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The importance of values in a community-based response to malaria in Santo Domingo, Dominican Republic: results from a longitudinal, mixed-methods study

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ABSTRACT

Trust and other values are essential for community engagement but their role in intervention outcomes is less understood. The objective of this study was to explore values in a community-based intervention for malaria control in Santo Domingo, Dominican Republic. The study used an exploratory, mixed-methods design that began in 2020 with a cross-sectional survey of 489 households. The survey measured trust for neighbors, neighborhood associations, health system actors, and the national government. Ordinal alpha, exploratory factor analysis, and ordinal logistic regression tested scale reliability, dimensionality, and significant associations. Then, a two-year, qualitative phase collected 66 interviews from 39 key informants recruited through theoretical, snowball, and referral sampling based on their insight as malaria patients, neighborhood residents, and community health workers. An iterative approach and grounded theory guided thematic analysis. Reliability of the trust module was acceptable (ordinal $\alpha = 0.70$). Household survey participants rated public and private institutions as "very trustworthy," while neighbors and neighborhood associations were most frequently considered "somewhat trustworthy." In qualitative analysis, companionship, reciprocity, and "showing face" fostered a virtuous circle linking participation, morale, and timely diagnosis and treatment. Quantitative and qualitative results suggest two domains of values: one in which trust links people and institutions, and the other in which values of solidarity and reciprocity connect people to each other. Both domains contributed to the intervention. The study provides a nuanced picture of trust and values in interventions and encourages thinking of community initiatives as "projects of mutual creation" with values at the center.

1. Introduction

1.1. Community engagement, values, and "what matters most"

Community engagement refers to practices that establish and maintain relationships with stakeholders in a given health project (King et al., 2014). Much of the discussion around community engagement springs from ethical dilemmas encountered between expert and "beneficiary" communities. Global health institutions operate from a position of financial, scientific, and political power distant from sites where health interventions take place. Often unquestioned are assumptions about values that legitimize health programs and interventions (Fassin, 2012; Feierman et al., 2010). The values of global health actors and institutions can be so deeply embedded – and presumed to be universal – that little thought is given to how local communities articulate their own ethical aspirations and moral experience (Stewart et al., 2010). *Moral experience* refers to the "register of everyday life" in which ordinary people strive to uphold and maintain what matters most to them, such as employment or a career, social status and responsibilities to others, or a relationship with the divine (Kleinman, 1998; Yang et al., 2007). In short, "certain things matter, matter greatly, even desperately" (Kleinman, 1998, p. 360). In local worlds, values structure moral codes

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that explain what is important, what people should or should not do, and what is at stake. Tensions may emerge as health interventions unfold in these contexts and local values are overlooked or undermined, carrying important implications for health initiatives, theories of community engagement, and ethical responsibilities (Biehl and Petryna, 2013; Kleinman et al., 1997; Reynolds and Sariola, 2018; Stewart et al., 2010).

1.2. Community engagement for malaria in Santo Domingo, Dominican Republic

This study explores these issues in the context of malaria control in Santo Domingo, capital of the Dominican Republic. Haiti and the Dominican Republic share the last malaria-endemic island in the Caribbean. Infection occurs from bites of *Anopheles albimanus* mosquitoes carrying *Plasmodium* parasites, nearly all of which on the island are *P. falciparum*. Prevalence is low (<1%) and transmission highly focal in both countries, and unlike other regions of the world, *P. falciparum* is sensitive to chloroquine. These features favor the binational goal of malaria elimination on the island (WHO, 2007).

In the last decade, malaria in the Dominican Republic declined in rural areas but increased in urban and peri-urban neighborhoods of Santo Domingo (pop. 3.6 million). From 2015 to 2020, the capital region accounted for 76% of all cases in the country. Transmission was almost entirely concentrated in two foci of the city: La Ciénaga and Los Tres Brazos.

At the same time, important malaria policy changes took place. Starting in 2016, the country's National Malaria Program (NMP) began decentralizing responsibilities to local health area districts, reflective of a decades-long, neoliberal agenda throughout Latin America (Bossert et al., 2000) and the global trend of task-shifting clinical responsibilities for malaria to local communities (Druetz et al., 2015). Meanwhile, financing and planning for malaria elimination on the island (Herrera et al., 2015; Tolchinsky, 2015) and in other countries and regions (Eckl, 2017) take place within complex public-private partnerships between national governments and external organizations. In effect, the ground-level response to malaria in Santo Domingo depends on local communities but the power to direct resources and formulate interventions rests with powerful but distant institutions.

In line with the country's decentralization plan and supported by external organizations, the NMP responded to outbreaks by launching a community health worker (CHW) intervention in 2019. In both foci, a cohort of selected residents were recruited as CHWs and trained for active (door-to-door) case search following the Pan-American Health Organization's (PAHO) recommendation of diagnosis and treatment within three days of symptom-onset (PAHO, 2019) and World Health Organization (WHO) guidelines on community case management (WHO, 2004). CHWs were expected to visit 200 households per week, inquire about sick residents, perform rapid diagnostic tests, and initiate treatment or referral (Ministerio de Salud Publica y Asistencia Social, 2023). They received a small stipend and supervision from the NMP.

The intervention was successful by certain measures. Malaria declined significantly across the metropolitan region, from a peak of 1,243 reported cases in June 2019 to only 6 reported cases in December 2022. Notably, this period also corresponded to the onset of the COVID-19 pandemic. Government-mandated restrictions and safety measures led to reduced household visits by CHWs. From June 2019 to March 2020 (the beginning of COVID-19 restrictions), 43% of all reported malaria cases in greater Santo Domingo were diagnosed by CHWs, who initiated treatment 1.5 days earlier, on average, than in formal health structures or other active case search efforts. Nearly all cases detected by CHWs (83%) were done during active case search, and 96% of all positive cases detected by CHWs began treatment within 24 h of symptom-onset (Michelén Ströfer et al., 2024). During the COVID-19 restriction period (March 2020–July 2021), CHWs detected 14% of all malaria cases; in the post-restriction period (August 2021–December 2022), they detected 18% of cases. Since 2022, few cases have been detected in either focus. While it is impossible to attribute the decline in malaria to the CHW intervention alone, these metrics suggest that it contributed to that decline, particularly during the worst period of the outbreak (2019–2020).

But do these numbers tell the full story? Absent in this portrayal is analysis of the social world of the intervention and consideration of people's values. Previous qualitative studies have hinted at the importance of values in this context. Trust (*confianza*) among community members, CHWs, and the NMP was important in the response to an outbreak from 2015 to 2016 (Valdez et al., 2020). Values of solidarity and service to others motivate interest and participation in malaria activities (Keys et al., 2021). In short, malaria outbreaks occur against a backdrop of social obligations and relationships, a reality that is under-studied in the literature on community engagement for malaria. While community engagement is paradigmatic in the global malaria agenda (Atkinson et al., 2011; Baltzell et al., 2019; Raj Awasthi et al., 2021), few, if any, studies consider how values have a role in interventions.

