

# Executive Summary

Smallholder farmers must adapt to a complex tangle of threats and risks by developing resilient coping strategies - ways to bounce back after tough times and maintain their core identity. Building those coping strategies requires a balance of competing demands, and an understanding that impact is both short-term and long-term. A household can spend an entire year working 8-10 hours a day, 6 days a week, and still be thwarted by a bug, an unexpected change in rainfall, or an abnormal rise in temperature of 2 degrees. External environmental and economic threats are outside the control of smallholder farmers, they occur with differing severity, take different forms, and require different adaptation needs year to year. The past two years in southern Ethiopia have been characterized by two types of external environmental threats, extreme weather and shifting rainfall patterns. The most common term used by the humanitarian community since 2014 has been “drought”, but various moderate to extreme threats have manifested themselves since 2014 in southern Ethiopia.

As a result, CEY crop yields declined 47% from 2015 to 2016 for Nuru farmers in the 2014 cohort. In 2016, Nuru Ethiopia farmer yields from the 2014 cohort were just slightly below the 299 Kgs/acre average yield for the comparison group, however, the 2015 and 2016 cohorts of Nuru farmers achieved CEY crop yields above the comparison group of 465 Kgs/acre and 438 Kgs/acre, respectively. When taken collectively, the average Nuru farmer CEY yield from the 2014, 2015, and 2016 cohorts is 390 kgs/acre, which is 26% higher than the comparison group. All Nuru cohorts and the comparison group experienced an average of 34% drop in CEY yield in 2016 over baseline.

As part of the 2017 Program Review, NE identified the variables outside their control, and claimed ownership over the weaknesses in their program activities. Implementation of program activity changes is already underway with clear monitoring and evaluation objectives. Nuru Ethiopia and the farmers they support are committed to learn and adapt quickly to the mounting challenges inherent to Ethiopia’s remote, rural areas, and the increased frequency and severity of external threats, like extreme weather events and pest outbreaks.

## Introduction

The Nuru Ethiopia (NE) Agriculture Program aims to impact crop yield, food security and household income by providing member farmers with farm input loans for improved maize and bean varieties and fertilizer. Agricultural Extension and Rural Livelihoods (AERL) field officers also provide technical training, extension services and cooperative support structures formally linked to the Government of Ethiopia’s cooperative institutions.

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The impact of the program is quantified through annual yield measurements and the income generated from crop revenue. As the Agriculture Program evolves, Nuru is researching new methods for measuring and quantifying impact that includes resilience and broader on-farm income generation.

## Objective

This report is the third Agriculture Program follow-up assessment since 2014. The following presentation of individual level data provides an update on the progress Nuru farmer households are making towards improving crop production and increasing household income. The available evaluation and monitoring data were used to generate recommendations for the program.

The Nuru Monitoring and Evaluation (M&E) team supports this work by conducting an annual assessment towards the evaluation question: *What is the impact of the Nuru Ethiopia Agriculture Program?*

## Methodology

In April 2014, NE conducted a baseline study of its first cohort of farmer households (intervention group) and non-intervention households (comparison group) across seven kebeles within Boreda Woreda, Gamo Gofa Zone, Southern Nations, Nationalities, and Peoples' Region (SNNPR). Monitoring data is also collected to track loan repayment, number of acres farmed, and average loan sizes provided.

Table 1: Survey timeline and sample sizes

Sample	# of Farmers	# of Enumerators	Training Dates	Survey collection dates	Data entry and quality control
Nuru	351	35	Sept 2016	Oct - Dec 2016	Oct - Dec 2016
Non-Nuru	643				

## Crop Equivalent Yield

For purposes of comparability across Nuru and non-Nuru farmers and versus baseline, Nuru Agriculture and M&E employs a single composite indicator of crop performance: Crop Equivalent Yield (CEY).

