

# Analyzing the Building Blocks of Resilience:

## Findings from a Baseline Survey of the Tuungane Population, Health, and Environment Project in Western Tanzania

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NOVEMBER 2016

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The Evidence Project is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the terms of cooperative agreement no. AID-OAA-A-13-00087. The contents of this document are the sole responsibility of the Evidence Project and Population Council and do not necessarily reflect the views of USAID or the United States Government.



The Evidence Project uses implementation science—the strategic generation, translation, and use of evidence—to strengthen and scale up family planning and reproductive health programs to reduce unintended pregnancies worldwide. The Evidence Project is led by the Population Council in partnership with INDEPTH Network, International Planned Parenthood Federation, PATH, Population Reference Bureau, and a University Research Network.

Published in November 2016.

Suggested citation: Bietsch, Kristin et al. 2016. “Analyzing the Building Blocks of Resilience: Findings from a Baseline Survey of the Tuungane Population, Health, and Environment Project in Western Tanzania,” Research Report. Washington, DC: Population Council, the Evidence Project.

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# ACKNOWLEDGMENTS

This publication was authored by Kristin Bietsch, Reshma Naik, and Kristen P. Patterson of the Population Reference Bureau (PRB). PRB intern Christopher Hale of Princeton University provided key inputs for the data analysis, and PRB consultant Carolyn Lamere of the University of North Carolina-Chapel Hill conducted a literature review that informed the background of the paper. Smita Gaith of PRB ably assisted many aspects of this research and was a key participant at the data-sharing workshop that led to this publication. All other authors provided technical review and insightful comments on multiple drafts of the paper, including Sebastiaan Hess: Hess Environmental Economic Analyst; Craig Leisher: The Nature Conservancy; and Cara Honzak, Mustafa Kudrati, Hellen Magige, Cheryl Margoluis, and Laura Subramanian: Pathfinder International. The authors would like to thank Karen Hardee, senior associate and director of the Evidence Project for her commitment to this project, participation in the data-exchange workshop, and technical review of the manuscript. Special gratitude also to Clive Mutunga, the Population, Environment, and Development Technical Advisor at the United States Agency for International Development (USAID) for his participation in the data-exchange workshop that planted the seed for this publication. The authors also appreciate the support of PRB's Paola Scommegna and Nicole LaGrone. Finally, we must give extra thanks to Craig Leisher, Sebastiaan Hess, Pathfinder International, the survey team, and the people of Mahale for leading and participating in the baseline survey in 2011, which provided a vital foundation for assessing and gathering evidence on the integration of family planning into nonhealth sector development through the Population, Health, and Environment (PHE) approach.



# INTRODUCTION

In recent years, the concept of resilience has gained increasing attention as a crucial component in efforts to promote economic growth and development. This is particularly the case for countries where a large share of the population faces chronic poverty, poor health, and repeated economic and environmental shocks. One international donor agency defines resilience as “the ability of people, households, communities, countries and systems to mitigate, adapt to and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth.” (USAID 2012) Although definitions of resilience vary, they typically reflect a commitment to reducing vulnerability and building households’ and communities’ adaptive capacity to quickly and effectively respond to new circumstances.

Two key elements important for resilience—yet often omitted from resilience programs and definitions such as the one above—are the need to meet demand for voluntary family planning (FP), and to help people adapt to climate change. Voluntary FP allows women to avoid unintended pregnancies and to time and space their births, leading to short- and long-term benefits that can promote resilience. Evidence shows that avoiding unintended pregnancies and planning the timing and healthy spacing of pregnancies can lead to better health and reduce deaths among mothers and children (Sing, Darroch, and Ashford 2014). In addition, when women spend less time and energy in pregnancy, breastfeeding, and child care because of greater access to sexual and reproductive health services, they are more likely to expand their participation in livelihoods and the labor force, and to attain more education. These outcomes can lead to improved earnings that in turn can be used to improve household health, nutrition, and food security, enhancing their household’s ability to cope with and bounce back from shocks. Further, reinforcing a woman’s right to choose whether or not to have children, as well as how often and how many, increases equity and may be a crucial component of building resilience, especially for rural women who often live far from health services. At the population level, equitable access to voluntary FP can contribute to building resilience by reducing population growth and supporting healthier, more stable family units, thereby allowing communities and governments to better keep pace with the provision of basic social sector services (Bremner, Patterson, and Yavinsky 2015).