1.3. Study justification and objectives

To borrow from Latour (2005), "the social" can be a conceptual blackbox when applied to malaria, undergoing shifts as anthropologists and others push the boundaries of what "the social" means (Brown, 2017). Social scientists have situated malaria in its historical and political context (e.g., Packard, 2007; Packard and Brown, 1997), focused on social determinants such as cultural beliefs and behavior to strengthen programs (e.g., Jones and Williams, 2004; Mwenesi, 2005; Panter-Brick et al., 2006) and applied new critical frames such as multispecies entanglements, nature-cultures, enactment, and multiplicity (e.g., Keys, 2022; Chandler and Beisel, 2017; Chandler et al., 2012; Kelly and Lezaun, 2014). The literature on community engagement for malaria has taken a largely applied approach (e.g., Baltzell et al., 2019; Raj Awasthi et al., 2021; Whittaker and Smith, 2015), emphasizing trust, transparency, collaboration, and inclusiveness. Yet there appear to be no published studies with empirical findings about the role of values in community-based interventions for malaria or implications for elimination strategies.

This study responds to this knowledge gap by asking: what values were important to people in these communities? How did values shape their experience with the intervention? And how did the intervention come to depend on those values, if at all? Answering these questions brings attention to overlooked aspects of community-based interventions and responds to debates over power dynamics and unquestioned assumptions in community engagement, whether for malaria or other health conditions. The study concludes with programmatic implications and reflects on community interventions as "projects of mutual creation" that hold values at the center.

2. Methods

2.1. Urban context of Santo Domingo

The population of greater Santo Domingo has exploded over the last decades as people from the country's interior migrate to the city in search of a better life. The population surge in both La Ciénaga and Los Tres Brazos is described as *una invasión*, where people with little means purchase small land parcels in under-the-table agreements from entrepreneurs, leaving them with ambiguous legal rights and vulnerable to evictions. For work, people circulate in the cash economy and rely on informal systems of credit among neighbors or in *colmados* (corner stores) to acquire food and other necessities. People decry lack of electricity, sewers, paved streets and sanitation. Neighborhood associations petition municipalities for basic services. For most, healthcare is found in crowded, under-resourced public hospitals and clinics.

2.2. Study overview

Drawing on previous research, the study followed a mixed-methods, sequential design that began with a quantitative survey in late 2020 and transitioned into a two-year, qualitative phase from 2021 to 2023 (Fig. 1). The survey focused on malaria knowledge, attitudes, and practices (KAP) and perceptions of trust. The objective of the qualitative phase was to identify and explain social processes that either facilitated or hindered community engagement for the CHW intervention. Qualitative data consisted of interview transcripts and field notes compiled by a local ethnographer who followed a cohort of key informants. After data collection stopped in 2023, quantitative and qualitative datasets were analyzed and compared.

2.3. Quantitative survey and analysis

The survey used a single-stage, household-based, cross-sectional design. The sampling frame was composed of twenty neighborhoods with highest incidence from January 1 to November 8, 2020. Twelve neighborhoods were in Los Tres Brazos and eight in La Ciénaga. Total population of the sampling frame was approximately 705,000. A desired sample size of 480 was based on a "20-by-20" design with presumed 80% response rate. To select households in each neighborhood, surveyors used a sampling interval after starting from a randomly selected geo-reference point. At each household, one adult resident was invited to complete the survey questionnaire. In total, 489 individuals participated from 501 selected households (response rate 98 %).

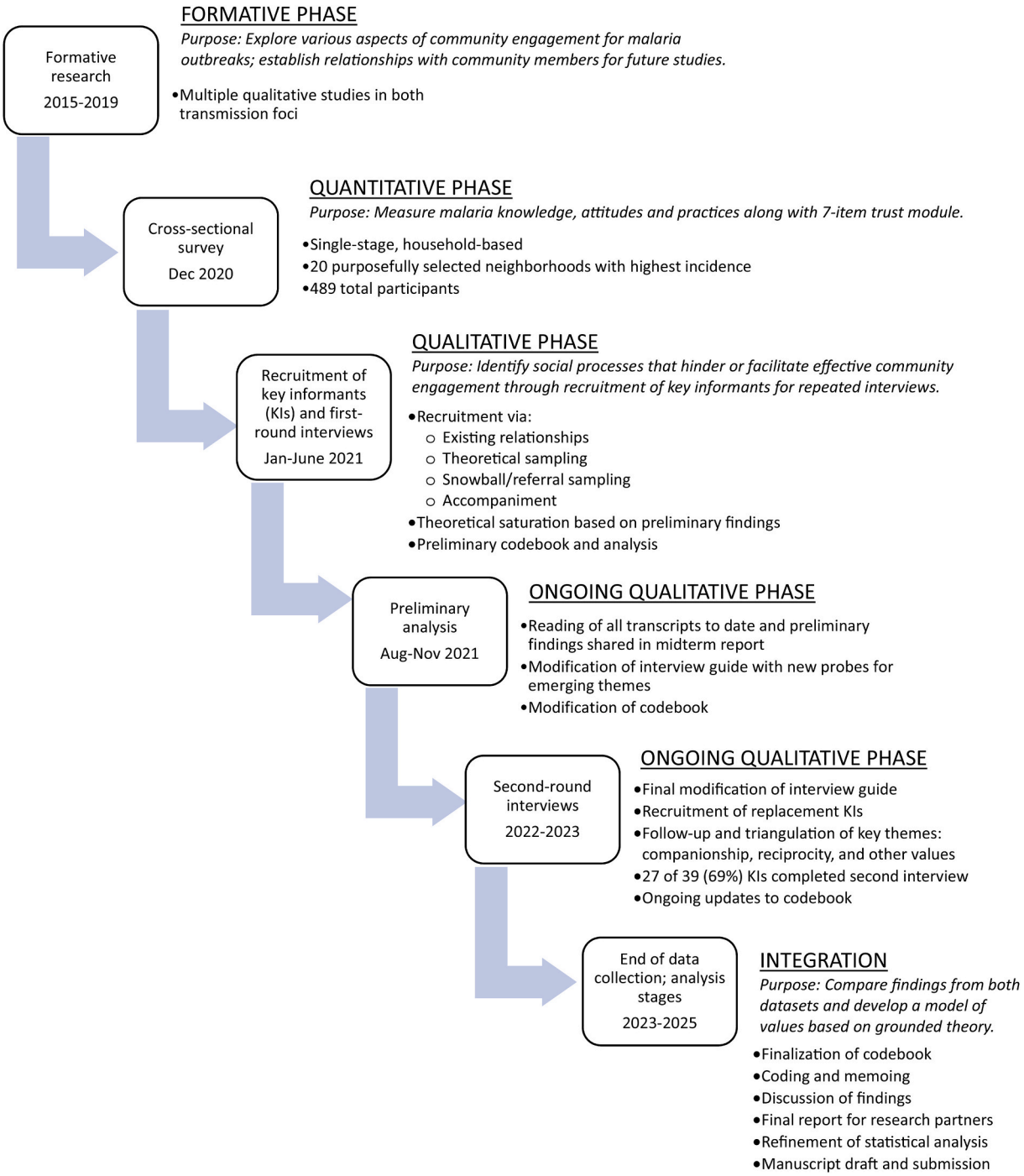

Fig. 1. Overview of study design.

