EVIDENCE FOR DEVELOPMENT

Assessing Rural Transformations in Tigray, Ethiopia: IHM evidence

Evidence for Development working paper 3

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Assessing the impact of their interventions in the context of rapid social and economic transformations is a major challenge for agencies involved in rural development. The Assessing Rural Transformations (ART) project was designed to address this challenge and investigate practical and credible ways of assessing the impact of development activities. Two approaches were used: the Qualitative Impact Assessment Protocol (QUIP), a tool for self-reported attribution, and the Individual Household Method (IHM), a relatively new approach to measuring and monitoring income at household level.

The IHM allows users to disaggregate and quantify contributions made by specific activities associated with a project to a household's overall economic status and its capacity to access the goods and services required for social inclusion and well-being. It is a tool that can be used to track change at household level and to gain insights into the drivers of change. This information can be used as a guide for further investigations using the most appropriate methodologies, making it an ideal tool for use in the ART project.

This is the third IHM working paper from the ART project, and looks at the 'Sustainable agriculture for improved food security project' in Tigray region, Ethiopia. The project aims to find sustainable solutions to problems of food security among some of the poorest households in the north of Tigray. The project's target beneficiaries are poor, female-headed households and young people. Among young people in particular, land shortages mean that these households are often highly dependent on cash income to meet their food needs. Project interventions were therefore designed to generate income through activities including beekeeping, vegetable production, goat-rearing and poultry.

Research protocol

As part of the ART project, a series of studies were carried out in a selected 'Sustainable agriculture for improved food security' NGO project area between 2013 and 2015 to track changes in beneficiary and non-beneficiary households, and to gain a deeper understanding of project impacts and the drivers of change among smallholder farmers in the project area. The individual household method (IHM) was used to collect information on household incomes and economies.

Project work in Tigray did not begin until mid-2013, and at the time of the first IHM study in March 2013 beneficiaries had not been selected. For this reason, data from 2013 has not been used in the final analysis, although useful contextual information was collected and local staff were trained in

IHM data collection methods. The training was led by Evidence for Development (EfD)[1] and a local staff member (from another NGO) with IHM level III certification. The two full IHM studies used in the final analysis were carried out by Evidence for Development and NGO staff members in March 2014 and March 2015, covering the study years March 2013 – February 2014 and March 2014 – February 2015.

The research protocol described in *Assessing Rural Transformations in Oromia, Ethiopia: IHM evidence*[2] was followed. Preliminary data was collected from focus groups and key informants at the study site to establish an overview of the local economic and social context. These interviews were repeated for each subsequent round of data collection to update prices and record major events, such as adverse weather conditions. A detailed village map was drawn on the first visit, showing all households and the names of their household heads. This was checked on subsequent surveys and any changes noted.

Location and sampling

The sites selected for study are in Ahferom *woreda*, where more than 30% of the population receive assistance from the government's Productive Safety Net Programme (PSNP). Land shortages and frequent droughts limit the agricultural potential of the area, which falls within Tigray's central mixed crop livelihood zone[3]. An initial livelihood zoning exercise established that all project sites fell within the same watershed livelihood zone. One *kebele* was selected as being 'typical' of the zone, and within the kebele, one village was selected as being typical of other villages in the kebele[4]and within reasonable reach (about an hour's drive) of the assessment base in Adwa.

The selected village, surveyed in the pilot, baseline and endline studies, included 352 households (261 male-headed and 91 female-headed). Resource limitations meant that only around 100 households could be interviewed in the time available. As part of the pilot study an initial wealth group breakdown was carried out, with a focus group of knowledgeable male and female members of the community. The group identified the characteristics of better-off, middle-income and poorer households, and estimated that the proportion of households in each category was approximately 14% better-off, 36% middle-income and 50% poor.

For the 2014 baseline study, quotas of non-beneficiaries and beneficiaries from the different intervention packages were sampled. Beneficiary households were selected for interviews through a fresh round of systematic sampling, as there were insufficient numbers of beneficiaries in the pilot study. Apparent non-beneficiary households were sampled systematically from the pilot study's

[1] For more details of Evidence for Development, see: http://www.efd.org/
[2] Petty, C. & Ellis, W. (2015) *Assessing Rural Transformations in Oromia, Ethiopia: IHM evidence*, Evidence for Development working paper 1. Available online at http://www.efd.org/reports/assessing-rural-transformations-in-oromia-ethiopia-ihm-evidence/
[3] *Ethiopia – Livelihood Zones* (2009), Famine Early Warning Systems Network (FEWS NET). Available online at http://www.fews.net/east-africa/ethiopia/livelihood-zone-map/november-2009
[4] The kebele and village were typical in that there were no characteristics that made them stand out from other kebeles and villages in the livelihood zone, for example in relation to market access, altitude, range of crops and livestock kept, and access to water and other natural resources.

disposable income distribution, with equal numbers from each quintile. However, during baseline interviews it became clear that several households initially thought to be non-beneficiaries were actually beneficiaries[5]. Some households also received multiple interventions, while others joined the project in the second year.

A total of 102 households were interviewed in the baseline study, with 97 households revisited for the 2015 endline study. The analysis that follows is based on the 83 households that appear in both databases without any unresolved data queries.

IHM concepts and terminology

In the analysis presented here, income produced or received by the household as food for their own consumption is classified as '**food income**', measured in kcal and distinct from '**cash income**', measured in the local currency. Software designed by Evidence for Development calculates the proportion of the household's total food energy requirement[6] met by its food income and the cost of purchasing the outstanding requirement, based on the mid-year market price of the most commonly consumed local staple foods. Any money remaining from the household's cash income after it has purchased this food is described as '**disposable income**' (DI):

$$\begin{aligned}&\text{Disposable income} = \\ &\quad \text{Sum of all household cash income} - ((\text{Household food energy requirement } [kcal] - \\ &\quad \text{Sum of all household food income } [kcal]) \times \text{Price per kcal of staple diet})\end{aligned}$$

Households that do not have sufficient income to meet their WHO reference standard food energy requirement are considered to be below the food poverty line and to have a negative disposable income. To allow for comparison between households of different size and demography, income is further standardised by '**adult equivalent**'[7], giving **disposable income per adult equivalent** (DI/AE). Figures that are not standardised per adult equivalent may be described as '**raw**'.

A '**standard of living threshold**' (SoLT) was set for the locality, representing the cost of a basket of essential items that are required to meet the local norms for social inclusion. When calculating each household's cost of meeting the standard of living threshold, personal costs (such as clothes, primary school costs, etc.) are allocated according to the age and gender of individuals in the household; other costs such as fuel are allocated per household. Households that cannot afford the full set of items are described as being below the standard of living threshold.

[5] This was due to differences between the names of beneficiaries on the NGO's list and the household head names given during mapping with community members.

[6] Food energy requirements derived from 1985 WHO reference standards: 'Energy and protein requirements', *Report of a Joint FAO/WHO/UNU Expert Consultation* (1985), World Health Organization Technical Report Series 724. Available online at http://www.fao.org/docrep/003/aa040e/aa040e00.HTM

[7] The number of adult equivalents per household is calculated as the total household energy requirement divided by the energy requirement of a young adult (2,600 kcal per day).