Helping communities adapt to and address the impacts of climate change by protecting natural resources such as forests, marine ecosystems, and coastlines can also go a long way to building resilience. Reducing deforestation and degradation and protecting forests are important means of mitigating climate change, since trees function as a carbon sink, reducing the amount of greenhouse gases in the atmosphere (Bonan 2008). In rural areas where rapid natural population growth and in-migration coincide with rapid deforestation, deforestation is often driven by small-scale farmers who clear land to make room for agriculture (Rudel et al. 2009). Drivers of deforestation are complex, however, given that rapid urban population growth drives demand for agricultural products, and powerful forces and interests such as global agricultural trade and land speculation are also at play (Rudel et al. 2009; DeFries et al. 2010). In the *Tnungane* Project area, land grabs by cattle herders are also a source of deforestation, especially around villages with boundaries that have not been formally established.

In many areas with growing coastal populations like *Tnungane*, fisheries are being depleted and degraded rapidly due to a number of reasons that are strongly influenced by population growth. For example, some common drivers of overfishing are:

- The needs of growing coastal populations.
- Increasing demand for fish globally because of rising populations and standards of living.
- The challenges faced by coastal governments to keep pace with enforcement of natural resource management policies, practices, and financing.

Populations in these coastal zones, and corporate entities that are not subject to strong government oversight, may also engage in poor agricultural practices, which contribute to poor water quality and inhibiting fish breeding. In addition, overall weak governance and corruption can worsen these levels of resource degradation, leaving communities without the knowledge or power to engage in processes that would allow them to maintain better control over their local resources. The protection of marine and freshwater ecosystems and engagement of local communities—including women, who have historically been excluded but disproportionately impacted by these processes—can thus enhance resilience by stabilizing the quantity and quality of fish stocks, and giving communities a secure long-term food and income source (Leisher et al. 2016).

The protection of coastlines is also important as coastal vegetation, including mangroves and other wetland plant life, is critical for protecting coastlines from erosion, and coastal communities from storm surges (Gedan et al. 2011). Population growth and its effect on land usage can also affect the erosion of coastlines. Terrestrial, marine, and freshwater ecosystems are also increasingly impacted by the in-migration of “environmental migrants”—human populations who must move to places with more abundant natural resources for survival because they rely directly on ecosystems for their food security and the natural resources in their places of origin have been so severely depleted or degraded.

One promising approach for building resilience is integrated development programming, known as population, health, environment or PHE. These programs combine conservation and natural resource management efforts with the development of more diverse livelihood opportunities as well as the provision of FP resources and education, alongside other health interventions like antenatal care, child immunizations, and HIV/AIDS awareness and prevention. PHE programs are particularly effective in isolated rural communities that are highly reliant on natural resources for subsistence and survival. In these cases, providing for the health of community members often requires programs to care for the environment upon which the community depends—taking into account the ways that human health is impacted by the environment, and how the health and availability of natural resources are impacted by community behaviors. Often an integrated approach can arise organically from the conditions in a given ecosystem, allowing programs to holistically consider all the needs of the local community and environment, and the many ways these needs fit together. For remote communities, running an integrated program can also be more efficient than operating two separate interventions in the same community.

There are dozens of past and current PHE programs around the world, including in places as widespread as Madagascar, Tanzania, Nepal, and Guatemala. This paper focuses on one particular program in western Tanzania called *Tuungane*. Over the course of the last 30 years, Tanzania’s population has tripled to nearly 53.5 million people (United Nations Population Division 2016). Although population growth is slowing, projections still foresee nearly 83 million people by 2030 (United Nations Population Division 2016). Contributing to this is a high total fertility rate; the average number of children a woman will have in her lifetime is 5.2, high enough to ensure rapid growth for decades to come (MoHCDGEC et al. 2016). One-quarter of sexually active unmarried women ages 15–49 and 22 percent of married women ages 15–49 would like to prevent or delay a future pregnancy for two or more years, but are not using a modern FP method (MoHCDGEC et al. 2016).

*Tuungane* is set within a context where PHE is well understood. Tanzania’s National Adaptation Programme of Action (NAPA) recognizes population growth as a contributing factor to social conflicts, environmental degradation, and unsustainable use of resources (United Republic of Tanzania 2007). Organizations working in Tanzania have identified the interconnected challenges of population, health, and environment factors facing the country, and are implementing integrated PHE programming to address these challenges in a holistic manner. One of the earliest examples of such integrated programming in Tanzania is the Jane Goodall Institute’s TACARE project, which began in the Kigoma region in 1994 (Thaxton 2004). In 2014, the Tanzania

PHE Network was revitalized by the Lake Victoria Basin Commission and others to help coordinate various PHE efforts around the country (Population Reference Bureau N.D.). Each of these programs is working to protect the health of people and the biodiversity and natural resources in Tanzania by promoting sustainable development, the uptake of voluntary FP, and improving the health of people living around national parks and protected areas as well as the ecosystems that sustain them.