The trust module was inspired by the Latin American Public Opinion Project (LAPOP; Vanderbilt University, 2024). People were asked to rate their trust in seven domains: neighbors; local neighborhood association; primary care clinics; public hospitals; private hospitals; the Ministry of Health; and the national government. An example question was, "How much do you trust your neighbors?" Participants then ranked their level of trust using LAPOP's four-point Likert scale from 0 ("Untrustworthy") to 4 ("Very trustworthy"). Questions were piloted and adjusted beforehand.

Quantitative analysis began by assessing scale properties of the trust module. Distributions of responses were examined for missing and "Don't know" responses. Univariate analysis was done to determine significant predictors of answering "Don't know" (coded as 1) as the outcome for each of the seven trust variables. Responses of "Don't know" were then set to missing to facilitate subsequent analyses.

Exploratory factor analysis (EFA) generated hypotheses about underlying constructs for trust. In EFA, polychoric, rather than Pearson, correlation matrices were used given the ordinal structure of the trust variables. "Don't know" responses were removed for EFA because they can distort correlations. Imputation was inappropriate since the response "Don't know" indicated lack of knowledge about a given institution or social actor, rather than a scale point. The final dataset for EFA had 176 complete observations. A correlation heatmap checked multicollinearity. Sphericity and sampling adequacy were tested using KMO and Bartlett tests, respectively. The number of factors was based on a scree plot of eigenvalues, parallel analysis, and cumulative variance. Oblique rotation was used since factors were expected to be correlated. After rotation, communalities of trust variables were checked; in a sequential process, variables were removed one-by-one if communality was <0.3. Ultimately, trust in primary care clinics, private hospitals, and public hospitals were removed. Final EFA was based on four remaining trust variables. Ordinal alpha, conceptually equivalent to Cronbach's but more appropriate for ordinal data, was based on the final, four-item polychoric correlation matrix.

Univariate ordinal logistic regression (OLR) checked for significant predictors of responses to each of the seven trust variables. Since OLR assumes that the outcome variable (trust) has ever-increasing "levels," responses of "Don't know" and Missing were again removed. Then, 42 univariate, OLR tests were done to check the odds ratios and significance of six predictor variables in relation to each trust variable. Predictors were: (1) La Ciénaga vs. Los Tres Brazos; (2) low vs. high incidence; (3) male vs. female; (4) age (a continuous variable in years); (5) less than secondary education vs. secondary or higher; and (6) bottom two wealth quintiles (poorest) vs. top three quintiles (wealthiest), using a score based on ownership of household assets (described in Keys et al., 2023).

Multivariate OLR models were made for five trust variables for which a predictor was significant in the univariate analysis: trust in neighbors, primary care clinics, public hospitals, Ministry of Health, and national government. Multivariate OLR determined if significance remained consistent after controlling for other predictors. Only significant predictors in the univariate analysis were included in multivariate models.

A similar process was done for another survey question that asked if people care about each other in the neighborhood. Responses followed a 5-point Likert scale ranging from zero (Never) to four (Always). Crosstab analysis checked distributions. Responses of "Don't know" and Missing were removed. Then, the same univariate and multivariate pathway was done between the six predictor variables and ordinal responses to the "Interpersonal care" variable.

Spearman's rank coefficient was calculated to assess correlation between "Trust in neighbors" and "Interpersonal care." Coefficients range from -1 (indicating a perfectly negative relationship) or 1 (perfectly positive).

In all tests, significance was defined as $p < 0.05$. EFA and calculation of ordinal alpha used the *psych* package in R v.4.2.3. Stratified analysis, logistic modeling, and calculation of Spearman's rank were done using STATA v.14.2.

2.4. Qualitative data and analysis

Qualitative data were collected through accompaniment, interviews, and reflective writing by a local ethnographer affiliated with the NMP.

The interview guide was based on theoretical literature, results from past studies, and research goals. It was sub-divided according to profiles of KIs: (1) community members and former patients; (2) clinicians and professionals; (3) CHWs; and (4) community leaders. Core domains included general life, illness and treatment-seeking, and experiences with the CHW intervention; challenges in the clinical setting; experiences of CHWs; and challenges at the programmatic level. The guide was piloted before first-round interviews. The guide was modified in late 2021 and late 2022, adding questions and probes for emerging themes.

KIs were sampled along theoretical, snowball, and referral pathways. The goal was a heterogenous cohort of KIs whose lives and experiences shed light on community engagement. They included malaria patients, neighborhood residents, CHWs, clinicians, community leaders, field technicians from the NMP, and other professionals. At the same time, steps were taken to mitigate the impact of the ethnographer's affiliation with the NMP by balancing recruitment pathways and being mindful of overlooking people from disadvantaged circumstances (e.g., those with less connection to the malaria program or with less social capital).

Inclusion criteria stipulated that individuals were adults (>18 years), consented to periodic visits and audio-recorded interviews, and felt comfortable speaking at length about their lives and experiences. Most KIs were recruited from January–June 2021. The ethnographer began meeting CHWs, neighborhood leaders, and others to develop rapport and become familiar with the context. Recruitment proceeded in parallel with preliminary analysis, as co-investigators monitored the formation of the cohort and read interview transcripts as they became available, providing guidance to address recruitment gaps (such as underrepresented profiles or adding other profiles to explore concepts). Recruitment continued until reaching thematic saturation, or once major conceptual categories identified in preliminary analysis were covered by the cohort.

In total, 39 KIs were recruited (Table 1). Nine (23.1%) were recruited through preexisting relationships with community contacts, four (10.3%) through snowball and referral sampling, and 23 (59.0%) during accompaniment. That nearly half (n = 18; 46.2%) were CHWs resulted from interest in the lives and work of CHWs and the need to explore values, trust, and morale, themes that arose during the iterative cycle. Remaining KIs were community residents (n = 6), community leaders (n = 7), clinicians (n = 3), entomologists (n = 2), and malaria program field technicians (n = 3). Seven of the 39 KIs were former patients. The team purposefully recruited a mix of patients to explore illness experiences. Three patients were men and four women, with an average age of 47 years (range, 35–65). Five were from La Ciénaga and two from Los Tres Brazos. Four were diagnosed in health structures and three were diagnosed in the community during active case search. Four had a time-to-diagnosis between 1 and 2 weeks and five had visited multiple health structures before receiving an accurate diagnosis.