In each year data was collected for consecutive twelve-month periods. The individual household method and concepts used in IHM analysis are described in more detail in EfD working paper 1[8].

Findings

Findings shown in this report are based on the 2014 baseline data and the 2015 endline data. The baseline year, March 2013 – February 2014, began after some households had started to receive 'Sustainable agriculture for improved food security' project inputs for beekeeping, goat-rearing, poultry production and vegetable and fruit production (either with drip irrigation materials and a treadle pump, or more basic other tools) at the beginning of 2013.

According to the local NGO staff, households that were beekeeping and poultry beneficiaries in 2013 may have had some project-related income from these activities in their baseline data, with further project-related income to be expected in the second, endline year (when some additional households also received beekeeping and poultry production inputs). For the households that were beneficiaries of the goat-rearing and/or vegetable and fruit-growing packages, households receiving inputs in the baseline year could have started to derive income from these in the endline year. However, households that became goat or vegetable beneficiaries during the endline year would be unlikely to have seen any positive effects on their incomes.

With livelihoods interventions such as these – particularly those involving more valuable livestock – it is also important to note that many of the effects on incomes and livelihood strategies might be expected over a far longer timeframe than the two years covered in this report.

Income distribution and standard of living

Just over one-third of the households included in the study (34%, or 28 out of 83) fell below the food poverty line due to negative disposable incomes in the baseline year (Fig. 1), with several others only just able to meet their food energy needs to WHO reference standards. Almost two-thirds of the sample fell below the local standard of living threshold (Table 1). This includes all of the poorest three quintiles, and a quarter of the households from the second-richest quintile.

61% (51 out of 83) of the households included were beneficiaries in the baseline year. Among these households, 14 were beekeeping beneficiaries, 9 were goat-rearing beneficiaries, 8 were poultry production beneficiaries, 9 were vegetable and fruit beneficiaries with drip irrigation materials and a treadle pump, 9 were vegetable and fruit beneficiaries with other tools, and 2 households received multiple intervention types.

[8] Petty, C., & Ellis, W., *op. cit.*

Figure 1: Baseline disposable income per adult equivalent

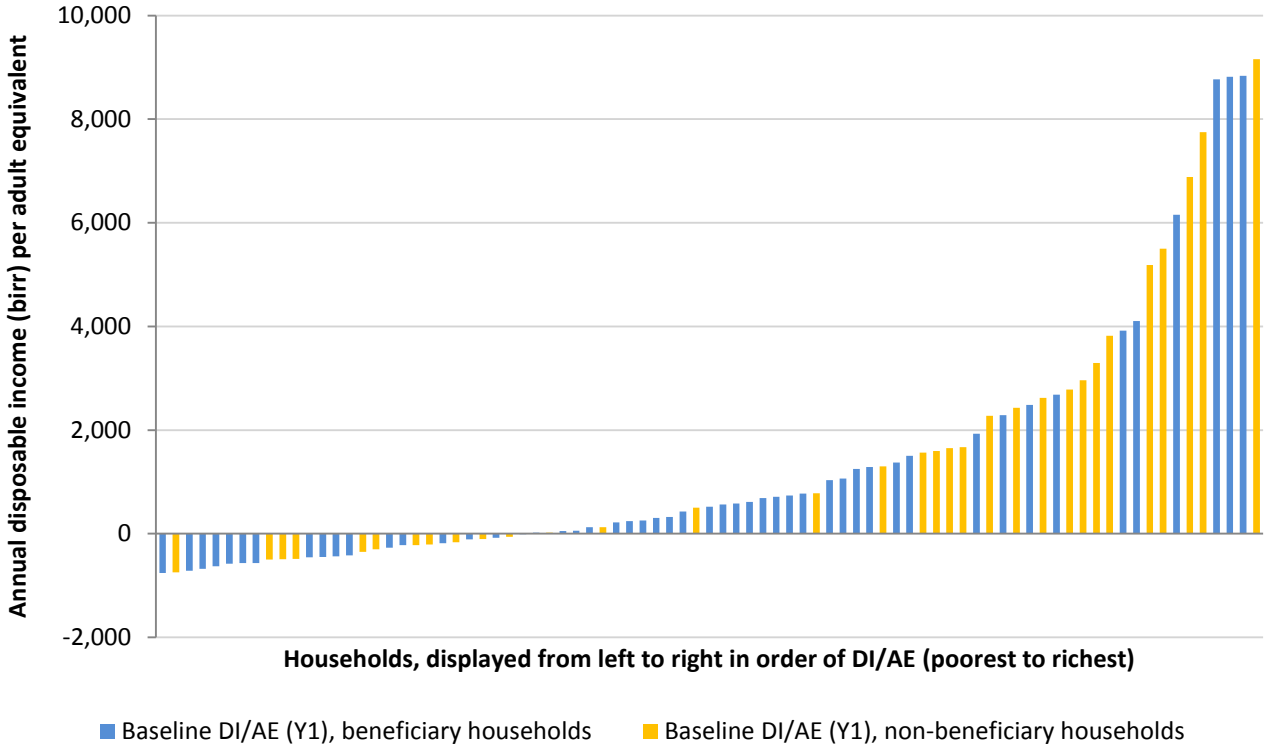


Table 1: Baseline percentages of households above and below the standard of living threshold and beneficiary households, by quintile[9]

	DI/AE quintile					*Overall*
	1 (poorest)	**2**	**3**	**4**	**5 (richest)**	
% of HHs below SoLT (no. in parentheses)	100.00% *(17/17)*	100.00% *(17/17)*	100.00% *(17/17)*	25.00% *(4/16)*	0.00% *(0/16)*	***66.27% (55/83)***
% of HHs above SoLT (no. in parentheses)	0.00% *(0/17)*	0.00% *(0/17)*	0.00% *(0/17)*	75.00% *(12/16)*	100.00% *(16/16)*	***33.73% (28/83)***
% of HHs beneficiaries (no. in parentheses)	64.71% *(11/17)*	58.82% *(10/17)*	88.24% *(15/17)*	50.00% *(8/16)*	43.75% *(7/16)*	***61.45% (51/83)***
% of HHs beekeeping benef. *(no. in parentheses)*	23.53% *(4/17)*	17.65% *(3/17)*	5.88% *(1/17)*	25.00% *(4/16)*	12.50% *(2/16)*	***16.87% (14/83)***
% of HHs goat benef. *(no. in parentheses)*	11.76% *(2/17)*	0.00% *(0/17)*	29.41% *(5/17)*	0.00% *(0/16)*	12.50% *(2/16)*	***10.84% (9/83)***
% of HHs poultry benef. *(no. in parentheses)*	11.76% *(2/17)*	11.76% *(2/17)*	11.76% *(2/17)*	12.50% *(2/16)*	0.00% *(0/16)*	***9.64% (8/83)***
% of HHs veg & fruit, drip benef. *(no. in parentheses)*	11.76% *(2/17)*	11.76% *(2/17)*	17.65% *(3/17)*	0.00% *(0/16)*	12.50% *(2/16)*	***10.84% (9/83)***
% of HHs veg & fruit, other benef. *(no. in parentheses)*	0.00% *(0/17)*	17.65% *(3/17)*	17.65% *(3/17)*	12.50% *(2/16)*	6.25% *(1/16)*	***10.84% (9/83)***
% of HHs multiple benef. types *(no. in parentheses)*	5.88% *(1/17)*	0.00% *(0/17)*	5.88% *(1/17)*	0.00% *(0/16)*	0.00% *(0/16)*	***2.41% (2/83)***

[9] This table only shows households as 'beneficiaries' if they were beneficiaries in the baseline year.