Although the value of PHE programs is appreciated by the development community and the conceptual linkages they incorporate are sound, little evidence exists to demonstrate their short- and long-term impacts—particularly the role that the FP component of PHE projects plays in building resilience, improving livelihoods, and helping people adapt to climate change (Yavinsky et al. 2015). To contribute to filling this gap, the Evidence Project collaborated with *Tuungane*, a PHE project jointly implemented by The Nature Conservancy and Pathfinder International, to conduct further analysis of their existing data and examine the evidence base around integrated PHE programming, FP, climate change adaptation, and resilience (Yavinsky et al. 2015).

This paper analyzes data from the *Tuungane* Project baseline survey to show the pre-project level of knowledge among village residents regarding their understanding and use of FP, understanding and attitudes toward conservation, and whether or not there are linkages among them. We hope to use this analysis to inform future efforts that will look more deeply at the relationships among and between: FP and climate change adaptation, FP and resilience, and the pathways through which the FP and other components of PHE projects like *Tuungane* contribute to building resilience and enhancing the ability to adapt to climate change.

# METHODS

## Setting

This study focused on the site of the *Tuungane* Project, which operates in an area bordering the shores of Lake Tanganyika in the Greater Mahale Ecosystem (GME) in Western Tanzania. Lake Tanganyika is the world's second largest lake by volume and holds nearly one-fifth of the Earth's available freshwater. This "in-land ocean" forms the western boundary of GME, a 4.8-million-acre forested landscape. The area is marked by rich biodiversity, including 250 endemic fish species and almost all of Tanzania's endangered chimpanzees. The population numbers about 115,000, of which an estimated 28,000 are women of reproductive age. Poor health conditions including malaria, intestinal worms, typhoid, and diarrhea are common among area residents, and the remote location makes access to health services challenging. Most families must survive on less than \$150 annually; the majority of people are small-scale farmers and fishers who depend upon natural resources for their livelihoods (Lake Tanganyika Authority N.D.).

Population growth rates in the GME are among the country's highest, as a result of births and in-migration. Some of this in-migration is driven by land pressures in other parts of the country or in neighboring countries. According to The Nature Conservancy:



*"...rapidly growing village populations are left with little choice but to expand their settlements and farms into the wild lands and clear forest and woodland for agriculture, fuel and timber. Steep hillsides are haphazardly farmed and the run-off, heavy with sediment, fills coastal zones and pushes near-shore fishery production—the source of 40 percent of the protein for local families—into decline. The area's deforestation rate (currently at 11 percent) only stands to increase as the human population grows."*

—Lake Tanganyika Authority N.D.

Without protection, which can be supported by and reinforced with good governance and secure land tenure, this valuable ecosystem and the people who rely on it for resources will remain vulnerable.

## Project Description

Since project implementation began in 2011, *Tuungane* has used a PHE approach, integrating FP and reproductive health into its conservation programming with an aim toward ensuring that community members are able to live healthy lives in balance with their environment in an area with rich natural biodiversity.

The project is a collaboration between Pathfinder International, The Nature Conservancy, and local and district governments working together to:

- Improve governance and natural resource management.
- Expand access to reproductive, maternal, and child health services.
- Raise community members' awareness of and access to FP.
- Improve understanding of the linkages between healthy timing and spacing of pregnancies, natural resource management, and improved livelihoods.



Together with such community-based social networks as Beach Management Units, community-conservation savings and loans groups (COCOBA), and community health workers, the project uses a holistic and integrated approach to respond to the region's health and environment challenges.

## Data Collection and Analysis

In June-July 2011, a baseline study was conducted for the *Tuungane* Project using a mixed methods approach including a population-based survey and key informant interviews with selected community stakeholders. A full report on the baseline survey, written by Sebastiaan Hess and Craig Leisher, is available online (Hess and Leisher 2011). The population-based survey was conducted among 487 unique households across 10 villages that are part of the *Tuungane* Project. The randomly selected households (approximately 50 per village) represent about 6 percent of all households across the 10 villages. Researchers selected villages for inclusion in the study based on their proximity to Mahale Mountains National Park (20 km or less) and field knowledge of whether the village residents were dependent upon the natural resources provided by the park, including clean water, bush meat, and fish spillover from the no-take zone.

A team of trained interviewers administered questionnaires to at least one person from each of the selected households. The survey was divided into three sections.