Most KIs (n = 27; 69.2%) completed two separate interviews spaced on average 16 months apart. In total, 66 interviews were collected, transcribed, and analyzed in original Spanish using MAXQDA software v.22.1.0.

A grounded theory approach identified concepts and categories that, once integrated, supported an explanatory model for values (Glaser and Strauss, 1967). During preliminary analysis, co-investigators began developing a codebook, starting with etic ("outsider") codes. These codes captured three broad domains of interest: malaria explanations, treatment-seeking, and community engagement, a domain broken into two parent codes: facilitator or obstacle.

The codebook was modified iteratively to *understand* (rather than only *identify*) issues and concepts (Hennink et al., 2017). As more interviews were collected, an eye was kept on emic ("insider") perspectives. Attention was given to key phrases, vocabulary, and repeated

Table 1
Background characteristics of key informants, 2021–2023.

Role	La Ciénaga n (%)	Los Tres Brazos n (%)	TOTAL n (%)
General community resident	4 (23.5)	2 (10.5)	6 (15.4)
Neighborhood association president or community leader	2 (11.8)	5 (26.3)	7 (17.9)
[a]Community health worker (CHW)	9 (52.9)	9 (47.3)	18 (46.2)
Clinician or public health professional	2 (11.8)	1 (5.3)	3 (7.7)
Entomologist	0	2 (10.5)	2 (5.1)
[b]NMP field staff	–	–	3 (7.7)
	17 (100)	19 (100)	[c]39 (100)
Education level (%)			
Completed secondary or more	6 (35.3)	8 (42.1)	14 (35.9)
Completed primary or some secondary	6 (35.3)	9 (47.4)	[c]18 (46.2)
Some primary or none	5 (29.4)	2 (10.5)	7 (17.9)
	17 (100)	19 (100)	[c]39 (100)
Age in years, Mean (range)	42.2 (22–65)	47.1 (34–65)	44.8 (22–65)
Sex			
Female	13 (76.5)	10 (52.6)	23 (59.0)
Male	4 (23.5)	9 (47.4)	[c]16 (41.0)
	17 (100)	19 (100)	[c]39 (100)

[a] Since they live in the same communities where they work, CHWs are also "general community residents," but are distinguished here for their role in the National Malaria Program (NMP).
[b] NMP field staff respond to both foci and are thus not stratified by transmission focus.
[c] Total includes three NMP field staff not stratified by transmission focus.

explanations. These key words and explanations led to new sub-codes. Most new codes emerged in the early stages of the study (first round of interviews); the second round of interviews sought to test, expand, and explore ideas. In this way, analysis linked general categories (e.g., facilitator to community engagement) to locally meaningful concepts (e.g., trust, reciprocity). Coding focused on "thick" description (Geertz, 1973).

Coding was done by the lead author in consultation with co-investigators. Limited access to qualitative coding software, time constraints, and other demands prevented coordinated coding among all co-investigators. Steps were taken to ensure coding validity. The codebook was developed collaboratively. Results from coding were shared in team discussions and internal reports for feedback. The lead author and ethnographer communicated regularly to check ideas in the field. Over 1,100 memos were taken as an audit trail of analytical ideas.

3. Results

Quantitative and qualitative results suggest two domains of values. One domain, defined by trust, encompassed the relationship between people and institutions. The other domain, defined by values of companionship, reciprocity, and "showing face," registered relationships between people in everyday life, with trust taking a more nuanced role. Both domains were important in the relationships between CHWs and community members. However, certain conditions undermined those values, and consequently the intervention itself.

3.1. Quantitative findings from the trust module

People expressed high levels of trust in public institutions and mixed levels of trust for neighbors and neighborhood associations. A plurality of individuals rated as "Very trustworthy" the Ministry of Health (44.9%), national government (43.8%), public hospitals (39.5%), private hospitals (33.1%) and primary care clinics (32.9%). Neighbors (43.8%) and neighborhood associations (24.3%) were most rated as "Somewhat trustworthy." Proportions of "Don't know" varied from 2.3% to 28.2% (Table 2).

Wealthiest persons were more likely to answer "Don't know" when asked to rate trust in public clinics (Odds ratio [OR] 1.60, 95% confidence interval [CI] 1.07–2.40, $p = 0.023$) and hospitals (OR 2.02, 95% CI 1.07–3.81, $p = 0.030$) and *less* likely to say "Don't know" about trust in private hospitals (OR 0.50, 95% CI 0.32–0.77, $p = 0.002$), as were people with higher education (OR 0.41, 95% CI 0.25–0.68, $p < 0.01$) (See supplementary materials).

EFA extracted two factors, each composed of two variables. The first factor explained 31.0% of the variance and encompassed proximate relationships: neighbors (factor loading of 0.81) and neighborhood

Table 2
Total distribution of responses to seven trust variables.

Trust variable	n (%)
Neighbors	
Untrustworthy	62 (12.8)
A little trustworthy	82 (16.9)
Somewhat trustworthy	213 (43.8)
Very trustworthy	118 (24.3)
Don't know	11 (2.3)
	486 (100)
Neighborhood associations	
Untrustworthy	78 (16.1)
A little trustworthy	60 (12.4)
Somewhat trustworthy	118 (24.3)
Very trustworthy	94 (19.4)
Don't know	135 (27.8)
	485 (100)
Primary care clinic	
Untrustworthy	10 (2.1)
A little trustworthy	38 (7.8)
Somewhat trustworthy	141 (29.0)
Very trustworthy	160 (32.9)
Don't know	137 (28.2)
	486 (100)
Public hospitals	
Untrustworthy	35 (7.2)
A little trustworthy	69 (14.2)
Somewhat trustworthy	141 (29.0)
Very trustworthy	192 (39.5)
Don't know	49 (10.1)
	486 (100)
Private hospitals	
Untrustworthy	28 (5.8)
A little trustworthy	46 (9.5)
Somewhat trustworthy	146 (30.0)
Very trustworthy	161 (33.1)
Don't know	105 (21.6)
	486 (100)
Ministry of Health	
Untrustworthy	15 (3.1)
A little trustworthy	42 (8.6)
Somewhat trustworthy	173 (35.6)
Very trustworthy	218 (44.9)
Don't know	38 (7.8)
	486 (100)
National government	
Untrustworthy	33 (6.8)
A little trustworthy	41 (8.4)
Somewhat trustworthy	160 (32.9)
Very trustworthy	213 (43.8)
Don't know	39 (8.0)
	486 (100)

associations (loading of 0.71). The other factor explained 22.2% of the variance and related to institutions: the Ministry of Health (loading 0.82) and the national government (0.46). There was a weak, positive correlation between the two factors (0.38).

