INTERNATIONAL FOOD
POLICY RESEARCH INSTITUTE
sustainable solutions for ending hunger and poverty
Supported by the CGIAR

IFPRI Discussion Paper 01057

January 2011

The Wealth and Gender Distribution of Rural Services in Ethiopia

A Public Expenditure Benefit Incidence Analysis

Tewodaj Mogues

Carly Petracco

Josee Randriamamonjy

Development Strategy and Governance Division

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

The International Food Policy Research Institute (IFPRI) was established in 1975. IFPRI is one of 15 agricultural research centers that receive principal funding from governments, private foundations, and international and regional organizations, most of which are members of the Consultative Group on International Agricultural Research (CGIAR).

PARTNERS AND CONTRIBUTORS

IFPRI gratefully acknowledges the generous unrestricted funding from Australia, Canada, China, Denmark, Finland, France, Germany, India, Ireland, Italy, Japan, the Netherlands, Norway, the Philippines, South Africa, Sweden, Switzerland, the United Kingdom, the United States, and the World Bank.

AUTHORS

Tewodaj Mogues, International Food Policy Research Institute
Research Fellow, Development Strategy and Governance Division
T.Mogues@cgiar.org

Carly Petracco, International Food Policy Research Institute
Research Analyst, Development Strategy and Governance Division
C.Petracco@cgiar.org

Josee Randriamamonjy, International Food Policy Research Institute
Research Analyst, Development Strategy and Governance Division
J.Randriamamonjy@cgiar.org

Notices

[1] Effective January 2007, the Discussion Paper series within each division and the Director General's Office of IFPRI were merged into one IFPRI–wide Discussion Paper series. The new series begins with number 00689, reflecting the prior publication of 688 discussion papers within the dispersed series. The earlier series are available on IFPRI's website at http://www.ifpri.org/publications/results/taxonomy%3A468.

[2] IFPRI Discussion Papers contain preliminary material and research results. They have been peer reviewed, but have not been subject to a formal external review via IFPRI's Publications Review Committee. They are circulated in order to stimulate discussion and critical comment; any opinions expressed are those of the author(s) and do not necessarily reflect the policies or opinions of IFPRI.

Contents

List of Tables

List of Figures

ABSTRACT

Over the past several years, the Ethiopian government has committed a substantial portion of the public budget to expanding public services and infrastructure in rural areas. This paper assesses who exactly is benefiting from this public spending. To do so, this paper undertakes a public expenditure benefit incidence analysis across gender and wealth groups of three public services/programs in rural Ethiopia: (1) selected components of the Food Security Program (FSP), (2) drinking water supply, and (3) agricultural extension services. The analysis uses data at the individual, household, *kebele* (a subdistrict administrative unit), and district level in Ethiopia. The literature on the benefit incidence of services in developing countries exclusively focuses on the education and health sectors, whereas its application to agricultural and other rural services is nearly wholly absent—a gap that this paper seeks to begin to fill. For the selected components of the FSP, the paper finds the average incidence of participation to be pro-poor, both in concentration curve analysis and quantile-based public spending incidence. However, examination of the value of cash and in-kind receipts from the programs finds the cash/food-for-work program to be progressive, whereas the direct support (unconditional transfers to households) tends to be nonprogressive. The incidence of water services is assessed using different measures of access: physical proximity to drinking water sources and the use of improved drinking water sources. Access, as proxied by physical proximity, is poverty neutral, whereas the use of improved water facilities is pro-poor. With regard to agricultural extension, concentration curve analysis finds the service to be relatively progressive, whereas the benefits-to-population ratio demonstrates a somewhat more differentiated picture, with nonprogressive features at both ends of the wealth spectrum. From a gender perspective, the incidence of agricultural extension is pronouncedly skewed in favor of men. The public works component of the FSP favors male-headed households, and the direct support component favors female-headed households. In the case of drinking water services, the incidence of safe water use is actually higher for female-headed households, raising considerations of how male and female heads may differentially prioritize safe water for consumption. As a complement to the benefit incidence analysis, regression results identify demand- and supply-side factors that are correlated with access to the three different services.

Keywords: benefit incidence analysis, Ethiopia, Food Security Program, water facilities, and agricultural extension

ACKNOWLEDGEMENTS

The authors are grateful to the Ethiopia country offices of IrishAid and the World Bank for financial support that made this study possible, including for co-financing the primary survey used in this and other studies. The work has benefited substantially from comments by participants of seminars at which it was presented, including a seminar at the Ethiopian Development Research Institute and another at IrishAid in Addis Ababa. Further, written comments by an anonymous reviewer for IrishAid, as well as by Laketch Mikael (senior rural development specialist, World Bank), have been very helpful in improving the paper. Any errors are ours.

ABBREVIATIONS AND ACRONYMS

ACF	Action Contre la Faim
ADLI	Agricultural Development-Led Industrialisation
ATVET	Agricultural, Technical, Vocational, and Education Training
BP	Benefit-to-Population
CIDA	Canadian International Development Agency
CSA	Central Statistical Agency
DA	Development Agent
DfID	Department for International Development
DS	Direct Support
DSA	Development Studies Associates
EC	Ethiopian Calendar
EEA	Ethiopian Economic Association
EEPRI	Ethiopian Economic Policy Research Institute
EPRDF	Ethiopian People's Revolutionary Democratic Front
FAO	Food and Agriculture Organization of the United Nations
FHH	Female-Headed Household
FSCB	Food Security Coordination Bureau
FSP	Food Security Program
FTC	Farmer Training Center
GTZ	Gesellschaft für Technische Zusammenarbeit
HABP	Household Asset Building Program
HH	Household
IDS	Institute of Development Studies
IFPRI	International Food Policy Research Institute
MHH	Male-Headed Household
MoARD	Ministry of Agriculture and Rural Development
MoFED	Ministry of Finance and Economic Development
MoPED	Ministry of Planning and Economic Development
NGO	Nongovernmental Organization
O&M	Operations and Maintenance
OFSP	Other Food Security Programs
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PSNP	Productive Safety Net Program
PW	Public Works
SDPRP	Sustainable Development and Poverty Reduction Program
SMS	Subject Matter Specialist
SNNP	Southern Nations, Nationalities and Peoples
TVET	Technical, Vocational, and Education Training
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
WB	World Bank
WC	Water Committee
WDI	World Development Indicators
WFP	World Food Program
WHO	World Health Organization
WoARD	Wereda Office of Agriculture and Rural Development
WSP	Water and Sanitation Program

1. INTRODUCTION

Over the last several years, the Ethiopian government has committed substantial resources from the public budget to expanding public services and infrastructure in rural areas. There are several important dimensions along which it is important to evaluate these public investments, such as the efficiency gains from the public resource allocation or the impact that these services and other interventions have had on households' well-being. This paper asks a more first-order question: To what extent do different social and economic groups in rural areas tend to access these investments and services?

This policy question is of course directly relevant to public interventions that seek to target particular social and economic groups. In such a context, the benefit incidence of public expenditures on these programs speaks directly to the intentions underlying the design in resource allocation for such programs. An example of a targeted program, which will be one of the foci of this paper, is Ethiopia's Food Security Program (FSP), a food/cash-for-work intervention that is the second largest program of its kind in Africa.

However, the question of how the benefits from the provision of other, not overtly targeted, public services are distributed between women and men, or between different wealth groups, remains important and provides information on the equity dimension of public resource allocation. This is especially true for interventions that have been a key element of the government's rural development strategy, such as agricultural extension, which has seen a big-push-like expansion in the rural areas of the country. Thus, we analyze the benefit incidence of this public service as well a third type of service examined in this paper is drinking water supply. This examination is motivated by the high priority that households themselves place on drinking water: studies across developing countries, including in Ethiopia (see, for example, IFPRI-WB 2010), have repeatedly found that rural households identify the quantity and quality of drinking water as the most pressing problem relative to other public services.

The literature undertaking benefit incidence analysis of public services in developing countries, to examine which socioeconomic groups tend to benefit from public spending and public subsidies of services, has nearly exclusively focused on the benefit incidence in the education and health sectors. This includes, for example, benefit incidence studies of education in Peru (Younger 2003); of health spending in South Africa (Castro-Leal 1999), Indonesia (van de Walle 1994), and Africa (Castro-Leal et al. 2000), and of both health and education in Madagascar (Glick and Razakamanantsoa 2006, 2002), Indonesia (Lanjouw et al. 2001), and Africa (Castro-Leal et al. 1999). Exceptions to this sole focus on health and education include analyses of the benefit incidence of public employment schemes and antipoverty programs in India, Indonesia, and Argentina (Lanjouw and Ravallion 1999b; Sumarto, Suryahadi, and Pritchett 2003; Jalan and Ravallion 2003, respectively), and of infrastructure such as water and sanitation, electricity, and telecommunication in Bolivia (Ajwad and Wodon 2007). However, to the best of our knowledge, no incidence analysis has been undertaken on agricultural services such as agricultural extension. From the perspective of the literature, this study also adds value by looking at sectors heretofore examined little to not at all in terms of their benefit incidence.

As will be apparent from the discussion, the three programs and services of interest in this paper—the FSP, drinking water supply, and agricultural extension—interlink in various ways. First, the FSP and the provision of drinking water supply interlink through the public works created in FSP's cash/food-for-work scheme, for which recipients provide their labor. These public works include drinking water facilities, such as constructed ponds and hand-dug wells. Furthermore, the component of the FSP (aside from the just-mentioned cash/food-for-work smaller-scale community assets) through which medium-scale infrastructure is constructed by the government also entails the construction of water facilities. Finally, the FSP's resettlement program included plans to provide resettled households with a range of basic services in their new areas, including water supply (FSCB 2004).[1]

[1] FSCB is Ethiopia's Food Security Coordination Bureau.

The FSP and agricultural extension also interlink in two important ways. First, development agents (DAs), whose primary task is agricultural extension, reallocated their time with the onset of the FSP, as they became involved in various aspects of FSP, including the Productive Safety Net Program (PSNP) implementation (see, for example, Brown and Teshome 2007; Segers et al. 2008). This includes collecting information on households' assets, income sources and incomes, and so on—that is, data needed both for identifying FSP-eligible households and for monitoring the outcomes of program participation. DAs are also tasked with compiling regular reports on key program elements—for example, the number and type of public works constructed and the number and types of beneficiaries (Devereux et al. 2008). They are also instrumental in the decisionmaking process in regard to PSNP public works, such as site selection for the works (Nigussa and Mberengwa 2009). Second, agricultural extension delivery itself is also an element of the FSP household input package.

The next three sections of the paper provide an overview, as well as a literature review, of these three services and interventions. Section 2 reviews Ethiopia's agricultural extension service; Section 3 reviews the country's FSPs, including productive safety nets, Other Food Security Programs, and resettlement programs; and Section 4 covers drinking water, inclusive of access, quantity, and quality. Section 5 describes the data used and the benefit incidence methodology employed in this study. Sections 6 through 8 provide the findings on the incidence of public spending on, and access to, agricultural extension, the FSP, and the drinking water supply, respectively. Section 9 examines the factors correlated with access to services through regression analysis. The final section concludes and summarizes the findings of the paper.

2. OVERVIEW OF THE LITERATURE ON AGRICULTURAL EXTENSION IN ETHIOPIA[2]

An enhanced agricultural extension service is essential to improve outcomes related to development and poverty reduction. Although there has been strong political determination to expand public investment in agricultural extension in Ethiopia, its impact on farmers' capacity and adoption of improved technologies and practices, and ultimately on agricultural production and incomes, depends on both the quantity and the quality of service provided.

Extension programs in Ethiopia are designed at the federal level and implemented by regional and local authorities. The government adopted its Agricultural Development-Led Industrialisation (ADLI) policy in 1993 (MoPED 1993). According to this policy, the government disseminates agricultural packages to farmers through the Wereda Office of Agriculture and Rural Development (WoARD) (Gebremedhin, Hoekstra, and Tegegne 2006). The national policy of decentralization has promoted rapid expansion of the extension service to the *kebele*s (a *kebele* is a collection of villages and is an administrative unit below the *wereda*, or district).

As of 2009, approximately 45,800 DAs were serving in Ethiopia (MoARD 2009a, cited in Davis, Swanson, and Amudavi 2009; see Table 1), after a very rapid growth in the number of DAs, from 2,500 in 1995 and 15,000 in 2002. With an adult agricultural population of 21.8 million, the farmer-to-DA ratio is thus 476, reflecting among the highest number of extension agents per agricultural population in the developing world.

Table 1. Number of development agents

Region	Number	Percentage
Afar	748	1.6
Amhara	10,196	22.3
Beneshangul-Gumuz	677	1.5
Dire Dawa	88	0.2
Harari	52	0.1
Oromia	19,654	42.9
SNNP	11,061	24.1
Somali	1,269	2.8
Tigray	2,067	4.5
Total	**45,812**	**100**

Source: Davis, Swanson, and Amudavi 2009.
Note: SNNP = Southern Nations, Nationalities and Peoples.

DAs graduate by earning a three-year diploma in an agricultural, technical, vocational, and education training (ATVET) colleges, of which there are 25 in Ethiopia. Between 8,000 and 14,000 graduate DAs have emerged annually from these colleges in the past few years, and as of 2008 a cumulative total of 60,000 DAs have gone through the training system.

The government aims to place three DAs in each rural *kebele*, with a technical specialization in crop production, livestock, and natural resource management, respectively. In some *kebele*s there are additional DAs with other specializations, such as beekeeping or cooperative development. These DAs are often responsible for providing extension support in more than one *kebele*. Subject matter specialists

[2] This section will limit itself to a brief overview of the literature on agricultural extension in Ethiopia. For a more extensive discussion of the topic, Abate (2007) presents the history of extension in Ethiopia, and a recent in-depth description and analysis of the Ethiopian agricultural extension system of more recent years is offered in EEA/EEPRI 2006 and in Davis, Swanson, and Amudavi 2009.

(SMSs) and supervisors are based at the *wereda* level and higher levels, and they are assigned by agroecological areas. The *wereda*-level SMSs are tasked with providing technical backstopping for the DAs, but in many cases they also de facto supervise the DAs. Supervisors, located at the *wereda* level, supervise the work of DAs and are assigned at a ratio of approximately 1 supervisor for 10 DAs (Abate 2007).

An agricultural public expenditure review published in 2008 showed that in the most recent year for which data were available (2005/06), 517 million birr (in nominal terms) were spent by the government on agricultural extension and technical, vocational, and education training (TVET), half of which is accounted for by expenditures incurred by regional governments (World Bank 2008).[3] Table 2 shows no pronounced trend in extension and training spending from 1997 to 2005, with expenditures fluctuating within a band of about 200 million and 600 million birr in real terms. As explained above, the most rapid growth in DA deployment to *kebele*s took place in later years, with the total number of DAs on duty tripling from 2002 to 2008. The share of regional expenditures on extension and training dramatically fluctuated from year to year, for example, with a big fall in the share from 1997 to 1998 and a large rise from 2003 to 2004, followed by a rapid fall again.

Table 2. Public expenditures on agricultural extension and technical and vocational education and training [4]

	1997/98	1998/99	1999/00	2000/01	2002/02	2002/03	2003/04	2004/05	2005/06
Federal + regional expenditures (real million birr, base year = 1997/98)									
Recurrent	30	44	51	61	75	137	206	213	188
Wages	7	10	12	12	26	94	152	156	131
O&M	24	34	39	50	50	44	55	57	56
Capital	186	536	416	298	159	342	392	53	172
Treasury	123	100	61	74	139	295	371	53	109
Foreign	62	437	355	224	20	47	21	1	62
Total	216	580	467	359	234	479	598	266	359
Regional share (percentage)									
Recurrent	73.3	56.8	39.2	45.9	38.7	82.5	87.9	92.0	90.4
Wages	28.6	20.0	33.3	33.3	26.9	86.2	91.4	91.7	89.3
O&M	83.3	67.6	43.6	48.0	44.0	72.7	76.4	93.0	94.6
Capital	61.3	22.6	17.5	18.1	25.8	14.6	21.4	100.0	4.7
Treasury	87.0	89.0	77.0	67.6	25.9	9.8	21.6	100.0	7.3
Foreign	11.3	7.3	7.3	1.8	20.0	44.7	23.8	100.0	0.0
Total	63.0	25.2	19.9	22.8	29.5	34.0	44.3	94.0	49.6

Source: World Bank 2008.
Note: O&M = operations and maintenance.

