84%, 96%) and 63% (95% CI: 41%, 81%) of consumers and providers, respectively, preferred the Ministry of Health to lead the integration, managed

through government legislation (54% [95% CI: 44%, 64%] and 47% [95% CI: 25%, 71%], respectively).

- Tailoring strategies to accommodate diverse providers, like traditional medicine practitioners, is essential for successful and inclusive linkages.

## Introduction

Access to quality healthcare services has been seen as a fundamental human right and a critical component for achieving Universal Health Coverage (UHC), a goal enshrined in the Sustainable Development Goals (SDG 3) (World Health Organization 2015). However, in low- and middle-income countries (LMICs) accessing quality health services is challenging, particularly in urban slums where a growing population,

fuelled by rural-urban migration, has led to the emergence of densely populated, informal settlements (Ayuba 2019, Adesina-Uthman et al. 2022).

In Nigeria, the formal healthcare system frequently falls short in meeting the needs of the urban poor, especially since the primary healthcare facilities in such areas are often found in low numbers, and the few that exist are ill-equipped, understaffed, and plagued by absenteeism, leading to informal payments and high out-of-pocket costs for residents (Onwujekwe et al. 2022). As a result of the constrained provision and access around formal health services in urban slums, many healthcare consumers (referred to as 'consumers' from here onwards) in Nigeria turn to informal healthcare providers (IHPs), including patent medicine vendors (PMVs), traditional birth attendants (TBAs), herbal medicine practitioners, and traditional healers, to address their healthcare needs (Sieverding and Beyeler 2016).

IHPs in Nigeria are diverse in background and qualifications. PMVs are often individuals with minimal formal health training, although some may have health-related certifications such as community health extension workers or those with nursing diplomas (Sieverding and Beyeler 2016, Nelissen et al. 2020). TBAs usually acquire skills through apprenticeships or community-based training and are often deeply embedded in cultural childbirth practices (Ugwu et al. 2021). Herbalists and traditional healers rely on indigenous knowledge systems informally passed down generationally (Okoronkwo et al. 2014). Despite their important roles in providing care in underserved areas, many IHPs operate outside the scope of professional health regulation and standardization, and their qualifications vary widely, which raises concerns about care quality and patient safety (Beyeler et al. 2015, Durowade et al. 2018).

Regulatory oversight for IHPs in Nigeria remains fragmented. For example, the Pharmacists Council of Nigeria (PCN) is responsible for licencing and monitoring PMVs, but enforcement is inconsistent and many vendors operate without full compliance to regulatory standards (Pharmacists Council of Nigeria 2018). Meanwhile, traditional medicine practitioners, including TBAs, bonesetters, and herbalists, often register with local associations but in practice are largely self-regulated. Although the Federal Ministry of Health established the Traditional, Complementary, and Alternative Medicine (TCAM) department in 2018 to promote integration and policy development for traditional health practitioners, routine supervision, quality control, and data linkage with the formal health system remains limited (Federal Ministry of Health 2018). The department's vision promotes parallel but collaborative practice between conventional and traditional systems; however, its implementation is still evolving.

Consequently, while some IHPs may have partial formal recognition through registration or membership of associations such as the Nigerian Association of Patent and Proprietary Medicine Dealers (for PMVs), their integration into the broader health system remains minimal. They are typically disconnected from standard supervision, health information systems, and referral pathways, which poses risks to health system coordination, quality of care, and accountability (Salami et al. 2019, Bigdeli et al. 2020).

Such IHPs are sought after because of their proximity, ease of access, and familiarity within the communities they serve (Sudhinaraset et al. 2013). However, despite their role in

providing care in Nigerian slums, IHPs are mostly not linked to nor integrated into the formal health system, with the resultant effect that many of them are unregulated and likely provide sub-optimal care quality and/or inappropriate health services, with potentially serious consequences for the health of their clients (Bigdeli et al. 2020). Specifically, some IHPs may belong to trade associations, which mostly function independently from the formal health system, while some just obtain registration certificates from the formal health system, represented by the Ministry of Health and its agencies, but nothing more (Bigdeli et al. 2020).

The World Health Organization (WHO) Framework on Integrated People-Centred Health Services (IPCHS) highlights the importance of linking IHPs into formal systems to ensure that care is coordinated, equitable, and people-centred (World Health Organization 2016). This framework emphasizes five interlinked strategies: empowering people and communities, strengthening governance and accountability, reorienting the model of care, coordinating services, and creating an enabling environment (World Health Organization 2016). These strategies aim to create health systems that are responsive to people's needs, particularly in underserved areas like urban slums.

Some of the key challenges to linking IHPs with the formal health system in Nigeria include regulatory, financial, and logistical barriers, as well as issues of trust and quality assurance (Sudhinaraset et al. 2013, Fayeahun et al. 2022). However, these are common concerns across most LMICs where IHPs serve as vital healthcare contributors, especially in regions with limited access to formal healthcare services but are rarely closely linked to the formal health system (Sudhinaraset et al. 2013, Fayeahun et al. 2022). The complexities associated with formalizing the relationship between IHPs and the established healthcare system are also evident in these regions (Sudhinaraset et al. 2013, Fayeahun et al. 2022).

Similar to many countries, the contributions of IHPs have been recognized in Nigerian health policies and strategic plans, but there are challenges in integrating them into the national healthcare system (Federal Ministry of Health 2016, 2018, Federal Government of Nigeria 2020). Some of these challenges arise from their mostly unsupervised and limited training, and their scepticism of the values of linkages with the formal health system. The 2016 National Health Policy and the Primary Health Care Under One Roof (PHCUOR) strategy both emphasize the importance of partnerships across healthcare sectors and outline a vision for integrated service delivery (Federal Ministry of Health 2016). The National Health Sector Development Plan II (2020–2024) also identifies IHPs as stakeholders in community-level health services and calls for structured partnerships, although operational guidelines remain underdeveloped (Federal Ministry of Health 2016). However, the implementation of these policies has been inconsistent, and mechanisms to integrate IHPs into existing health governance structures are still lacking.

Applying the IPCHS framework to the Nigerian context, there is a clear need for policy and operational strategies that promote the linkage of IHPs into the formal health system. This effort would not only enable more effective regulation, improved service quality, and better coordination of care delivery, addressing the gaps in access for populations in urban slums but also foster a health system that is more inclusive, equitable, and people-centred, in line with the IPCHS framework (Onwujekwe et al. 2022, Odii et al. 2024). Hence, while there is a growing recognition of the importance

of integrating IHPs into formal healthcare systems in Nigeria, there is still a need for more comprehensive and context-specific evidence on how this can work most effectively (Federal Ministry of Health 2016, 2018, Federal Government of Nigeria 2020, Onwujekwe *et al.* 2022).