Univariate OLR detected nuances. No significant relationship was found between any trust variable and transmission focus or malaria incidence. Rather, significant predictors were gender, increasing age, higher education level, and higher socioeconomic status. Females had lower odds of highest trust in the national government (OR 0.65; 95% CI 0.46–0.93; $p = 0.018$). Increasing age predicted highest trust for neighbors (OR 1.02; 95% CI 1.01–1.03; $p < 0.001$), primary care clinics (OR 1.01, 95% CI 1.00–1.02, $p = 0.04$), public hospitals (OR 1.01, 95% CI 1.00–1.02, $p = 0.016$), Ministry of Health (OR 1.01, 95% CI 1.00–1.02, $p = 0.033$), and national government (OR 1.02, 95% CI 1.01–1.04, $p < 0.001$). Persons with higher education were less likely to have highest trust in the Ministry of Health (OR 0.54, 95% CI 0.38–0.78, $p = 0.001$), and wealthiest people were more likely to have highest trust in neighbors (OR 1.55, 95% CI 1.11–2.17, $p = 0.010$) (Table 3). (See supplementary materials).

Odds ratios and significance were nearly unchanged in multivariate OLR, although some models were insignificant (Table 4). The full model of trust in neighbors was significant ($p = 0.0001$); increasing age still had higher odds of predicting highest trust (OR 1.02; 95% CI 1.01–1.03; $p < 0.0001$) as did highest socioeconomic status (OR 1.54; 95% CI 1.10–2.20; $p = 0.014$). The full model for trust in the Ministry of Health was significant ($p = 0.0178$), with higher education predicting less trust (OR 0.58; 95% CI 0.39–0.87; $p = 0.008$). The full model for trust in the national government was significant ($p < 0.0001$), and while gender was no longer significant for predicting trust, increasing age was (OR 1.03; 95% CI 1.01–1.04; $p < 0.0001$). (See supplementary materials).

Although a quarter of the sample (24.3%) said neighbors were "Very trustworthy," more (29.2%) said that people in their neighborhood "Always" care for each other (Table 5). Spearman's rank coefficient was 0.522 ($p < 0.0001$), indicating a moderately strong, positive relationship between "Trust in neighbors" and "Interpersonal care."

In univariate OLR, only increasing age was associated with higher odds of reporting that people "Always" care for each other (OR 1.01; 95% CI 1.00–1.02; $p = 0.024$) (Table 6). Since no other predictors were significant, no multivariate analysis was done (See supplementary information).

These findings suggest that trust connected people and institutions, but what values connected people to each other? And why was trust lacking among neighbors? Results from the qualitative phase shed light on these questions.

3.2. *"Companionship above all else": values of care and solidarity*

An impressive aspect of the CHW intervention was how it became integrated into a landscape of care and solidarity. The intervention was an opportunity to enact values important to both CHWs and neighbors. Care was not reduced to a unidirectional relationship of giver (CHW)

Table 4
Significant models from multivariate OLR of predictors.

Trust for neighbors *p=0.0001* (full model) n = 474	**OR**	**95 % CI**	***p***
Gender	0.84	0.60–1.18	0.326
Age	1.02	1.01–1.03	***<0.0001***
Education level	0.97	0.68–1.43	0.871
Wealth index	1.54	1.10–2.20	***0.014***
Trust in Ministry of Health *p = 0.0178* n = 447			
Gender	0.94	0.66–1.35	0.745
Age	1.01	0.99–1.02	0.361
Education level	0.58	0.39–0.87	***0.008***
Wealth index	1.03	0.71–1.49	0.872
Trust in national government *p < 0.0001* n = 446			
Gender	0.72	0.50–1.03	0.075
Age	1.03	1.01–1.04	***<0.0001***
Education level	1.27	0.86–1.89	0.230
Wealth index	0.93	0.65–1.34	0.704

OLR – ordinal logistic regression.
OR – odds ratio.
CI – confidence interval.

Table 5
Total distribution of responses to interpersonal care variable.

	n (%)
Do people care for each other in your neighborhood?	
Never	52 10.7)
Almost never	51 (10.5)
Sometimes	141 (29.0)
Most times	83 (17.1)
Always	142 (29.2)
Don't know	17 (3.5)
	469 (100)

Table 6
Significant predictor in univariate OLR of interpersonal care variable.[a]

Interpersonal care (outcome)	Predictor OR, (95% CI), *p*-value
	Age, years
Do people care for each other in your neighborhood?	1.01 (1.00–1.02) ***p*=0.024**

OLR – ordinal logistic regression.
OR – odds ratio.
CI – confidence interval.
[a] Excluding "Don't know".

Table 3
Significant predictors identified in univariate OLR of trust variables.[a]

Trust variable (outcome)	Predictor variable OR, 95 % CI, *p*-value											
	Gender Male vs. female			Age, years			Education Less than secondary vs. secondary or more			Wealth index Bottom two vs. upper three quintiles		
Neighbors	0.77	0.55–1.07	0.120	1.02	1.01–1.03	***<0.001***	0.80	0.57–1.12	0.207	1.55	1.11–2.17	***0.010***
Primary care clinics	0.86	0.58–1.28	0.462	1.01	1.00–1.02	***0.040***	0.82	0.54–1.24	0.344	1.05	0.71–1.56	0.813
Public hospitals	0.93	0.66–1.32	0.682	1.01	1.00–1.02	***0.016***	0.77	0.54–1.10	0.158	0.81	0.57–1.14	0.228
Ministry of Health	0.86	0.60–1.22	0.397	1.01	1.00–1.02	***0.033***	0.54	0.38–0.78	***0.001***	0.91	0.64–1.30	0.610
National government	0.65	0.46–0.93	***0.018***	1.02	1.01–1.04	***<0.001***	0.89	0.62–1.27	0.518	1.02	0.72–1.46	0.890

OLR – ordinal logistic regression.
OR – odds ratio.
CI – confidence interval.
[a] Excluding "Don't know".

and receiver (patient). Instead, caring, reciprocal relationships connected everyone, from CHWs and field staff to patients and others.

In both foci, residents relied on strategies like collective organizing, petitioning, and pooling resources to implement services, infrastructural improvements, and collective welfare schemes. Such practices of reciprocity carried over into the CHW intervention. For example, a malaria patient said: "We have to help the public health team eliminate stagnant water and trash and try to improve the community," while another recovered patient remarked, "If [the CHW] needs me for a meeting or anything, or my husband, we will never say no. We are always available for her because she is always available for us." Residents offered CHWs a cold drink, a chance to rest in their homes, or directions when lost. In other instances, CHWs gave patients drinks or snacks, always at personal expense, along with medications. In other areas, gang leaders provided safe escort for CHWs. Collaboration and help flowed in a circular pathway.