A high level of supply, however, does not necessarily imply effective utilization of the service. Due to the top-down approach of the service provision, extension agents enforce the promotion of fixed-technology packages rather than responding to farmers' demands (IFPRI-WB 2010; Davis, Swanson, and Amudavi 2009; Abate 2009). Alene and Hassan (2005) illustrate the inefficiencies due to inappropriate technologies with the example of the hybrid maize production observed in the eastern region, where food production gains from improved agricultural technologies were not realized mainly because of the disequilibrium created by continuous changes in technology and economic conditions. Other examples are also given on the absence of variation in the extension system across agroecological zones (Alene and Hassan 2008; Spielman, Alemu, and Kelemework 2010). Efa, Gorman, and Phelan (2005) argue that the relevance, effectiveness, and sustainability of agricultural research have been proved when its design

[3] Unfortunately, the report does not provide data distinguishing agricultural extension and TVET expenditures.

[4] The US$/Ethiopian birr average exchange rate in 1997 was US$1 to 6.5 Ethiopian birr, and in 2006 it was US$1 to 9.02 Ethiopian birr.

takes into consideration farmers' indigenous knowledge. Buchy and Basaznew (2005), however, report that there is little effort to associate new agricultural research and development with farmers' knowledge or to learn what kinds of services farmers would like to receive. A limitation also lies in a lack of practical (as opposed to theoretical) skills on the part of DAs, limiting their ability to effectively serve farmers (Davis, Swanson, and Amudavi 2009).

One of the ways in which extension advice reaches farms is through model farmers: extension agents work closely and directly with model farmers, who are then supposed to pass extension messages on to "follower" farmers. Lemma (2007) reports that the selection of these model farmers is often cited as being based not solely on farming skills but also on social capital as well as other considerations pointing to favoritism, which may compromise the usefulness of this extension modality.

Alternative providers play a limited role in the provision of extension services. Farmer cooperatives, although not directly active in offering extension services, were reported to be successful in projects that encourage farmers to engage in activities such as dairy farming and beehive production (IFPRI-WB 2010). Cooperatives are also a major source of both agricultural inputs and credit, which are found as major supply-side constraints to fertilizer adoption (Davis, Swanson, and Amudavi 2009; Croppenstedt, Demeke, and Meschi 2003). However, local farmers reported that cooperatives are closely tied into the standard package approach to extension, and although supposedly farmer-driven organizations, they are not free to set their own agendas based on member needs. Instead, the government sets the parameters within which cooperative programs operate (IFPRI-WB 2010). Bernard, Gabre-Madhin, and Teffesse (2007) found that cooperatives are more likely to be found in *weredas* that already have better access to markets and lower exposure to price and environmental risks. DSA (2006) attributes a weak agricultural input sector to the absence of integration of the private sector, cooperatives, and farmers with microfinance institutions

Other actors in agricultural extension services are the nongovernmental organizations (NGOs), which generally provide training to extension agents and other *wereda*-level civil servants on, for example, gender issues in development and community development. Although a strong record of training broad groups of DAs has been recorded (Davis, Swanson, and Amudavi 2009), there are challenges in the collaboration and coordination between interventions of NGOs and those of the *wereda* government.

3. BRIEF OVERVIEW OF THE ETHIOPIAN FOOD SECURITY PROGRAM

Ethiopia's FSP is a large-scale intervention aimed at mitigating food insecurity in the country by providing food, cash, assets, and agricultural inputs to chronically food-insecure households, in part free and in part in compensation for individuals' labor provision for constructing community infrastructure and agricultural projects. Some medium-scale public works are also directly financed by the FSP. In addition, the program resettles food-insecure households in some areas with very low agricultural potential to more fertile locations. At the time when the FSP was being initiated, the government estimated that the problem of food security, having become one of the key features of rural poverty, had grown to a scale in which approximately 14 million people had been in need of emergency food aid in the early years of the first decade of the 2000s (MoARD 2004). Initially, 262 *weredas* were identified as eligible for receiving FSP benefits.

This section provides a (very short) overview of the FSP and its components—the PSNP, the Other Food Security Programss (OFSP) (some components of the latter recently renamed the Household Asset Building Program), and the resettlement program—and summarizes findings on the FSP's performance and impact by reviewing the pertinent literature. For more in-depth discussion of the components of the FSP, please refer to the cited studies.

Productive Safety Net Program

The PSNP consists of transfers to households in the form of food or cash (or some combination of food and cash). Households may receive transfers for which a household member has to provide labor for community infrastructure creation, or if there is no able-bodied household member, the household eligible for PSNP receives free transfers. In practice, however, some households received both transfers in compensation for labor (referred to as *public works [PW] transfers*) and free transfers (referred to as *direct support [DS]*). In the CSA[5]/International Food Policy Research Institute (IFPRI) survey conducted in 2006 to analyze the impact of the PSNP, 7 percent of all PSNP beneficiaries received both labor-compensated transfers and free transfers, whereas 78 and 15 percent received only the former and only the latter, respectively (Gilligan et al. 2007). This finding may reflect cases of households receiving PW transfers and DS at different times during the survey period. Sharp, Brown, and Teshome (2006) describe some study sites in which women reaching advanced stages of pregnancy were temporarily being recategorized from being a PW to a DS beneficiary. Or it may reflect households receiving, at any given time, a combination of PW and DS—an arrangement recommended as an option in Sharp, Brown, and Teshome 2006 for households that are not completely devoid of household members who can provide labor but have only limited labor power.

Each beneficiary type (PW and DS beneficiaries) could potentially receive either of the payment types (cash or food). In the 2006 IDS/Indak survey, it is interesting and perhaps somewhat surprising to note that the prevalence of DS beneficiaries was higher among the cash recipients than among the food recipients. Specifically, of the beneficiaries who received cash only, 73 percent were PW and 27 percent were DS beneficiaries. In contrast, of the food-only recipients, 80 and 20 percent were PW and DS beneficiaries, respectively (Devereux et al. 2006).

At the outset of the PSNP, it was anticipated that each year 734,286 households (or 5.14 million people, under the assumption of a household size of 7 people) would receive PSNP transfers. Of them, 587,429 households (or 80 percent) were expected to participate in public works and the remainder to receive DS. According to government documentation in 2009, more than 7 million people have received PSNP transfers (MoARD 2009b); the figure is set at 7.57 million people (over 1 million households) in World Bank 2009b.

[5] CSA is the Ethiopian Central Statistical Agency.

Other Food Security Programs and Household Asset Building Program (HABP)

The OFSP has three main components: (1) agricultural input packages (for example, seeds, fertilizer, and agricultural extension) made available to households on subsidized credit; (2) productive assets also given on credit to households, such as livestock, poultry, and agricultural equipment; and (3) resources provided to regional and local governments to construct community assets such as roads, drinking water facilities, irrigation structures, and other infrastructure. According to MoARD (2009b), more than 692,000 households received credit through the government's Federal Food Security budget line from 2005 to 2007. (However, from the document it is unclear whether this refers strictly to OFSP recipients or more broadly to all recipients of government credit through the above-mentioned budget line.).

The OFSP plays a critical role in the overall FSP's overriding goal established by the government, namely, to maximize the number of households that graduate out of the program by moving them out of chronic food insecurity. Only those households that are receiving the OFSP household asset or input packages are assessed in terms of their progress toward graduation—as opposed to those households only receiving the PSNP transfers, which are not necessarily expected to be able to graduate (Devereux et al. 2008). It is also this role of the OFSP packages as a needed complement to PSNP to bring households toward graduation that led to a reprioritization, after the first year of the overall program, in targeting of OFSP packages to households that are also PSNP beneficiaries (Slater et al. 2006). The federal government set itself a goal of covering 30 percent of PSNP recipients also with an OFSP package. The CSA/IFPRI 2006 survey showed that this rate was not achieved in some regions and was far exceeded in others. For example, in Tigray 62 percent of the PSNP beneficiaries also received OFSP benefits, while the share in Oromia was only 11 percent (Gilligan et al. 2007).

Very recently, in 2009, donor agencies began support for a Household Asset Building Program (HABP), which in content and substance essentially comprises two of the components of the OFSP—namely, subsidized credit to households to purchase assets, and agricultural input packages. World Bank (2009b) describes donor support to the HABP in detail.[6] Dom (2009) discusses the evolution from donor support exclusively of the PSNP to extending support for the HABP/household asset and input provision component of the OFSP. Development partners sought to redesign the asset and input packages to make the accompanying extension services more demand driven, expand support for nonfarm activities, and delink the provision of credit from being exclusively tied to government agencies in order to make financial services more sustainable. Given that donor engagement with the HABP/OFSP household transfers is very new, robust evidence is still outstanding on the extent to which the design of these services has indeed been sustainably reformed, and if it has, what the impact of this redesign is.

The Resettlement Component of the FSP

By 2006, the government had resettled about 170,000 households (World Bank 2006), and in the early part of that year, resettlement out of the Tigray region was mostly completed. However, in the subsequent three years—that is, by 2009—the cumulative number of households resettled through the FSP was only 188,874 according to World Bank (2009b), or 205,000 according to MoARD (2009b), suggesting a substantial frontloading of the implementation of the resettlement component of FSP. By 2009, the program had only resettled less than half of the planned 440,000 households (or 2.2 million people), with the latter number originally intended to be resettled within the first three years of the FSP (FSCB 2004). The frontloading in practice also contrasts with the intended slight backloading, as in each of the three years the number of households resettled was meant to be approximately 100,000, 150,000, and 190,000, respectively.

The resettlement component of the FSP has several linkages and relationships with the other components. First, settler-receiving *weredas* were considered ineligible for PSNP transfers, since by

[6] This project document does not mention the OFSP, whereas the past World Bank project document for the PSNP (World Bank 2006) discusses the OFSP. But at the time of the latter document, donor support for the FSP was restricted to the PSNP and did not extend to the OFSP, as the financial tables of World Bank (2006) show.

design only *weredas* deemed not food-insecure were considered as receiving *weredas* (World Bank 2004). This applies also to households in receiving *weredas* after they have been resettled from a sending *wereda* to their new location (FSCB 2004). Second, if a household head resettles but other household members temporarily remain behind, these household members may still receive PSNP transfers if they fulfill the requisite eligibility criteria. Third, at least in the first year of the FSP, de facto targeting criteria for resettlement versus PSNP transfers seemed to have been used in a way so as to maximize graduation out of the program. Specifically, in the Amhara region those targeted for receiving the transfers were households closer to the food security threshold, likely with the goal that the transfers would have a greater impact on achieving graduation rates. In contrast, the landless, who also tended to be among the poorest and least likely to graduate, were more likely to fall among those slated for resettlement (Sharp, Brown, and Teshome 2006).

Impact of the FSP

In the first years of the program, there was a strong discrepancy between planned rollout of the FSP and actual implementation. This situation has also had tangible consequences on the impact of the program on food security and asset accumulation. Examining the June 2005 to May 2006 program period, Gilligan, Hoddinott, and Seyoum (2009) found no impact of participation in the PSNP public works—defined has having received any PW transfers—on food security, and in fact participation had a statistically significant negative effect on asset growth, with asset growth slower for the treatment than the nonbeneficiary (control) households. However, when considering only beneficiaries who received half or more of the transfers that they were supposed to receive as per the program design, a positive program impact is discernible for one of the measures of food security considered, and neither a positive nor a negative impact is found on asset accumulation. Considering a third definition of *beneficiary*—namely, those who received any PW as well as also received any type of OFSP—a stronger impact on a range of food security indicators is identified, although here too there is no effect on asset growth.

Another study based on a longer time frame of the program, using the 2006 and 2008 CSA/IFPRI panel data focusing on certain components of the FSP, also offers a mixed picture (Gilligan et al. 2009a). It uses three definitions of being a beneficiary of the program similar to those used in Gilligan, Hoddinott, and Seyoum 2009. In Gilligan et al. 2009a, under the first definition of *beneficiary* (namely, being a recipient of any PW transfers), the program had no statistically significant impact on the value of livestock assets, though it had a positive impact on livestock holdings measured as physical units. At the same time, the program under this first definition in fact had a statistically significant negative impact in terms of distress asset sales (that is, beneficiaries engaged in greater distress sales than control households). Under a second definition of *beneficiary* (namely, being a recipient of PW transfers of an amount above 900 birr), again no impact was discerned on the value of livestock assets, a positive impact was observed on livestock assets measured in physical units, and neither a positive nor a negative impact was identified on distress sales. A third definition—being a recipient of PW transfers above 900 birr as well as of OFSP packages—yielded positive results on both physical assets and their monetary value, but it still showed no impact on reducing distress sales.

Analyses suggest the strongly limiting factors of the PSNP when the transfers to the households are "too little, too late"—that is, when transfers are less than planned and there are arrears and uncertainties in the timeliness of payments. Devereux et al. (2008) point to the challenges on this front in 2007, with 71 percent of this study's sample households reporting PSNP transfer delays, and 47 percent disagreeing that payment reliability had improved since PSNP started.

Another study examined the differential impact of the PSNP on beneficiaries who received transfers in the form of food versus those who received cash. Sabates-Wheeler and Devereux (2010) find that recipients of food transfers, and to some extent beneficiaries who received a mix of food and cash transfers, displayed higher income growth and greater food security as compared with nonbeneficiaries. However, cash-only beneficiaries did not show any statistically significantly better outcomes in terms of income changes, asset changes, or food security compared with nonbeneficiaries. This study, which

examines a time period (2006–2008) during which Ethiopia was visited by record-breaking food price increases, highlights the importance of building in mechanisms to limit the susceptibility of beneficiaries to such price shocks, such as indexing the cash transfer amount to inflation and building contingency funds into the program.

The productive safety net transfers could have effects not only on food consumption and wealth but also on economic activity. A preliminary study, drawing on the CSA/IFPRI two-year panel data of 2006 and 2008, examines the extent to which the program crowded out supply of labor to the private labor market and increased credit use (Gilligan et al. 2009b). Using the same three definitions of *beneficiary* as Gilligan, Hoddinott, and Seyoum (2009), the study finds that there is indeed a labor supply crowding out effect, especially for male household members, under the first two definitions of *beneficiary* (that is, one who receives any PSNP payment and receives at least half the planned PSNP payment). For beneficiaries defined as those who receive any PSNP transfers as well as OFSP, participation does not crowd out households' supply of labor to the private market. Participation—under any of the three definitions—significantly increases the use of credit. However, under the first two definitions, this is primarily driven by a higher demand for loans for covering consumption needs, whereas under the third definition (one who receives both PSNP and OFSP), the effect on credit demand derives from greater use of productive credit. The latter is to be expected, as productive credit is a key element of OFSP packages. Beneficiaries, however, also report having encountered greater problems in repaying loans, which may be a function of the fact that they are also more likely to take out a loan than are nonbeneficiaries.

A special segment of the labor market—namely, child labor—may also be affected by the PSNP, albeit with reverse normative implications. Hoddinott, Gilligan, and Seyoum (2010) examine how participation of households in the PW component of the FSP has affected child labor and child schooling, distinguishing effects by age and gender of children. The potential presence of both an income effect (which may decrease child labor and increase school attendance) and a labor demand effect (which could have the reverse impact) make likely outcomes a priori inconclusive. The findings of the study point to broadly salutary effects on child labor, in that PW transfers lead to reduced use of children as labor compared with households not receiving such transfers; however, when PW transfers are coupled with household receipts of OFSP packages, girls are more likely to be drawn into domestic chores (while some positive effects for boys are still identified). Girls' school attendance is negatively affected by PW transfers in general, but when considering only transfers larger than a threshold monetary amount, this negative impact is reversed, possibly through a predominating income effect.

Government and Donor Financing of the FSP

Table 3 presents a breakdown of resource allocation and financing of the PSNP since its inception. The World Bank is the largest donor to this program. The second largest (U.S. Agency for International Development, or USAID) and WFP provide most, if not all, of the contributions in-kind. In the early years of the FSP, the government allocated approximately US$230 million per year from its own resources (World Bank 2006).[7] Starting in 2010, the government planned to allocate out of its own funds annually about $160 million, and in addition the equivalent of $53 million in-kind for the non-PSNP components of the FSP—that is, for the resettlement program, household agricultural packages, and the creation of community assets (World Bank 2009b).

The resettlement program is fully financed by government resources; that is, it does not draw on non-budget-supported donor funds (World Bank 2006). In the government's poverty reduction strategy paper, it estimated that the resettlement program under the FSP would require a total of 1.2 billion birr, or $138 million at the exchange rate at the time of the cost estimation (MoFED 2005). In the design, it was planned that the federal government would disburse to the regions grants to be used for the resettlement program, and the regions would allocate resources out of these funds to the sending and receiving *weredas* as required for carrying out the resettlement (World Bank 2004).

[7] All dollars are in U.S. dollars.