Beneficiary households were slightly more numerous among the poorer three quintiles in the baseline year – perhaps reflecting project targeting – although beneficiaries were found across the entire income distribution and included the second-, third- and fourth-richest households. The only two categories of beneficiary households not to include any households from the richest quintile were the poultry production beneficiaries and the beneficiaries receiving multiple interventions.

The median baseline disposable income of beneficiary households was 322 birr per adult equivalent, considerably less than the non-beneficiary households' median of 1,434 birr per adult equivalent. 76% (39 out of 51) of beneficiary households were below the standard of living threshold in the baseline year, compared to 50% (16 out of 32) of non-beneficiary households.

Baseline to endline changes

To compare baseline data (March 2013 – February 2014) with endline data (March 2014 – February 2015), all cash values in the endline data were adjusted (downwards) for inflation, with compound inflation rates derived from the Ethiopian Central Statistics Agency (CSA)'s regional inflation figures for Tigray[10]. To make these regional figures more appropriate for the rural area of Tigray to which the IHM data relates, several categories that were better-suited to an urban inflation index have been removed from the original inflation baskets[11]. The remaining categories were then re-weighted in accordance with the most appropriate publically-available CSA weightings[12], and standardised to make March 2013 – February 2014 the starting point. From these calculations, rural year-on-year inflation for March 2014 – February 2015 in Tigray was approximately 3.34%.

Disposable incomes

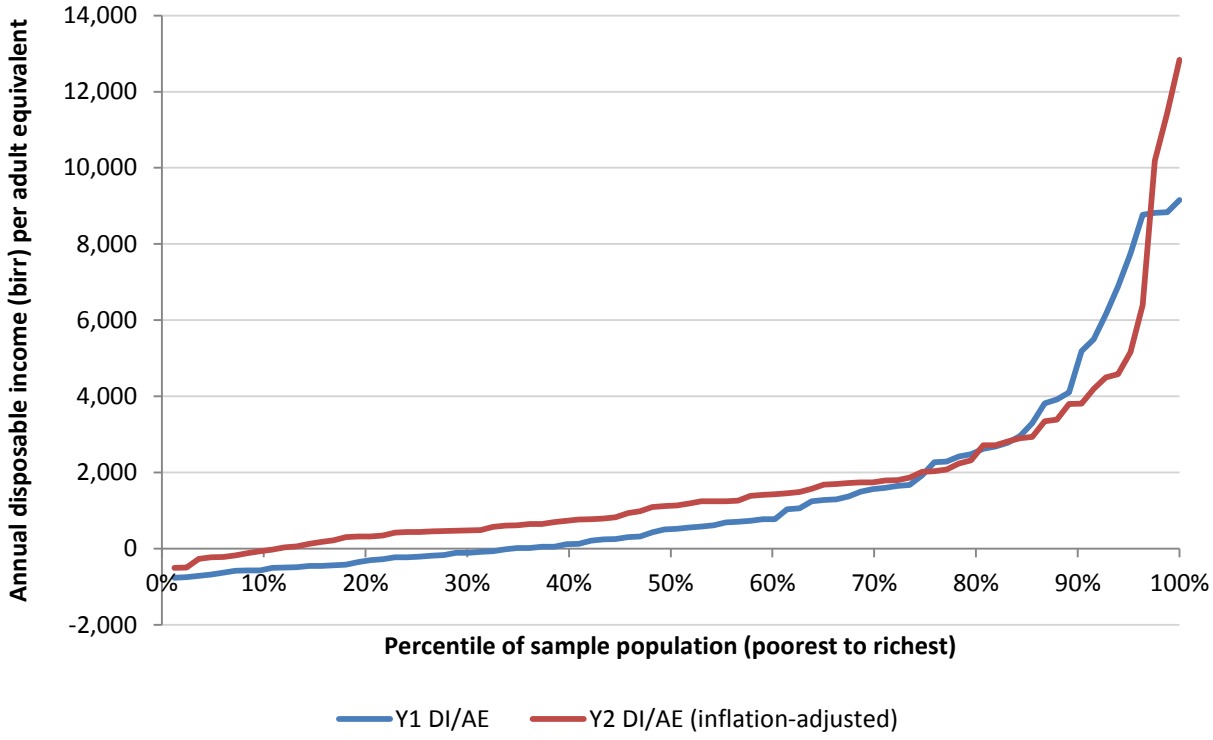
Fig. 2 and Table 2 show the baseline (Y1) and endline (Y2) disposable income distributions and proportions of households above and below the standard of living threshold. Note that while the same 83 households are shown for both years, their income percentiles and quintiles vary between the years. Fig. 2 and Table 2 therefore show changes at an aggregate level within the sample, rather than an individual household level – data showing the changes to individual households' disposable incomes is presented later, in Fig. 3.

[10] **March 2013 – June 2013** inflation rates: *Country and Regional Level Consumer Price Indices for the month of May 2014, Information No. 15* [p. 23], Central Statistics Agency (2014). Available online at http://www.csa.gov.et/images/documents/pdf_files/CPI/may_2014_cpi.pdf
July 2013 – February 2015 inflation rates: *Country and Regional Level Consumer Price Indices for the month of April 2015, Information No. 26* [p. 32], Central Statistics Agency (2015). Available online at http://www.csa.gov.et/images/documents/pdf_files/CPI/cpiapril2015.pdf

[11] For the weighting categories in use since January 2012, 'Alcoholic Beverages and Tobacco', 'Housing, Water, Electricity, Gas and Other Fuels', 'Furnishings, Household Equipment and Routine Maintenance of the House', 'Recreation and Culture' and 'Restaurants and Hotels' have been excluded.

[12] Full CSA weightings (used from January 2012 onwards): *Country and Regional Level Consumer Price Indices for the month of April 2015, Information No. 26* [p. 11, 'Table B'], Central Statistics Agency (2015). Available online at http://www.csa.gov.et/images/documents/pdf_files/CPI/cpiapril2015.pdf

Figure 2: Baseline and endline disposable income distributions



For households at most points of the income distribution – all apart from those in two relatively small better-off groups – disposable incomes were higher in the third, endline year (Fig. 2), despite the adjustment downwards by a little over 3% to account for inflation. These rises in disposable income for the poorer households were accompanied by decreased food poverty – with 19 more households (23% more of the sample) able to meet their basic food energy needs in the endline year – and an increase in the proportion of households above the standard of living threshold, from a baseline 34% (28 out of 83 households) to an endline 53% (44 out of 83 households) able to meet their basic food and non-food needs (Table 2).

