

Population, health, and environment (PHE) in Kuresoi North and Kuresoi South sub-counties, Nakuru County: a child health and water, sanitation, and hygiene (WASH) infrastructure impact assessment

KNOWLEDGE CONTRIBUTION

This retrospective assessment uses project data abstracted from the Kenya Health Information System to determine whether community-level PHE activities, implemented through community health volunteers (CHVs) and PHE Champion volunteers, resulted in positive changes in child diarrhea case rates and improved household sanitation and handwashing infrastructure. The results can guide whether and to what degree WASH activities should be integrated within PHE activities.



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PROBLEM STATEMENT

Kuresoi North and Kuresoi South sub-counties of Nakuru County in Kenya's Rift Valley region are experiencing environmental degradation due to deforestation, diminishing clean water resources, and expanding human settlement. Residents observe that changes in climate—specifically, timing and quality of the rainy season—have negatively affected the agriculture sector, farm yields, and general economic activities in the area. Farming encroachment into forests, traditional farming practices, and poor waste disposal are among the myriad environmental issues facing these communities. Kuresoi North Sub-County borders the Mau National Forest, a forest complex that forms the largest drainage basin in Kenya and is the origin of Lake Victoria—the largest freshwater lake in East Africa—and numerous major rivers. These and other environmental challenges contribute to households' difficulty in addressing their own well-being, resulting in persistently low levels of health care seeking and poor health outcomes. For example, in 2017, Kenya Health Information System (KHIS) data indicated that health indicators in Kuresoi North lagged far behind those of Nakuru County as a whole: The prevalence of modern contraceptive use among women of reproductive age in Kuresoi North was 21% (vs. 54% in Nakuru County), 17% of deliveries had skilled birth attendants (vs. 70%), and 11% of patients completed four or more ANC visits (vs. 52%).

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Evidence indicates the value of linking environmental activities with population and health accelerator behaviors to leverage the relationship among different behaviors and to reinforce positive changes across these interrelated areas.¹⁻⁴

BACKGROUND

Afya Uzazi—meaning *healthy parenthood* in Kiswahili—was a five-year United States Agency for International Development (USAID) Kenya/ East Africa -funded project to improve access to quality family planning, reproductive, maternal, newborn, child, and adolescent health services (FP/RMNCAH) in selected sub-

counties of Kenya's Nakuru and Baringo counties. The project expanded access to quality services for underserved communities through a comprehensive, integrated package of technical support delivered in partnership with the Ministry of Health, the respective county governments, and the county health management teams to health facilities and

communities. The Afya Uzazi consortium was led by FHI 360 and included Living Goods, Gold Star Kenya, Management Sciences for Health, Family Health Options Kenya, Kisumu Medical and Education Trust, and local community-based organizations (CBOs).

To respond to the complex environmental and health contexts of Kuresoi North and Kuresoi South, Afya Uzazi developed and implemented activities within a population, health, and environment (PHE) approach as part of community-based activities. This approach brought together stakeholders from health and non-health sectors to jointly promote health service utilization and healthy behaviors in forested communities that are facing severe environmental challenges and have poor health indicators. The PHE approach integrated the promotion of FP and maternal, newborn, and child health (MNCH) services with environmental, water, sanitation, and hygiene (WASH) and livelihood activities to promote interrelated benefits at the household and community levels.

The PHE approach promoted and supported a set of accelerator behaviors/ actions, drawing from the Lake Victoria Basin Commission (LVBC) projects,⁵ that link household achievement of priority health behaviors with environmental actions and emphasize the connections between household health, the environment, and livelihoods. Adoption of accelerator behaviors at the household level was reinforced through an enabling environment at the community level.