Therefore, in this study, we provide innovative evidence on the views of both consumers and providers of healthcare in urban slums on whether to link the IHPs to the formal health system, and if so how best to achieve this. The use of the views from the direct potential beneficiaries of this linkage is important to ensure that the interventions chosen to achieve this linkage are context-specific, acceptable and will be effectively implemented. By drawing on the IPCHS framework, this study contributes to the discourse on how to build integrated, people-centred health systems in urban slums.

## Materials and methods

### Settings

Providers were surveyed at their place of work (either a formal workplace, such as a health facility, or their home), while consumers were surveyed in their households, with both surveys done in the same eight urban slums in Enugu and Anambra states, in the South-East geopolitical zone of Nigeria. Enugu and Anambra States have estimated populations (as of 2022) of 4 690 100 and 5 953 500, respectively. The two states were purposefully chosen because of their proximity to each other and the research team and because they both contain several, large, long-term urban slums. Additionally, Onitsha city in Anambra State is the home to one of Nigeria's largest open drug markets, which supports the production of fake and contaminated pharmaceuticals as well as thriving unofficial health services (Fatokun 2016, Adum *et al.* 2019). The study was conducted in the following slums: Afia-Nine, Ngenevu, Ugbo-Oghe, and Ikilike in Enugu State, and Okpoko 4, Okpoko 5, Prison Marine, and Ibollo in Anambra State.

In Nigeria, health care is delivered by a very diverse range of providers. The government-owned formal health care sector is organized into three tiers for service delivery: primary, secondary, and tertiary. Then there is a very large, but often poorly documented, private sector including both formal for-profit and not-for-profit providers and informal for-profit providers, with different providers practising modern or traditional medicine. The limited evidence available suggests that the majority of health care provision in the country is provided by the private sector (IOM 2014, Hirose *et al.* 2018).

### Study design

We collected data via two cross-sectional surveys within the same slum areas: one survey of consumers, i.e. community members of the study slums, and one survey of health care providers from the formal and informal sectors (referred to as 'providers' from here onwards) in the study slums. The two surveys were part of a larger project ultimately aiming to develop and evaluate models for linking the informal health sector to the formal health sector in Nigerian slums, and as such collected a wide range of data related to this wider project. However, in this study, we just focus on providers' and consumers' views around the issue of linking the informal and formal health sectors.

## Description and eligibility criteria for providers and consumers

We aimed to maximize the generalizability of both surveys by having minimal and non-restrictive eligibility criteria. We defined formal healthcare providers as those operating within the government-recognized healthcare system, including primary, secondary, and tertiary facilities. These providers are typically licenced and regulated by relevant professional bodies and government agencies, and they adhere to established medical protocols and standards of care. Formal providers include any physicians, nurses, pharmacists, and community health extension workers working in government-run or private hospitals, clinics, and/or health centres. We defined IHPs as those operating outside the government-recognized healthcare system, often without formal licencing or regulation. These providers typically offer healthcare services based on traditional knowledge, apprenticeship, or limited training. IHPs included patent medicine vendors (PMVs), traditional birth attendants (TBAs), herbal medicine practitioners, and traditional bonesetters.

Providers were eligible if they were any type of formal or IHP that had been delivering any type of health care services within the study slum sites for at least the past six months, other than those IHPs who offered spiritualism- or exorcism-based services. This included sole operator providers and organizations with multiple members of staff. Where providers had multiple members of staff either the head of the facility or, if they were not available, a representative of the head was eligible to participate. Consumers were eligible if they were community members living in an eligible household within the study slum sites, with eligible households being those that contained either at least one woman aged 15–49 (i.e. of typical child-bearing age) and/or at least one child aged ≤5. Within eligible households, we primarily sought the main female caregiver as the eligible respondent, but if such an individual was not available, then we allowed the male head of the household to be the eligible respondent if they had sufficient knowledge of household health seeking behaviour and expenditure. We focused on women from households containing women of child-bearing age and/or young children as these households are frequent users of both formal and informal healthcare services, particularly for maternal and child health needs, with the primary female caregiver typically playing a central role in making healthcare decisions for the household.

### Target populations

For our provider survey, the intended target population are the heads, or representatives of the heads, of formal and informal sole operator or multi-staff providers that ordinarily operate in Nigerian slums at the time of the survey. For our consumer survey, the target population are the female primary caregivers of households, containing either at least one woman aged 15–49 and/or at least one child aged ≤5, living within Nigerian slums at the time of the survey. It is important to note that while the target population for the consumer survey was primarily female caregivers, this does not imply that males do not seek healthcare or hold relevant views. Rather, the study design prioritized the perspectives of those most directly involved in household healthcare decisions related to maternal and child health.

### Sampling

For both the provider and consumer surveys within the two selected states (see *Settings* above), we initially purposively

selected three local government areas (LGAs; the third level of government below the federal and state level) in each state, focusing on those LGAs believed to be densely populated and with comparable population densities (based on the views of the research team, given that the last available formal data on LGA population sizes was the 2006 census) and the presence of diverse urban slum settings, with the goal of selecting a representative sample for the target population. We then purposefully selected a total of eight slums, four per state, across the LGAs, based on three criteria: (i) the perceived relative size of the slum (based on the views of the members of the research team who were familiar with the slums, given that no official data on the slums' sizes were available), to ensure broadly similarly sized slums in both states, (ii) having at least one functional primary health centre (PHC), and (iii) the slum being judged as suitably accessible and safe for our research team to work in, given local contextual considerations. See [Supplementary Table S1](#).

For the consumer survey, within each slum, the data collection team started at the PHC and then located the nearest household and attempted to interview an eligible member of the household. They then moved onto the next-nearest household and repeated this process and so on until the cluster sample size was met. If there were no eligible or willing participants in a household, the team skipped that household. The resulting sample was therefore purposively selected but aimed to represent the target population.

For the provider survey, we aimed to sample all eligible providers within all selected slums. With support from knowledgeable community members, we initially mapped all formal and IHPs in each slum and then approached them and requested their participation. Again, the resulting sample was therefore purposively selected but aimed to represent the target population.

## Survey tools

We developed initial drafts of the two survey questionnaires using insights from previous surveys that the research team had conducted and from key literature sources, with some questions for the consumer survey also being drawn from the most recent Nigeria DHS questionnaire. Both questionnaires were pre-tested in a slum community in Enugu with six households (for the consumer questionnaire) and five providers (three informal and two formal—for the provider questionnaire). Data collectors provided feedback on the clarity and ease of understanding of the items in the questionnaires based on their observations while administering the questionnaires. We then finalized the two survey tools based on this feedback. Both questionnaires are available as [Supplementary materials](#).