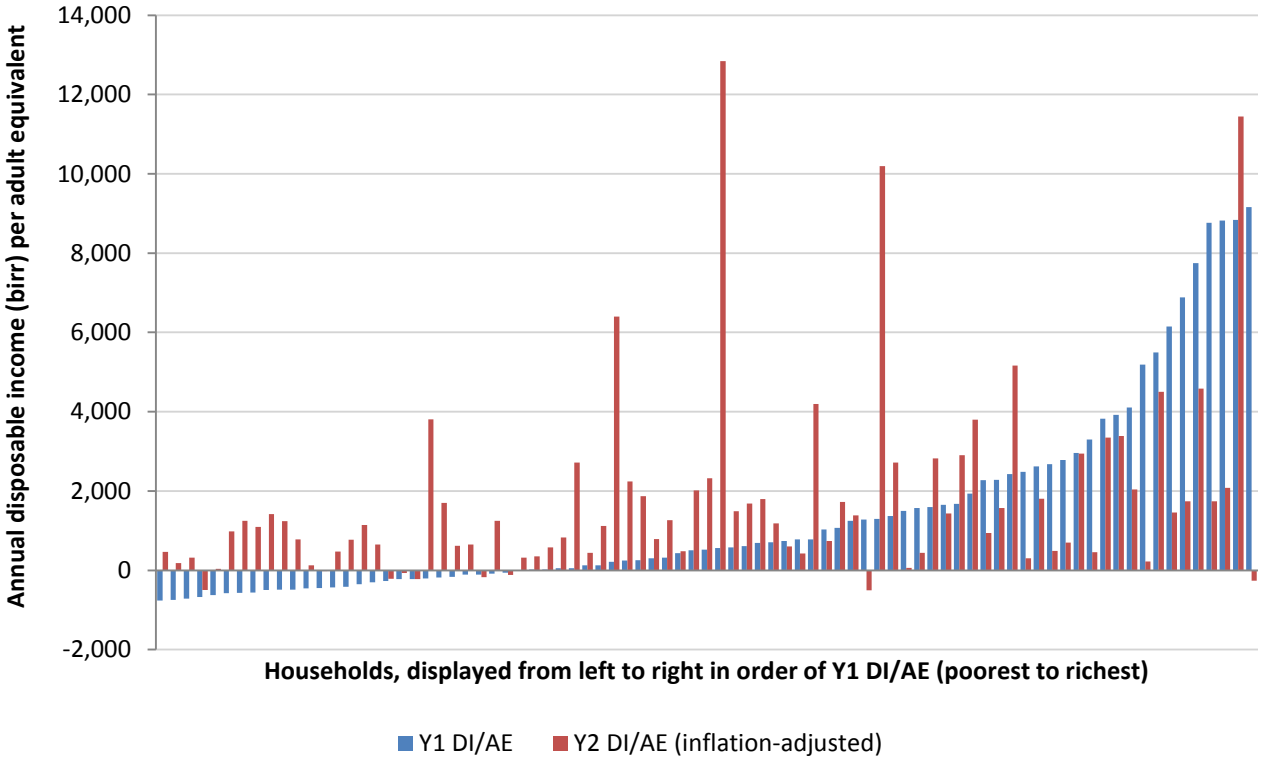
Beneficiary households clustered more at the extremes of the income distribution in the second year overall, with fewer households in the middle quintile and more in both the poorest and richest quintiles; the largest increase in numbers of beneficiaries occurred in the second-richest quintile. Consistent with this, beneficiaries' median disposable income rose from 322 birr per AE in the baseline to 1,142 birr per AE in the endline – almost identical to the non-beneficiary households' median 1,140 birr per AE (which fell from 1,434 birr per AE in the baseline).

Table 2: Baseline and endline percentages of households above and below the standard of living threshold and beneficiary households, by quintile[13]

		DI/AE quintile					*Overall*
		1 (poorest)	**2**	**3**	**4**	**5 (richest)**	
% of HHs below SoLT (no. in parentheses)	**Y1**	100.00% *(17/17)*	100.00% *(17/17)*	100.00% *(17/17)*	25.00% *(4/16)*	0.00% *(0/16)*	***66.27% (55/83)***
	Y2	100.00% *(17/17)*	100.00% *(17/17)*	29.41% *(5/17)*	0.00% *(0/16)*	0.00% *(0/16)*	***46.99% (39/83)***
% of HHs above SoLT (no. in parentheses)	**Y1**	0.00% *(0/17)*	0.00% *(0/17)*	0.00% *(0/17)*	75.00% *(12/16)*	100.00% *(16/16)*	***33.73% (28/83)***
	Y2	0.00% *(0/17)*	0.00% *(0/17)*	70.59% *(12/17)*	100.00% *(16/16)*	100.00% *(16/16)*	***53.01% (44/83)***
% of HHs beneficiaries (no. in parentheses)	**Y1**	58.82% *(10/17)*	64.71% *(11/17)*	88.24% *(15/17)*	50.00% *(8/16)*	43.75% *(7/16)*	***61.45% (51/83)***
	Y2	70.59% *(12/17)*	64.71% *(11/17)*	58.82% *(10/17)*	81.25% *(13/16)*	50.00% *(8/16)*	***65.06% (54/83)***
% of HHs beekeeping beneficiaries *(no. in parentheses)*	**Y1**	23.53% *(4/17)*	17.65% *(3/17)*	5.88% *(1/17)*	25.00% *(4/16)*	12.50% *(2/16)*	***16.87% (14/83)***
	Y2	23.53% *(4/17)*	17.65% *(3/17)*	17.65% *(3/17)*	6.25% *(1/16)*	18.75% *(3/16)*	***16.87% (14/83)***
% of HHs goat beneficiaries *(no. in parentheses)*	**Y1**	5.88% *(1/17)*	5.88% *(1/17)*	29.41% *(5/17)*	0.00% *(0/16)*	12.50% *(2/16)*	***10.84% (9/83)***
	Y2	11.76% *(2/17)*	11.76% *(2/17)*	5.88% *(1/17)*	18.75% *(3/16)*	6.25% *(1/16)*	***10.84% (9/83)***
% of HHs poultry beneficiaries *(no. in parentheses)*	**Y1**	11.76% *(2/17)*	11.76% *(2/17)*	11.76% *(2/17)*	12.50% *(2/16)*	0.00% *(0/16)*	***9.64% (8/83)***
	Y2	11.76% *(2/17)*	17.65% *(3/17)*	5.88% *(1/17)*	12.50% *(2/16)*	0.00% *(0/16)*	***9.64% (8/83)***
% of HHs veg & fruit, drip irrigation beneficiaries *(no. in parentheses)*	**Y1**	11.76% *(2/17)*	11.76% *(2/17)*	17.65% *(3/17)*	0.00% *(0/16)*	12.50% *(2/16)*	***10.84% (9/83)***
	Y2	5.88% *(1/17)*	11.76% *(2/17)*	11.76% *(2/17)*	18.75% *(3/16)*	6.25% *(1/16)*	***10.84% (9/83)***
% of HHs veg & fruit, other tools beneficiaries *(no. in parentheses)*	**Y1**	0.00% *(0/17)*	17.65% *(3/17)*	17.65% *(3/17)*	12.50% *(2/16)*	6.25% *(1/16)*	***10.84% (9/83)***
	Y2	5.88% *(1/17)*	0.00% *(0/17)*	17.65% *(3/17)*	25.00% *(4/16)*	6.25% *(1/16)*	***10.84% (9/83)***
% of HHs multiple beneficiary types *(no. in parentheses)*	**Y1**	5.88% *(1/17)*	0.00% *(0/17)*	5.88% *(1/17)*	0.00% *(0/16)*	0.00% *(0/16)*	***2.41% (2/83)***
	Y2	5.88% *(1/17)*	5.88% *(1/17)*	0.00% *(0/17)*	0.00% *(0/16)*	0.00% *(0/16)*	***2.41% (2/83)***
% of HHs 2nd year beneficiaries *(no. in parentheses)*	**Y1**	0.00% *(0/17)*	11.76% *(2/17)*	0.00% *(0/17)*	6.25% *(1/16)*	0.00% *(0/16)*	***3.61% (3/83)***
	Y2	5.88% *(1/17)*	0.00% *(0/17)*	0.00% *(0/17)*	0.00% *(0/16)*	12.50% *(2/16)*	***3.61% (3/83)***