The daily work of finding, diagnosing, and treating malaria patients was deeply rewarding and created a sense of purpose and satisfaction for CHWs. A common way of describing the work was "a duty, a calling" (*un deber, una vocación*). "To go directly to the person [who is] sick, and bring them medicine, I think this has no price, it is very positive" (CHW, La Ciénaga). Some derived spiritual satisfaction in their work: "In reality, God is at work in this, in this physical work, but it's also a spiritual labor [because] each time someone is infected, it is a chance to glorify God [by helping that person]" (CHW, La Ciénaga).

At the same time, CHWs saw themselves as more than "malaria workers:"

> When it comes to health, there are few agencies that come along to help the marginalized [*desposeídos*]. I think the work we do, it's very important not just for health, since we may arrive at someone's house, and we see that some things are happening outside the health domain. Sometimes we are like therapists, since there are some who have family problems, so we listen, and try to find a solution, or mediate, so that they can find the right way forward. (CHW, Los Tres Brazos)

Ultimately, the intervention became part of a vision for a better future:

> In my mind, I imagine a future in which this area has no contamination, better hygiene, and companionship above all else [*compañerismo ante todo*]. (Recovered malaria patient, Los Tres Brazos)

3.3. Follow-up, "showing face," and trust for CHWs

Follow-up (*seguimiento*) and "showing face" (*darle la cara*) invoked sustained commitment and a positive reputation. For CHWs, follow-up entailed regular house visits and ensuring that patients recovered. For residents, *seguimiento* occurred over the long-term: "Things must be done continuously, giving follow-up [*seguimiento*], because if you come one day, then a year passes and you don't come back, it means nothing" (Neighborhood leader, Los Tres Brazos).

CHWs showed face by making frequent rounds to check on people. "Even go where there haven't been cases," said a field technician, "and show face […] so that people recognize you and know you […] Always go back." Being available was sometimes necessary at odd hours; CHWs visited sick residents late at night, winning them admiration: "no matter the time you need [the CHW], she's there," said a resident of La Ciénaga.

Follow-up, showing face, and being available increased opportunities for diagnosing and treating sick residents, generating trust. "This person feels very satisfied after you give them the medicine. They are very grateful that they don't have to go to the hospital or doctor," said a CHW. "When you see the difference in how he was sick and then he got healthy […] this creates in the person total trust (*una total confianza*)."

This last remark illuminates how trust arose within the intervention. With their technical skills and wearing their malaria program vests, CHWs were an extension of the Ministry of Health, a trusted institution. However, CHWs acknowledged that trust *among people* was less common:

> Interviewer: Why do you think that happens, that people mistrust (*desconfían*) [getting a blood test for malaria]?
>
> CHW: For various reasons…[trails off, thinking]…We can say that we live, in quotation marks, in a "deplorable zone," where nobody trusts anyone. (La Ciénaga)

Two idioms captured this feeling of suspicion: *cada uno por su lado*, or "each on his/her side," and *en la confianza está el peligro*, "there is danger in trust." Both expressions signal the need for vigilance amidst economic scarcity, potential violence, and *tigueres*, or cunning street hustlers. Less trust in economically disadvantaged areas echoes results from the survey, in which people in wealthier socioeconomic brackets were more likely to trust their neighbors. Showing face and demonstrating technical competency generated trust *for CHWs*, however:

> [Interviewer]: What is trust, according to you?
>
> [Neighborhood association president]: Well, trust is… for example, I have symptoms, and I know this person [CHW] can resolve the problem; I trust her and her skill to resolve the problem; that's trust. (Los Tres Brazos)

News of a neighbor's recovery spread by word-of-mouth, further increasing trust, visibility and reputation of CHWs. As trust and awareness grew, people alerted CHWs of nearby sick neighbors, actively sought out CHWs for blood testing when sick themselves, and pointed out locations of stagnant water for fumigation teams.

3.4. Threats to values: pago digno, hierarchies, and malaria's root causes

Three structural conditions undermined these relationships: the issue of dignified pay; hierarchies in the health system; and failure of institutions to address malaria's root causes. These conditions had downstream effects on the intervention, CHWs, and reputation of the NMP in the community.

CHWs frequently brought up the issue of fair pay (*pago digno*). Each CHW held a contract with the Ministry of Health. Monthly stipends originated from a complex financial arrangement between the government, local labor laws, and external malaria funders. Apart from the wage itself (said to be too low), unpredictability of payments was also a problem. An audit process in the wake of a corruption scandal in 2021 delayed payments.

These issues rippled into the general community. Some CHWs shared disturbing stories describing how they borrowed money or credit from neighbors, putting at risk their public reputation and ability to show face. One woman's powerful remark illustrates this:

> I'm being sincere: I no longer have the same passion for the work; I'm even thinking of quitting. […] The question of pay disenchants us. It really affects us. Aside from this work, I don't have to pay [rent], [and] I have food. I still have my own little problems. I owed 23,000 pesos but nobody had to loan it to me, [because] I had my mom and brothers and grandmother and little sister – they don't pressure me [to pay them back]. But as for my companions [other CHWs], who must pay their house, they complain a lot, they're even going crazy with how much they owe to so-and-so, to the corner grocery store [*colmado*]. (CHW, Los Tres Brazos)

"We feel a lack of support," said another. "They say they can't pay us [even] after three months because of an 'inconvenience' [*incomodidad*], but my God! It's been three months!"

CHWs reported to doctors or nurses in primary care clinics; at times, these interactions left them feeling belittled or unimportant: "They say, '[CHWs] aren't health technicians [*técnicos*], nor are they professionals with university degrees' […] but we have the knowledge and skills to do

the work" (CHW, Los Tres Brazos). CHWs said that supervisors and others higher up the hierarchical ladder sometimes *echarnos a lado*, or "cast us aside." Low or delayed pay and disparaging interactions sapped morale.

Failure of institutions to address malaria's root causes undermined values. In their explanatory models, residents and CHWs attributed malaria not just to surrounding physical conditions but politics of marginalization. "Wherever dengue and malaria exist, in the low-lying areas, nobody wants to go" (Neighborhood association president, Los Tres Brazos). He went on:

> We are a marginalized *barrio*; if it was anywhere else, where people with money live, we would have resolved this problem long ago. It's because we don't pay taxes [i.e., composed of mostly squatter settlements], so we have no rights.