Table 3. Expenditures on, and financing of, the Productive Safety Net Program[8]

Phase:	1	2		3	Average
Period:	2005–06	2007–09	Addt'l*	2010–14	Annual
Type of costs					
Public works	51.8	353.3	17.4	1,098.3	152.1
Direct support	12.9	210.8	4.3	274.6	50.3
Institutional support	1.3	47.8		77.4	12.6
Physical contingencies	4.0	3.0			0.7
Price contingencies		3.0			0.3
Contingencies for household transfers		139.8		274.6	41.4
Capital and administrative costs		132.7	3.8	274.5	41.1
Drought risk financing		25.0		160.0	18.5
Support to the Household Asset Building Program				83.3	8.3
Performance incentive grants				14.2	1.4
Total	**70.0**	**915.3**	**25.6**	**2,256.9**	**326.8**
Source of funding					
World Bank	70.0	175.0		480.0	72.5
USAID		38.0		530.9	56.9
DfID		194.6		324.1	51.9
European Commission		195.6		78.7	27.4
IrishAid		18.0		80.6	9.9
CIDA		14.4		81.8	9.6
Other		56.5		23.0	8.0
WFP		26.6		50.0	7.7
Netherlands				71.3	7.1
Trust funds			25.6		2.6
Government	0.1	2.0		10.0†	1.2
Total funds	70.1	720.7	25.6	1,730.4	254.7
Financing gap		194.6		526.5	72.1
Total	**70.1**	**915.3**	**25.6**	**2,256.9**	**326.8**

Sources: World Bank 2004, 2006, 2009a, 2009b.
Note: USAID = United States Agency for International Development; DfID = Department for International Development; CIDA = Canadian International Development Agency; WFP = World Food Program.
*Funding supplemental to Phase 2. Estimated U.S. dollar value of Euro funds, based on 1 Euro = $1.3363.
†All of these funds are allocated to the Household Asset Building Program component. Funds are in nominal U.S. dollars.

[8] The U.S. dollar/Ethiopian birr average exchange rate in 2005 was US$1 to 8.83 Ethiopian birr, and in 2009 the average exchange rate was US$1 to 11.86 Ethiopian birr.

4. DRINKING WATER IN ETHIOPIA

Conceptualizing Access to Drinking Water: Physical Access, Water Quantity, and Water Quality

An increase in access to drinking water can be measured along at least three dimensions: (1) greater ease and lower cost, including transaction costs in accessing a water source; (2) improvements in water quality; and (3) improvements in water quantity. Each dimension affects human welfare through distinct pathways. An important element in the first dimension is the physical distance to a water source. The lengthy time that people, often women, spend walking to a water site and back, and waiting their turn at the site, is time that could be used for other productive purposes, for example, agricultural production and nonfarm income-earning activities. In the case of children who also frequently have water-fetching responsibilities, reducing time for this activity would free up time for human capital accumulation through higher school attendance. Long travel for fetching water and the physical burden of carrying water, especially when no pack animal is used, have implications for women's and children's energy expenditure, requiring more food consumption to maintain a given health status. In addition to these transaction costs associated with fetching water, another element of the first dimension relates to direct costs, through cash or in-kind contributions for facility construction and maintenance and for water use.

Spencer and Winkowska (1991) find in their study of a rural community in southeast Ethiopia a strong positive correlation between distance to the main source of water in the community and mortality. They also find that households farther from the water source make fewer trips to fetch water, implying lower household consumption of water. A more recent study analyzing the Ethiopian Rural Household Survey established that greater distance to water exercises a strong negative influence on agricultural labor productivity (Croppenstedt and Muller 2000). Gibson and Mace (2002), drawing on evolutionary life-history theory, consider the gain for women in terms of less exertion of energy due to easier access to water facilities. They hypothesize that an impact of reducing rural women's water-carrying burden on the spacing of births (less burden decreases the spacing) and on the time until menses resumes after birth (less burden shortens this time) would be a reflection of women with easier water access expending less energy. Their study in southern Ethiopia in fact finds that women in villages in which water taps were installed—on average reducing time spent fetching water from 6 hours to 30 minutes per day—had in the years subsequent to installation shorter birth spacing and sooner return to menses after birth.

The second dimension of access to drinking water is the extent to which water that households use is safe for consumption. Water-borne diseases are rampant in rural Ethiopia, caused in great part by consumption of water from unimproved sources, which suffer contamination from fecal and other sources. One of the major water-borne diseases, diarrhea, is responsible for more than 17 percent of deaths in children younger than five years in Ethiopia—likely a strong underestimate, as this percentage does not include diarrhea deaths during the neonatal period (WHO 2006). In a randomized controlled trial in a rural community in Ethiopia, Boisson et al. (2009) found that diarrheal diseases can be importantly reduced even where protected water sources do not exist, through the use of low-cost water treatment devices.

Natural and environmental conditions can exacerbate the quality of drinking water obtained both from water facilities and from unimproved sources such as rivers and lakes. One such problem is excessive fluoride content, which is particularly endemic in Ethiopia's Rift Valley. In a recent study, 41 percent of water samples across the Rift Valley had excessive levels of fluoride (Tekle-Haimanot et al. 2006). The severe form of the disease, fluorosis, can be debilitating and cannot be effectively treated after onset. Environmental dynamics also affect water quality. With biomass (wood) as the dominant rural source of energy, and with increased agricultural extensification entailing farmers transforming woodlands to farmland, deforestation has been an ongoing environmental challenge in Ethiopia. It has consequences not only for agricultural production but also for access to drinking water. Since riparian forests contribute to water purification, deforestation in Ethiopia has exacerbated the already limited access to potable water (Reynolds, Farley, and Huber 2009). Deforestation also has the potential to

increase the contamination of unprotected sources of water, when resultant soil erosion washes sediments and human and animal waste into lakes and other natural water sources.

Not only the quality but of course also the quantity of water—the third dimension of water access discussed here—is an integral ingredient to human health. Several water- and health-related organizations identify the availability of at least 20 liters per person per day (for the main domestic uses—that is, drinking, cooking, and washing) as reasonable access to water; water only for drinking in tropical climates should be approximately 3 liters per person per day (see Howard and Bartram [2003] for an overview of the literature on water quantity requirements). This third dimension of access to water, water quantity, is of course intimately connected to the first. In the arid areas of Ethiopia, including most parts of Afar region, Somale region, and the southernmost areas of Southern Nations, Nationalities and Peoples (SNNP) region, severe water scarcity prevails, requiring travel of greater distances to access water. In these areas characterized by pastoral livelihoods, seasonal migration to areas that received relatively better rains is not uncommon. However, because water scarcity is ubiquitous, this usually means that already vulnerable locales receive migrants from even worse-off areas, stretching the water resources of the host areas even more. This was the case recently, for example, when Borenas from drought-ravaged northern Kenya had to migrate north to Moyale, leading to more rapid depletion of water resources there (ACF 2010).

Access to Drinking Water in Ethiopia

Table 4 presents the share of the population with access to improved water in Ethiopia and, as a comparison, the mean of Sub-Saharan African countries. Based on these data, Ethiopia has seen a steady increase in access to safe water sources, albeit from a very low base. This increase is most pronounced in rural areas, where the table shows access to improved water sources relatively rapidly ascending from 4 to 31 percent over an approximately 15-year time span. This sustained increase, however, has not been enough to allow Ethiopia to catch up with Sub-Saharan Africa as a whole. Rural areas in Ethiopia fall clearly behind rural Sub-Saharan Africa, while urban Ethiopia is far ahead.

Table 4. Access to improved water, Ethiopia and Sub-Saharan Africa in comparison

	1990	1995	2000	2006
Ethiopia				
Total	13	20	29	42
Rural	4	10	19	31
Urban	74	79	87	96
Average Sub-Saharan Africa				
Total	49	51	55	58
Rural	35	38	42	46
Urban	82	81	81	81

Source: WDI 2010.

An examination of different data sources is also of interest, not only to examine trends in water access figures but also to discern the robustness of the most commonly used such indicators for Ethiopia. Table 5 shows access to improved water based on the Ethiopian government's 2005–2010 poverty reduction strategy paper (PASDEP, or Plan for Accelerated and Sustained Development to End Poverty), releases of the World Development Indicators (WDI) from two different years, and 2010 data from the Joint Monitoring Program for Water Supply and Sanitation by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF). The description of the indicator given by each source is also included.

Table 5. Access to improved drinking water, comparison across sources (in percentage of total, rural, and urban population)

Source	Indicator as stated in source	'90	'95	'96	'98	'00	'02	'03	'04	'05	'06	'08
Country												
PASDEP (Table 1.3)	Access to potable water (0.5 km)								42*			
PASDEP (Table 2.7)	Source of drinking water is safe			19.1	23.7	27.9			35.9			
PASDEP (Table 3.1)	Access to clean water						30+	37.9‡				
WDI 2004	Access to improved water source	25				24						
WDI 2010	Access to improved water source	13	20			29					42	
WHO/UNICEF (2010)	Served with improved water	17	22			28				35		38
Rural												
PASDEP (Table 2.7)	Source of drinking water is safe			9.6	13.7	17.1			25.2			
WDI 2004	Access to improved water source	17				12						
WDI 2010	Access to improved water source	4	10			19					31	
WHO/UNICEF (2010)	Served with improved water	8	12			18				24		26
Urban												
PASDEP (Table 2.7)	Source of drinking water is safe			72.1	83.5	91.7			92.4			
WDI 2004	Access to improved water source	80				81						
WDI 2010	Access to improved water source	74	79			87					96	
WHO/UNICEF (2010)	Served with improved water	77	82			88				95		98

Source: See first column of table.
Note: PASDEP = Plan for Accelerated and Sustained Development to End Poverty; WDI = World Development Indicators; WHO = World Health Organization; UNICEF = United Nations Children's Fund.
*End of 2004/05.
+Status at beginning of the Sustainable Development and Poverty Reduction Program (SDPRP) period (2002/03–2004/05).
‡Signifies end of 2003/04.

The wide array of figures for the same area (for example, rural versus urban) and same year is immediately striking. For example, the share of the rural population with access to an improved/safe water source in 2004 ranges from 11 percent according to the WDI 2008, to 25 percent according to PASDEP. For 1990 the lowest figure is 4 percent in the WDI 2010 and the highest is 17 percent in the WDI 2004.

The interpretation of the data in terms of trends over time can be significantly changed depending on the data used. Table 5 in fact shows a pattern of estimates for 1990 decreasing from the early (2004) to the later (2010) publication dates of the database, and estimates for more recent years (for example, 2000) increasing in the later publication dates. As a consequence, the data from the WDI 2004 release show a *decrease* in rural access to improved water over time (which may happen, for example, when more facilities fall into disrepair than are being constructed or rehabilitated),[9] whereas the WDI 2010 shows a clear *increase* in access over time. Thus, a degree of caution is warranted in relying heavily on one such indicator without further information about the reason for the discrepancies.

[9] WSP (2004) reports that in the mid-nineties, a survey showed that between 18 percent (in Tigray) and 67 percent (in Beneshangul-Gumuz) of rural water schemes were nonfunctioning.

5. DESCRIPTION OF THE DATA AND METHODOLOGY

Benefit incidence analysis describes how the benefits of public services are distributed among different groups in society—for example, groups categorized by income or wealth, gender, or gender of the head of household. Benefit incidence analysis is primarily concerned with the incidence of public services and infrastructure across different social or economic groups in society, and not with the impact that access to these services may have on other outcomes, such as household income or agricultural productivity. Benefit incidence analysis also does not account for the potentially differential valuations of the public service that individual users may make.

This section only very briefly summarizes the key features of benefit incidence analysis employed in this study, as the general methodology is already described elsewhere in detail (for example, in Demery 2003, Glick et al. 2004, and van de Walle 1994). We first describe the data used in this study and then discuss some methodological considerations when assessing the incidence of public expenditures on services; we also distinguish average from marginal incidence. The final subsection lays out the measure of welfare used as a basis for determining incidence—namely, household wealth—and provides information on some features of the distribution of wealth among the study households.

Description of the Data

This study draws on two sets of surveys. The first set is individual-, household-, and *kebele*-level surveys that were conducted jointly in 2009 by the Ethiopian Economic Policy Research Institute (EEPRI) and the IFPRI. The second set consists of the Wereda/City Benchmarking Surveys, which were financed by the World Bank, managed and administered by Gesellschaft für Technische Zusammenarbeit (GTZ), and implemented by Selam Consult in 2008. The design of the Wereda/City Benchmarking Surveys is described in detail in Wegener, Yaron, and Alemu 2007.

The following describes the EEPRI/IFPRI Gender and Rural Services surveys (further details are described in the household survey guideline for field staff, IFPRI/EEPRI 2008). Eight *weredas*, which are located in seven regions, were selected on the basis of four criteria. One criterion in this purposive method of *wereda* selection was that the *weredas* be also part of the Wereda/City Benchmarking Survey dataset, which collects information at the *wereda* government level (for example, public spending and local government capacity), so that these two datasets can be linked and the public spending benefit incidence of programs can be determined. Second, the eight *weredas* were to be composed of four FSP *weredas* and four non-FSP *weredas*, as the FSP was intended to be one of the three interventions of interest for this study.

Third, the *wereda* choice was affected by the plan to conduct future research focused on decentralization and rural service delivery. On this basis, the eight *weredas* were selected as four *wereda* pairs, such that each pair would consist of two *weredas* that are contiguous to each other but belong to different regions. Of the two regions associated with a *wereda* pair, one is in a "leading" region in which local-level decentralization has taken place, and the other is in a "lagging," or "emerging," region that has not yet experienced local-level decentralization. There are three such *wereda* pairs; the fourth pair consists of a *wereda* in the Amhara region and one in the Tigray region. Both are considered leading regions, but local empowerment and community mobilization have had a longer and distinct history in Tigray, making this an interesting and relevant comparison. Fourth, from the few *weredas* that fulfilled the three criteria stated above, the final selection of the eight *weredas* was guided by an intent to capture diverse agroecological, livelihoods, and remoteness characteristics.

From each of the 8 *weredas*, 4 *kebele*s were randomly sampled. In each of the resulting 32 selected *kebele*s, households were stratified into beneficiaries of the FSP and nonbeneficiaries. Fifteen households were randomly drawn from the *kebele*'s FSP beneficiary list and 20 households from the comprehensive list of households in the *kebele*, excluding those in the FSP beneficiary list. This resulted in a total of 35 households per sampled *kebele*, and a planned household sample size of 1,120 (the final sample size after data cleaning was 1,118). In each household, the questionnaire was administered

separately to both the household head and the spouse, with only a few modules relating to general household-level information (for example, household assets and demographic composition of the household) administered only to the head.

Quantitative *kebele*-level surveys were also conducted in the same *weredas* as the household survey. Separate questionnaires were used for eight respondent types; in each *kebele*, the following were interviewed: one focus group, one *wereda* council member, one female and one male *kebele* council member, the (single) *kebele* council speaker, the (single) *kebele* chairperson, two DAs (the crop DA and the livestock DA), the head of one water committee, and the head of the multipurpose agricultural cooperative. For those respondent types of which there are multiple in a *kebele*, the selected respondent or respondents were sampled randomly from their category—for example, one female *kebele* council member was drawn randomly from the list of all female *kebele* council members in the given *kebele*. The *kebele*-level surveys were conducted not only in the sample *kebele*s in which the household survey was undertaken but in all of the *kebele*s of the eight selected *weredas*.

The fieldwork also included qualitative case studies in four of the eight *weredas*, as well as an additional *wereda* outside of the eight. In each case study *wereda*, key informant interviews and focus group discussions took place in the *wereda* capital town and one *kebele*, resulting in a total of 105 respondents. In the *wereda* capitals, interviews took place with *wereda* government officials responsible for finance and budget, agricultural extension, drinking water, and women's affairs; the speaker of the *wereda* council; local ruling party leaders or senior members of the *wereda* (in the cases of all *weredas*, this was the Ethiopian People's Revolutionary Democratic Front [EPRDF] or affiliated parties); and leaders of the *wereda* women's association, the cooperative union. At the *kebele* level, the field team interviewed DAs; the *kebele* manager; the speaker of the *kebele* council; the *kebele* chairperson; members of the *kebele* cabinet responsible for agriculture, drinking water, and women's affairs; leaders of the agricultural cooperative, the women's association, and the ruling party; members of a water committee; and male and female farmers. The team prepared interview guides for discussions with key informants and focus groups.

Using Information on Public Expenditures to Undertake Benefit Incidence Analysis

There are two main ingredients in determining the incidence of the public supply of services. The first ingredient is information on the distribution of the use of public services, for example, through information on which individuals receive and which do not receive agricultural extension advice. The second ingredient is information on public resource allocation for the provision of these services. This information is predominantly captured by public expenditures for a given service, but in certain cases it can be estimated by aggregating different components of the cost of providing a service or infrastructure. Information on public expenditures or unit costs help to quantify the supply of services, thus enabling a comparison of, for example, benefit incidence across different sectors or subsectors. The use of information on public resource allocation also mitigates the common problem faced in trying to account for quality (as opposed to only quantity) differences in public services.