While the two questionnaires contained many questions related to issues we wanted to explore for the wider project, in this paper, we just focus on those questions that related to providers' and consumers' views on whether the informal health sector should be linked to the formal health sector, and questions around how they thought that might best work. In addition, we collected data on key provider and consumer characteristics.

## Data collection and management

Data were collected in pairs, with one of the pair collecting data using a tablet and one via a paper version of the questionnaire. Following each day's data collection, each pair of data collectors would compare all responses for consistency, with

the field supervisor also carrying out a further cross-check for consistency. Following this, the electronic data were uploaded and added to the database, with the paper copy retained. Once the database was completed, the data were checked for anomalous or missing values. If any such values were found, then the data manager reviewed the paper copies and attempted to correct the issue, if possible. If correction was not possible, then any anomalous or missing values were left as they were.

## Outcomes and independent variables

All outcomes were based on consumer and provider responses to questions in the questionnaires that related to the issues of interest for this study. Broadly, these related to respondents' views on whether the informal health sector should be linked to the formal health sector, and, if so, how that would best work. All outcomes were treated as categorical, with their category levels based on categorizing the different sets of responses obtained to each question. [Table 1](#) provides details on the full category levels for all outcomes, but as described in the relevant results text and tables for some outcomes some category levels were merged for certain analyses to facilitate and simplify those analyses.

To explore how respondents' views differed in relation to key characteristics, we also used a range of independent variables in our analyses. For consumers, these related to their age, education level, employment status and marital status. For providers, this related to what broad type of provider they were, whether they had received any formal training, and their years of service provision. All the independent variables were categorical, and their category levels are given in the relevant results tables.

## Sample size

The provider survey aimed to sample all eligible providers in the selected slums as there were not expected to be more providers than we could feasibly interview across the study areas, but the consumer survey had to take a sample of households. The primary goal of the consumer survey (and provider survey) was descriptive, and all the responses to the questions in the questionnaire would result in categorical outcomes, specifically either binary, ordinal or multinomial outcomes, with the ordinal/multinomial outcomes being treated in practice as a series of binary outcomes (one per category level). Therefore, for the consumer survey, we based our sample size calculation on being able to estimate 95% confidence intervals for the percentage of consumers choosing any given category level, using the sample size calculation formula in the Demographic and Household Survey Sampling and Household Listing Manual. As we sought to describe many outcomes, we looked at the most conservative scenario where the percentage we sought to estimate was 50%. In that situation, assuming a design effect (deft) of 1.6 (which was typical of indicators from the Nigerian Demographic and Health Survey 2018) and targeting a 95% confidence interval width of  $\pm 0.098$  (based on a relative standard error of 0.05), we estimated that we needed a sample size of 1025 households/participants. This was then divided approximately equally between the eight slums (~128 households per slum).

## Statistical analysis

We describe key characteristics of the providers and consumers using standard sample statistics, specifically percentages

**Table 1.** Outcome details.

| Survey         | Question asked                                                                                                             | Full category levels based on possible responses                                                                                                                                                                                                                                                                                                                                               |
|----------------|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Consumers only | What aspects of the services of the informal providers would you want to be linked to the formal healthcare system?        | <ul style="list-style-type: none"> <li>• Data sharing</li> <li>• Training and other capacity building activities</li> <li>• Providing immunization services</li> <li>• Referral of patients</li> <li>• Supervision of activities</li> <li>• Laboratory diagnosis</li> <li>• Drug procurement</li> <li>• Joint meetings</li> <li>• Others</li> </ul>                                            |
| Consumers only | How do you think that it is a good strategy to link the informal with the formal healthcare providers?                     | <ul style="list-style-type: none"> <li>• Regulation</li> <li>• Accreditation</li> <li>• Training</li> <li>• Supervision</li> <li>• Provision of drugs to them</li> <li>• Making them to serve in government health facilities for some time (apprenticeship)</li> <li>• Others</li> </ul>                                                                                                      |
| Consumers only | What office or individual(s) will you want to coordinate the linkage of the formal with the informal healthcare providers? | <ul style="list-style-type: none"> <li>• Ministry of Health</li> <li>• Ward development committee</li> <li>• Traditional leaders</li> <li>• Religious leaders</li> <li>• Do not know</li> <li>• Not bothered</li> <li>• Others</li> </ul>                                                                                                                                                      |
| Consumers only | How will you want the linkage between the informal and formal health sector to be managed?                                 | <ul style="list-style-type: none"> <li>• Through government making a law to the effect</li> <li>• Simple oral agreement between the informal and formal sectors</li> <li>• Written contractual agreements between the informal and formal sectors</li> <li>• Inclusion of the linkage as part of government policy</li> <li>• Do not know</li> <li>• Not bothered</li> <li>• Others</li> </ul> |
| Providers      | What is your opinion about government/regulatory agencies accrediting and approving informal service providers?            | <ul style="list-style-type: none"> <li>• Strongly agree</li> <li>• Agree</li> <li>• Neither agree/disagree</li> <li>• Disagree</li> <li>• Strongly disagree</li> </ul>                                                                                                                                                                                                                         |
| Providers      | What aspect of your services would you want to be linked to the formal healthcare system?                                  | <ul style="list-style-type: none"> <li>• Data sharing</li> <li>• Training and other capacity building activities</li> <li>• Providing immunization services</li> <li>• Referral of patients</li> <li>• Supervision of activities</li> <li>• Joint meetings</li> <li>• Others</li> </ul>                                                                                                        |
| Providers      | What leadership structure will you want to lead the linkage of the formal with the informal healthcare providers?          | <ul style="list-style-type: none"> <li>• Ministry of Health</li> <li>• State Primary Health Care Development Agency</li> <li>• Ward development committee</li> <li>• Traditional leaders</li> <li>• Religious leaders</li> <li>• Do not know</li> <li>• Not bothered</li> <li>• Others</li> </ul>                                                                                              |
| Providers      | How will you want the linkage between the informal and formal health sector to be managed?                                 | <ul style="list-style-type: none"> <li>• Through government making a law to the effect</li> <li>• Simple oral agreement between the informal and formal sectors</li> <li>• Written contractual agreements between the informal and formal sectors</li> <li>• Inclusion of the linkage as part of government policy</li> <li>• Do not know</li> <li>• Not bothered</li> <li>• Others</li> </ul> |

Each row represents a separate outcome, with the full category levels for that outcome indicated in the final column.

and counts for categorical outcomes and medians and inter-quartile ranges for numerical outcomes.