Institutional neglect, social and economic marginalization, and malaria risks converge in the example of household water storage. Improvised networks of piped and stored water were common in these neighborhoods, but they increased mosquito breeding sites:

> Water delivery is unreliable. It comes one day, or for a week, then it stops. So, people stock their own water, which […] creates breeding sites [for mosquitos]. Sometimes people don't cover the water, or don't treat it with chlorine, they don't have the means. […] It isn't easy to do all that – treat with chlorine regularly, wash the tanks, keep them covered. If the water just arrived directly, it would be a real success. (CHW, La Ciénaga)

Nonetheless, they had hope: "I think in five years, it can change. We can do our part as a community, but the government [also] must do its part. We are not asking for houses or food. We need a friendly hand so that, God-willing, in five years it will change" (Former patient). In effect, people expected institutions to reciprocate values: "[the authorities] should trust us and come closer [*acercarse*] to us" (Former patient). Commonly proposed ideas for collaboration included connecting malaria activities to primary healthcare for common health conditions (family planning and teen pregnancy, hypertension and diabetes), funding small clinics in poor areas, improving roads and drainage, and organizing environmental clean-ups with local organizations.

4. Discussion

Two domains of values were important for the CHW intervention. One, defined by trust, registered the social contract between people and institutions, especially the health system; the other, comprised of companionship, reciprocity, and showing face, connected people in everyday life and sustained relationships necessary for timely diagnosis and treatment.

These findings enrich debates about community engagement and challenge common assumptions, notably about trust. As a construct, trust is widely understood as essential for interventions but escapes fine-grained analysis of cultural and contextual variations (Goudge and Gilson, 2005). Here, trust was not monolithic nor understood and expressed the same way within the population. Responses to the trust module varied significantly across gender, age, education, and socioeconomic status and according to whom such trust should be granted, whether distant institutions or proximate relationships in the community. The trust module uncovered issues of healthcare access and inequities: persons of higher socioeconomic status were *less* likely to rate trust in the public health system, indicating familiarity or preference for the private (and more expensive) system. Contradictions also arose: people trusted certain institutions but decried how those same institutions failed to address malaria's root causes; while they generally had low to moderate trust for neighbors, they endorsed high levels of interpersonal care, articulated in values of solidarity and showing face. "Trust in neighbors" and "Interpersonal care" were only moderately correlated, suggesting they exist as distinct conceptual domains, each with their own significance and function in everyday life. Unlike trust, there were fewer significant predictors of interpersonal care, suggesting that the value of caring for others was more widespread across the population regardless of gender, socioeconomic status, education level, or transmission focus.

4.1. A theoretical model for values in the CHW intervention

Reducing transmission depended on timely diagnosis and treatment, visibility and positive reputation of CHWs, engagement with CHWs, and morale and job satisfaction. Such aspects of the intervention are well known in the malaria literature for their importance in community engagement and for reducing transmission; what is novel in this study is the relationship between those essential components and values of companionship, reciprocity, and "showing face." In effect, values – or rather, the capacity for people to enact their values – fostered a virtuous circle linking timely diagnosis, increased visibility and acceptance, increased engagement, and morale of CHWs. At the same time, though, certain structural conditions undermined these values. Low or delayed pay and disrespect in the professional setting diminished morale and public standing of some CHWs. Others resigned, reducing reach and visibility. Failure of institutions to tackle malaria's root causes represented a "values gap" in the eyes of community members.

Insights from anthropology and systems theory help to ground this model. Anthropology frames values as socially constituted beliefs about what matters most in local, social worlds (Yang et al., 2014). Malaria was not the only matter of concern in these neighborhoods; so were livelihoods, reputations, and reciprocal relationships. Values of companionship, reciprocity, and public face provide a moral grid to not only navigate and survive life's complexities but also "bring universes into being" (Graeber, 2013) – to organize collective action so that new "projects of mutual creation," or visions of a shared world, can be made real. A crucial task for health programs is to identify values (such as companionship, reciprocity, and showing face) and understand their function. This values approach reformulates the question, "how does this population accept (or participate in) this intervention?" as, "how do the design and objectives of this intervention align with what matters most to people?" Putting values at the center of community initiatives helps to bridge two, often separate spheres in the global health discipline: the "local", or moral experience of people as they strive to achieve meaning and purpose in their lives; and the expert culture of global health professionals, whose articulations of ethical responsibilities are often unquestioned or presumed to be universal. Conceptualizing health interventions as projects of mutual creation – *mutual*, between communities and program implementers – helps to level historical inequities between the two and acknowledges the plurality of values in global health programs and interventions (Stewart et al., 2010).

Second, these findings push the edges of "bounded rationalities" of the intervention. The idea of bounded rationalities comes from systems theory, which posits that the most crucial determinant of a system is often the least obvious (Meadows, 2008). What first comes to mind when thinking of a "community engagement system" for malaria control and elimination? Bounded rationalities frame malaria largely as a biomedical-technical problem (Packard, 2007); as such, the human network of CHWs, rapid diagnostic tests, data collection and reporting, and curative medicine come to the foreground. The reflex to bolster, strengthen, or amplify those elements can miss less obvious but potentially more impactful determinants of the system's outcome. In addition to tracking cases, indicators, and medication compliance, programs should consider how, and to what degree, an intervention supports people to live according to their values. In this setting, the NMP and implementing partners can include feedback mechanisms and qualitative indicators collected in different fora (such as community meetings, chats, and other activities) to track companionship, reciprocity and showing face and adjust the intervention over time.

4.2. Tensions between values and structural conditions

Healthcare and community-based interventions are almost entirely relational (Ozawa and Sripad, 2013). Here, the two most important issues for CHWs – essentially, pay and respect – were relational problems between themselves and the NMP: one in terms of recognizing the harm of delayed pay and the other in terms of addressing disrespectful interactions in the health system. Going further, these relational problems are rooted in structural conditions.

In recent decades, public services in the Dominican Republic shifted away from the state through structural adjustment and repayment obligations (Greenberg, 1997; Le Franc, 2000; Pomeroy and Jacob, 2004). Decentralization of services, proliferation of market approaches to global health problems, and an emphasis on individual-level risk factors obscure these political-economic determinants of malaria. The relational problems felt by CHWs – of delayed pay tied up in distant bureaucracies and disrespect in an over-stretched and under-resourced health system – implicate fundamental questions about the role of the state, responsibilities of CHWs in settings of scarcity, and preference for corporate accounting in malaria programming.

Given the potential for "values conflict" in such conditions, a practical step is to prioritize *care-value*. *Care-value* refers to the value of practices that acknowledge the patient's worth, such as tending to the emotional and spiritual health of sick neighbors, inquiring about well-being outside of malaria, mutual aid, and other expressions of solidarity and empathy. *Data-value*, or quantitative indicators like number of visited houses or persons tested (Hutchinson et al., 2018), reflects an emphasis on clinical outcomes and services but overlooks practices that support equity and well-being, including practices rooted in values of companionship, reciprocity and showing face. Both care- and data-value are inseparable, as the same social relations that enact values of care are those that also generate seemingly neutral indicator data (Gerrets, 2015). Rather than try to tease apart care- and data-value, the NMP can ask: how can both be supported? Going further, this would entail identifying the scales and temporalities at which such values are enacted (e.g., household visits, clinical encounters, promotion activities in larger community fora) and valorizing practices that are less visible but crucial for the intervention.