The following summarizes the main building blocks in determining public spending benefit incidence. Let E_l^i refer to the number of residents of location/administrative unit *l* with access to a public service *i*, and let E_{jl}^i be the notation for those in location *l* with access to service *i* who fall into some income or wealth quantile *j*. S_l^i is the amount of public expenditures by the government of location *l* on public service *i*. Then, the amount of public expenditures for service *i* accruing to those individuals in the income or wealth bracket *j* in location *l* can be expressed as

$$X_{jl}^i = S_l^i \cdot \frac{E_{jl}^i}{E_l^i}$$

and the public spending accruing to all quantile *j* residents as $X_j^i = \sum_{l=1}^{L} X_{jl}^i$. The benefit incidence of public resources for a given service can be expressed in the form of a percentage of the resources that

benefit an economic group—that is, $x_j^i = \frac{X_j^i}{S^i}$, where $S^i = \sum_{l=1}^{L} S_l^i$. Or in full form, the benefit incidence share is

$$x_j^i = \frac{\sum_{l=1}^{L}\left(S_l^i . \frac{E_{jl}^i}{E_l^i}\right)}{\sum_{l=1}^{L}\left[\frac{S_l^i}{E_l^i}.\left(\sum_{j=1}^{J} E_{jl}^i\right)\right]}$$

so $\sum_j x_j^i = 1$. The benefit incidence shares of these quantiles can be directly compared with one another to ascertain the differential benefits that various economic groups receive, as quantiles by definition refer to equal-sized shares of the population. However, when generalizing *j* to refer to any subcategorization of the population (for example, men and women, female- and male-headed households, or even when *j* refers to, say, women who fall into different quantiles of the population), it is no longer necessarily true that the size of these groupings are equal. Thus, the benefit incidence share x_j^i for the different groups is not as immediately informative about the extent of equity of investments in a public service. It is then useful to obtain the ratio between the benefit share x_j^i and the share of *j* in the reference population, which we will refer to as the benefits-to-population (BP) odds ratio. A case of fully equitable benefits from public investments in a sector would then be indicated by a BP odds ratio of 1 for all *j*.

Some incidence analyses rely only on information on the use of services and do not draw on cost or public spending data, usually due to data constraints. But aside from constraints, there are other reasons for relying only on service use data, relating to certain drawbacks in proxying the magnitude of benefits by using public expenditure/cost data. For example, some of the variation in the amount of resources allocated in different areas or to different sectors may reflect differences in efficiency, or transaction costs, and not quality or quantity of services. For example, two hypothetical areas may receive the same amount and quality of a public service, but public spending in the more remote area is higher because it costs more to provide the same amount of service. Similarly, in a given area, the bureaucracy working in one sector may be more efficient than the administration responsible for another sector, resulting in the former's being able to provide a given quality and quantity of service with comparatively fewer resources. Due both to data constraints on public spending in some sectors and to the limitations just discussed, this study presents most results both with and without the use of public expenditure data to see whether the core findings are robust to these alternative approaches.

When assessing the benefit incidence of public spending, there are inherent challenges in determining the temporal dimension of the cycle from expending resources, to the generation of services, and finally to their use. For simplicity several studies have assumed contemporaneity; that is, they have assigned some indicator of service use in one year to public spending of the same year (for example, Castro-Leal 1999; Lanjouw et al. 2001; van de Walle 1994).[10] However, there is often a lag between the allocation of resources and the production—and even more, the use—of services, as discussed in the related literature on the impact of and returns to public spending (see a methodological overview in Benin et al. 2008). Due to this lag, and because the provision of services is ultimately the cumulative consequence of past spending, this study builds on this notion in its assessment of the benefit incidence of public spending, and it uses the cumulative amounts of public spending at the *wereda* level for the three years preceding the use data.

Most public spending benefit incidence analyses also implicitly assume the same levels of public spending across localities within a country, by basing the calculation of unit costs of services on nationally aggregated public expenditure data. Castro-Leal (1999)[11] is one of the exceptions, using

[10] For the public cost of services, this paper relies on unit-cost estimates from other studies; however, these unit costs are based on public spending data from the same year as the survey data used to obtain information on access to and use of public services.

[11] In the case of some wereda-service combinations, no expenditure data were available, in which case the average of the

province-specific data for South Africa. In this study, we differentiate levels of public spending on the basis of which benefit incidence is assessed, by *wereda*, rather than using uniform figures. For this we draw on public expenditure data from the Wereda/City Benchmarking Survey described in Section 5. Table 6 summarizes cumulative local public expenditures in the eight *weredas* under study.

Table 6. Wereda public spending on agricultural extension and the Food Security Program, cumulative 1997EC–1999EC (birr)[12]

Wereda	Region	Extension	FSP household transfers/packages*		
			OFSP	Public works	Direct support
Bati	Amhara	4,374,433	—	8,123,955	31,673,952
Gog	Gambella	3,567,735			
Ibantu	Oromia	1,603,718			
Ofla	Tigray	14,277,046	0	3,922,069	3,805,004
Sekota	Amhara	6,925,951	0	43,745,824	5,116,164
Sheko	SNNP	3,281,116			
Telalak	Afar	2,000,846	0	0	515,568
Yaso	Beneshangul-Gumuz	7,771,407			

Source: Authors' compilation from the Wereda/City Benchmarking Survey.
Note: EC = Ethiopian calendar; FSP = Food Security Program; OFSP = Other Food Security Programs; SNNP = Southern Nations, Nationalities and Peoples.
*Data for the FSP pertain only to those four *weredas* in which the FSP operates.

Average and Marginal Benefit Incidence Analysis

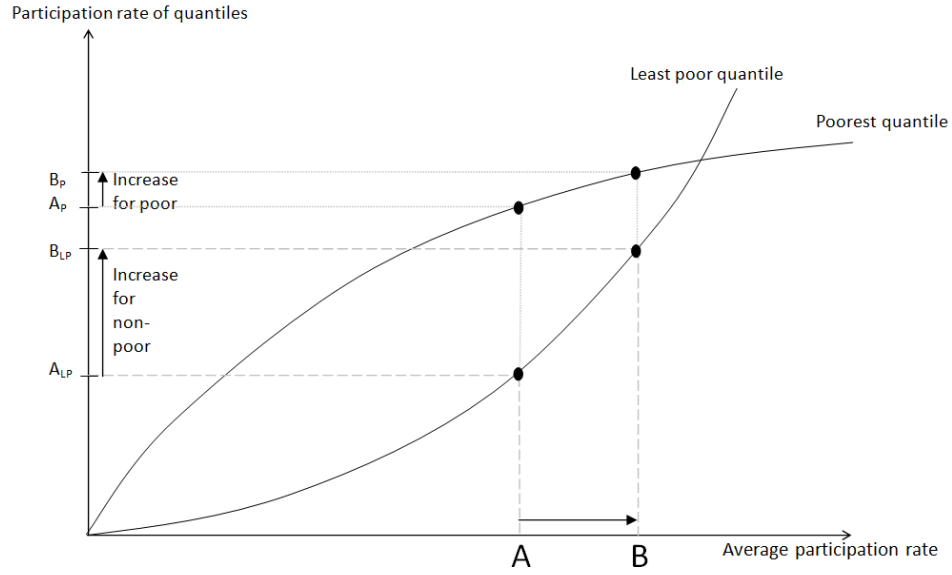
This paper distinguishes between the average and marginal benefit incidence of the public programs. Average incidence refers to the way that overall benefits from, say, services and programs are distributed across different wealth groups and gender. However, there may be differences in the extent to which the poor versus the nonpoor benefit at earlier stages of the rollout of a program and in how much these different groups benefit when the program is further expanded. Average incidence analysis provides information that effectively aggregates these effects, which may potentially differ by the state of the program. Lanjouw and Ravallion (1999b) discuss this conceptually; one of their examples is that of late capture of a food transfer scheme. In this example, because the program is initially targeted to the poor, the latter may see the greatest gains from the scheme; but as the nonpoor become more informed of its benefits and are able to exert political pressure, they may be able to gain more from the additional expansion of the scheme than from the intervention on average.

Figure 1, adapted from Lanjouw and Ravallion (1999b), graphically illustrates the distinction between average and marginal incidence. Consider an expansion of a government program such that on average, participation increases from A to B. Prior to the expansion, the average incidence of the poorest group is greater than that of the least poor ($A_P > A_{LP}$). After expansion, the average incidence is still pro-poor, with the poorest participating at a higher rate than the better-off ($B_P > B_{LP}$). However, the marginal incidence of the wealthiest group is greater than that of the poorest ($B_{LP} - A_{LP} > B_P - A_P$).

survey's sample rural weredas in the corresponding region was used.

[12] The Ethiopian calendar year is either seven or eight years lower than the corresponding Western calendar year. For example, the Ethiopian calendar year 2003EC commenced on September 11, 2010.

Figure 1. Average versus marginal incidence



Source: Adapted from Lanjouw and Ravallion 1999b.

These two aspects of benefit incidence can be compared through the average and the marginal odds ratio of access to a public service. The average participation rate is the proportion of households in a given wealth quantile that participate in a program, or use a public service. The average odds ratio of participation is defined as the ratio of the participation rate of one quantile to the overall average odds ratio. We can interpret the average odds ratio of participation as the overall distributional incidence of government spending. For example, if the average odds ratio of participation in the FSP for the poorest quintile equals 1.5, and for the second poorest quintile it is 1.3, this shows that the poorest quintiles benefit disproportionately from the service; however, the gains to the poorest are proportionately even higher than those to the second poorest.

The marginal odds ratio of participation is the increment in the program participation rate of a given quintile when there is a change in aggregate participation. If we assume that the cost to the government is the same across geographic areas and income groups, we can derive from the marginal odds of participation how an increase in public spending on a given program will affect each quintile. For example, a marginal odds ratio of participation in the FSP for the poorest quintile of 1.5 and for the richest quintile of 0.4 means that if an extra 100 birr per capita is spent on the FSP, public expenditures on food security per capita going to the poorest quintile will rise by 150 birr, and the equivalent benefits accruing to the richest group will increase by 40 birr.

To estimate the marginal odds ratio of participation, we follow the approach proposed by Lanjouw et al. (2001) and regress quintile-specific participation rates across the *kebele*, the lower geographic area, on the average participation rate of the *wereda*, the upper geographic area (all quintiles, all *kebele*s) for each program. We use the leave-out mean as an instrumental variable for the *wereda*'s average participation rate to avoid the bias that the ordinary least squares estimation can give, as the *wereda* overall mean participation rate is affected by the specific *kebele* and quintile participation rates. The leave-out mean is the mean for the *wereda* excluding the specific *kebele* and quintile participation rates that correspond to each observation in the data. For example, if we use the data for Quintile 3 in *Kebele* 5 within *Wereda* 8, then the leave-out mean is the average for all *kebele* and quintiles within *Wereda* 8, excluding Quintile 3 in *Kebele* 5.

Categorizing Households into Welfare Groups for Assessing the Incidence of Public Services

This study relies on a measure of household wealth, rather than a measure or proxy of household income, for welfare stratification into quantiles and analysis of the distributional incidence of public services (see, for example, Carter and Barrett 2006, and Brandolini, Magri, and Smeeding 2010, for a discussion of the merits and demerits of proxying poverty and welfare by using measures of wealth versus income or expenditure). Flow measures such as income and expenditure, especially in the absence of panel data, are not able to distinguish chronic poverty from highly transitory and short-lived poverty—or for that matter, similarly fleeting occurrences of relatively high levels of welfare. Consumption and expenditure measures are also much more difficult to collect and, if collected, to measure with a comfortable degree of accuracy. As the survey on which this study is based was centrally focused on capturing extensive information relating to access to, quality of, and accountability mechanisms surrounding the delivery of public services, it collected detailed information on assets to capture household welfare, heeding the literature proposing the strengths of asset-based measures of welfare and poverty, and did not collect consumption data.

This asset value approach has been employed by various other studies within the African and Ethiopian contexts. A study of household duration and transition into and out of poverty in Ethiopia uses the value of assets as a measure of household wealth (Bigsten and Shimeles 2008). Also, in Ethiopia, an assessment of the impact of the productive safety nets measures the change in the value of assets, which comprises the value of livestock and tools owned (Gilligan, Hoddinott, and Seyoum 2009). Numerous studies across Africa have employed the value of assets as a measure of wealth for a variety of topics, including studies in South Africa on credit constraints (Baiyegunhi, Fraser, and Darroch 2010), adult mortality and primary school attendance in rural Kenya (Yamano and Jayne 2005), and livelihood strategies in eastern Nigeria (Adi 2007).

Three main types of wealth are captured in the core wealth measure used in the analysis: livestock; other agricultural assets, namely, tools and equipment such as ox ploughs and sickles; and consumer assets such as furniture, radios, and iron. All are aggregated in value terms on the basis of prices obtained from each asset type at the *kebele* level. There are, of course, additional sources of asset wealth for households in Ethiopia and other countries; however, for the following reasons they are not employed in this analysis. Land value was not included in this measure, given the challenges in assessing land values in the absence of land markets in Ethiopia. The wealth measure also does not include crops held in storage, given the high variability of this form of asset that can be quickly drawn down, for example, before the harvest period and just as quickly accumulated after the harvest. Thus, crops in storage being strongly seasonal in nature, a snapshot at a given point in time may not contribute to useful information about a household's wealth status. Neither outstanding debts nor financial obligations are included as negative assets in the asset measure.

Other asset types, such as the size and quality of housing and the existence and quality of toilet facilities, are difficult to assess in monetary value terms and thus are not included in the aggregate wealth measure. This omission is—for the purposes and in light of the objectives of this study—only of concern if, for example, housing quantity and quality does not substantially correlate with the wealth measure used. If it does not, then the categorization of households into wealth groups may look quite different with the inclusion of housing value than with its exclusion. However, in subsequent regression analysis (see Section 9) to determine the correlates of access to services, we are able to incorporate the wealth measures that cannot be easily valuated and are thus not included in the incidence analysis.

It is not uncommon to find in the literature wealth being proxied by selected assets, such as by livestock in the pastoralist Ethiopian context in Lybbert et al.2004, or in the Chinese context in Jalan and Ravallion 2001 by the combined value of grain stocks, cash and bank deposits, agricultural equipment, livestock, and consumption assets, with a conscious exclusion of land given the difficulty in valuing land in the absence of a land sales market.

With this caveat, we proceed to provide a brief overview of the distribution of wealth levels by the households in the study area. Average household assets amount to about 48,000 birr. The largest component of these comprises agricultural tools and equipment, followed by livestock assets. Households' consumer assets make up the smallest part of overall assets, with the mean value of this component only less than 2 percent of mean total assets. Table 7 also shows the distribution of asset components over quintiles based on each component (for example, among the 20 percent of households with the lowest value of agricultural equipment, the average household has 60 birr's worth of agricultural tools). Comparing the average value of the asset components with their distribution shows that the larger components tend to be more unevenly distributed. Even though agricultural tools make up the largest part of assets overall, the poorest quintile based on this asset component has a lower value of agricultural assets than, correspondingly, the poorest livestock quintile and the poorest consumer assets quintile. Consumer assets, the smallest component, are least unequally distributed.