To address our research questions using both the provider and consumer surveys, we computed two sets of inferential

results for all outcomes, which allowed us to explore the distribution of responses to our key questions for the overall target population and across key subgroups. As we wanted to describe these differences as they exist, primarily to inform

planning and policy, we did not adjust these estimates of association for any other independent variables (Fox et al. 2022, Lesko et al. 2022). First, for each outcome, we computed the percentage (and count) with which each question response (i.e. category level) measured by that outcome occurred and the associated 95% confidence intervals for each percentage, and we did this for both the overall sample and key subgroups, as defined by our categorical independent variables. Second, for each outcome, we computed how the percentage with which those responses differed (in terms of percentage points) between each category level compared to a logically chosen reference level, for those same categorical independent variables, and the associated 95% confidence intervals.

We computed all percentages, percentage point differences, and their 95% confidence intervals using model prediction methods (Long and Mustillo 2021), using functions from the R package *marginal effects* (Arel-Bundock et al. 2024), applied to generalized linear models with Bernoulli errors and logit links (i.e. binary logistic regression models). Specifically, for the overall estimates, we first fit logistic regression models to each outcome without any independent variables (i.e. intercept-only models). We then used the *avg\_predictions* function to compute the mean of the probability-scale outcome predictions for all observations, and the associated 95% confidence intervals. For the subgroup-specific estimates, we fit logistic regression models to each outcome with one model per independent variable. We then used the *avg\_predictions* function to again compute the mean of the probability-scale outcome predictions for all observations, and the associated 95% confidence intervals, within each category level, as defined by the relevant independent variable. We then used the *avg\_comparisons* function to compute the differences between the mean probability-scale predictions for all observations within each category level compared to the reference level, and the associated 95% confidence intervals.

We converted all measures from the probability scale to the percentage scale for presentation. All 95% confidence intervals were computed based on cluster-robust (HC3 version) standard errors (Cameron and Miller 2015), clustered at the level of the slum to account for the clustered sampling, computed via the delta method. We used R (version 4.4.1) statistical software for all analyses (R Core Team 2024).

## Results

The provider survey was carried out between 14 October 2022 and 3 December 2022 and the consumer survey was carried out between 19 October 2022 and 6 December 2022. For the provider survey, we approached 255 providers and all 255 agreed to participate, resulting in a complete sample of eligible providers among the sampled slums (subject to the accuracy of our initial mapping), and for the consumer survey, we approached 1025 households, and an eligible individual from all 1025 households agreed to participate.

As shown in Table 2, most consumers were female (96%) with just a small proportion being male (4%), with a median age of 31 years old. As described in the methods, the consumer survey intentionally targeted the primary female caregiver and households with women of child-bearing age and/or young children, although we allowed males from eligible households to be respondents if there was no eligible female, which

**Table 2.** Sociodemographic characteristics of consumers ( $N = 1025$ ).

| Characteristic                          |             |
|-----------------------------------------|-------------|
| Age                                     | 31 (21, 49) |
| Sex                                     |             |
| Female                                  | 95.9% (983) |
| Male                                    | 4.1% (42)   |
| Highest completed education level       |             |
| None                                    | 0.8% (8)    |
| Basic education                         | 23.4% (240) |
| Post basic education                    | 63.8% (654) |
| University                              | 12% (123)   |
| Marital status                          |             |
| Living with spouse                      | 89.6% (918) |
| Never married                           | 4.8% (49)   |
| Widowed                                 | 3.6% (37)   |
| Divorced/separated                      | 2.0% (21)   |
| Occupation                              |             |
| Informal sector employed                | 62.5% (641) |
| Business/self-employed                  | 18.1% (186) |
| Unemployed/homemaker/student            | 12.3% (126) |
| Formal sector employee (public/private) | 7% (72)     |

Data are median (2.5th and 97.5th quantiles) or % ( $n$ ). All variables have complete data apart from age which had two (0.2%) missing values.

explains the high proportion of female respondents. Most consumers lived with a spouse (90%). Most consumers had some level of formal education, most frequently up to post-basic education (64%), with very few having no formal education (0.8%), and most reported being employed, most frequently in the informal sector (63%).

Table 3 shows that most providers were part of the informal healthcare system (93%) and operated privately (95%), with the most frequent type of informal provider job title being patent medicine vendor (54%) followed by herbal medicine practitioners (16%), and the most frequent type of formal provider job title being community health worker/community health extension worker/community health officer (53%) followed by nurse/midwife (33%). No formal providers reported being the only member of staff at their organization, while 64% of informal providers were the only member of staff at their organization, and 35% of formal providers reported working at an organization with five or more members of staff, while just 4% of informal providers reported working at an organization with five or more members of staff. Formal providers tended to report having worked in their role for long than informal providers, with 29% of formal providers and 18% of informal providers reporting that they had worked in their role for <1 to 3 years, and the corresponding figures for reporting having worked in their role for >15 years were 53% and 23%. All informal providers reported that they offered treatment services to everybody but some informal providers did not, with 91% offering services to all ages and 5% only offering services to children and 4% only offering services to adults. About 77% of informal providers reported having received training for the work they do, and the corresponding figure for formal providers was unsurprisingly 100%.

When consumers were asked 'Do you think that it is a good strategy to link the informal healthcare providers to the formal healthcare system?' 92% (95% CI: 84%, 96%;  $n = 943/1025$ ) responded 'yes', while 6% (95% CI: 3%, 12%;  $n = 66/1025$ ) responded 'no' and 1.6% (95% CI: 0.4%, 6.4%;  $n = 16/1025$ ) respondent 'I don't know'.