■ Afya Uzazi focus counties: Nakuru and Baringo • Major city/town

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Accelerator behaviors for these PHE activities included:

- **Tree planting:** Plant at least three different types of trees that provide you with food, income, and cooking fuel and that will help your family enjoy more financial stability in the future, which will make it easier to access health care.
- **Harvest rainwater:** Install rainwater harvesting system equipment such as water tanks and gutters to collect clean water for drinking, cooking and cleaning, and handwashing. This will provide your family with a continuous water supply to prevent illnesses, especially among children, and will save time and resources that you can use for health care and preparation of nutritious food.
- **Use fuel-efficient cookstoves:** Use fuel-efficient cookstoves and solar lamps to save money for important household needs such as health care and school fees, clothes, and nutritious food, and to conserve the environment.
- **Establish a kitchen garden:** Establish a kitchen garden near your house to provide nutritious foods such as carrots, spinach, and tomatoes so your children grow strong and healthy.
- **Use a latrine:** Construct and use latrines to prevent the spread of diarrhea and diseases such as typhoid and cholera, saving family income.
- **Family planning:** Visit a health center to talk about FP and consider using a modern contraceptive if you want to avoid pregnancy or if you have reached your desired family size.

The PHE approach was implemented through *Nyumba Kumi* platforms, a set of households within an administrative boundary that are overseen by a village elder. Afya Uzazi trained, coordinated, and supported non-health sector development organizations, such as water users' associations (WRUAs), community forest associations (CFAs), and environmental conservation CBOs. The PHE activities leveraged the resources and ongoing activities of CBOs and conservation organizations; Afya Uzazi did not finance their contributions. In the same areas, Afya Uzazi also worked with community health volunteers (CHVs), who integrated environmental messages into their established activities around health education and care-seeking mobilization. The multisectoral CBO volunteer and CHV teams provided information, education services, and demonstrations of accelerator behaviors to the households and communities, while reinforcing the linkages between health and the environment. The teams organized community-wide dialogues/meetings and communal labor events around accelerator activities such as tree planting and mobilized local resources to support adoption of priority actions (Photo 1). During the initial demonstration phase in Keringet Ward, the PHE activities were initiated and tracked through 10 environmental organizations and 154 *Nyumba Kumi* platforms targeting 4,452 households. After public health officers (PHOs) documented service delivery and uptake in the pilot communities, Afya Uzazi expanded the PHE approach to communities in Kiptororo Ward of Kuresoi North and Tinet Ward of Kuresoi South in the fourth program year.



PHOTO 1. KITCHEN GARDEN PRODUCE

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AIM

In this technical brief, we investigate the extent to which a subset of the accelerator behaviors related to WASH affected child health outcomes in Kiptororo and Tinet Wards. We conducted a retrospective secondary data analysis of routine KHIS information to describe trends in key indicators in the 12 months before implementation of the PHE approach and during the 12 months of implementation. To isolate longer-term effects, we conducted a sub-analysis of the last six months of the implementation period. We also assessed the reach of the intervention through selected process measures.

Specific objectives of this analysis were to:

- Measure differences over time between PHE implementation and comparator wards in the proportion of children younger than age 5 years (children U5) seeking facility- or community-based treatment for diarrhea in intervention wards and the proportion who are underweight
- Measure differences over time between PHE implementation and comparator wards in the number of households with improved WASH infrastructure in their homes (safe drinking water, handwashing facilities, and latrines) from community-level data

METHODS

Activity Description

Specific behaviors related to child health (Box 1) were promoted in households with pregnant women and with children U5 by CHVs and CBO volunteers.

Handwashing with soap and water at critical times was emphasized, especially for lactating mothers and children, to minimize diarrheal illness in children. This behavior was reinforced through coordinated support by CBOs and CHVs to encourage the installation and use of handwashing stations (tippy taps) by households (Photo 2). To further prevent diarrhea and other oral-fecal infections, participating households were encouraged to build and use a sanitary latrine to reduce the risk of children U5 coming into contact with animal or human feces. During routine visits, CHVs shared messages and engaged household members in dialogues regarding the importance of ensuring that children U5 drink only properly treated water. To support this behavior, households and CBOs were mobilized to install gutters to harvest rainwater and to then properly store the harvested water in clean covered water tanks. In addition, the

households practiced simple water treatment technologies such as boiling at high temperatures, using chlorine tablets supplied by CHVs, or filtering with locally supplied and purchased water filters. Households also used harvested rainwater to grow diverse crops in kitchen gardens to supply families, particularly children U5, with diverse nutritious foods, prioritizing foods rich in vitamin A.