- 1. Household survey.** Interviewers typically conducted the first section with the head of the household or, if that person was not available, with another adult member of the household. The survey included extensive questions on various topics including: the household's access to services; household assets; farming and livestock; forest products and forests; livelihoods and credit; governance and participation; health and access to medical care; and population-environment linkages (including knowledge of FP).
- 2. Fishing practices survey.** The second section of the survey was conducted with a person in the household who was engaged in fishing (if applicable).
- 3. Reproductive health survey.** The third section of the survey focused on reproductive health knowledge and practices (including use of FP), and was conducted with a female household member of reproductive age (15-49). If the person completing the household survey fit this criteria, she continued on with this section. If not, the interviewer asked to speak with any other available female household member from the roster.

The data for this paper were analyzed using the software R, version 3.2.2. Unweighted frequencies were run for descriptive variables. To determine if frequencies were statistically different from one another, bivariate regression analyses were performed. When applicable, control variables such as age and education were used and are mentioned in the results. Logistic regression analyses were used for any models with binary outcomes. Ordinary least square analyses were used for models with continuous outcomes. Statistical significance is reported at the 95 percent and 99 percent confidence levels.

# RESULTS

## Household and Respondent Characteristics

A total of 487 people from as many households completed the household section of the questionnaire. The median household size was 6 members (range: 1-19). Those who completed the questionnaire included: the household head (58 percent), the spouse of the household head (28 percent), and another adult household member (14 percent). A little more than half of these respondents were male (53 percent) and the median age was 35 years. The majority of household respondents had completed primary school (79 percent). About 2 percent had no education, less than 1 percent had post-primary training, 17 percent completed secondary school, less than 1 percent completed post-secondary training, and 1 percent completed university. With regard to ethnicity, 47 percent of respondents self-reported as Ha, 28 percent as Tongwe, 8 percent as Bembe, 8 percent as Fipa, 3 percent as Goma, and the rest were Manyema, Mbware, Mhutu, Mrundi, Mtabwa, or other. Forty percent of household heads were born in the village.

A total of 364 female respondents from as many households completed the reproductive health section of the survey. Respondents had a median age of 29 years (range: 15-48) and most (82 percent) were currently married. Most (70 percent) respondents had completed primary school. About 27 percent of respondents had no education, less than 1 percent had completed pre-school, and 2 percent completed secondary school. Almost all women interviewed (95 percent) had given birth. The median age at first birth among these women was 18 years (range: 12-33 years). Many women had also experienced the death of a child; 43 percent of those who had ever given birth reported having lost at least one child. This proportion increased to 79 percent among those ages 45-49 years.

## Livelihoods

The respondent who completed the household section was asked to list all of the economic activities in which at least one member of the house participated. Agriculture was mentioned by 95 percent of respondents, followed by business (38 percent), fishing (27 percent), livestock (22 percent), fish trading (13 percent), and formal employment (3 percent).

Only 39 percent of households have documents proving land ownership or short- or long-term leasing rights. However, 89 percent of respondents reported having access to some land, either for forestry or agriculture. Consistent with the importance of agriculture for livelihood in this community, 85 percent of households have access to agricultural land. Of those with access to land, the median plot size was 3 acres (range: 0.25-90 acres). When asked to list the two main farming problems in the area, 40 percent mentioned droughts and 23 percent mentioned lack of inputs such as fertilizer, pesticides, and improved seeds.

## Family Size Preferences

Household section respondents were asked about their ideal number of children. The median desired number of children was 6 (range: 1-100). Respondents naming particularly high numbers of children likely reflected the view that people desire “as many children as possible.” A separate analysis was conducted whereby “small” families were defined as those with four children or fewer and “large” families were defined as those with five children or more. The majority (78 percent) of respondents expressed a preference for a “large” family (five+ children). Preferences were similar by gender, with 80 percent of women and 76 percent of men saying that an ideal family would include five or more children. Family size preferences differed by age. Among those ages 35 and younger, the median ideal family size was five, while for those ages 36 and older, it was eight.

## Family Planning: Knowledge, Attitudes and Use

The respondents who completed the household section of the survey were asked if they knew what FP was. Only 43 percent said yes, and there was virtually no difference between genders. However, younger people were significantly more likely to report knowing about FP ( $p < 0.05$ ). Forty-eight percent of those ages 35 and younger knew of FP, compared to 38 percent among those ages 36 and older ( $p < 0.05$ ). This result is driven by differences at the oldest and youngest ages, with those 15-24 most likely to have heard of family planning, and those over 60 least likely.