**Table 3.** Characteristics of providers (*N* = 255).

| Characteristic                                                                     | % ( <i>n</i> ) |             |           |
|------------------------------------------------------------------------------------|----------------|-------------|-----------|
|                                                                                    | Overall        | Informal    | Formal    |
| <b>Formal or informal provider</b>                                                 |                |             |           |
| Informal                                                                           | 93.3% (238)    | 100% (238)  | 0% (0)    |
| Formal                                                                             | 6.7% (17)      | 0% (0)      | 100% (17) |
| <b>Public or private provider</b>                                                  |                |             |           |
| Private                                                                            | 94.5% (241)    | 100% (238)  | 17.6 (3)  |
| Public                                                                             | 5.5% (14)      | 0% (0)      | 82.4 (14) |
| <b>Provider job title</b>                                                          |                |             |           |
| Patent medicine vendor                                                             | 54.1% (138)    | 58% (138)   | 0% (0)    |
| Herbal medicine practitioner                                                       | 16.1% (41)     | 17.2% (41)  | 0% (0)    |
| Nurse/midwife                                                                      | 8.2% (21)      | 6.3% (15)   | 35.3% (6) |
| Bone setter                                                                        | 7.1% (18)      | 7.6% (18)   | 0% (0)    |
| Community health worker/community health extension worker/community health officer | 6.3% (16)      | 2.9% (7)    | 52.9% (9) |
| Traditional birth attendant                                                        | 2.4% (6)       | 2.5% (6)    | 0% (0)    |
| Pharmacist                                                                         | 1.6% (4)       | 1.7% (4)    | 0% (0)    |
| Other                                                                              | 4.3% (11)      | 3.8% (9)    | 11.8% (2) |
| <b>Number of staff at facility</b>                                                 |                |             |           |
| 1 (just the provider)                                                              | 59.2% (151)    | 63.4% (151) | 0% (0)    |
| 2                                                                                  | 24.7% (63)     | 24.4% (58)  | 29.4% (5) |
| 3                                                                                  | 7.1% (18)      | 5.9% (14)   | 23.5% (4) |
| 4                                                                                  | 3.1% (8)       | 2.5% (6)    | 11.8% (2) |
| 5+                                                                                 | 5.9% (15)      | 3.8% (9)    | 35.3% (6) |
| <b>Who the provider/facility serves</b>                                            |                |             |           |
| All ages                                                                           | 91.8% (234)    | 91.2% (217) | 100% (17) |
| Children only                                                                      | 4.7% (12)      | 5% (12)     | 0% (0)    |
| Adults only                                                                        | 3.5% (9)       | 3.8% (9)    | 0% (0)    |
| <b>Years worked in the role</b>                                                    |                |             |           |
| <1 to 3                                                                            | 28.2% (72)     | 29% (69)    | 17.6% (3) |
| >3 to 7                                                                            | 23.9% (61)     | 24.4% (58)  | 17.6% (3) |
| >7 to 15                                                                           | 23.1% (59)     | 23.9% (57)  | 11.8% (2) |
| >15                                                                                | 24.7% (63)     | 22.7% (54)  | 52.9% (9) |
| <b>Formally trained for the role</b>                                               |                |             |           |
| Yes                                                                                | 78% (199)      | 76.5% (182) | 100% (17) |
| No                                                                                 | 22% (56)       | 23.5% (56)  | 0% (0)    |

There were no missing values for any variable.

When consumers were asked about which service aspects of IHPs should be linked to the formal health system (Table 4), no single aspect appears to be overwhelmingly supported, with the top three supported aspects being ‘training and any other capacity building activities’ (61% [95% CI: 49%, 72%]), ‘supervision of activities’ (53% [95% CI: 38%, 67%]), and ‘referral of patients’ (44% [95% CI: 37%, 51%]). When they were asked about their preferred strategy for linking IHPs (Table 4), there was a clearer primary preference, with the top three supported strategies being training (75% [95% CI: 63%, 85%]), supervision (53% [95% CI: 39%, 68%]), and regulation (37% [95% CI: 31%, 43%]). When they were asked about their preferred leadership structure for linking the informal sector (Table 4), there was a clear and dominant preference for this to be led by the Ministry of Health (92% [95% CI: 84%, 96%]), with minimal support for any other model. Lastly, when they were asked about how such linkage should be managed (Table 4), there again a clear single preference for government legislation (54% [95% CI: 44%, 64%]), followed by ‘contractual agreements between the informal and formal sectors’ (20% [95% CI: 15%, 28%]), with limited support for other approaches.

**Table 4.** Consumers’ views on how the informal health sector could best be linked to the formal health system.

| Question/response                                                                                             | <i>n</i> | % (95% CI)           |
|---------------------------------------------------------------------------------------------------------------|----------|----------------------|
| <b>Which service aspects of informal providers should be linked?<sup>a</sup> (<i>N</i> = 959<sup>a</sup>)</b> |          |                      |
| Training and any other capacity-building activities                                                           | 590      | 61.5% (48.5%, 73.1%) |
| Supervision of activities                                                                                     | 504      | 52.6% (38%, 66.7%)   |
| Referral of patients                                                                                          | 418      | 43.6% (36.7%, 50.8%) |
| Data Sharing                                                                                                  | 339      | 35.3% (25.8%, 46.3%) |
| Drug procurement                                                                                              | 318      | 33.2% (22.3%, 46.1%) |
| Providing immunization services                                                                               | 204      | 21.3% (16.3%, 27.3%) |
| Joint meetings                                                                                                | 163      | 17% (9.7%, 28%)      |
| Laboratory diagnosis                                                                                          | 80       | 8.3% (5.3%, 12.8%)   |
| Other                                                                                                         | 3        | 0.3% (0.1%, 0.9%)    |
| <b>Preferred strategy for linking informal providers<sup>c</sup> (<i>N</i> = 943<sup>b</sup>)</b>             |          |                      |
| Training                                                                                                      | 711      | 75.4% (63.3%, 84.5%) |
| Supervision                                                                                                   | 504      | 53.4% (38.6%, 67.7%) |
| Regulation                                                                                                    | 348      | 36.9% (30.9%, 43.3%) |
| Provision of drugs to them                                                                                    | 338      | 35.8% (27%, 45.7%)   |
| Accreditation                                                                                                 | 200      | 21.2% (13.5%, 31.7%) |
| Apprenticeship in government health facilities                                                                | 130      | 13.8% (8.7%, 21.2%)  |
| Other                                                                                                         | 2        | 0.2% (0.1%, 0.8%)    |
| <b>Preferred leadership structures for the linkage<sup>c</sup> (<i>N</i> = 1025)</b>                          |          |                      |
| Ministry of health                                                                                            | 940      | 91.7% (83.7%, 96%)   |
| Ward development committee                                                                                    | 74       | 7.2% (4.2%, 12.2%)   |
| Religious leaders                                                                                             | 63       | 6.1% (3.2%, 11.3%)   |
| Traditional leaders                                                                                           | 55       | 5.4% (2.8%, 9.9%)    |
| Do not know/not bothered/other                                                                                | 11       | 2.5% (1.3%, 5%)      |
| <b>Preferred approach to managing the linkage<sup>d</sup> (<i>N</i> = 1025)</b>                               |          |                      |
| Through government making a law to the effect                                                                 | 556      | 54.2% (43.9%, 64.2%) |
| Written contractual agreements between the informal and formal sectors                                        | 208      | 20.3% (14.5%, 27.7%) |
| Inclusion of the linkage as part of government policy                                                         | 126      | 12.3% (8%, 18.3%)    |
| Simple oral agreement between the informal and formal sectors                                                 | 100      | 9.8% (6.8%, 13.7%)   |
| Do not know/not bothered/other                                                                                | 17       | 3.4% (1.5%, 7.7%)    |

See Table 1 for a full description of the questions and original categorization of the responses. There were no missing data for any outcomes. <sup>a</sup>The sample of consumers included in the analysis of this outcome was restricted to those consumers who responded ‘yes’ or ‘I don’t know’ to the question ‘Do you think that it is a good strategy to link the informal healthcare providers to the formal healthcare system?’. <sup>b</sup>The sample of consumers included in the analysis of this outcome was restricted to those consumers who responded ‘yes’ to the question ‘Do you think that it is a good strategy to link the informal healthcare providers to the formal healthcare system?’. <sup>c</sup>Multiple responses allowed to be given by respondents. <sup>d</sup>Only one response allowed to be given by respondents.