At an individual household level, there were many fluctuations in disposable income between the baseline and endline years (Fig. 3). The disposable incomes of 74% (40 out of 54) of the beneficiary households grew, but just less than half (48%, or 14 out of 29) of non-beneficiaries had increases in their disposable incomes. The median change in disposable income per AE for beneficiaries was an increase of 659 birr, while the median change for non-beneficiaries was a decrease of 3 birr.

Figure 3: Baseline and endline disposable incomes by household



The majority of beneficiary households from all five livelihoods package types saw increases in their disposable incomes (Table 3). Poultry production beneficiaries had marginally the highest proportion of households with increased DI/AE (88%), and goat-rearing households the lowest proportion (67%) among the beneficiary types. The largest median changes in DI/AE from baseline to endline were experienced by the beneficiaries of the vegetables and fruit package that included drip irrigation materials (1,035 birr), followed by the 'other tools' vegetables and fruit package (939 birr) and then the poultry production package (834 birr). Goat-rearing beneficiaries' disposable incomes per AE increased by a median 182 birr, the lowest of the beneficiary groups – but higher than the non-beneficiaries.

[13] Unlike Table 1, the households shown as 'beneficiaries' in 'Y2' of Table 2 include 3 households that became beneficiaries of the beekeeping or poultry production packages in the second year. Although these 3 households are not shown as beneficiaries in 'Y1' of the table, their quintiles for both years are shown (partly in grey) in the '2nd year beneficiaries' section at the bottom of the table. Because the goat-rearing and vegetable and fruit production packages would be unlikely to have generated income in either the baseline or the endline data of households that became beneficiaries of these interventions in Y2, these households are not shown as beneficiaries in this data.

All groups of beneficiary types also had a higher proportion of households moving above the standard of living threshold than newly falling below it, in contrast to the non-beneficiaries, where an equal proportion moved above or fell below the threshold between the two study periods.

Table 3: Baseline to endline changes in disposable income and the standard of living threshold, by beneficiary type[14]

	Beneficiary type					
	Beekeeping	**Goat-rearing**	**Poultry production**	**Veg & fruit, irrigated**	**Veg, other tools**	**Non-beneficiary**
% of HHs with increased DIAE	71.43% *(10/14)*	66.67% *(6/9)*	87.50% *(7/8)*	77.78% *(7/9)*	77.78% *(7/9)*	48.28% *(14/29)*
% of HHs with decreased DI/AE	28.57% *(4/14)*	33.33% *(3/9)*	12.50% *(1/8)*	22.22% *(2/9)*	22.22% *(2/9)*	51.72% *(15/29)*
Median DI/AE change	542.59	181.65	834.01	1,034.57	939.30	-3.13
Most positive change	*6,185*	*1,999*	*1,344*	*2,612*	*12,277*	*8,894*
Most negative change	*-4,693*	*-7,026*	*-2,180*	*-6,740*	*-2,064*	*-9,424*
% of HHs moving above SoLT	35.71% (5/14)	22.22% (2/9)	37.50% (3/8)	33.33% (3/9)	55.56% (5/9)	20.69% (6/29)
% of HHs moving below SoLT	14.29% (2/14)	0.00% (0/9)	12.50% (1/8)	0.00% (0/9)	0.00% (0/9)	20.69% (6/29)

Similar patterns can be seen in relation to the food poverty line by comparing the baseline (Fig. 4) and endline (Fig. 5) distributions of disposable income for the different types of beneficiaries.

All of the poorest households in the endline year are either above or much closer to the food poverty line ('0' on the *y* axis) than was the case in the baseline, but the main difference higher in the income distribution is where the groups of different beneficiary types have largely 'caught up' with their non-beneficiary counterparts around the middle and upper-middle sections. There are particularly notable rises in disposable income for the beneficiaries of both types of vegetable and fruit packages.

[14] This table excludes households that were beneficiaries of multiple intervention packages or newly became beneficiaries in the second, endline year.