The CEY calculation converts the performance of select crops into one standard unit of maize kilograms per acre. This is done using the farm gate prices per kilogram of haricot beans and maize. Finally, M&E transforms all crops into maize via the price ratios of haricot beans versus maize. One way to interpret this calculation is to ask: *If farmers only grew maize this season, how much maize would they have produced?*

## Agricultural Profits

These figures are calculated only for the particular crop production farmers engage in as part of the Nuru package. Revenue is calculated by multiplying the average CEY by the average farm gate price for maize. There are two ways to calculate cost. The cost for Nuru farmers is the loan price for the improved farm inputs (seed and fertilizer) provided by Nuru cooperatives. The cost for the comparison group, on the other hand, is calculated using farm input adoption rates gathered from survey responses. With the support of Nuru extension services, Nuru farmers deploy all improved inputs, while not all comparison farmers use improved seed and fertilizer. Under ideal growing conditions, an increased investment in improved inputs should lead to increased productivity. Finally, net profit or loss is calculated by subtracting the costs from revenue.

## Monitoring

In addition to yearly impact evaluations, the NE Agriculture team collects monitoring data throughout the year. While evaluations focus on a sample of farmers, program teams monitor the entire Nuru farmer population. In 2016, the NE Agriculture Program set a series of targets that were monitored throughout the 2016 production season. Leading up to the 2016 season a Nuru farmer has been defined as a registered cooperative farmer that takes a Nuru administered input loan. In 2016, Nuru Ethiopia targeted a total of 2,580 registered Nuru farmers with 3,011 acres farmer with those inputs, and was able to register an actual number of 2,269 Nuru farmers with 2,733 farmed acres. These targets were missed in 2016 as a result of the extreme weather and erratic rainfall that characterized the 2015 season and early part of the 2016 rainy seasons.

## External Threats: 2015 to present

Smallholder farmers in rain-fed production systems face increasingly complex, and at times overwhelming and exasperating choices. The best production seasons are characterized by stable grain prices, strong and consistent rainfall, and low pest and disease outbreaks. In these ideal conditions, farmers can generate an additional \$300-400 USD of income annually from crop production, enough to invest in on-farm improvements, send 3-4 children to school, and cover unexpected medical expenses.<sup>1</sup> However, the past four years have not been the best of years in southern Ethiopia. The most common term used by the humanitarian community since 2014 has been “drought”, but over the past 4 years a myriad of moderate to extreme threats, including drought, have shocked smallholder farmers in a region painted with a diverse array of sprawling grasslands, green mountain peaks, and lush forested valleys. Threats that include:

- Pests and crop diseases
- Extreme weather events (droughts and floods)
- Changing seasonal rainfall and temperature patterns that negatively affect crop growth

The 2016 production season in East Africa was littered with external threats of different severity. The production season varied greatly from region to region and farm to farm, but the threats were material. For example, the GEOGLAM Early Warning Crop Monitor (EWCM)<sup>2</sup> classified crop conditions as “poor” in the Nuru Ethiopia (NE) operating area, Gamo Gofa Zone, which is circled on Map 1. As the map indicates, the primary drivers of poor crop conditions in Gamo Gofa Zone, Ethiopia in 2016 were irregular dry conditions and the delayed onset of rainfall.<sup>3</sup> More generally, these drivers are a result of changing seasonal rainfall and temperature patterns in congruence with a higher frequency of extreme weather events. The poor crop conditions equate to lower than usual yields for staple food crops, which in southern Ethiopia are maize, pulses (beans), teff, and wheat.