When providers were asked ‘Do you think it is a good strategy to connect or integrate the informal healthcare providers to the formal healthcare system?’ 86.7% (95% CI: 59.6%, 96.6%; *n* = 221/255) responded ‘yes’, while 13.3% (95% CI: 3.4%, 40.4%; *n* = 34/255) responded ‘no’. When asked their opinion about government/regulatory agencies accrediting and approving informal services (Table 5), there was clear support, with 91% (95% CI: 62.2%, 98.4%) responding ‘yes’. When asked about their view on which service aspects of IHPs should be linked (Table 5), no aspect was clearly most popular, but the top three most popular preferences were training and any other capacity building activities

**Table 5.** Providers' views on how the informal health sector could best be linked to the formal health system.

| Question/response                                                                                                                | n   | % (95% CI)           |
|----------------------------------------------------------------------------------------------------------------------------------|-----|----------------------|
| <b>Opinion about government/regulatory agencies accrediting &amp; approving informal service providers (N = 221<sup>a</sup>)</b> |     |                      |
| Strongly agree/Agree                                                                                                             | 201 | 91% (62.2%, 98.4%)   |
| Neutral/Disagree/Strongly disagree                                                                                               | 20  | 9% (1.6%, 37.8%)     |
| <b>Which service aspects should be linked?<sup>d</sup> (N = 218<sup>d</sup>)</b>                                                 |     |                      |
| Referral of patients                                                                                                             | 182 | 83.5% (76.1%, 88.9%) |
| Training and other capacity building activities                                                                                  | 168 | 77.1% (49.9%, 91.9%) |
| Joint meetings                                                                                                                   | 128 | 58.7% (32.9%, 80.5%) |
| Data sharing                                                                                                                     | 76  | 34.9% (13.8%, 64.1%) |
| Supervision of activities                                                                                                        | 62  | 28.4% (17.8%, 42.1%) |
| Providing immunization services                                                                                                  | 48  | 22% (14%, 32.9%)     |
| Other/don't know                                                                                                                 | 3   | 1.4% (0.2%, 10.6%)   |
| <b>Preferred leadership structure for the linkage<sup>c</sup> (N = 218<sup>d</sup>)</b>                                          |     |                      |
| Ministry of Health                                                                                                               | 137 | 62.8% (40.6%, 80.7%) |
| State Primary Health Care Development Agency                                                                                     | 53  | 24.3% (10.5%, 46.7%) |
| Others                                                                                                                           | 20  | 9.2% (5.1%, 16.1%)   |
| Do not know/do not care                                                                                                          | 8   | 3.7% (1.4%, 9.4%)    |
| <b>Preferred approach to managing the linkage<sup>c</sup> (N = 221<sup>a</sup>)</b>                                              |     |                      |
| Through government making a law to the effect                                                                                    | 103 | 47.2% (25.1%, 70.5%) |
| Written contractual agreements between the informal and formal sectors                                                           | 79  | 36.2% (21.7%, 53.9%) |
| Simple oral agreement between the informal and formal sectors                                                                    | 22  | 10.1% (3.9%, 23.5%)  |
| Inclusion of the linkage as part of government policy                                                                            | 5   | 2.3% (0.6%, 8.8%)    |
| Do not know                                                                                                                      | 9   | 4.1% (2.1%, 8.1%)    |

See Table 1 for a full description of the questions and original categorization of the responses. There were no missing data for any outcomes. <sup>a</sup>The sample of providers included in the analyses for all outcomes in the table was restricted to those providers who answered 'yes' to the question 'Do you think it is a good strategy to connect/integrate the informal healthcare providers to the formal healthcare system?'. <sup>c</sup>Only one response allowed to be given by respondents. <sup>d</sup>Multiple responses allowed to be given by respondents. <sup>e</sup>Same sample as described by <sup>a</sup> but 3 (1%) respondents did not respond to the question.

(83.5% [95% CI: 76.1%, 88.9%]), supervision of activities (77.1% [95% CI: 49.9%, 91.9%]), and referral of patients (58.7% [95% CI: 32.9%, 80.5%]). When asked about their preferred strategies for linking IHPs training was mentioned most often (75.4% [95% CI: 63.3%, 84.5%]), followed by supervision (53.4% [95% CI: 38.6%, 67.7%]) then regulation (36.9% [95% CI: 30.9%, 43.3%]). When asked about their preferences for leadership structures, the Ministry of Health was overwhelmingly preferred (91.7% [95% CI: 83.7%, 96%]), with minimal support for other options. Lastly, when asked about their preferred approach to managing the linkage there were no strongly supported preferences, but the most popular option was via government making a law to the effect (54.2% [95% CI: 43.9%, 64.2%]) followed by written contractual agreements between the informal and formal sectors (20.3% [95% CI: 14.5%, 27.7%]).

When looking at whether and to what extent consumer views on how the informal health sector could best be linked to the formal health system varied by key sociodemographic characteristics

(age, education level, and occupation status/sector), we found little evidence of any substantial differences in views across the sociodemographic groups that we looked at (Supplementary Tables S2–S5). However, we found that those with university-level education suggested slightly less frequently that referral of patients should be an aspect of any linkage compared to those with no or basic education (35% [95% CI: 28%, 44%] compared to 48% [95% CI: 40%, 57%], respectively—a difference of –13pp [95% CI: –24, –2]; Supplementary Table S2).

When looking at whether and to what extent provider views on how the informal health sector could best be linked to the formal health system varied by key characteristics (broad provider type, receipt of any formal training, and years of service provision), we also found little evidence of any substantial differences in views across the characteristic groups that we looked at (Supplementary Tables S6–S9). However, we did find that traditional medicine practitioners reported moderately less frequently that referral of patients should be an aspect of any linkage compared to patent medicine vendors (66% [95% CI: 45%, 82%] compared to 87% [95% CI: 78%, 93%], respectively—a difference of –21pp [95% CI: –40, –2]) and that providers who had received any formal training reported moderately more frequently that referral of patients should be an aspect of any linkage compared to those who had never received any formal training (86% [95% CI: 75%, 93%] compared to 68% [95% CI: 52%, 80%] respectively—a difference of 18pp [95% CI: 2, 34]). Formal providers also reported substantially less frequently that training and other capacity building activities should be an aspect of any linkage compared to patent medicine vendors (49% [95% CI: 18%, 81%] compared to 88% [95% CI: 67%, 96%] respectively—a difference of –39pp [95% CI: –72, –7]). While those with >4 to ≤10 years of service provision reported slightly less frequently that that training and other capacity-building activities should be an aspect of any linkage compared to those with ≤4 years of service provision (74% [95% CI: 48%, 89%] compared to 80% [95% CI: 50%, 94%], respectively—a difference of –6pp [95% CI: –12, –1]). Lastly, we also found that formal providers reported substantially more frequently that the Ministry of Health should lead any linkage compared to patent medicine vendors (80% [95% CI: 53%, 94%] compared to 57% [95% CI: 38%, 75%])—a difference of 23pp [95% CI: 5, 41]).