The behaviors in Box 1 were promoted through one-on-one education and counseling sessions, and home visits. Community counseling, community-based treatment with integrated community case management (ICCM) of child illness, and health facility referrals for diarrhea and other childhood illnesses were promoted through the joint efforts of CHVs and PHE champions. Households were encouraged to seek treatment for uncomplicated diarrheal illness or take ailing children to health facilities for prompt management and also to observe proper household hygiene, sanitation, and feeding practices.

Box 1. Priority WASH- and child health-related behaviors promoted by the PHE approach

- Mothers/caregivers of children younger than age 5 (children U5) wash their hands with soap and water at the four critical times
- Install tippy tap at the household to facilitate handwashing with soap and water
- Mothers/caregivers ensure that children U5 drink only properly treated water
- Mothers/caregivers keep their children U5 from coming in contact with fecal matter by construction and use of latrines
- Households with children U5 grow nutritious kitchen gardens



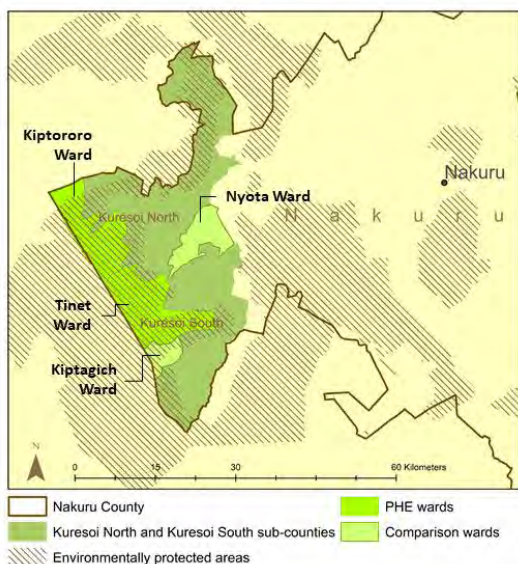
PHOTO 2. USING A TIPPY TAP

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Selection of Comparator Wards



Matched comparison wards were selected based on key program, health system, and demographic characteristics (Table 1). We compared wards in Kuresoi North independently (Kiptororo vs. Nyota) and in Kuresoi South independently (Tinet vs. Kiptagich), and then compared intervention and comparator wards in aggregate. Tinet Ward was matched with Kiptagich Ward as program iCCM activities were implemented in both wards. The iCCM and the PHE models were mutually reinforcing, as both promoted positive household child and newborn care behaviors and practices to prevent diarrhea and malnutrition. The unique element in Tinet Ward was exposure to the PHE approach, where an additional non-health actor supported the promotion of household priority practices for family health. Both Kiptororo and Nyota in Kuresoi North and Kiptagich Ward in Kuresoi South had concomitant community-led total sanitation (CLTS) activities, which were expected to have reinforced messaging about improved household sanitation and hygiene in those wards.

Table 1. Characteristics of PHE implementation and comparator wards

	Kuresoi North		Kuresoi South	
	Nyota non-PHE	Kiptororo PHE activity	Kiptagich non-PHE	Tinet PHE activity
Program activities				
PHE activities implemented		X		X
Child health activities implemented (iCCM)			X	X
Afya Uzazi CLTS activities (routine and WASH-COVID)	X	X	X	
UNICEF supplies nutrition commodities (e.g., ready to use therapeutic food) to the county through DOH	X	X	X	X
Nutrition International (Vitamin A commodities supplied to the DOH)	X	X	X	X
DoH Afya Uzazi Malezi Bora (Vitamin A)	X	X	X	X
Health system characteristics				
Number of hospitals	0	0	0	0
Number of health centers	1	2	1	0
Number of dispensaries	8	9	7	6
Number of clinics	1	2	1	2
Demographics				
Number of households*	11,540	15,509	8,280	5,705
Population*	51,814	69,633	37,262	25,671
Women of reproductive age*	12,191	16,384	8,768	6,039
Children under 5 years of age *	8,446	9,724	5,217	3,593