Figure 4: Baseline DI/AE distribution, by beneficiary type

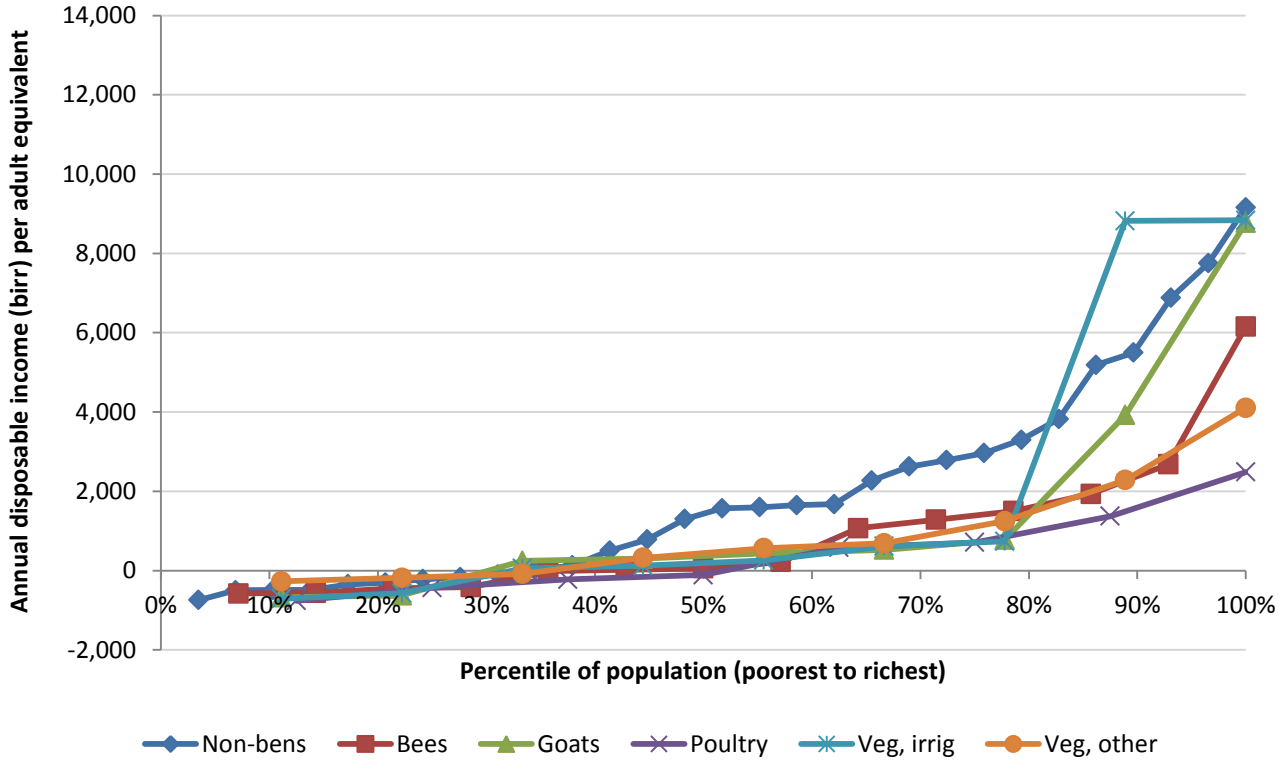
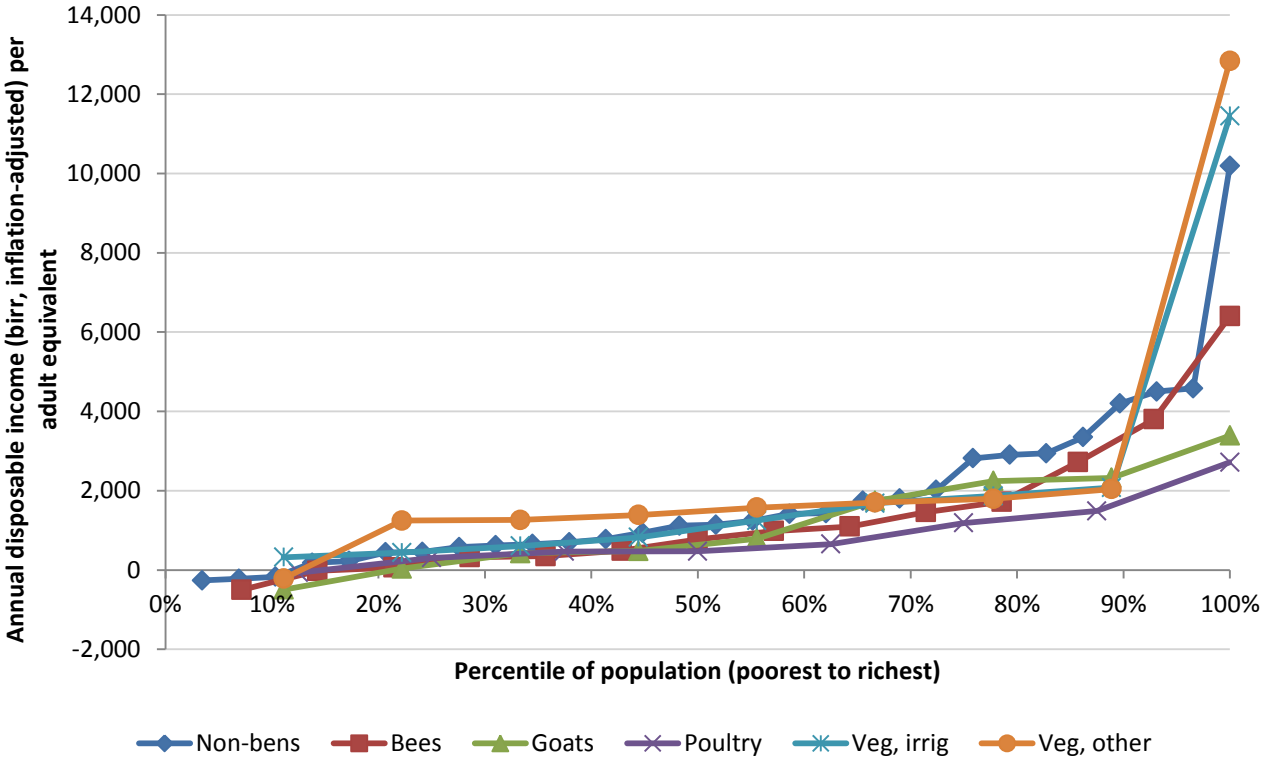


Figure 5: Endline DI/AE distribution, by beneficiary type



Project-related income sources

Table 4 shows the food incomes of different beneficiary types from sources linked to their project interventions. Only the vegetable production beneficiary households consumed significant quantities of project-related food income.

Table 4: Beneficiary groups' food incomes from project-related sources[15]

		Beneficiary type				
		Bees	**Goats**	**Poultry**	**Veg, irrig**	**Veg, other**
% of HHs with project-related food income	**Y1**	21.43% *(3/14)*	11.11% *(1/9)*	62.50% *(5/8)*	100.00% *(9/9)*	88.89% *(8/9)*
	Y2	78.57% *(11/14)*	22.22% *(2/9)*	50.00% *(4/8)*	100.00% *(9/9)*	77.78% *(7/9)*
Median project-related food income (kcal)	**Y1**	5,720	14,900	3,585	182,000	344,510
	Y2	5,720	34,800	5,703	294,850	373,350
Median project-related % of total food income	**Y1**	0.16%	0.72%	0.19%	9.48%	12.45%
	Y2	0.30%	2.31%	0.54%	9.01%	13.03%

All but one of the vegetable production beneficiary households consumed own-produced vegetables or fruit in the baseline year, which preceded any potential impact of their livelihoods package. In the second year (when project interventions could impact on production) the median amounts consumed rose, particularly for the households receiving drip irrigation materials. It should also be noted that there were better growing conditions in this year, due to higher groundwater levels. The median increases in food income from vegetables and fruit were accompanied by small increases in their median contributions to disposable income per adult equivalent (through reduced need for food purchases)[16].

The next highest median food income from project-related sources came from goats, although only 3 out of 9 goat beneficiaries derived food income from the animals in the study period. Around half of the poultry beneficiaries consumed chicken or eggs in each year, with the median food income from these sources increasing by almost 60% in the second year, while a far higher proportion of beekeeping beneficiaries consumed honey from their hives in the second year (79%, up from 21%).

As the first year involved a late rainy season, low rainfall and icy frost (reducing foraging opportunities for bees, goats and poultry) and particularly high numbers of chicken fatalities due to

[15] All 'project-related' incomes here are incomes from sources related to the project interventions received as part of the beneficiary type's livelihoods package, and vary by beneficiary type. Goat-rearing and vegetable production households' incomes from project-related sources are shown in grey for the baseline year ('Y1'), as extra income linked to the project was unlikely to appear for these households until the second, endline year. This table excludes non-beneficiaries and households that were beneficiaries of multiple intervention packages or newly became beneficiaries in the second year. Medians here are 'raw' (i.e. not standardised per adult equivalent) and exclude 0s.

[16] These increases in food income (kcal) were equivalent to approximately 31 birr of staple food purchase for the irrigation beneficiaries and 20 birr for beneficiaries receiving other tools, with important nutritional value beyond the limited number of kilocalories.

disease and predation, these first- and second-year figures may partly reflect differing local conditions.

In absolute terms these food incomes from livestock products contributed very little to households' disposable incomes in either year. Excluding the vegetable production beneficiaries, the largest proportions of total household food income provided by project-related income sources in either year were 4% for a goat beneficiary, and 1% for both poultry and beekeeping beneficiaries.