Table 7. Household asset values, by quintile (birr)*

	Total	Q1 (poorest)	Q2	Q3	Q4	Q5	Gini
Wealth							
All assets	47,761	1,172	7,648	33,306	71,561	125,193	0.553
Agricultural equipment	33,258	60	271	15,297	50,259	102,109	0.633
Livestock	13,813	90	2,219	6,754	13,870	46,182	0.660
Consumer assets	690	81	180	386	939	1,881	0.540
Wealth per capita							
All assets	9,067	259	1,693	5,750	11,421	26,235	0.582
Agricultural equipment	6,388	13	58	2,157	8,481	21,279	0.685
Livestock	2,536	19	436	1,302	2,484	8,457	0.657
Consumer assets	143	15	38	82	163	420	0.569

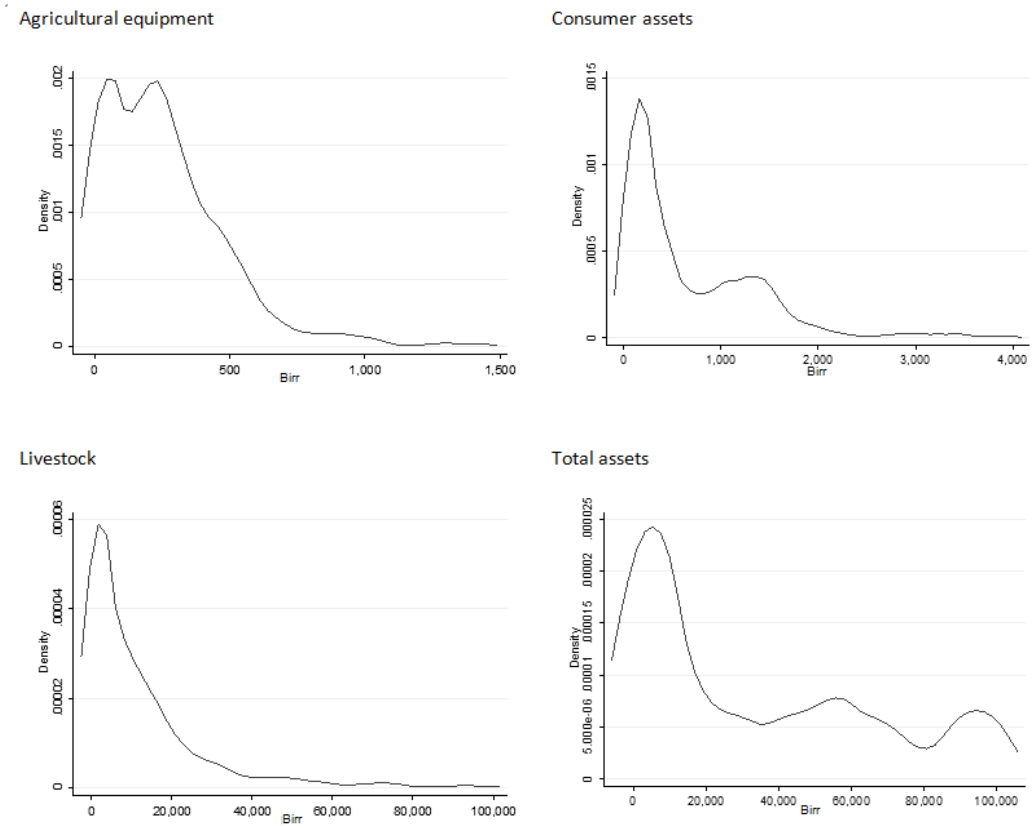
Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: *These quintiles are based on each respective asset type; for example, the Q1 figure for consumer assets gives the mean consumer asset level of the 20 percent of households with the lowest consumer assets. The analogous situation holds for the other quintiles and asset types.
In final column to the right of the table, Gini stands for the Gini coefficient.

The second panel of Table 7 shows household wealth per capita, as opposed to household wealth. The average value of per capita assets of households is about 9,000 birr. The distributional features are quite similar to household wealth, in that the largest asset component is agricultural equipment, followed by livestock and consumer assets, the latter again making up less than 2 percent of total wealth per capita. And again, asset inequality of the larger components is higher than that of consumer assets.

Whereas Table 7 captured the first moment (mean) and partial features of the second moment of asset distribution, Figure 2 graphically displays features of its third moment. As is common with wealth distributions, total assets as well as the component asset types are pronouncedly skewed to the right, with the bulk of households concentrated at the lower asset values in the distribution. Not necessarily as typical is the multimodality of the asset distribution seen here: both agricultural equipment and consumer assets have more than one mode (peak), resulting in a multipeaked total asset distribution.[13]

[13] The alternate use of a very high bandwidth in obtaining the nonparametric density graphs, which "oversmooths" the curves, still retains the multimodality of the asset components and total assets, suggesting that this feature is relatively robust.

Figure 2. Distribution of household assets



Source: Authors' compilation based on the EEPRI/IFPRI survey.

Female-headed households (FHHs) have lower wealth levels than male-headed households (MHHs); at the household level, FHH assets are about half the value of MHHs (Table 8). However, FHHs also usually tend to be smaller; thus, the table also considers household wealth per capita. In this case, the gender gap in wealth is still present but is much narrower than when one does not account for the smaller size of FHHs. Gender differences in overall household wealth are somewhat narrowed in the case of livestock assets.

Table 8. Household wealth, by gender of household head (birr)

	All assets	Agricultural equipment	Livestock	Consumer assets
Household wealth				
FHHs	25,972	15,940	9,642	390
MHHs	53,787	38,048	14,966	773
Head–gender gap (ratio)	0.483	0.419	0.644	0.505
Household wealth per capita				
FHHs	7,139	4,932	2,102	105
MHHs	9,600	6,791	2,656	154
Head–gender gap (ratio)	0.744	0.726	0.791	0.684

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: FHH = female-headed household; MHH = male-headed household.

Finally, Table 9 presents mean wealth levels by *wereda*. It shows a wide range in mean asset levels, with the highest mean asset level about 10 times larger than the lowest average asset level. The ranking of *weredas* by asset values also differs by asset type, which underlines the importance of examining the totality of the most important assets as opposed to only one asset type (for example, just livestock) as a proxy for wealth.

Table 9. Household wealth by *wereda*

Wereda	All assets	Agricultural equipment	Livestock	Consumer assets
Household wealth				
Bati (Amhara)	31,559	21,010	10,282	268
Gog (Gambella)	8,762	2,904	5,380	478
Ibantu (Oromia)	89,399	64,707	23,496	1,196
Ofla (Tigray)	9,177	1,651	7,096	431
Sekota (Amhara)	8,619	2,170	6,156	293
Sheko (SNNP)	93,248	83,318	8,407	1,523
Telalak (Afar)	67,567	22,043	45,364	160
Yaso (Beneshangul-Gumuz)	74,230	68,354	4,707	1,169
Household wealth per capita				
Bati (Amhara)	6,766	4,758	1,952	56
Gog (Gambella)	1,615	535	988	91
Ibantu (Oromia)	12,395	9,062	3,163	169
Ofla (Tigray)	2,091	310	1,664	118
Sekota (Amhara)	2,048	556	1,410	82
Sheko (SNNP)	20,592	18,538	1,681	373
Telalak (Afar)	13,653	4,857	8,762	34
Yaso (Beneshangul-Gumuz)	13,473	12,510	744	219

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: SNNP - Southern Nations, Nationalities and Peoples.

Although in the empirical microeconomic literature on developing countries, household consumption or income is practically always normalized by household size—that is, is expressed in per capita or per-adult-equivalent terms—there is less consistency when it comes to wealth or assets. The argument for using household-size–normalized measures of wealth is simple and analogous to the argument for doing so with income or consumption: considering a large household with many household members and a small household with only few members, but both with the same amount of overall wealth, it is intuitive to consider the larger household less well off (when considering the wealth measure as the key proxy for welfare). This of course does not mean that assets that are not captured in the wealth measure may not mitigate this conclusion. For example, household members—in particular, working-age ones—are not only consumers across which the returns or benefits from household wealth must be spread but also productive labor units that add to a household's earnings and thus welfare. The difficulty in valuating labor assets and incorporating such assets into an aggregate measure of wealth means that there remains an inconclusive trade-off between using the value of household wealth (excluding labor assets) as a proxy for household welfare and using household wealth per capita.

As mentioned above, the literature reflects the tentativeness in the choice between normalized and nonnormalized measures of assets as a proxy for household wealth. On the one hand, for example, Jalan and Ravallion (2002) proxy a household's level of wealth as the value of its fixed productive assets per capita. Similarly, for analysis of the extent to which poorer versus richer households are protected against shocks, Jalan and Ravallion (1999) stratify households on the basis of their wealth per capita. In assessing the determinants of primary schooling, Ainsworth, Beegle, and Koda (2005) also control for household wealth using the value of household assets per capita. Both Bigman et al. (2000) and Mukherjee and

Benson (2003) consider the effect of household wealth on poverty, including per capita livestock value as a proxy for the former. On the other hand, however, some studies also consider total household assets, nonnormalized for household size, in analysis—for example, Liverpool-Tasie and Winter-Nelson (2010) and Andersson, Mekonnen, and Stage (2010).

As seen in Table 8, using assets per capita as the basis for wealth categorization may make FHHs "look" better off, possibly producing results that may suggest lower pro-poor incidence. At the same time, using assets instead of assets per capita does not account for the lower welfare of larger households, holding wealth constant. In light of the lack of conclusiveness about the most appropriate approach, in the subsequent analysis in this paper, we consider most of the results based on both types of wealth measures; where only one measure is considered for economy of space, it will be total (that is, nonnormalized) household assets.

6. THE BENEFIT INCIDENCE OF PUBLIC SPENDING ON AGRICULTURAL EXTENSION

As discussed in Section 2, the extent of contact with extension agents is very high in Ethiopia. This country stands out in international comparison with other developing countries in terms of the reach of agricultural extension in rural areas (IFPRI-WB 2010; Davis, Swanson, and Amudavi 2009). In this study, too, we find a high coverage rate, with more than one-third of farmers (including both women and men) having access to some form of agricultural extension service. The locational variety in access, however, is very large, as Table 10 shows. Telalak in the Afar region has by far the lowest access—less than 1 percent of respondents have any form of extension—while in Ofla in the Tigray region a strikingly high two-thirds of all respondents have access to extension.

Table 10. Access to extension, by *wereda*

Wereda	DA home visits	DA ag. meetings	Demonstr. plot	FTC training	All extension
Bati (Amhara)	12.66	22.78	5.49	3.38	32.91
Gog (Gambella)	24.42	29.03	3.23	0.00	46.08
Ibantu (Oromia)	8.33	19.70	1.14	1.14	23.11
Ofla (Tigray)	42.20	51.83	6.42	0.46	66.51
Sekota (Amhara)	32.92	41.25	3.75	0.83	58.75
Sheko (SNNP)	19.29	21.26	1.18	0.00	33.07
Telalak (Afar)	0.49	0.49	0.00	0.00	0.97
Yaso (Beneshangul-Gumuz)	4.25	19.31	4.25	0.39	23.17

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: DA = development agent; ag. = agricultural; demonstr. = demonstration; FTC = farmer training center; SNNP = Southern Nations, Nationalities and Peoples.

This generally high extension coverage—with significant peaks in some study sites—as well as the wealth and gender incidence to be discussed below, warrants a more detailed description of how access to agricultural extension is measured in this study. As is well known, in Ethiopia extension agents are referred to as *development agents* because they come into contact with rural households for a range of activities that go beyond agricultural advisory services. DAs have been instrumental in the administration of the FSP, as discussed in the Introduction. They also play a role in collecting agricultural statistics for the Wereda Office of Agriculture and Rural Development (WoARD) and ultimately the Ministry of Agriculture and Rural Development (FAO/WFP 2006). DAs, among others, visit households and hold meetings in order to mobilize community labor for infrastructure projects in the *kebele* (as also found in our qualitative case studies). Finally, being a DA involves a range of nonagricultural tasks and household contacts; many DAs are part of the *kebele*-level political executive body (*kebele* cabinet).

Thus, for this analysis we sought to extract those DA–household contacts that pertain to the provision of agricultural advice. In the survey, these contacts are captured in four main ways. First, respondents are asked about community meetings they attended that were held to discuss agricultural issues. Follow-up questions address a range of issues with regard to these meetings, including who was the main organization or individual who organized the event, and which main agricultural topics were covered at the event. To be conservative, this first part of our measure of agricultural extension only includes those agriculture-related meetings that were held by DAs and do not include, for example, meetings held by the *kebele* chairperson. Meetings that had as their main topics only nonagricultural themes or agriculture-related themes unlikely related to the provision of information for improving farmers' agricultural practices were excluded (an example of the latter exclusion would be the topic of land conflicts between farmers).

Second, the survey asked respondents about visits by experts to their homes. Follow-up questions included, among other things, the type of expert and the main topics discussed. This component of the extension measure then excluded visits by nonagricultural experts, visits by agricultural experts who do not have an advisory role but may provide other agricultural services (for example, veterinarians), and discussions with any expert about only nonagriculture-related topics. The third component of the measure captured respondent visits to demonstration plots or agricultural research stations or both. The final component draws on survey questions about respondents' participation in FTC training. The time frame considered for engagement/participation in each component is the 12-month period preceding the interview.

Table 11 shows the gender incidence of access to agricultural extension. The share of all heads of households who have access to agricultural extension, and the share of all men, is 44 and 47 percent, respectively. There is a clear gender gap in access to extension; only a quarter of all women, and a slightly smaller share of all spouses in households, have access to extension. The gender gap ratio—the ratio of women's access to men's access—is thus a low 0.5, as is the gap between spouses and household heads. A gap between access of heads and spouses is also obtained when considering only women, although this gap is not as large. Although one-third of all female heads have access to agricultural extension, 23 percent of female spouses do, resulting in a headship gap ratio of 0.7. The gap between heads' and spouses' access is clearly narrower when considering only women than when considering all respondents—this is of course not surprising, as nearly all spouses are women; thus, the overall headship gap captures, in a sense, both headship as well as gender differences.

Table 11. Access to various extension modalities, by gender and headship status

		Both men and women	Women	Men*	Gender gap
Both heads and spouses	All extension	35.43%	25.22%	47.21%	0.534
	DA home visits	17.79%	15.37%	20.59%	0.746
	DA ag. meetings	25.66%	14.68%	38.34%	0.383
	Demonstr. plot	3.17%	1.08%	5.57%	0.194
	FTC training†	0.79%	—	—	—
Spouses of household heads	All extension	23.18%	22.84%		
	DA home visits	14.47%	14.58%		
	DA ag. meetings	12.16%	11.74%		
	Demonstr. plot	0.64%	0.52%		
Household heads	All extension	44.03%	32.92%	47.08%	0.699
	DA home visits	20.13%	17.92%	20.73%	0.864
	DA ag. meetings	35.13%	24.17%	38.14%	0.634
	Demonstr. plot	4.94%	2.92%	5.50%	0.530
Headship gap	All extension	0.526	0.694		
	DA home visits	0.719	0.814		
	DA ag. meetings	0.346	0.486		
	Demonstr. plot	0.130	0.177		

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: DA = development agent; ag. = agricultural; Demstr. = demonstration; FTC = farmer training center.
*Summary statistics are not computed for male spouses, as the number in this category was very small in the sample.
†Further breakdown is not provided for extension modalities with extremely low overall incidences.

The qualitative case studies confirm the gender gap found in the data.[14] Women farmers interviewed highlighted that they felt there was a discrepancy between what they heard about the government's policy on reaching out to women with agricultural services—for example, on the radio—and what they experienced themselves. Some DAs also stated explicitly that they exclusively worked with

[14] More expansive discussion of qualitative research findings can be found in IFPRI-WB 2010.

household heads, even when providing information on crops that they knew were commonly handled by women in the area, expecting that the (male) household head would convey the information to his wife.

The most frequent modality of extension service provision is community meetings convened by DAs during which agricultural issues are discussed. The second most common a mode by which farmers come into contact with extension agents is through visits to farm households by the DA. Much less common are visits by farmers to demonstration plots and research stations; finally, it is very rare for farmers to receive training at farmer training centers (FTCs), despite the considerable policy (government, as well as donor) attention given FTCs in Ethiopia recently. This is certainly not due to an absence of FTCs: 53 percent of the *kebele*s in the study *weredas* have FTCs. However, as other studies have shown (Davis, Swanson, and Amudavi 2009), the vast majority of FTCs in Ethiopia are essentially just the building structure, without adequate instructional equipment and other inputs to make them functional centers.

The gender gap in extension access varies widely with the mode of access. For example, it is much less common for women than it is for men to visit demonstration plots and attend DA-convened meetings in which agriculture is discussed, whereas the gender gap is relatively narrower for receiving extension advice through DAs' visits to households (see Table 11). Similar patterns are found with regard to the differential access of household heads versus spouses (also, when only comparing women heads with women spouses). The differing gender gap for different extension modalities may be expected to an extent, in light of possible cultural and social constraints for women (and in particular, women who are not the head of a household) venturing out of the house to attend formal meetings.

In Table 11 it is of note that the gender (and headship) gap is much larger in the case of visits to demonstration plots than in the case of community meetings called by the DA—in the case of the latter, it is likely that these meetings serve purposes in addition to the provision of agricultural advice, whereas demonstration plot visits are likely to be focused on agriculture. Thus, the greater gap in the latter accentuates the gender discrepancy in access to agricultural expertise.

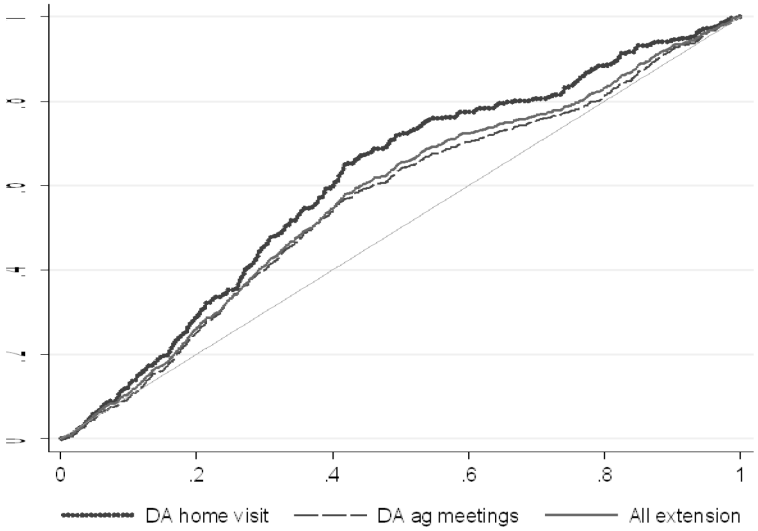
The case studies highlight other cultural norms that may work in a different way in affecting the social acceptability of different extension modalities. Interviewed farmers and DAs in some of the qualitative case study sites pointed out that it is deemed not appropriate for (male) DAs to meet one-on-one with women farmers (especially spouses of heads) alone. Several approaches were therefore employed to get around this cultural constraint. One of these approaches is the collaboration of DAs with women leaders in the *kebele*. For example, DAs made efforts to work with heads of *kebele* women's associations, with *kebele* cabinet members for women's affairs, and with the leaders of the EPRDF women's league so that these leaders could mediate meetings between the DAs and women farmers. In part these meetings are undertaken in groups, in light of the constraining social norms pertaining to one-to-one meetings between (male) DAs and women farmers.