## Discussion

The results highlight the very high level of support from both consumers and providers for linking IHPs to the formal healthcare system and that both healthcare consumers and providers recognize the potential benefits of such linkages, particularly in improving access to and coordination of care. Similar findings have been reported in previous studies conducted in Nigeria and sub-Saharan Africa, which explored perceptions of integrating IHPs into the formal health system (Lees et al. 2012, Sieverding and Beyeler 2016). While these studies, like ours, primarily document beliefs about the value of integration, they lay credence to the opinion that these linkages could improve service delivery, even if further empirical evaluation of such interventions is needed.

Regarding the service aspects and strategies for the linkages, consumers and providers both reported training, capacity-building, supervision, and referral systems as the

most highly favoured approaches. This is consistent with the IPCHS strategy of reorienting the model of care, which calls for the training and capacity-building of healthcare workers to align with patient-centred care (WHO 2016). Our findings resonate with Ahmed *et al.* (2009), an empirical study focused on IHPs in Bangladesh, which highlights that these providers often lack adequate knowledge and training to deliver basic services but could significantly improve their practices through targeted capacity-building and supportive supervision. Similarly, Lees *et al.* (2012), a review of HIV care in sub-Saharan Africa, emphasizes the need for both ‘actor-oriented’ and ‘systems-oriented’ linkages between formal and informal care providers, suggesting that such partnerships could enhance coordination and knowledge transfer.

The importance of linked referral systems in improving healthcare delivery is further supported by Das *et al.* (2024), who conducted a systematic review of interventions targeting IHPs in LMICs. Their findings highlighted those multifaceted interventions including training and referral services, improved IHPs’ practices and strengthened their integration into the broader healthcare system. Referral systems were noted as a critical component of successful interventions, facilitating timely access to higher levels of care and addressing service delivery gaps.

These priorities are in line with coordinating services—another key component of IPCHS, which focuses on promoting seamless care across different sectors, ensuring that IHPs can effectively collaborate with formal healthcare workers. These findings have specific implications for policy and practice. They highlight the need for tailored capacity-building programmes for IHPs, mechanisms for ongoing supervision and mentorship, and the establishment of robust referral pathways to bridge the gap between informal and formal providers. Policymakers should prioritize the formal recognition of IHPs and invest in creating functional collaborations that enhance care coordination and information sharing. These measures can improve healthcare access and quality in urban slum settings, where IHPs often serve as the first point of care.

Specifically, training programmes for IHPs are increasingly recognized as a way to improve healthcare quality in settings where formal medical professionals are scarce. Multifaceted training interventions can enhance basic clinical skills, disease management, referral practices, and record-keeping (Das *et al.* 2024). These programmes often focus on recognizing and managing common illnesses (e.g. malaria, diarrhoea, respiratory infections), wound care, and hygiene, showing improvements in correct case management and adherence to clinical protocols (Das *et al.* 2016, 2024). Interventions frequently include guidance on when and how to refer patients to formal healthcare facilities and on maintaining basic health records, supporting better continuity of care (Das *et al.* 2016, 2024, Thapa *et al.* 2021). While some programmes address ethical issues and appropriate medication use, evidence suggests that training does not always reduce unnecessary prescriptions or antibiotic use (Das *et al.* 2016, 2024). Certification, though not universally implemented, has been suggested as a way to standardize care quality and increase provider credibility (Das *et al.* 2016, 2024).

Another finding from the current study is that consumers and providers showed a clear preference for the Ministry of Health to lead this integration, with over 90% of both consumers and providers supporting this leadership structure. This overwhelming consensus aligns with the IPCHS strategy

of strengthening governance and accountability. Furthermore, the preference for government legislation as the method for managing the linkage by both consumers and providers suggests a desire for a structured and enforceable framework to guide integration, rather than informal agreements or piecemeal interventions. It reflects the recognition of the need for structured governance and legal frameworks for regulation and oversight to ensure the effectiveness and sustainability of these linkages. These findings resonate with similar research by the WHO, which emphasized the pivotal role of government authorities, particularly the Ministry of Health, in healthcare coordination and health systems strengthening, as observed in various contexts, including examples such as Zambia and Paraguay (Hanney *et al.* 2020).

This preference for the Ministry of Health to lead or coordinate the linkage between IHPs and the formal health system implies that the Ministry needs to develop clear strategies, allocate resources, and ensure accountability (Sudhinaraset *et al.* 2013, Odii *et al.* 2024, Onwujekwe *et al.* 2025). Effective integration requires leveraging existing primary healthcare infrastructure and collaborating with stakeholders (Sieverding and Beyeler 2016, Thapa *et al.* 2021, Odii *et al.* 2024). Engaging professional associations and community leaders can enhance collaboration and trust (Brahmachari *et al.* 2024, Odii *et al.* 2024, Onwujekwe *et al.* 2025). While IHPs play a significant role in primary care, maternal and child health, and infectious disease management, many collaborations remain informal and undocumented, limiting their potential impact.

Our study found minimal variation in consumer and provider views on linking the informal and formal health sectors based on sociodemographic characteristics or key provider attributes. These findings correspond with research by Prieto and Alonso (2000), who found that preferences related to health were consistent and independent of sociodemographic variables, including gender, age, and social class, in various populations. This suggests that, in this context, health preferences related to integration appear to be relatively stable across different demographic groups.

However, some clear patterns emerged among herbal medicine practitioners, who were less inclined to favour patient referrals as part of the linkage compared to patent medicine vendors. These insights emphasize the need for culturally sensitive approaches, as reflected in the IPCHS pillar of creating an enabling environment, which calls for the adaptation of policies to meet the diverse needs of different healthcare providers and communities. The reluctance among traditional medicine practitioners, as seen in South Africa (Mutola *et al.* 2021) was attributed to a lack of formal regulation and certification. Mutola *et al.* (2021) suggested that for successful integration, there is a need for governmental and institutional support, including the establishment of regulatory frameworks that validate traditional practices. This could foster trust and collaboration between traditional and biomedical practitioners, facilitating smoother linkages between both systems.