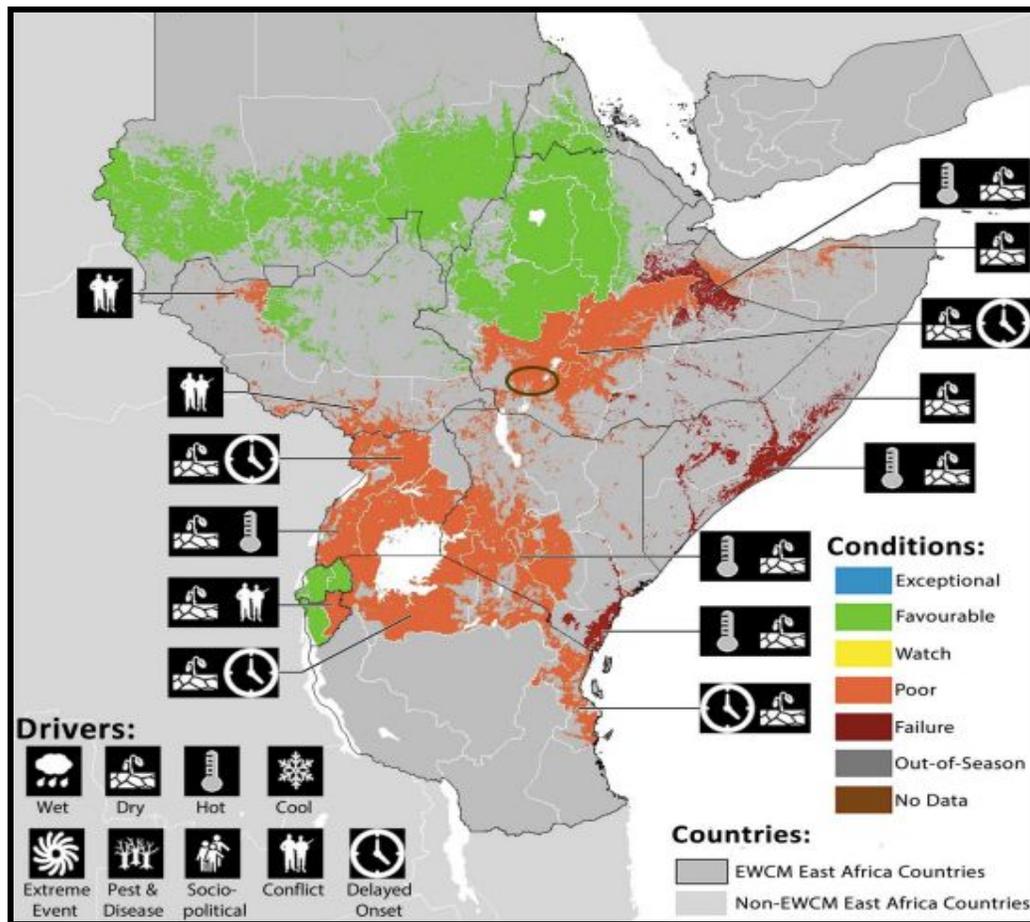
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<sup>1</sup> <http://www.fao.org/3/a-i5251e.pdf>

<sup>2</sup> The EWCM is a consensus based, multi-agency effort including FEWS NET, JRC, WFP, Agricultural Research Council of South Africa, and the University of Maryland,

<sup>3</sup> <http://www.fews.net/east-africa/special-report/february-3-2017>

Map 1: Early Warning Crop Monitor, Crop Conditions 2016



## Results & Discussion

The 2016 season was characterized by late and lower than normal rainfall and unusually high temperatures for smallholder farmers in southern Ethiopia. International institutions like the United Nations and World Food Programme have declared multiple humanitarian crises that include Gamo Gofa Zone and most of SNNPR.<sup>45</sup> Multiple short season droughts and rainfall pattern changes have occurred in both the Belg (short) and Meher (long) rain seasons of southern Ethiopia. Producing maize as a cash crop under these conditions is incredibly difficult, and nearly impossible without precise timing. Success in agribusiness, even on the smallest scale, is a moving target year in and year out, requires annual adjustments, and at times

<sup>4</sup> World Food Programme Ethiopia, "Situation Report #10", September 1, 2016. <http://reliefweb.int/sites/reliefweb.int/files/resources/WFP%20Ethiopia%20Drought%20Emergency%20Situation%20Report%202310%20-%20201%20September%202016.pdf>

<sup>5</sup> Other WFP Situation Reports, 2016 and 2017. <https://www.wfp.org/Situation-Reports/Ethiopia>

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extreme coping measures like migrating in search of work or selling off productive assets like animals, land or even their homes.