These types of group meetings, however, are different from the DA-convened community-wide meetings discussed above and captured in the incidence results in Table 11. Nevertheless, women farmers can encounter cultural gender-based constraints in both types of meetings for extension provision and other purposes. In case study interviews, local women's leaders stated that some men are unenthusiastic about their spouses attending meetings facilitated by the women's associations and the women's party leagues; they are concerned that aside from agricultural issues, these meetings may be used to convey messages of women's equality to their spouses. The local female leaders also pointed out that men occasionally display dismissive attitudes in community-wide public meetings when women speak up or ask questions.

Figure 3 presents the distribution of the benefits of agricultural extension services through concentration curves and compares the distribution of the two most common forms of extension access. Concentration curves are similar to the familiar Lorenz curves for the graphic illustration of inequality in income or wealth measures, in that they map the cumulative distribution of the population (after ordering from poorest to wealthiest) against the cumulative distribution of a measure of benefit, in this case access to agricultural extension. That is, concentration curves, analogous to Lorenz curves, show that, say, the

poorest *X* percent of the population (read along the *x*-axis) obtain *Y* percent of the total benefits of the provision of a public service (*y*-axis).

Figure 3. Concentration curves for agricultural extension services



Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: DA = development agent; ag = agricultural. The measure of access to all forms of extension accounts for extension modalities other than the two also displayed, that is, DA visits to farm and home and DA meetings. Thus, it is possible for the concentration curve for "all extension access" to lie outside the space between the other two curves.

Concentration curves, however, differ from Lorenz curves in several important aspects. First, since the former are effectively a mapping of one variable (wealth) on another (extension service benefits), as opposed to a univariate exercise, concentration curves can lie below or above the 45-degree diagonal line, whereas Lorenz curves always lie below or on the diagonal line. A concentration curve lying on the 45-degree line suggests that access to services is perfectly egalitarian across the wealth spectrum. A curve above the line signifies that poorer segments of the population have better access to services than less poor households. Second, Lorenz curves are by construction and of necessity convex or semiconvex. Expressed in discrete terms, this means that the total wealth of a quantile of the population cannot be more than the total wealth of a richer quantile. In contrast, concentration curves, although like Lorenz curves always monotonically increasing (assuming there are no "negative benefits"), can be convex, concave, or any combination thereof. Therefore, they can also intersect the 45-degree line, leading to a more complex set of possibilities for interpreting the distribution of public service benefits derived from examining concentration curves.

Figure 3, then, shows the progressivity of access to agricultural extension. With the concentration curves for extension lying (predominantly) above the perfect-equity line, it shows clearly that less wealthy households are more likely to have access to agricultural extension agents than better-off households. The graph also shows the mild difference in progressivity of the two most prominent modes of service access. DA visits to households are more oriented toward the less well-off households than is extension advice gained through attendance at DA community meetings. This suggests that not only is the incidence of extension away from the home lower for women (versus men) and spouses (versus heads), as previously established, but it is also lower for poorer (versus less poor) individuals.

Table 12 presents the benefit incidence of public spending on extension by showing the share of the resources accruing to different wealth groups. This information is complemented by the BP odds ratio mapped in Figure 4—the ratio between the share of benefits accruing to a particular quintile and the share of this quintile in the population (see the discussion in Section 5). The share of a quintile in the population is of course by definition 20 percent when considering all individuals, but not necessarily so for a

subgroup. For example, of all women, the share of women who fall in the poorest quintile (that is, who falls in the group of the poorest fifth of all individuals) is not 20 percent but 28 percent.

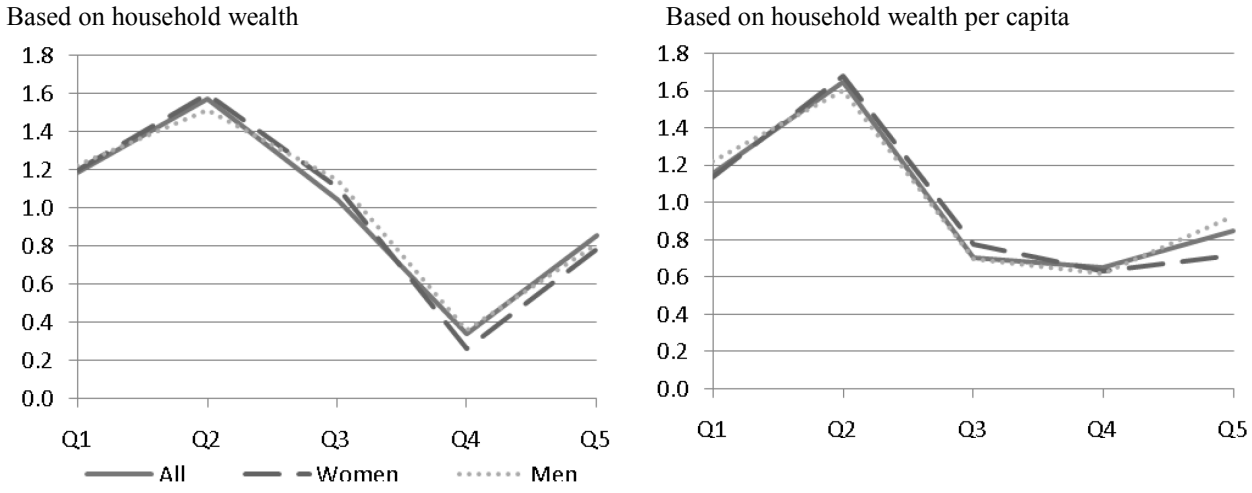
Table 12. Benefit incidence of public spending on agricultural extension, by gender-specific quintile

	Q1 (poorest) (%)	Q2 (%)	Q3 (%)	Q4 (%)	Q5 (%)	Total (%)
Based on household wealth						
All	23.73	31.50	20.87	6.83	17.07	100.00
Women	27.58	30.96	21.85	5.18	14.42	100.00
Men	20.25	31.46	23.27	7.35	17.66	100.00
Based on household wealth per capita						
All	23.16	32.81	14.07	13.07	16.90	100.00
Women	26.16	32.89	15.24	12.01	13.70	100.00
Men	20.35	32.72	14.30	13.25	19.39	100.00

Source: Authors' compilation based on the EEPRI/IFPRI survey.

The results in Table 12 and Figure 4 are broadly consistent with the findings on access to extension represented by the concentration curves; however, they reveal some additional features in wealth incidence. The benefits from local public expenditures on agricultural extension are largest for the poorest individuals in the study area: The two poorest wealth groups benefit most substantially from public spending in this sector; however, the second-poorest quintile benefits from a clearly larger share of resources allocated to agricultural extension than that of the poorest quintile. It is also only the lowest three wealth groups—and in the analysis based on wealth per capita, the lowest two groups—that gain disproportionately to their share in the population (BP odds ratio greater than 1). The table and figure also show the distribution of benefits by gender. That is, they give the distribution of benefits for women by the wealth group that they are part of, and analogously for men. The pattern observed for all respondents is closely replicated when examining the gender breakdown: Women in the poorest quintiles (especially the second-poorest group) benefit most and at a rate greater than their presence among the female population. The analogous is true with respect to men.

Figure 4. Agricultural extension benefits-to-population odds ratio, by gender-specific quintile



Source: Authors' compilation based on the EEPRI/IFPRI survey.

However, it is notable that the public spending benefit incidence markedly increases again for the highest quintile, and it does so also when examining the wealth incidence separately by gender. Thus, whereas the nondiscrete (and nonpublic spending–based) analysis through the concentration curves conveys a general picture of progressive provision of extension services, the discretized analysis of public spending incidence by wealth groups in Table 12 and Figure 4 highlights that the incidence is oriented toward the better off when examining the trends at the two ends of the wealth spectrum.

The analysis in Table 12 does not allow for direct intergender comparison but rather examines the distribution of benefits within each gender (as well as within all respondents). In contrast, Table 13 presents how agricultural extension benefits are distributed between men and women. It is perhaps not surprising that more of the benefits accrue to men than women. The BP odds ratio, however, is an important complement to the benefit shares, as the former accounts for the share of men, and of women, in the population (there are more women than men, as female household heads usually do not have a present spouse).

Table 13. Benefit incidence of public spending on extension, by gender and headship status

	Benefit share (%)	BP odds ratio
Gender		
Women	39.22	0.732
Men	60.78	1.309
Total	100.00	—
Headship status		
Spouse	26.24	0.637
Head	73.76	1.255
Total	100.00	—

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: BP = benefits-to-population.

The BP odds ratio shows that men obtain 31 percent more of the benefits than would be the case if the public spending on extension would benefit women and men proportionately to their numbers. The table presents analogous analysis with respect to respondents' headship status. The disproportionate benefits to heads relative to spouses is not substantially different from that in the gender distribution.

Finally, Table 14 contrasts the average and the marginal incidence of agricultural extension services. As discussed in Section 5, although an economic group may benefit pronouncedly from a public service, the benefits it might receive if the service were expanded on the margin might be less compared with other economic groups. Indeed, we see distinct implications from the average and marginal odds ratios for agricultural extension. Specifically, although the two lowest quintiles benefit robustly from this service on average, the marginal incidence for these groups, while still large, is lower than the average incidence. This analysis suggests that the benefits the poorest groups obtain from an expansion of extension services are lower than what they obtain on average.

Table 14. Average and marginal odds ratios for agricultural extension benefits to different wealth groups

		Q1 (poorest)	Q2	Q3	Q4	Q5
Total	Average odds	1.303	1.426	0.891	0.544	0.836
	Marginal odds	1.211***	0.905***	1.029***	0.821***	0.680*
		(0.138)	(0.0758)	(0.1639)	(0.3056)	(0.2493)
Women	Average odds	1.579	1.534	0.892	0.340	0.530
	Marginal odds	1.081***	0.998***	0.964***	0.612	0.229
		(0.0728)	(0.1028)	(0.2201)	(0.4989)	(0.2896)
Men	Average odds	1.190	1.346	0.883	0.655	0.965
	Marginal odds	1.255***	0.840***	1.070***	0.940***	1.023**
		(0.2222)	(0.136)	(0.1376)	(0.2402)	(0.1555)

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: * $p < .1$, ** $p < .05$, *** $p < .01$.

In contrast, the gains accruing to the third and fourth quintiles are greater at the margin than on average. This is also true with respect to the highest quintile for men, but not overall. Despite this situation, the greatest marginal incidence still accrues to the lowest-wealth group (as compared with the other wealth groups)—both when considering the whole sample as well as when considering each gender separately. In other words, while the poorest benefit the most from an expansion of the program, they benefit distinctly less from an expansion than they do from the services on average. The overall picture from this comparison of the average and marginal odds ratios in agricultural extension, then, conveys that an expansion would still favor the poor, albeit less than the program as a whole does.

7. THE BENEFIT INCIDENCE OF PUBLIC SPENDING ON SELECTED COMPONENTS OF THE FOOD SECURITY PROGRAM

We first provide core descriptive information of household survey beneficiaries of the different components of the FSP. There are a total of 1,118 households, of which by sample design exactly half (559) are in the four FSP *weredas*. Of these, 269 are FSP beneficiaries. Specifically, 178 are beneficiaries of the PW component of the PSNP, 101 are beneficiaries of the PSNP's DS component, and only 13 households, or 5 percent of all beneficiaries, ever received OFSP household assets or input packages.[15] Finally, only 1 household in the sample had been resettled as part of the FSP (2 other households had been resettled in the context of other non-FSP resettlement schemes in the country).

To undertake a specific incidence study of the resettlement program, it is necessary to administer a tailored survey that traces the resettled households on the basis of administrative information from the FSP and then surveys them at the location of their resettled area; however, it was somewhat of a surprise to find that the number of OFSP recipients in the survey was so small, given the sampling methodology used (see Section 5). Unfortunately, it is not possible to compare the OFSP versus PSNP beneficiary numbers in the sample with those of the country as a whole, as we were not able to obtain any conclusive information on the number of OFSP beneficiaries in Ethiopia (see also Section 3). Furthermore, the largest survey conducted to assess the impact of PSNP and OFSP—the CSA/IFPRI survey consisting of 3,688 households, from which several studies have emerged, such as Gilligan, Hoddinott, and Seyoum (2009) and Gilligan et al. (2009a, 2009b) referenced earlier in this paper—has a sampling approach designed to be representative of the FSP's PSNP beneficiaries, but it is not designed to be representative of OFSP beneficiaries, so estimates of the number of the latter cannot be discerned from that survey.

In the overall incidence analysis of the program, we will treat all beneficiaries—that is, also the OFSP recipients—as beneficiaries. The analysis of subcomponents separately will be able to consider PW incidence and DS incidence, but it will not be able to examine OFSP incidence separately given the small sample size.

Furthermore, it should be made explicit that the analysis focuses on the incidence of household transfers and does not consider how benefits from the use of the community infrastructures constructed under the PW component, or any medium-/large-scale infrastructure constructed under the OFSP, accrue to different socioeconomic groups. Although the household survey provides information on households' access to, and use of, different infrastructures, it does not differentiate which of these infrastructures were produced through the FSP, as the information requirement to households in making these distinctions was considered too high for reliable reporting results to emerge from such questions.

In light of these limitations in the scope of the FSP considered for incidence analysis, the results in the tables and graphs pertaining separately to subcomponents will be referred to as such, and the aggregate results will be referenced as "selected components of the FSP."

The benefit incidence of public spending on the FSP is reflected in Table 15 and Figure 5. A household's beneficiary status pertains to enrollment in the program at any point in time since it was initiated in the household's *kebele*. The first panel shows the results based on wealth groups constructed on household wealth, and the bottom panel on the basis of household wealth per capita. In each panel, the first three rows consider the spending benefit incidence of the combined selected FSP components taken together, the next three consider the food/cash-for-work program, and the last three consider the spending benefit incidence of the free food and cash aid to households. Figure 5 depicts the corresponding BP odds ratios, using the same scale for all six graphs for visual comparability.

The incidence of FSP is generally pro-poor: poor households, including both FHHs and MHHs, receive proportionately the largest share of the public spending benefits. Forty-one percent of the expenditure benefits accrue to the households in the poorest quintile. Among MHHs and FHHs alone, the

[15] As also found in the IFPRI/CSA survey (see the discussion in Section 3), in this survey, too, some households have been recipients of more than one FSP component).

equivalent share is 36 and 61 percent, respectively; however, since FHHs tend to be more concentrated in the poorest quintile of all households, it is once again useful to assess incidence by the BP odds ratio. In so doing, it is apparent that households in the poorest quintile gain from the FSP at somewhat less than double the rate as their population share (the ratio being higher for MHHs than for FHHs) (Figure 5).