Other steps to counteract structural conditions are to incorporate local values into recruitment criteria, create more transparency regarding pay, and strengthen relationships between CHWs and superiors to foster collaboration. In this context, recruitment criteria can honor companionship, reciprocity, and showing face in addition to academic qualifications, which generally reinforce hierarchies.

Remunerating CHWs with fair pay is a bedrock principle (Cometto et al., 2018), but pay should not be the only incentive. In multiple contexts, meeting social needs of CHWs – ensuring that they feel valued, respected, and find opportunities for career growth and learning – is just as, if not more, important for motivation and retention as direct financial compensation (Arora et al., 2020; Colvin et al., 2021).

The concept of *alignment* can address undesired effects of hierarchical relationships (McCarville et al., 2022). Friction and conflict can arise when team members do not value the roles and responsibilities of other team members, especially in technical and specialized settings like healthcare. *Alignment* unites the team around a common vision, articulates roles and responsibilities, and seeks to align perceptions within the team so that all team members are understood and acknowledged as essential for accomplishing the vision. In this context, the NMP could convene ground-level actors (clinicians, health administrators) in separate discussions to explore their perceptions about CHWs. From there, the NMP may identify areas of divergence, or misalignment, between "higher level" profiles and CHWs and take steps to integrate CHWs by clarifying the vision of malaria control and elimination and roles and responsibilities of CHWs as front-line, community-based actors. Again, operationalizing the idea of care-value can be helpful, since care-value helps to make more visible other, indispensable qualities of the work of CHWs beyond clinical tasks alone.

A final recommendation is to fold activities into broader, locally driven visions of health and well-being. For example, in Brazil, Argentina, and Bolivia, participation in programs for Chagas disease increased once program activities were integrated alongside housing and school improvement projects (Bryan et al., 1994; Gürtler et al., 2007). Thailand and The Philippines offer success stories in bridging local knowledge, relationships, and expertise at village and district-levels to national elimination targets (Gosling et al., 2020).

4.3. Implications for urban settings

Community engagement and inter-sectoral collaboration are core principles for responding to malaria in urban areas (WHO, 2022). Urban leadership, public institutions, and national malaria programs should examine trust between themselves and target populations, identify where and why trust is lacking, and develop engagement strategies in response. Spatial heterogeneity of urban settings requires tailored vector control, surveillance, and prevention (Wilson et al., 2015). Engagement strategies should also consider sociocultural and demographic variation within "hotspots:" age, socioeconomic status, education, and gender predicted trust outcomes more so than transmission focus.

A values-based approach can also guide inter-sectoral collaboration to address malaria's root causes. Malaria in urban settings tends to affect marginalized neighborhoods. Strengthening links with civil society actors and local communities serves program goals and helps to level power imbalances between institutions and communities whose values and priorities are rarely taken into account.

5. Limitations

5.1. Methodological

Most KIs were recruited through snowball (referral) sampling and accompaniment. Generalizability should be tempered given recruitment bias. Future studies can consider other sampling techniques, such as stratification by socioeconomic status or micro-scaled geographic variation (within and across neighborhoods) and using other outreach strategies to recruit people from disadvantaged backgrounds.

The team lacked time and resources to develop a more detailed trust module or adapt a widely recognized scale like the 5-item Wake Forest tool for trust in healthcare (Dugan et al., 2005). Since the primary objective of the survey was to measure malaria KAP, less time was available to explore trust in more quantitative detail.

5.2. Contextual

The locally hired ethnographer was affiliated with the NMP. This presented a challenge for maintaining neutrality, reducing the impact of power differentials, and encouraging KIs to speak candidly about the CHW intervention. No doubt, the ethnographer's personal background and professional training – as a young, educated, female medical doctor – had an influence on her ability to establish rapport with interlocutors, particularly those from disadvantaged backgrounds or potentially with older men. Although there were no discernible differences in the richness and key findings of interviews between men and women, it is noteworthy that the majority of KIs were themselves female (n = 23, 64%), potentially reflecting ease in recruiting female KIs compared to men. The team attempted to reduce the effect of positionality by deliberately recruiting people via different recruitment pathways as well as from a range of socioeconomic backgrounds, particularly education level (Table 1).

Second, the study did not explicitly examine gender, ethnicity, and race. Although KIs were mostly women, less attention was given to elucidating how values manifest differently across genders or how gender influences participation or engagement with the CHW

intervention. For example, the trust module of the survey detected an association between gender and trust in the national government. While women in the survey were less likely to trust the national government, most CHWs (in the study cohort and the overall intervention) were themselves women. Future research could investigate how gender influences practices of care-value (companionship, reciprocity, and showing face) and whether (and how) gender potentially attenuates negative perceptions and mistrust of public institutions.

Similarly, the survey did not capture racial or ethnic background. Haitians and persons of Haitian descent in the Dominican Republic report high levels of interpersonal discrimination (Keys et al., 2019); their experience and values should also be explored to inform community engagement strategies.

5.3. Analytical

Significant odds ratios were usually small. Quantitative findings should be interpreted as important signals indicating relationships between predictors and outcomes and deserving additional investigation, rather than definitive in themselves. Aside from regular team meetings between the lead investigators and local ethnographer, data analysis and interpretation were largely disconnected from the communities. More participatory methods can potentially uncover alternative understandings and nuanced perspectives as well as strengthen validity of findings.

6. Conclusion

Rather than overly medicalize CHWs as front-line clinicians, malaria partners in the Dominican Republic and elsewhere can "re-humanize" the approach by seeing CHWs and sick community residents as agents of social transformation brought together through shared values. This leads to an exciting possibility: rather than stand-alone, clinical interventions, community-based health initiatives can be re-imagined as "projects of mutual creation" in which people's values are an animating force for change.

CRediT authorship contribution statement

Hunter Keys: Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Keyla Ureña:** Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Kevin Bardosh:** Writing – review & editing, Supervision, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Diana Taveras:** Investigation. **Luccene Desir:** Writing – review & editing, Project administration, Funding acquisition, Data curation. **Gregory Noland:** Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Investigation, Funding acquisition.

Ethical statement

CONABIOS (Bioethics Research Committee for the Ministry of Health, Santo Domingo) and Emory University (study number 00099347) granted ethical approval for the study. Informed consent discussions were held with all individuals selected for the survey and as key informants for the qualitative phase.

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Glossary

CE	Community engagement
CHW	Community health worker
CI	Confidence interval
DR	Dominican Republic
EFA	Exploratory factor analysis
KAP	Knowledge attitudes and practices
KI	Key informant
NMP	National Malaria Program
OLR	Ordinal logistic regression
OR	Odds ratio
PAHO	Pan-American Health Organization
WHO	World Health Organization

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.socscimed.2026.118957.

Data availability

Data will be made available on request.

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