Not all beneficiary households generated cash income from their project-related activities (Table 5), but for those that did, the cash incomes made far higher median contributions to disposable income – ranging between 156 and 478 birr per adult equivalent, depending on the beneficiary group.

Table 5: Beneficiary groups' cash incomes from project-related sources[17]

		Beneficiary type				
		Bees	**Goats**	**Poultry**	**Veg, irrig**	**Veg, other**
% of HHs with project-related cash income	**Y1**	28.57% *(4/14)*	44.44% *(4/9)*	75.00% *(6/8)*	66.67% *(6/9)*	55.56% *(5/9)*
	Y2	64.29% *(9/14)*	44.44% *(4/9)*	50.00% *(4/8)*	77.78% *(7/9)*	44.44% *(4/9)*
Median project-related cash income (birr)	**Y1**	478	1,350	593	2,283	900
	Y2	1,452	1,410	763	2,052	629
Median project-related % of total cash income	**Y1**	11.06%	13.59%	18.36%	33.30%	9.93%
	Y2	20.05%	28.63%	11.49%	28.79%	6.36%
Median project-related cash income contribution to DI/AE	**Y1**	117.39	305.48	208.32	550.02	193.52
	Y2	267.81	369.08	282.18	478.03	156.38

Vegetable and fruit beneficiaries that received drip irrigation materials had the highest median project-related cash incomes in both years, and these households were also the most likely to generate cash income from project-related sources. By contrast, in the endline year the households that received other tools for vegetable production generated the lowest median cash incomes from project-related sources and included the joint-fewest households selling project-related produce. Further interviews would be needed to establish why these households consumed more of their vegetables and fruit but sold less than the households that received the irrigation materials.

Among households where irrigation systems were installed during the baseline year, median cash income from vegetables and fruit decreased between the first and second year. However, only 3 of

[17] All 'project-related' incomes here are incomes from sources related to the project interventions received as part of the beneficiary type's livelihoods package, and vary by beneficiary type. Goat-rearing and vegetable production households' incomes from project-related sources are in grey for the baseline year ('Y1'), as extra income linked to the project was unlikely to appear for these households until the second, endline year. This table excludes non-beneficiaries and households that were beneficiaries of multiple intervention packages or newly became beneficiaries in the second year. Medians here are 'raw' (i.e. not standardised per adult equivalent) and exclude 0s. Endline cash incomes are adjusted for inflation.

the 9 irrigation beneficiaries experienced a fall in their cash income from vegetables and fruit – with increases for 4 of these households.

The number of goat beneficiary households with related cash income remained constant for the second year while their median cash income rose, and fewer poultry beneficiaries generated cash income from their chickens in the second year, but these households received higher median cash returns. Beekeeping again provided far more of its beneficiaries with cash income in the second year, and the median cash income from beekeeping almost trebled.

Cash incomes from project-related sources were important to many households in both years, providing a median of 13% of total household cash income in the first year and 18% in the second year. The median proportions of total cash income rose for the beekeeping and goat beneficiaries but fell for the other groups, indicating greater diversification and/or larger rises in other income sources for many of the poultry and vegetable and fruit production beneficiary households.

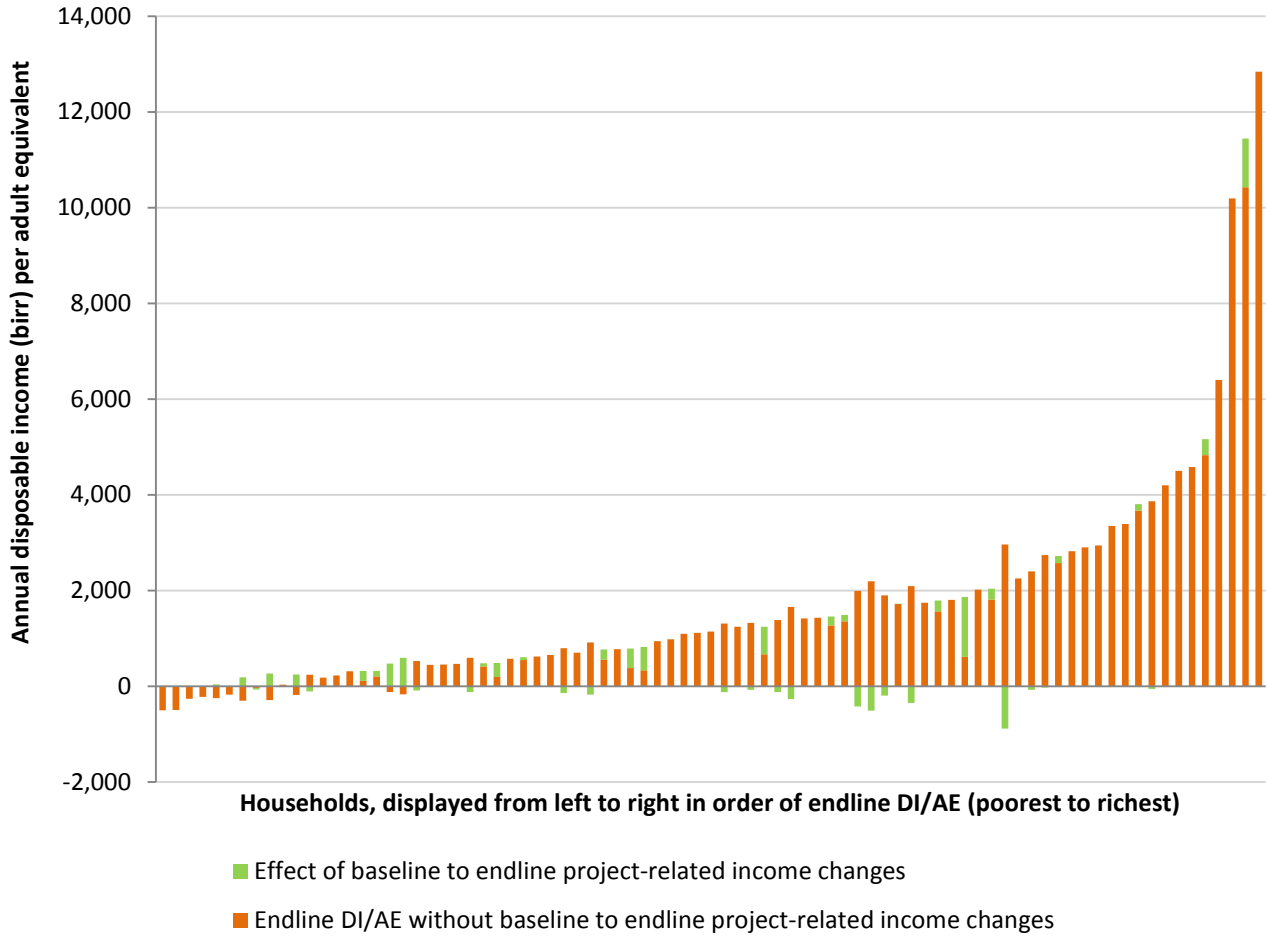
Fig. 6 shows the effects on endline disposable income per adult equivalent of changes in beneficiary households' combined food and cash incomes, bringing together the impacts of the changes indicated in Table 4 and Table 5.