Table 15. Benefit incidence of public spending on the selected components of the Food Security Program, by gender-specific quintile (percentage)

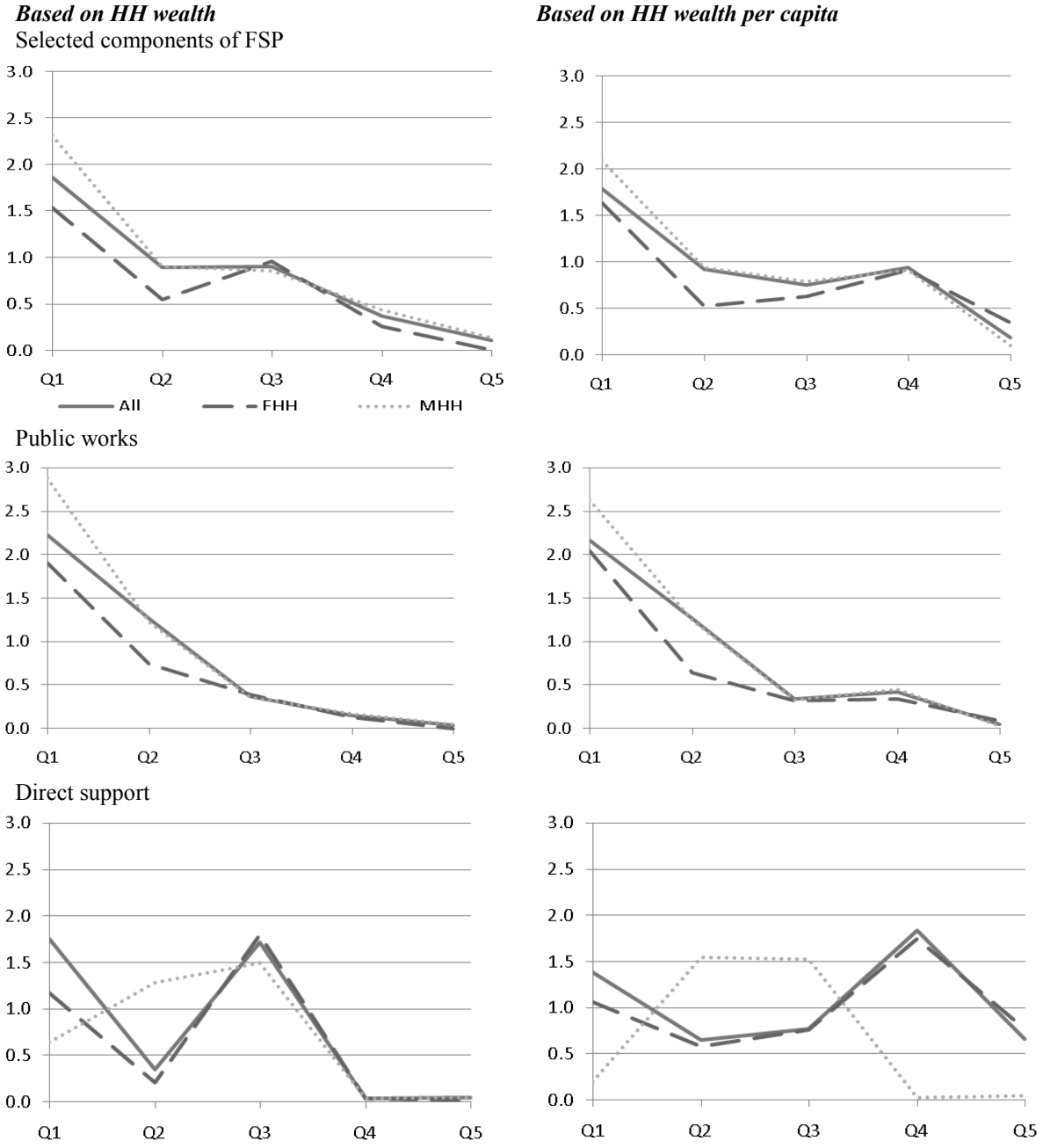
		Q1 (poorest)	Q2	Q3	Q4	Q5
Based on household wealth						
Selected components of FSP combined	All	41.46	26.62	26.21	5.08	0.63
	FHH	60.73	9.31	26.56	3.36	0.03
	MHH	35.56	31.90	25.66	5.95	0.93
Public works	All	49.46	37.56	10.71	2.06	0.21
	FHH	75.13	12.49	10.66	1.71	0.00
	MHH	44.22	42.79	10.52	2.19	0.29
Direct support	All	38.97	10.46	49.83	0.50	0.24
	FHH	46.35	3.60	49.51	0.48	0.06
	MHH	9.87	44.84	44.45	0.51	0.33
Based on household wealth per capita						
Selected components of FSP combined	All	39.45	27.48	19.08	12.26	1.73
	FHH	60.37	9.78	11.86	14.76	3.24
	MHH	33.56	32.32	22.33	10.82	0.98
Public works	All	47.74	37.67	8.65	5.51	0.43
	FHH	75.57	12.05	5.97	5.55	0.86
	MHH	42.31	42.74	9.38	5.28	0.29
Direct support	All	30.50	19.58	19.59	24.04	6.28
	FHH	39.35	10.85	14.19	28.43	7.18
	MHH	3.14	53.14	42.97	0.30	0.45

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: FSP = Food Security Program; FHH = female-headed household; MHH = male-headed household.

The next two panels, however, show that these pro-poor features of overall FSP incidence are mostly driven by the incidence of the PW component of the program, and less so by the way that public expenditures on the direct support program benefit different wealth groups. Although the public works spending incidence is decidedly pro-poor, benefits from spending on the direct support program do not follow any discernable pattern. The highest odds ratio overall is that of the lowest and the middle quintiles, and similarly, neither of the gender-disaggregated odds ratios reveals any pro-poor trend as seen in the PW component. The second set of panels, undertaking the spending benefit incidence on the basis of household wealth per capita, generally does not point in a different direction than the odds ratios based on household wealth: the PW incidence is successively lower for wealthier groups, whereas the DS incidence does not show such a trend.

This finding may suggest that the self-targeting element of the program is relatively effective in reaching lower-wealth households, whereas the administrative targeting can be further improved. The public works program, by virtue of its requirement of hard manual labor and wage rates that may be lower than what the somewhat higher skilled among rural residents can obtain in alternative employment, has a strong self-targeting element to it in that poorer people are more likely to seek enrollment in the program. In contrast, the free food or cash or both provided in the direct support program has no self-targeting element, and thus successful targeting would need to fully rely on administrative measures.

Figure 5. Benefits-to-population odds ratio for selected components of the Food Security Program, by gender-specific quintile



Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: HH = household; FSP = Food Security Program; FHH = female-headed household; MHH = male-headed household.

The results also raise the question of whether the findings on incidence—in particular, the incidence of the DS—may arise due to the intervention's having had the impact of raising household asset levels relative to those of nonbeneficiaries. This is doubtful in light of the very mixed picture of program impact on asset accumulation given by Gilligan et al. (2009a) and Gilligan, Hoddinott, and Seyoum (2009), summarized in Section 3.4 above. Granted, these two studies examined the impact only of the PW component and the impact of PW transfers combined with OFSP receipts. We are not aware of a similar

impact analysis of the DS component. However, the findings on the impact on asset growth in the above-mentioned two papers at least do not lend confidence to the hypothesis that the DS incidence patterns may be a result of how this component built up beneficiaries' assets relative to those of nonbeneficiaries. That said, further research into features of de facto targeting—including how the administrative and self-targeting aspects empirically worked out in the context of the FSP—is required to speak conclusively to the reasons for the stronger pro-poor benefit incidence of the public works program identified here relative to that of the direct support program.

Information on the relative benefits that accrue to MHHs versus FHHs shows that MHHs are slightly more likely to benefit from spending on the FSP as a whole than are FHHs (Table 16). This is true also in the case of the PW subcomponent. But the gender-specific benefit incidence of DS, very much in contrast, suggests that the benefit that FHHs receive far outstrips that of MHHs.

Table 16. Benefit incidence of public spending on selected components of the Food Security Program, by gender of household head

	Selected components of FSP (%)	BP odds ratio	Public works (%)	BP odds ratio	Direct support (%)	BP odds ratio
FHHs	27.15	0.947	18.45	0.644	79.38	2.768
MHHs	72.85	1.021	81.55	1.143	20.62	0.289

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: FSP = Food Security Program; BP = benefits-to-population; FHH = female-headed household; MHH = male-headed household.

It is useful to contrast the incidence of the FSP captured through household participation in and public spending on the program, as discussed above, with incidence measured by the monetary value of in-kind and cash receipts by households. The latter is summarized in Table 17, which shows the per capita cumulative value that households received from the start of the program in their community to 2000EC. The pro-poor nature of the PW component is clearly reflected not only in the public spending benefits distribution but also in the value of beneficiaries' receipts: average per capita transfer values are lower in successively higher-wealth groups.

Table 17. Incidence of household receipts from selected components of the Food Security Program, by quintile and gender of the household head (birr)

	Based on household wealth			*Based on household wealth per capita*		
	Selected comp. of FSP	Public works	Direct support	Selected comp. of FSP	Public works	Direct support
Total	357.20	306.24	348.26			
Q1 (poorest)	386.06	353.79	332.79	343.27	322.76	276.58
Q2	332.33	296.51	222.66	340.46	307.21	242.38
Q3	324.72	277.87	303.02	330.18	277.18	302.87
Q4	356.41	192.25	411.13	363.30	314.56	376.33
Q5	494.06	148.00	518.77	560.23	310.00	591.51
FHH	410.00	294.92	371.31			
MHH	333.09	309.87	325.22			
Head–gender gap	1.231	0.952	1.142			

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: The distinction between results based on wealth and wealth per capita only applies to the wealth incidence of receipts. comp. = component; FSP = Food Security Program; FHH = female-headed household; MHH = male-headed household.

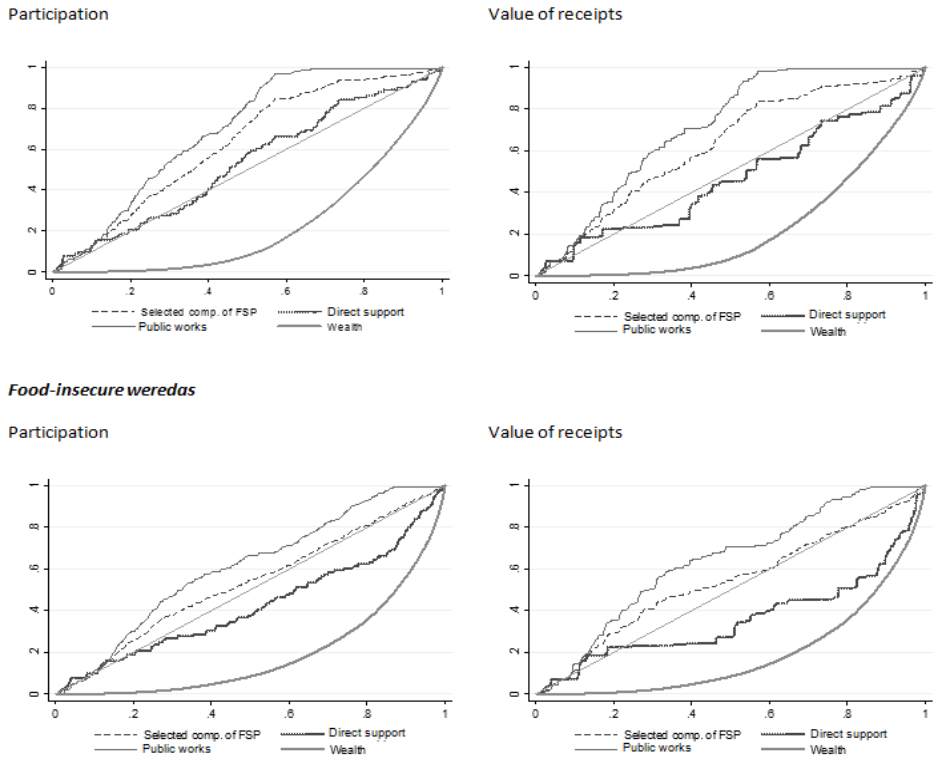
The same is not true with respect to the DS component, where there is an approximate trend of greater transfers to higher-wealth households. As a result, overall transfer values through the program

increase with wealth, with the exception of the lowest quintile, which goes against this trend, as average transfers to the poorest group are greater than the overall average transfer value. The picture that emerges from the alternative measure of wealth per capita does not improve the distribution of transfers: the magnitude of PW transfers is approximately flat with respect to wealth groups, and DS transfers are inversely related to household wealth per capita.

There is less consistency between results on the gender incidence of the program when comparing the public spending incidence and the incidence of household receipts among beneficiaries. Although FHHs gain strongly disproportionately in terms of participation in the direct support program, the magnitude of cash and in-kind benefits that FHHs receive is somewhat smaller than that of MHHs.

Figure 6 undertakes a less discretized view of the incidence of access to, and receipts from, the program through concentration curves, allowing us to compare the progressivity of these two aspects of the intervention. The concentration curves for the PW component (thin curves) show that although both measures of the program (participation and receipts) reflect that it is generally targeted to the less well off, the distribution of the receipts among beneficiaries tends to be slightly more progressive than general access to (participation in) the program is. To interpret the comparison between the concentration curves on the left and the right, consider that if each participating household were to receive the exact same PW transfer value, then the left and right PW concentration curves would be identical. Thus, the slightly stronger upward and leftward bulge of the receipts distribution of public works (PW curve in the right-hand graph) is the result of the generally larger amount received by poorer beneficiaries relative to the better-off beneficiaries.

Figure 6. Concentration curves for the distribution of selected components of the Food Security Program



Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: comp. = component; FSP = Food Security Program.

The reverse is true with regard to the DS concentration curves (darker curves). The participation curve on the left shows a neither unambiguously progressive nor regressive distribution, but the clearly regressive receipts curve suggests that better-off beneficiaries tend to receive greater amounts than less-well-off beneficiaries. Both participation in and receipts from the program as a whole are progressive, and comparing the left and right FSP curves suggests that incidence just among the beneficiaries depicts neither progressivity nor regressivity (since the receipts-concentration curve approximately follows the participation curve, that is, is neither to the left/above it nor to the right/below it).

It is also of interest to consider program incidence with the distribution of wealth itself. The incidence of the program as a whole, as well as of its two major components, has a more equitable distribution than the distribution of wealth itself. This is true whether one considers incidence in terms of participation in the program or the value of receipts gained from the program. Thus, for example, although receipts from direct support accrue at higher rates to the better off, the degree of inequality in benefits from the direct support program is still lower than the degree of wealth inequality.

Finally, the lower two graphs of Figure 6 repeat this analysis; however, they include only the four food-insecure *weredas*. The fact that after exclusion of the FSP *weredas* all concentration curves are generally to the right and below their upper panel counterparts suggests that households in the non-FSP *weredas* are indeed higher wealth, as distribution of access across all *weredas* is more progressive than across only the *weredas* designated food-insecure.

Table 18 presents the average and marginal incidence of the FSP. As was also seen in the analogous comparison in the case of agricultural extension, on average poor households benefit more from the FSP than they would from a marginal expansion of the program. In contrast, overall, the best-off households gain slightly more from a further rollout of the FSP than they do from the program on average. Comparing the relative gains across quintiles, however, both the average and the marginal odds of access to the FSP are highest for the poorest quintiles, when considering all households. This is also true for MHHs but not for FHHs.

Table 18. Average and marginal odds ratio for benefits from selected components of the Food Security Program, accruing to different wealth groups

		Q1 (poorest)	Q2	Q3	Q4	Q5
Total	Average odds	1.418	1.317	1.361	0.659	0.246
	Marginal odds	1.143***	0.995***	0.777***	0.860***	0.999*
		(0.1443)	(0.1217)	(0.0984)	(0.1599)	(0.2768)
FHH	Average odds	0.924	0.913	1.626	0.868	0.164
	Marginal odds	0.771***	0.849***	1.114***	1.044	0.312
		(0.2356)	(0.2264)	(0.1129)	(0.198)	(0.2189)
MHH	Average odds	1.697	1.497	1.237	0.629	0.280
	Marginal odds	1.381***	1.009***	0.651***	0.919***	1.054**
		(0.2283)	(0.1312)	(0.1188)	(0.1692)	(0.2758)

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: FHH = female-headed household; MHH = male-headed household.
* $p < .1$; ** $p < .05$; *** $p < .01$.

8. THE BENEFIT INCIDENCE OF DRINKING WATER SUPPLY

Public expenditure on the drinking water supply in rural areas is primarily in the purview of the regions. There are *wereda* water desks at the local level—most of which are a unit within the WoARD—but they are predominantly responsible for supporting the region in implementing water facility construction and providing technical assistance to water committees. In light of this, the Wereda/City Benchmarking Survey did not include in its questionnaire information on public spending on drinking water for rural *weredas* (but did so for municipalities). Thus, this analysis will be confined to the benefit incidence of drinking water supply that does not account for the cost dimension of provision of this service but examines the differential access to water by wealth and gender categories of households.

We follow the conceptualization of "access" to drinking water discussed in Section 4. One dimension is the physical access, represented by households' distance to water sites, which invariably has implications for the amount of water a household is able to obtain. The other dimension is quality, which we assess by looking at the extent to which households draw on safe water sources.

Table 19 reflects the first dimension. It shows that it takes households approximately one hour to fetch water for one trip—somewhat less during the rainy season and somewhat more in the dry season, when some water sources may not be available. The differentiation across wealth groups does not reveal a clear relationship between physical access to water and wealth.