A subset of 294 recent mothers with a child aged less than five years were asked if at the time of their recent pregnancy, they had wanted to get pregnant. A little less than half (46 percent) said they had not wanted to get pregnant at that time. Of those women with unintended pregnancies, 88 percent said they wanted to delay the birth, while 12 percent said they did not want any more children.

Among women of reproductive age who were interviewed, 58 identified themselves as currently pregnant. The 306 women who said they were not pregnant were asked about their current use of contraception. Twenty percent of these women reported using a contraceptive method. Among the 60 women who reported a method, 88 percent were using a modern method (59 percent injectables, 8 percent condom, 7 percent female sterilization, 5 percent pills, 3 percent implants, 3 percent IUD, and 2 percent lactational amenorrhea method (LAM)). Twelve percent were using a traditional method (7 percent rhythm, 2 percent herbals, 2 percent withdrawal, 2 percent *pige*<sup>1</sup>).

Among the 245 nonpregnant women not using contraception, 13 percent reported that they want to get pregnant. **Table 1** shows the reasons why women were not using contraception. Not knowing a method was the most commonly cited reason.

**TABLE 1. REASONS FOR NOT USING CONTRACEPTION REPORTED BY NONPREGNANT WOMEN WHO WERE NOT USING CONTRACEPTION IN THE GREATER MAHALE ECOSYSTEM IN WESTERN TANZANIA: 2011 (N=245)**

Reason	N (%)
Does not know a method	42 (17)
Concerns about health or side effects	35 (14)
Breastfeeding or has not menstruated since last birth	35 (14)
Wants to get pregnant	31 (13)
Husband/partner/or someone else is opposed	19 (8)
Not having sex, sex is infrequent, or unmarried	19 (8)
Menopause/had a hysterectomy	19 (8)
Does not know a source/where to get it	7 (3)
Feels it is up to God	8 (3)
Other	8 (3)
Does not know	8 (3)
Opposed to it	6 (2)
Inconvenient to use	2 (1)
Lack access/too far	3 (1)
Religion prohibits it	3 (1)

\*Note: Due to rounding, the figures do not add to 100%.

<sup>1</sup> *Pige* involves the use of special charms made of wood that are carried around the waist.

## Relationship Between Household Respondent's Ideal Family Size and Knowledge of Contraception

Respondents who report a preference for smaller ideal family sizes are significantly more likely to have knowledge of contraception. Among those whose ideal family size is four children or fewer, 56 percent know what FP is, compared to 41 percent among those whose ideal family size is five or more children ( $p < 0.05$ ). This relationship held even after accounting for age.

## Relationship Between Household Respondent's Ideal Family Size and Household's Access to Land

Multivariate regression adjusting for education showed that those with access to more land reported larger ideal family sizes ( $p < 0.05$ ). Another analysis found that respondents with access to three or more acres of land were significantly more likely to have a preference for a larger family (five or more children) than those with access to less than three acres of land. Among those with access to less than three acres of land, 26 percent preferred a smaller family (four or fewer children) compared to 16 percent among those with access to more than three acres of land ( $p < 0.05$ ). However, when including age in the model, household land access was no longer a statistically significant predictor of desire for small families. An additional analysis showed that land access is also positively related to older age.

## Relationship Between Household Respondent's Knowledge of Family Planning and Woman's Use of Family Planning

When linking responses from the household and reproductive health sections of the baseline survey, we found that 28 percent of women in households where the household respondent knew about FP were using some form of contraception, versus 14 percent of women in households where the household respondent did not know about FP ( $p < 0.01$ ). When the analysis was limited to the 118 households where a male head of household answered the question about knowledge of FP, the results are similar. Thirty-two percent of women living in a household where the head knew about FP were using a method of contraception, compared with 15 percent of women in households where the male head of household did not know about family planning ( $p < 0.05$ ).

## Relationship Between Household Respondent's Ideal Family Size and Woman's Use of Family Planning

Similarly, when linking responses from the two surveys, we found that larger ideal family size reported by the household section respondent was negatively correlated with contraceptive use by the woman of reproductive age. In households where the interview subject reported an ideal number of children of four or fewer, 39 percent of women were using contraception, compared to 18 percent of women in households where the respondent reported an ideal number of children of five or more ( $p < 0.01$ ).