Smallholder farmers must adapt to the complex tangle of threats and risks by developing resilient coping strategies - ways to bounce back after tough times and maintain their core identity. Nuru is working quickly to help Ethiopian farmers develop the types of coping mechanisms and risk management strategies that are resilient to a myriad of shocks. In smallholder rainfed systems proper risk management requires innovative methods of risk reduction, risk transfer, risk reserves, and prudent risk taking. At Nuru Ethiopia, risk reduction takes the form of livelihood diversification and greater integration between crop and animal production systems. Risk transfer is a constant effort to find affordable and trustworthy smallholder crop insurance that reflects the reality of smallholder farmers. The farmer cooperatives supported by NE are building risk reserves to help their members cope financially in years of high external threats, while prudent risk taking requires a complement of financial literacy trainings from our Financial Inclusion program and hands-on agricultural extension under the Agriculture Program.

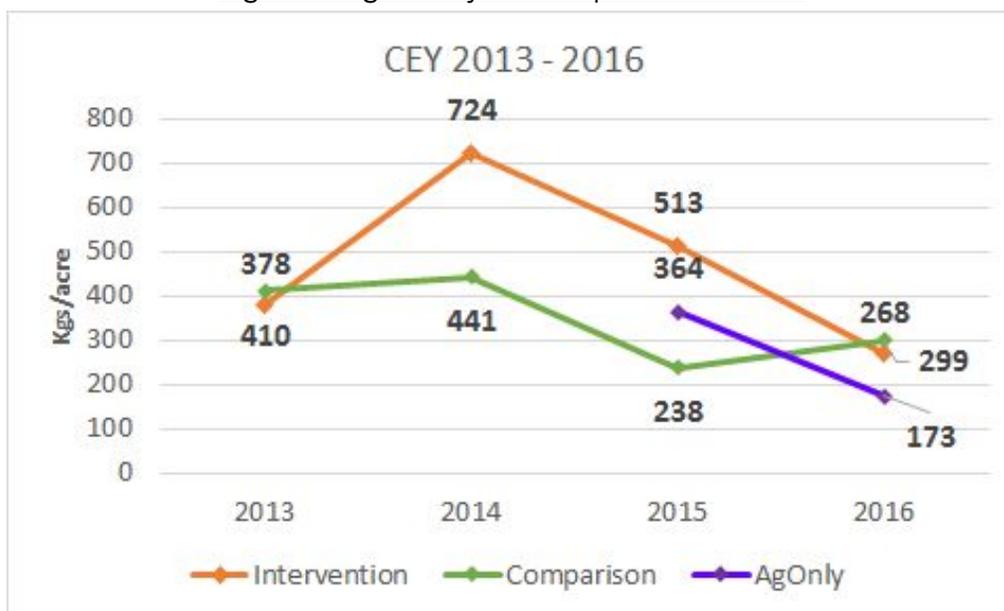
## Crop Yield

NE's agriculture intervention helped households achieve an increase in CEY crop yields in 2014 and 2015 over baseline. In 2016, however, CEY yields dropped below baseline for the 2014, 2015, and 2016 cohorts of Nuru farmers, as well as, the comparison cohort. These decreases are consistent with one of the most severe droughts in the past 50 years throughout 2015, and a production season in 2016 characterized by the late onset of rainfall, high temperatures, and households rebounding from the 2015 shock.

On the left hand side of Figure 1, the 2013 CEY baseline yields can be viewed as kilograms per acre for the intervention cohort and the comparison cohort. The orange line represents the intervention cohort, or specifically, the 2014 cohort of Nuru farmers and the purple line represents the "AgOnly" cohort of farmers who only receive Nuru's agriculture interventions. The figure does not include the CEY yields from the 2015 and 2016 cohorts of new Nuru farmers receiving Nuru's integrated impact programs. For consistency with past Impact Assessments, Nuru M&E is displaying the CEY yield trends for the Nuru and comparison cohorts with the same baseline year of 2013, and the AgOnly 2015 cohort.

The NE Agriculture Program targets CEY yield increases of 32% as a minimum, and as Figure 1 displays, the intervention cohort achieved a yield increase of 91% from 2014 to 2015. This was well above the marginal yield increase of 7% experienced by the comparison cohort during the same period. The external environmental shocks described above began impacting the CEY yields for all Nuru and comparison farmers starting in 2015 and carrying into 2016.