54 households in the sample could have received additional income in the second year as a result of project interventions: this includes households who were goat-rearing or vegetable and fruit production beneficiaries in the first year, households who became beekeeping or poultry production beneficiaries in either year, and households who received multiple types of intervention packages. Of these 54 beneficiary households, 27 (50%) saw increases in their disposable incomes as a result of changes in combined food and cash income (standardised for household size) from project-related sources between the two years, at a median 215 birr per adult equivalent[18].

In contrast, the disposable incomes of 20 of the 54 beneficiary households (37%) decreased as a result of changes in standardised income from project-related sources – with a median reduction of 120 birr – or 21 households (39%) if the household with an absolute decrease in income from project-related sources is included (see footnote **Error! Bookmark not defined.**). For 7 of the 54 beneficiary households (13%), changes in income from project-related sources had no effect on disposable income; these households reported no food or cash incomes from project-related sources in either the baseline or endline year.

[18] This proportion falls to 26 households (48%) with the exclusion of 1 irrigated vegetable and fruit beneficiary household whose overall project-related income decreased in absolute terms between the baseline and endline years (a rise in food income was more than cancelled out by a fall in cash income). Changes in household demography meant that the household's food energy requirements decreased more significantly, such that the overall value of the income source to the household would have increased, at least in terms of the proportion of household food energy needs that it provided.

Figure 6: Effects of 'project-related' income changes on beneficiary households' DI/AE, baseline to endline[19]



The largest negative effects on disposable income from changes in project-related income sources occurred towards the upper-middle part of the DI distribution – suggesting that these changes could be due to diversification of household labour and resources away from livestock or crop products. IHM trend analysis over a longer period, combined with additional QUIP interviews, would throw further light on this.

To establish whether project activities had an opportunity cost, many of the beneficiary households were asked whether they had experienced any change in the time they spent on other work due to their involvement in the project. While other income sources were clearly important, there is little sign that the various interventions had a high opportunity cost. 65% (13 out of 20) of the households for whom baseline answers are available responded that there had been no change in the time they spent on other work, 13% (3 out of 20) gave ambiguous answers, 9% (2 out of 20) had reduced the time given to other work, and 4% (1 out of 20) had actually been able to increase their time spent on

[19] Note that while other charts in this paper are displayed in order of baseline DI/AE, this chart is displayed in order of endline DI/AE, to better demonstrate the impacts of changes in project-related income sources. Although goat-rearing and vegetable production households' baseline incomes from project-related sources were unlikely to include any extra income linked to the project, they have been included in these calculations to more accurately display the nature of the subsequent changes in the endline year.

other activities because of the time-saving drip irrigation materials that they received. More households (13%, or 7 out of 55[20]) gave that response in the second year; 6 of these households were from the two categories of vegetable and fruit production beneficiaries, with 1 beekeeping beneficiary. The figures for households without any changes in time spent on other work (76%, or 42 out of 55) and with less time spent on other work (11%, or 6 out of 55) were broadly similar to the first year, given that no ambiguous responses were recorded in the second year.

While Fig. 6 displays the effects across the endline disposable income distribution of *changes* in baseline to endline incomes from sources related to beneficiary households' livelihoods packages, Table 6 shows the impacts in each year of those incomes (in absolute terms) using the key benchmarks of the food poverty line and the standard of living threshold. Households are considered to be above those benchmarks 'due to project-related income' if the subtraction of those combined food and cash incomes from sources linked to the project would leave the household below the poverty line[21].

Table 6: Food poverty line and standard of living threshold impacts of income from project-related sources[22]

		Beneficiary type				
		Bees	**Goats**	**Poultry**	**Veg, irrig**	**Veg, other**
% of HHs above food poverty line due to project-related income	**Y1**	14.29% *(2/14)*	0.00% *(0/9)*	0.00% (0/8)	22.22% *(2/9)*	0.00% *(0/9)*
	Y2	14.29% *(2/14)*	11.11% *(1/9)*	0.00% *(0/8)*	0.00% *(0/9)*	0.00% *(0/9)*
% of HHs above SoLT due to project-related income	**Y1**	0.00% *(0/14)*	0.00% *(0/9)*	0.00% *(0/8)*	0.00% *(0/9)*	11.11% *(1/9)*
	Y2	0.00% *(0/14)*	0.00% *(0/9)*	12.50% *(1/8)*	33.33% *(3/9)*	11.11% *(1/9)*

The actual extents of project impacts on those incomes from project-related sources are again somewhat ambiguous. However, of the households above the food poverty line in the second year due to income from project-related sources, all three – 2 beekeeping beneficiaries and 1 goat-

[20] The 55 beneficiary households mentioned here are more than the 54 counted in Table 2, because the 55 here include households that had been beneficiaries during the endline year (and were therefore able to comment on their activities during it), but with project interventions for which any additional incomes were unlikely to appear until the next year's data.

[21] The closest equivalent to this in Fig. 6 would be the poorer households for whom positive changes in project-related income sources (with a green bar above '0' on the *y* axis) were sufficient to outweigh negative disposable incomes without those sources (orange bar below '0' on the *y* axis) and give the households positive disposable incomes overall, therefore pulling them above the food poverty line.

[22] All 'project-related' incomes here are incomes from sources related to the project interventions received as part of the beneficiary type's livelihoods package, and vary by beneficiary type. Goat-rearing and vegetable production households' incomes from project-related sources are in grey for the baseline year ('Y1'), as extra income linked to the project was unlikely to appear for these households until the second, endline year. This table excludes non-beneficiaries and households that were beneficiaries of multiple intervention packages or newly became beneficiaries in the second year. Medians here are 'raw' (i.e. not standardised per adult equivalent) and exclude 0s. Endline cash incomes are adjusted for inflation.

rearing beneficiary – had large increases in those sources from the baseline. The narrative is more mixed for the households above the second year's standard of living threshold due to income from project-related sources: 3 of the 5 households (2 vegetables and fruit with other tools beneficiaries, and 1 poultry beneficiary) did increase their incomes from those sources, although the other two households (1 vegetables and fruit with drip irrigation materials beneficiary, and 1 vegetables and fruit with other tools beneficiary) had less income from those sources than in the baseline year.

Conclusions

Within a short project timeframe, it is difficult to attribute impact due to specific livelihood interventions, and to isolate these from other factors, which may include weather conditions, markets, ill health, pests and disease affecting crop and livestock income. Attribution is particularly problematic where interventions are designed to strengthen existing livelihood strategies, and beneficiary households may already be involved in project-related activities. Similarly, some interventions – particularly those involving livestock – may take several years beyond the project timeframe before their contribution can be reliably assessed.

However, monitoring information of the kind recorded in this paper provides NGOs with useful indications of the contribution their projects are making, and highlights particular strengths and weaknesses that can be followed through at field level. For example, in the three cases (2 beekeeping beneficiaries and 1 goat-rearing beneficiary) mentioned above in relation to Table 6, project-related income clearly contributed to their transition out of extreme poverty, lifting them above the food poverty line in the second year of the project. Lessons can be learnt from these cases, and adjustments made at project level to reach other households with similar characteristics.

At a more general level, the success of irrigated vegetable production is an indicator for the implementing NGO that a focus on production for the market in this locality is a good option, particularly as land scarcity means that most households are dependent on cash income to meet their food needs and achieve basic food security.