## Perception of Pressures Caused by Population Growth

The majority (79 percent) of household respondents said they thought the population in their village had grown in the last five years. When asked about the cause of growth, 40 percent said it was due to migration of outsiders, 39 percent said it was due to many births, 14 percent said it was due to both births and migration, and about 7 percent did not know or gave other responses. When asked if the increase was causing any problems, nearly half (46 percent) said no. Of the remaining 206 respondents who believed the population increase was causing problems, the types of problems reported included:

- Not enough land (43 percent)
- More crime (33 percent)

- Increase in food prices (26 percent)
- Not enough forest (13 percent)
- Not enough fish (10 percent)
- Increase in disease (10 percent)
- Causes conflicts (2 percent)
- Shortage of public services (2 percent)
- Other (2 percent)

## Conservation: Knowledge and Attitudes

To assess knowledge about the effects of environmental problems, interviewers asked household section respondents whether they agree or disagree with the following two statements:

- Statement 1: Deforestation causes siltation.<sup>2</sup>
- Statement 2: Siltation from the rivers is harmful to the fish in the lake.

**Table 2** shows the distribution of responses among the 487 respondents. Less than half (48 percent) agreed with Statement 1, and even fewer (29 percent) agreed with Statement 2. Only one-quarter of people answered both questions correctly. The proportions who did not know the answer to either question was sizeable.

**TABLE 2. KNOWLEDGE ABOUT THE HARMS OF ENVIRONMENTAL DESTRUCTION, BASED ON AGREEMENT WITH TWO STATEMENTS ABOUT SILTATION IN THE GREATER MAHALE ECOSYSTEM IN WESTERN TANZANIA**

Statement	Agree N (%)	Disagree N (%)	Don't Know N (%)
Deforestation causes siltation (N=485)	232 (48)	50 (10)	203(42)
Siltation from the rivers is harmful to the fish in the lake (N=486)	140 (29)	106 (22)	240 (49)

To measure forest quality and degradation from a services point of view, interviewers asked respondents if they agreed or disagreed with the following statement: There is sufficient forest close to this village for us to meet our day-to-day needs. More than half (56 percent) disagreed with this statement, while 36 percent agreed, and 8 percent said they didn't know. To assess opinions and attitudes about conservation, interviewers asked respondents if they agreed or disagreed with the following four statements:

- Statement 1: The village forest should be protected.
- Statement 2: Wildlife such as chimpanzees should be protected.
- Statement 3: The Mahale National Park should continue to be protected.
- Statement 4: The National Park provides benefits for our community.

**Table 3** shows the distribution of responses for the four statements. Positive attitudes about the importance of conservation are relatively high, as seen in the responses for Statements 1-4. Taking these four statements together, 69 percent agreed with at least three and 43 percent agreed with all four.

<sup>2</sup> Siltation is the process of water being polluted by fine particles of sand and clay.



**TABLE 3. OPINIONS AND ATTITUDES ABOUT CONSERVATION, BASED ON AGREEMENT WITH FOUR STATEMENTS ABOUT THE NATURAL ENVIRONMENT IN THE GREATER MAHALE ECOSYSTEM IN WESTERN TANZANIA (N=486)**

Statement	Agree N (%)	Disagree N (%)	Don't Know N (%)
The village forest should be protected	386 (79)	55 (11)	45 (9)*
Wildlife such as chimpanzees should be protected	375 (77)	53 (11)	58 (12)
The Mahale National Park should continue to be protected	395 (81)	39 (8)	52 (11)
The National Park provides benefits for our community	256 (53)	146 (30)	84 (17)

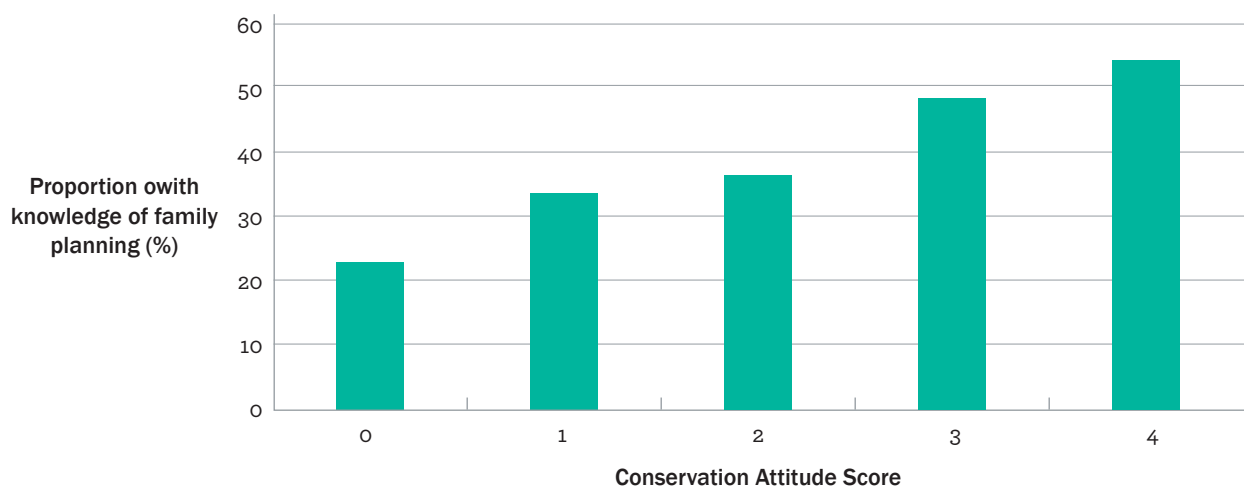
\*Note: Due to rounding, the figures do not add to 100%.