*source KHIS 2020

Data

We extracted KHIS data from facilities in PHE implementation wards (Tinet and Kiptororo) and the two comparison wards (Kiptagich and Nyota). We included data from 40 public health facilities, comprising four health centers, 30 dispensaries, and six clinics (Table 1). All data were aggregated to the ward level. We assessed select WASH indicators, including the number of households with safe drinking water, using improved

toilet facilities, and with handwashing facilities. These WASH indicators are routinely reported by CHVs in their monthly reports to health facilities. We also assessed select child health indicators (number of children treated for diarrhea, number of children reported as underweight) reported routinely by health facilities. We transformed all indicators into proportions, standardized by population of children U5 in the ward for the respective year (for diarrhea), by children U5 monitored for growth (for underweight) and by households in the ward in the respective year (for WASH indicators). Ward level averages for each indicator were calculated using Stata v15 (Stata Corporation, College Station, Texas, US) over the 12-month pre-intervention period, for the 12 months during intervention, and for the last six months of intervention implementation.

Table 2. Ward-level indicators compared over time and between intervention and non-intervention wards

Indicator name	Indicator definition
WASH indicators	
Households with safe drinking water (calculated)	Number of households with safe drinking water
Households using improved toilet facilities (calculated)	Number of households with functional latrines
Households with handwashing facilities (calculated)	Number of households with handwashing facilities on premises
Child health indicators	
Children U5 treated for diarrhea (at community and facility)	Facility-level count of diarrhea cases treated at all health facilities and at community level by reporting CHVs in each facility catchment area in the ward. Reported monthly
Child growth monitoring	Total number of children U5 monitored for growth at the health facility. Used as the denominator to determine proportion of children underweight. Reported monthly.
Underweight children	Combined value of the total number of children U5 who were monitored for growth and determined moderately, severely, or acutely underweight. Reported monthly.

RESULTS

By the end of Afya Uzazi program activities by January 2021, the program had engaged 30 CBOs and supported the planting of 2.5 million trees. The program had also supported more than 1,900 households to construct latrines, 10,700 to harvest rainwater, 8,500 to establish kitchen gardens, and more than 13,000 to plant trees (Box 2).

Beginning in January 2020, PHE activities were implemented in Kiptororo and Tinet wards (analyzed in this brief), eventually reaching 165 communities. The 123,786 households in this catchment area were covered by 75 CHVs, and the enabling environment

Box 2. PHE model home and community activity process indicators

By end of Q1 PY5:

- 30 CBOs were actively involved in supporting PHE activities.
- Nakuru County had allocated 2,000,000 Kenyan shillings to support water projects.
- 2.5 million trees had been planted.
- 1,902 households had been supported in latrine construction.
- 10,718 households had been supported in rainwater harvesting.
- 8,502 households had been supported in establishing kitchen gardens.
- 13,179 households were supported in planting trees.
- 2,041 households supported in using energy-saving stoves.

was strengthened by the activities of four CFAs, two environmental CBOs, one health CBO, and three WRUAs.

Comparing averages for the 12-month pre-implementation period to those across the 12-month PHE implementation period, we find that in most wards, the proportion of households with WASH infrastructure (latrines, handwashing, and clean water) modestly increased (Table 4). However, this did not hold true in all PHE implementation wards: In Tinnet Ward, the proportion of households with a latrine and with a clean water source remained the same or decreased slightly, and in Kiptororo Ward, the proportion of households with latrines increased by just 0.2 percentage points. Nevertheless, there were substantial gains in some indicators. The greatest gains were found in non-PHE intervention wards; for example, we saw a 12.9 percentage point increase over time in the proportion of households with handwashing facilities in Kiptagich. The overall positive trends for WASH indicators were likely also the result of the CLTS activities implemented through Afya Uzazi in all wards but Tinnet. Across all wards, the most substantial increases in WASH indicators occurred in the proportion of households with handwashing facilities—likely a reflection of the intense concomitant activities in 2020 related to improved hand hygiene to prevent COVID-19 transmission.