Figure 1: Kgs/acre yield comparison 2013-16



CEY crop yields declined 47% from 2015 to 2016 for Nuru farmers in the 2014 cohort (orange line). The CEY yields for the “AgOnly” Nuru farmers (purple line) declined by 51% from 2015 to 2016, while the comparison group CEY yields increased by only 12%. In 2016, NE farmer yields from the 2014 cohort were just slightly below those of the comparison group, however, the 2015 and 2016 cohorts of Nuru farmers not depicted in Figure 1 statistics achieved CEY crop yields above the comparison group of 465 Kgs/acre and 438 Kgs/acre, respectively. When taken collectively in 2016, the average Nuru farmer CEY yield from the 2014, 2015, and 2016 cohorts is 390 kgs/acre, which is 26% higher than the comparison group not receiving NE agricultural interventions.

## Income Model

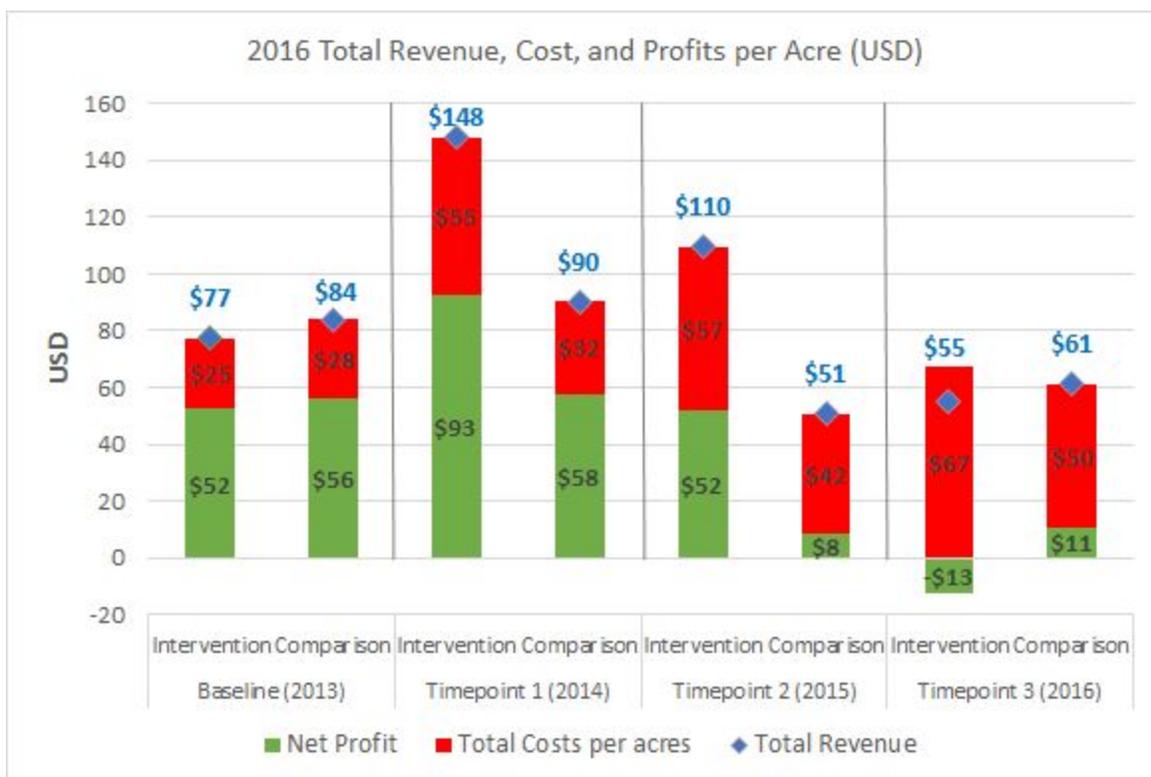
As Figure 2 depicts, the higher cost of improved inputs (seeds and fertilizers) in 2016 combined with declining yields, led to a net loss for Nuru farmers *on average*. The lower costs of inputs for comparison farmers is why a net profit was achieved for the comparison group in 2016. From baseline in 2013 until 2015, Nuru farmers experienced an increase in profits of 85% more than comparison farmers. Even as external threats led to declining yields in 2015, the higher costs for improved inputs was generating, on average, 39% more revenue per year than comparison from 2013 to 2015 until the 2016 season.