## Relationship Between Family Planning Knowledge and Conservation Knowledge and Attitudes

A multivariate regression analysis adjusted for education showed that there was a significant association between knowledge of FP and knowledge of conservation. This relationship was the same whether the respondent answered one or both conservation knowledge questions correctly.

**Figure 1** shows that knowledge of FP was also positively associated with attitudes towards conservation. The more statements (see Statements 1-4 above) about the importance of conservation that respondents agreed with, the more likely they were to know about FP. Among those who agreed with all four conservation statements, 51 percent knew a method of FP compared to 21 percent among those who did not agree with any statements ( $p<0.01$ ).

**FIGURE 1. KNOWLEDGE OF FAMILY PLANNING BASED ON ATTITUDES TOWARDS CONSERVATION (N=486)**



## Relationship Between Place of Birth and Attitudes Toward Conservation

In households where the household head was born in the village (40 percent), respondents were found to have more positive attitudes towards conservation. Among these respondents, 44 percent agreed with all four conservation statements, compared to 21 percent of respondents where the household head had been born elsewhere ( $p<0.05$ ).

## Relationships Between Various Aspects of Family Planning and Conservation

When we ran regression analyses on the responses of household respondents we found no relationships existed between their:

- Ideal family size and knowledge of siltation.
- Ideal family size and attitudes towards conservation.
- Knowledge of FP and perception that population growth causes problems.
- Perception of population growth-related problems and use of FP by the woman of reproductive age.
- Ideal family size and perception of population growth-related problems.
- Household size and ability to meet daily needs.
- Ideal family size and ability to meet daily needs.

## Relationship Between Household Respondent's Knowledge About Siltation and Perception About Population Growth-related Problems

Respondents with more knowledge of siltation were more likely to perceive harmful effects of population growth. Among those who answered both siltation knowledge questions correctly, 52 percent recognized that population growth can have at least one harmful effect, compared to 36 percent among those who answered both questions incorrectly ( $p < 0.01$ ). This relationship held after adjusting for education.

Similarly, respondents with a higher conservation attitude score were increasingly more likely to recognize that the population is growing and that this is causing problems. Among those who agreed with all four conservation statements (see Statements 1-4 above), 54 percent mentioned at least one problem related to population growth, compared with 28 percent among those who did not agree with any of the statements ( $p < 0.01$ ).

Governance and social cohesion. Good governance and social cohesion are recognized as important for effective conservation. To assess respondents' views on these issues, interviewers asked about:

- Their level of satisfaction with the services provided by the village and district leadership.
- Whether or not they feel their household has an influence on the decisions made by the village government.
- Whether they thought the relationship between Tanzania National Parks Authority (TANAPA) staff and the village residents was good or bad.

Only 28 percent of the 487 respondents said they were satisfied with the services provided by leadership and less than a quarter (24 percent) felt they had any influence on government decisions. With regard to TANAPA, 43 percent said the relationship between staff and residents was good, while 22 percent said it was bad, and 35 percent said they either did not know or felt neutral.

# DISCUSSION

The findings from this analysis regarding baseline knowledge at the start of the *Tuungane* Project can inform program planning and implementation as well as provide insights to other similar PHE projects.

The majority of respondents expressed a desire for relatively large families, however, the difference in median ideal family size between older and younger respondents (those ages 35 and younger and those ages 36 and older) shows that preferences are shifting across generations. Interestingly, the analysis also showed that younger respondents have access to less land. It is unclear whether land access is affecting their family size preferences or whether their preference influences how much land they seek to access. There may be an opportunity to further accelerate these changes by simply meeting unmet need for FP, particularly since those in the younger generation were also more knowledgeable about FP. General awareness raising may be an important first step given that overall, the proportion of people aware of FP was relatively low (43 percent). In contrast, the 2010 Demographic and Health Survey found that knowledge of a method of FP at the national level in Tanzania is nearly universal (98 percent among all women and 99 percent among all men) (NBS and ICF Macro 2011). Possibly, there was a problem with the way the question was asked or the language used, because there were cases where people reported not knowing about FP, yet they were using a method.