Table 3. Changes in monthly indicator means from pre- to post-implementation for PHE and non-PHE wards

	All		Kuresoi North		Kuresoi South	
	Non-PHE	PHE	Nyota (non-PHE)	Kiptororo (PHE)	Kiptagich (non-PHE)	Tinnet (PHE)
WASH indicators						
Latrine (proportion of households with latrine)						
Pre-implementation period (12 months)	7.6%	22.2%	10.4%	9.6%	4.8%	34.8%
Implementation period (12 months)	14.8%	22.1%	17.0%	9.8%	12.6%	34.4%
Last 6 months of implementation	19.6%	23.6%	22.2%	10.1%	17.0%	37.1%
Handwashing (proportion of households with handwashing facilities)						
Pre-implementation period (12 months)	4.7%	14.4%	8.1%	6.7%	1.3%	22.1%
Implementation period (12 months)	14.4%	20.2%	14.7%	10.0%	14.2%	30.5%
Last 6 months of implementation	16.6%	22.6%	17.7%	11.3%	15.5%	33.8%
Improved drinking water source (proportion of households with clean water source)						
Pre-implementation period (12 months)	5.0%	13.0%	8.4%	4.4%	1.6%	24.5%
Implementation period (12 months)	8.3%	15.2%	9.6%	6.6%	7.0%	23.8%
Last 6 months of implementation	9.8%	15.8%	10.2%	5.9%	9.3%	25.7%
Child health indicators						
Underweight (as proportion of children monitored for growth)						
Pre-implementation period (12 months)	1.0%	1.6%	1.7%	3.1%	0.2%	0.2%
Implementation period (12 months)	1.3%	1.6%	2.6%	2.8%	0.1%	0.5%
Last 6 months of implementation	0.9%	1.5%	1.8%	2.5%	0.0%	0.6%
Diarrhea (as proportion of children U5)						
Pre-implementation period (12 months)	1.1%	1.1%	1.4%	0.8%	0.9%	1.4%
Implementation period (12 months)	1.1%	1.0%	1.0%	0.9%	1.1%	1.2%
Last 6 months of implementation	1.3%	1.1%	1.2%	1.0%	1.4%	1.1%

Changes over time in child health indicators were less substantial. Comparing the pre-intervention to the 12-month intervention period, we see mixed results across wards for both the proportion of underweight children and the proportion of children with diarrhea. Because PHE activities and other Afya Uzazi interventions aimed to both prevent underweight status and diarrhea cases in children and to increase timely care-seeking, improvements over time could be attributed to some or all of the activities, making it difficult to isolate any definitive trend.



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In all cases, for WASH indicators, the change over time was more pronounced when the analysis focused on the last six months of implementation. This subanalysis of child health indicators did not clarify or strengthen any relationships.

Due to social and mobility restrictions during the COVID-19 pandemic, we were not able to triangulate these findings with the perceptions and opinions of stakeholders through in-depth interviews or focus group discussions. Furthermore, isolating PHE activity impact is complicated by spillover effects across ward boundaries because the work of the WRUAs and CFAs crossed borders, as did care-seeking by households.

CONCLUSION

Overall, PHE activities framed as accelerators of household behaviors were broadly accepted in Kuresoi North and South sub-counties, which was reflected by PHE process data showing broad CBO involvement and household- and community-level engagement in PHE activities. Furthermore, the PHE approach achieved substantial impact in terms of the number of households reached with support to improve the WASH infrastructure in their homes and communities and, notably, the effort garnered further investment from the local county government for expanded, ongoing support of safe water projects. In this analysis, we documented substantial ward-level improvements in availability of WASH infrastructure at the household level. Although these results are difficult to attribute solely to the PHE intervention given the broader context of child health and environmental programming, the overall positive trend is an important achievement. Impacts on child health outcomes were mixed, and likely a stronger evaluation design and longer implementation period would be needed to attribute these child health outcomes to the PHE intervention.

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