Costs differ between Nuru farmers and comparison farmers solely because of adoption rate – NE assumes that Nuru farmers use all of the beans, maize, DAP, and UREA provided, while comparison adoption is based on survey responses. Essentially, the cost of maize and bean production outpaced the revenue that was generated on average across all 2,269 NE farmers

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in 2016. This net loss across the 2,269 NE farmers was incurred by Nuru in the form of low loan repayment (79% in 2016) and was not formally incurred as an extra financial burden on Nuru households. Many Nuru farmers broke even or achieved a small profit in 2016.

Figure 2: Income Model Comparison 2013-16



## Conclusions and Recommendations

The NE Agriculture Program acknowledges that the 2016 production season did not have the substantial positive impact experienced in Ethiopia in 2014 and 2015. Yields and profits for Nuru farmers continued to decline from 2015 as a result of poor rains and abnormal weather patterns. The program did achieve other positive impacts for the farmers it supports.

In 2016, NE worked with community members to build local institutions, 22 farmer cooperatives to date, that provide valuable market access for surplus production of maize, beans, teff, wheat, and pigeon pea, as well as, other grains and pulses. These activities took place in the context of Nuru’s integrated approach offering Financial Inclusion, Healthcare and Education Programs as well.

The dedicated NE agricultural staff, who live, work, and build families in these rural communities are committed to bringing alternative livelihood diversification options to Nuru farmers in 2017, like goat and sheep fattening based on improved practices. This pilot has

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great potential to help Nuru farmers adapt to changing rainfall patterns and grain price fluctuations by increasing household income with improved animal husbandry practices, while simultaneously diversifying income generation to lessen the dependence on rainfed grain and pulse production.

NE is committed to making the difficult decisions based on the best available data. To this end ,the first annual program review was convened in 2017. The Program Review team analyzed the results of this report together with monitoring data, and identified the following weaknesses in their Agriculture Program:

- Nuru farmer access to improved inputs on Government of Ethiopia (GoE) loan for maize and bean seeds and fertilizers have increased since 2013. The use of improved seed and fertilizer in maize production was only 50% amongst non-Nuru farmers in the 2013 baseline survey, but by 2016 surveys the use of improved maize seed and fertilizer for the non-Nuru comparison group increased to 82% and 75%, respectively.
  - Program weakness: NE's duplication of GoE input provision is a waste of time and resources
- The 2015 drought and 2016 rainfall changes, and associated low CEY crop yields, confirmed that Nuru farmer resilience to environmental shocks is weak, and requires more climate-smart agriculture practice adoption.
  - Program weakness: insufficient crop diversification and livelihood diversification to absorb loss of single on-farm income generating activity due to shock.

In order to strengthen the identified weaknesses, NE will focus on refining the following activity changes in Q3 of 2017 for implementation as pilots in 2018:

- Collaborate closely with local Woreda Government to ensure Nuru sponsored cooperatives receive timely seed and fertilizer inputs from the GoE, and stop Nuru provision of maize and bean inputs.
- Train GoE kebele agriculture extension agents on maize and bean best agronomic practices (BAP) by co-developing Farmer Training Center (FTC) demonstration plots for cascading to farmers.
- Explore "cash crop" input package for potential piloting in 2018-19, to increase profit margins for Nuru farmers.
  - Cash crops would be very low risk crops like groundnuts, sesame, and other legumes. This would not include high risk crops like coffee or horticulture in the near term.
- Expand animal husbandry, livelihood diversification, activities to more than 50% of Nuru sponsored cooperatives that include farmer training curriculum for healthier and more productive animals.
- Integrate water and soil conservation agriculture practices (climate-smart) into BAP trainings for 2018 season (i.e. agroforestry, manure management, etc.).