Given that nearly half of recent mothers said they had not wanted to get pregnant, there is clearly a strong unmet need for FP in the GME. Further, since the majority had wanted to delay their pregnancies, there are opportunities for activities that emphasize the importance of FP, including the use of long-acting methods for delaying a first pregnancy and/or for birth spacing.

Unmet need was also illustrated strongly by the fact that only 20 percent of nonpregnant women were using contraception, and a relatively small proportion of nonusers wanted to become pregnant soon. Many of the commonly mentioned reasons for nonuse of contraception are amenable to PHE program interventions. These include not knowing a method, having concerns about side effects, not knowing where to get it, limited access, being opposed to it, or lacking support from a husband or partner (reasons collectively cited by 45 percent of the nonpregnant women who were not using FP). Further, since the method mix among contraceptive users is heavily skewed toward injectables, there may be a need for increasing knowledge about and access to a wider range of methods depending on the population's self-identified needs. Including activities that provide women with information and counseling about methods and that engage them in discussions about their concerns could help to improve their comfort with FP. And engaging men and partners as FP champions, perhaps via fisher and farmer networks, could help garner their support as well.

The data show that women were more likely to use a method of contraception when the household respondent knew of FP and also reported a smaller ideal family size, indicating that information sharing and supportive attitudes within households could have a positive effect on FP use. These findings suggest that employing targeted interventions through multiple modes of communication to influence household decisionmaking and gender norms at the individual, household, community, and ward/district level could be an effective way to promote FP. Engaging with and raising knowledge among both women and men (including senior household members, key opinion holders, religious leaders, and others whose views carry weight) increases the likelihood of empowering women to make choices about contraception that best meet their needs. Integrated PHE programming and messaging that targets and resonates with male-dominated fisher and farmer groups is a good example of how contraceptive use can be effectively influenced in these settings (Belachew et al. 2013; Kitantides 2010).

A large majority of respondents are aware of population growth in the community. However, it is important to note that nearly half of those aware of population growth did not see this growth as a problem. Among

those who did, recognition of the effects on land, forests, fish, and food prices was relatively low. Similarly, knowledge about siltation was quite low, offering a clear opportunity for communication and messaging around the issue of population pressures and environmental degradation, perhaps by engaging those in the community who are aware to become champions or peer advocates. Given that respondents from households with heads born in the village were more likely to support conservation, they may serve as an important pool of champions from which to draw.

General attitudes about conservation were quite favorable in the baseline survey, a promising sign. People believe in the need to protect forests, national parks, and animals, and more than half also felt that the forests are not sufficient for their needs. These attitudes may reflect a “politeness” effect whereby respondents felt compelled to respond affirmatively to a positively framed statement. However, these shared positive attitudes reflect a reasonably strong foundation for the *Tuungane* Project, likely making the community more receptive to proposed solutions for improving natural resource management, including FP. An important first step may be improving relationships and trust between community residents and the government, and between residents and TANAPA staff. Residents expressed a high level of dissatisfaction with government services and at the same time did not feel empowered to influence decisions. While a higher proportion held a favorable view of the relationship with TANAPA, they represented less than half of respondents, and a sizeable proportion also said they did not know or felt neutral.

The positive relationships between knowledge of FP and knowledge of conservation, as well as between knowledge of FP and attitudes toward conservation are notable. The nature of the analyses does not allow us to infer causation or a direction of causation. The association could reflect the fact that some people are more inclined to learn about new or “out of the norm” topics, seek out information, or use information sources that cover a range of topics. Thus, those who knew about FP also may be more likely to know about conservation. However, this relationship held when we took education levels into account, suggesting that positive views on both conservation and FP may be closely linked. Stronger study designs in future *Tuungane* Project surveys will be needed to assess whether broad views on conservation affect individual reproductive health behavior.

In several analyses looking at the different types of relationships between individual aspects of population (for example, knowledge of FP or ideal family size) and perceptions about the effects of population growth, we did not find any significant associations. As the PHE program develops, it will be useful to continue to monitor and measure these important relationships.

We identified other synergies among different types of knowledge and attitudes, including correlations among knowledge of siltation, attitudes toward conservation, and perceptions about harms caused by population growth. Perhaps those with greater awareness about one topic are more inclined to seek out knowledge about the others or obtain information from the same sources. Regardless, these findings suggest that PHE projects can draw on community members who have a strong understanding of conservation and its connections to population to inform and engage the broader community.

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