Additionally, concerns about losing patients to the formal healthcare system, a finding noted in broader studies on IHPs in LMICs, highlight the economic insecurities associated with referrals (Sudhinaraset *et al.* 2013). To address this, process interventions fostering dialogue and collaboration between formal and IHPs have been recommended, aiming to build trust through better communication and mutual

understanding. Tailoring linkage strategies to local contexts through inclusive co-creation with stakeholders—including formal providers and IHPs, policy makers, and the communities they serve—can ensure that interventions are sustainable and responsive to diverse needs.

To facilitate referrals, clear referral criteria and protocols should be established, IHPs should be provided with referral forms and contact information for formal facilities, a system for tracking referrals and ensuring follow-up care should be created, and mobile technology could be used to facilitate referrals and communication (Hysong et al. 2011, Goodarzi et al. 2023).

These findings have significant implications for health policy, particularly in countries with large informal healthcare sectors. The strong support for training and supervision points to a need for programmes that can provide ongoing education and oversight for IHPs, ensuring that their practices align with formal healthcare standards. Given the preference for government leadership and legislation, policymakers should consider developing clear regulatory frameworks that define the roles, responsibilities, and standards for IHPs.

Potential regulatory models could include licencing or registration of IHPs, accreditation of IHP practices based on certain standards, community-based monitoring and oversight, and partnerships between formal healthcare providers and IHPs to facilitate referrals, recordkeeping, and ensure quality (Ahmed et al. 2009, Abimbola et al. 2016). However, enforcement challenges and the risk of corruption often undermine regulatory approaches. Community-based strategies offer promising alternatives but are also limited in their reach and effectiveness, highlighting the need to augment and support these efforts to overcome persistent obstacles (Abimbola et al. 2016).

While our findings align with previous research highlighting the potential benefits of linking IHPs to the formal health system, this study makes certain novel contributions. First, it provides novel evidence on the views of both consumers and providers in Nigerian urban slums, offering a comprehensive understanding of the perspectives of those most directly affected by integration efforts. Second, it identifies specific service aspects and strategies for linking IHPs that are highly favoured by both consumers and providers, providing valuable guidance for policymakers and practitioners. Third, it highlights the strong preference for Ministry of Health leadership and government legislation in managing the linkage, underscoring the importance of structured governance and legal frameworks. A key strength of this study is its large sample size, which allowed us to generate robust and representative findings for this setting. Another strength is its focus on both consumer and provider perspectives, providing a more complete picture of the contextual issues associated with integrating IHPs.

### Study limitations

Our study has a number of obvious limitations. First, although we aimed to obtain samples that were representative of our intended target populations, we were not able to use probability sampling methods. Therefore, although we designed our sampling approaches to generate representative samples, they involved purposive selection of clusters and participants. Consequently, our samples are unlikely to be as representative of our intended target populations as they would be if we had been able to use probability sampling methods. Second, as our findings rely on self-reported responses, they are of course also likely to be affected,

to some degree, by common biases affecting such study designs, particularly social desirability bias. Third, although we sampled all the eligible providers in all the selected slums for our provider sample, the sample size was quite small, restricting how generalizable the findings were to the wider target population (given the resulting relatively wide confidence intervals around the estimates). Fourth, the consumer survey focused on female respondents from households with women of childbearing age and/or young children. This approach was intentional, as such women are typically the main healthcare decision-makers and frequent users of health services in urban slum settings. However, this focus may limit the generalizability of our findings to male consumers or other household members who also influence healthcare decisions. Finally, while these findings provide valuable insights into the preferences of consumers and providers, they do not capture the perspectives of policymakers or other key stakeholders who may have a role in shaping healthcare policy and regulations. Future research should aim to explore the perspectives of policymakers and stakeholders and consider the broader healthcare ecosystem to develop comprehensive strategies for integrating IHPs into the formal system.

### Conclusion

In conclusion, our study provides valuable insights into the perspectives of consumers and providers in Nigeria on linking the informal health sector to the formal system. The study findings align with key strategies of the IPCHS framework, particularly in terms of strengthening governance, reorienting care models, coordinating services, and creating enabling environments. The path to enhancing healthcare access and quality in underserved areas in Nigeria through the integration of IHPs into the formal health system is clear. This effort requires the collective engagement of researchers, policymakers, and healthcare practitioners to translate these findings into practical, contextually appropriate interventions. Co-creation of the interventions should be done between the IHPs and the Nigerian government, particularly the Ministry of Health, for effective and sustainable linkages.

### Acknowledgements

This research was funded by UK aid from the British government through the Community-led Responsive and Effective Urban Health Systems (CHORUS) project. We also acknowledge the individuals and communities who participated in this study for their time and valuable insights.

### Supplementary data

Supplementary data is available at [Health Policy and Planning](#) online.

### Author contributions

Conception or design of the work—O.O. Data collection—I.O., O.O. Data analysis and interpretation—J.P.H., I.O., O.O. Drafting the article—I.O., J.P.H. Critical revision of the article—I.O., J.P.H., O.O. Final approval of the version to be submitted—all named authors approved the paper prior to submission.

## Reflexivity statement

This paper is the result of a collaborative effort among three authors with distinct academic and professional backgrounds. The lead author is a female junior researcher and doctorate student of Nigerian origin. She is joined by a male Lecturer in Medical Statistics at the University of Leeds, and a male Professor of Health Economics and Policy at the University of Nigeria. This diverse team includes emerging and established researchers, fostering a balanced perspective on integrating informal healthcare providers into formal health systems. We prioritized inclusivity and actively sought input from various stakeholders to ensure our findings reflect a broad range of experiences and perspectives.

## Ethical approval

This research was approved by the University of Leeds School of Medicine Research Ethics Committee with reference number: MREC 21-009 and the Health Research Ethics Committee of the University of Nigeria Teaching Hospital Enugu with reference number: NHREC/05/01/2008B-FWA00002458-1R B00002323. Prior to administering the questionnaires, written informed consent was obtained from all participants. Their participation was voluntary, and they were fully informed about the study's purpose, their roles, and their rights, including the option to withdraw at any point during data collection or before the analysis began.

## Conflict of interest

The authors declare no conflict of interest.

## Funding

This work was supported financially by the UK aid from the British government (Grant 301132) through the Community-led Responsive and Effective Urban Health Systems (CHORUS) project in Nigeria. However, the views expressed in this publication are solely those of the authors and do not necessarily reflect the official policies of the UK government.

## Data availability

The data supporting the results of this study are held by the Health Policy Research Group, University of Nigeria. While these data are not publicly accessible due to certain restrictions, they can be obtained from the corresponding author, Iheomimichineke Ojiakor, upon request and with approval from the Health Policy Research Group.

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