Table 19. Physical access to water: Distance to water source (minutes)

		Total	Q1 (poorest)	Q2	Q3	Q4	Q5
Based on household wealth							
Primary source in	One way	25.25	22.55	24.94	32.79	25.43	20.86
dry season	Full trip	65.15	54.98	62.79	86.52	66.37	55.88
Primary source in	One way	20.98	20.73	21.22	26.08	19.77	17.35
wet season	Full trip	53.05	50.37	53.48	66.08	51.30	44.76
Based on household wealth per capita							
Primary source in	One way		22.93	25.41	30.02	23.14	24.80
dry season	Full trip		55.80	63.64	80.32	62.95	63.12
Primary source in	One way		20.84	21.27	24.16	18.25	20.46
wet season	Full trip		50.71	53.07	62.47	48.42	50.81

Source: Authors' compilation based on the EEPRI/IFPRI survey.

Table 20 presents various measures of access to safe drinking water. The survey has detailed information on the sources of water a household uses. The categorization of water sources as improved and unimproved sources follows the WHO/UNICEF Joint Monitoring Program for Water Supply and Sanitation.[16] As different sources will be available in the two seasons, we consider the availability of safe sources separately by season. We also consider the use of improved sources as the primary source drawn on by the household (possibly combined with occasional use of unimproved water as an alternate source) versus the exclusive use of safe water.

The table indicates that there are in fact only very small differences by these two dimensions. Thirty-seven percent and 38 percent of households use as their primary source an improved source in the dry and wet seasons, respectively, and 36 percent consistently access safe water as their primary source throughout the year. The share of households that exclusively access safe water in the dry season, rainy season, and throughout the year is markedly lower, by about 10 percentage points, respectively.

[16] An electronic version of the guidelines can be found at <http://www.wssinfo.org/definitions/infrastructure.html>.

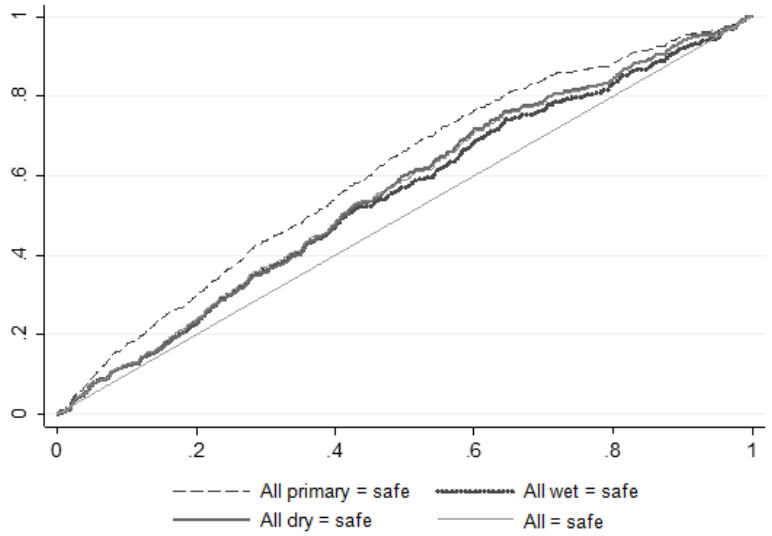
Table 20. Access to safe drinking water (percentage)

		Total	Q1 (poorest)	Q2	Q3	Q4	Q5
Based on household wealth							
Safe primary source in:	Dry season	37.05	53.16	45.31	43.01	22.28	23.12
	Wet season	38.08	53.16	44.79	41.40	25.74	26.63
	Both seasons	35.71	53.16	43.75	39.78	21.78	21.61
Safe: all sources used in:	Dry season	25.81	30.11	31.05	30.56	17.41	20.92
	Wet season	26.30	29.95	31.58	27.72	19.60	23.23
	Both seasons	24.53	29.41	29.32	27.17	17.41	20.10
Based on household wealth per capita							
Safe primary source in:	Dry season	37.05	56.91	41.45	37.70	27.27	23.12
	Wet season	38.08	56.91	41.45	37.70	30.30	25.13
	Both seasons	35.71	56.91	40.41	35.08	25.76	21.61
Safe: all sources used in:	Dry season	25.81	31.35	29.63	27.96	19.90	20.81
	Wet season	26.30	32.26	29.10	26.60	22.16	21.89
	Both seasons	24.53	30.65	27.89	25.40	18.88	20.40

Source: Authors' compilation based on the EEPRI/IFPRI survey.

Unlike when capturing water supply incidence through the physical access measures, in this case of a measure relating to water quality, there are more pronounced differences by wealth groups. And quite strikingly, the incidence is clearly highest for the poorest group of households, no matter which measure of access to safe water is considered. The lower the quintile, the higher the incidence of improved water access (except for the least poor quintile). How surprising these results are, however, is uncertain given that there have been no extensive benefit incidence analyses of water services in prior literature, though other incidence analyses in Uganda, Bolivia, and Nicaragua have found public water services to be poverty neutral (Wokadala, Magidu, and Guloba 2010; Ajwad and Wodon 2007; Pradhan and Rawlings 2002). The progressive incidence of safe water access in our results is also reflected in the mapping of the distribution as concentration curves (Figure 7). As the lower panel of Table 20 shows, this trend is more pronounced when households are classified on the basis of their per capita wealth rather than their total wealth.

Figure 7. Concentration curves for access to safe water



Source: Authors' compilation based on the EEPRI/IFPRI survey.

Finally, the results comparing marginal and average wealth incidence of safe drinking water access (Table 21) suggest that unlike the analogous analysis for the other two programs, generally speaking there is not a large discrepancy between how wealth groups would benefit from this service on average and on the margin if the services were to expand.

Table 21. Average and marginal odds in improved drinking water access

		Q1 (poorest)	Q2	Q3	Q4	Q5
Total	Average odds	1.489	1.225	1.114	0.610	0.605
	Marginal odds	1.183***	1.218***	0.839***	0.691***	0.583*
		(0.2184)	(0.2477)	(0.24)	(0.2952)	(0.2441)
FHH	Average odds	1.244	0.989	0.854	0.604	0.980
	Marginal odds	0.499***	1.743***	-1.390***	0.489	1.258
		(0.5146)	(0.6234)	(0.692)	(0.3916)	(0.4389)
MHH	Average odds	1.501	1.319	1.217	0.631	0.593
	Marginal odds	1.115***	1.113***	1.302***	0.957***	0.400**
		(0.2983)	(0.2391)	(0.2463)	(0.3083)	(0.353)

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: The average and marginal incidences are estimated for access to improved sources as the primary source, in both dry and wet seasons. FHH = female-headed household; MHH = male-headed household.
* $p < .1$; ** $p < .05$; *** $p < .01$.

Although the lowest-wealth group benefits somewhat less from program expansion than from the program on average, the average and marginal benefits for the other wealth groups are about the same. The wealth group that is the greatest benefactor on average is the poorest quintile—and this is true in the aggregate as well as when considering male- and female-headed households separately. The wealth group that tends to benefit the most on the margin, although not the poorest, is still the second poorest quintile.

Table 22 summarizes the earlier discussed two dimensions of water access for each of the study *weredas*. It is not surprising that households in the relatively arid Telalak spend by far the most time fetching water. The *wereda* (Ibantu in the west of Oromia) for which the time spent fetching water is lowest also has by far the lowest incidence of use of improved sources, likely due to the abundant existence of natural (unimproved) water sources. Households in Ofla have the best access to safe water sources overall, and among the highest rates of improved water use as a primary source. In the study *wereda* in Gambella, water sources of households are highly diversified, explaining the fact that although a high percentage use facilities providing safe water as their primary source, a rather low percentage rely exclusively on improved sources.

Table 22. Access to and quality of drinking water, by *wereda*

Wereda	**Access to improved water in both seasons (%)**		**Distance to primary source in dry season (round trip, minutes)**
	Primary source	**All water sources**	
Bati (Amhara)	58.77	30.09	70.4
Gog (Gambella)	56.30	13.43	64.1
Ibantu (Oromia)	4.69	4.72	39.2
Ofla (Tigray)	52.43	53.00	48.5
Sekota (Amhara)	38.66	36.44	49.9
Sheko (SNNP)	11.36	8.40	38.8
Telalak (Afar)	28.18	19.09	183.7
Yaso (Beneshangul-Gumuz)	39.53	38.46	40.4

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: SNNP = Southern Nations, Nationalities and Peoples.

The value of considering the two distinct measures of access to drinking water is particularly well revealed in the results shown in Table 23. The gender discrepancy in the two sets of measures actually points in different directions. FHHs are more likely to be located further away from their primary water source than are MHHs. However, a distinctly greater share of FHHs than MHHs use safe water sources. Half of the FHHs rely on safe sources as their main water source, in contrast to a third of MHHs. If indeed safe water sources tend to be located at a greater distance than unimproved sources, this finding is less inconsistent than it may initially seem. These results, in any case, may have quite different implications about the gendered nature of access to water, depending on how one measures access.[17]

Table 23. Gender incidence of water supply

		FHH	MHH	Head–gender gap
Physical access to drinking water (minutes)				
Primary source in dry season	One way	29.0	24.3	1.196
	Full trip	73.5	62.9	1.169
Primary source in wet season	One way	25.1	19.9	1.264
	Full trip	62.8	50.4	1.245
Use of safe drinking water (percentage)				
Primary source in:	Dry season	49.51	33.73	1.468
	Wet season	48.53	35.29	1.375
	Both seasons	48.04	32.42	1.482
All sources used in:	Dry season	29.56	24.80	1.192
	Wet season	29.56	25.43	1.162
	Both seasons	28.08	23.58	1.191

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: FHH = female-headed household; MHH = male-headed household.

It appears, then, that not only are women responsible for undertaking the work required to access this service but also that FHHs are more willing than MHHs to invest in the effort (and cost) to access safe water from facilities instead of relying on unimproved natural water sources. This may well be due to women's predominant responsibility for caring for children, and thus their greater awareness of the health problems contaminated water causes especially for children (as discussed in Section 4). Our result may be related to the fact that female household heads are likely in a better position than wives of male household heads to make household decisions about whether the financial and time cost should be incurred to use water from facilities.

These results on the gender incidence of improved water use contrast markedly with the gender features of community drinking water management in the study *weredas*. Of the water committees surveyed in the eight *weredas*, 92 percent are headed by men, and a still high 76 percent of all water committee members are male. The qualitative research confirmed this finding that local drinking water management tends to be heavily male dominated—though there was at least one woman on the committee. This gender imbalance on water committees stands in contrast to the chore of fetching water, which is predominantly a woman's and children's task. It is women who have the keenest awareness of any challenges pertaining to the distance of facilities, quality of the water, problems with reliability and quantity of water from facilities, and any issues with how payment for water is administered; thus, women should arguably have a better representation in community management of water than their extent of involvement found in the qualitative research, as well as in the quantitative survey of water committees.

The qualitative research also identified serious challenges with water committees' ability to engage with water users in the community to encourage them to undertake timely payments as per the

[17] The survey asked respondents the more detailed questions on water source (including distance to the source and time spent waiting to collect water at the source) only with regard to respondents' primary sources. Thus, it is unfortunately not possible to compare distance to sources households use versus distance to sources they do not primarily use or do not use at all.

terms of water use, or to contribute labor to maintaining the water systems. Water committee members and leaders reported that they received no training on community relations, and whatever training they got tended to focus only on the technical aspects of facility management. They also pointed to limited support from the *wereda* water desk; and finding themselves in a bind between poor support from above and inability to ensure contributions from the community for facility upkeep, the facilities have become nonfunctional. In several cases, the water committees themselves had de facto disbanded. The qualitative fieldwork also showed that households in several sites were relatively quick to resort back to unimproved surface water as soon as there was a problem with the facility. This ready exit option for users makes the overall functioning of improved water service provision all the more difficult, as users are not compelled to seek to hold water committees accountable for their management of facilities.

Generally, the sites visited in Ofla tended to be an exception to this somewhat bleak picture of community water management; here the interface between water committee and users appeared to function better, and the women's association head interviewed had been very assertive in holding the water committee to account for shortcomings she perceived. At this site, however, water service was not without its problems; community members raised issues with fairness regarding the requirement to contribute money and labor toward facility construction, comparing their cost arrangements with those of neighboring communities; however, at least the engagement with the water committee was vigorous, even if unresolved complaints remained.

9. WHICH DEMAND- AND SUPPLY-SIDE FACTORS ARE ASSOCIATED WITH ACCESS TO THESE PUBLIC SERVICES?

Sections 6 through 8 offered an analysis of the benefit incidence of public investments in the three sectors/programs of central interest in this study—agricultural extension, water supply, and selected components of the FSP. The undertaking above offered a picture of how these public investments reach different socioeconomic groups. In this section, we take one step further and go beyond incidence analysis to examine how supply- and demand-side factors are associated with households' and individuals' access to these services—including the factors of particular interest in the preceding analysis, namely, gender and wealth.

The motivation for the regression analysis is to buttress the findings of previous sections with regard to gender and wealth variables, as well as to identify additional variables that are correlated with access. In doing so, we can better understand the pathways by which the provision of rural services occurs and which demand- and supply-side variables are correlated with this provision. It is important to note that although regression analysis is used in this section, causality is not implied by the results, nor is it sought. Issues related to endogeneity limit the interpretation of these regression results to correlations, not causality. Nonetheless, the results here serve as a useful first step in identifying important variables and in later modeling of access to these services.

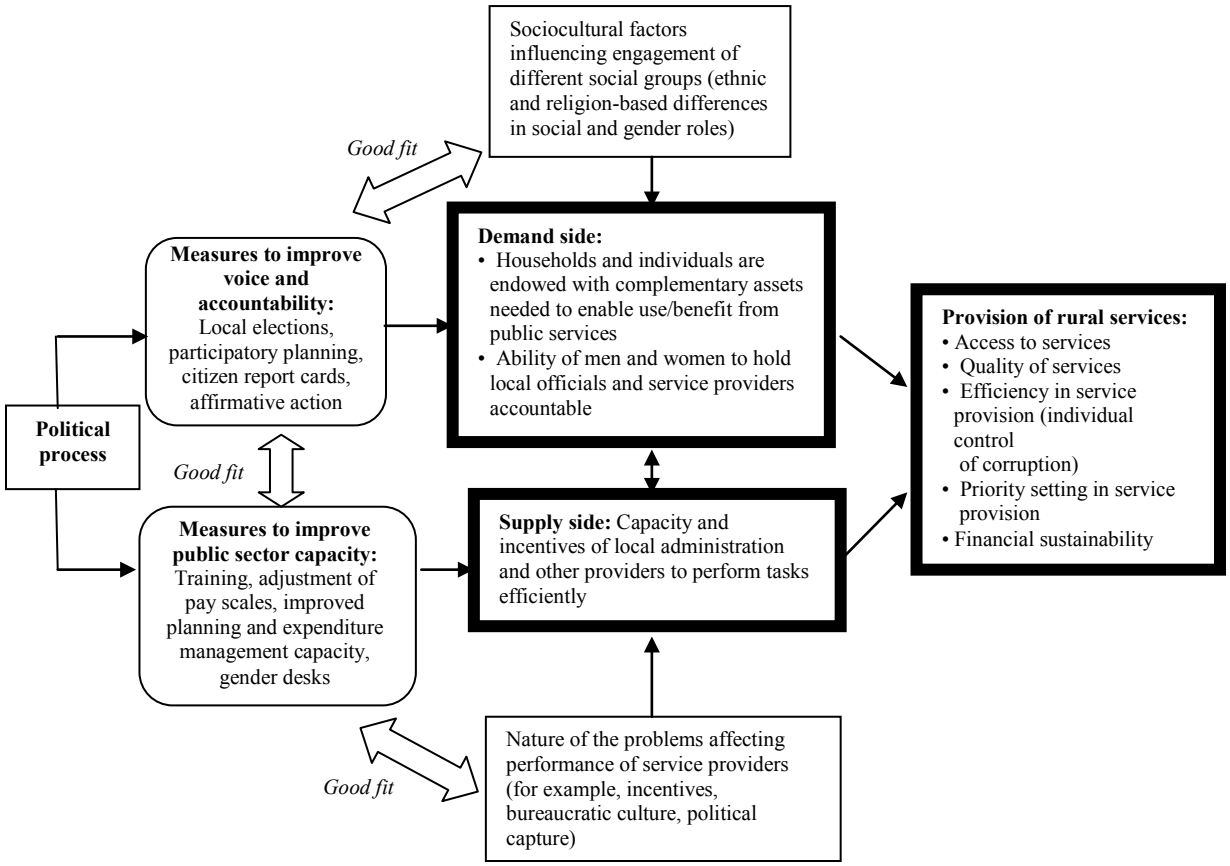
The consideration of supply- and demand-side factors in affecting access to services is motivated by a broader framework of the forces that ultimately determine public service quantity, quality, and equity. This framework is summarized in Figure 8. Generally, elements of the different reform measures undertaken by the government and the large-scale programs supported by the donor community to provide public services can be categorized into demand-side approaches (increasing citizens' ability to demand better services) and supply-side approaches (improving the incentives and capacity of the administration to supply better services). Effective demand-side mechanisms improve citizen voice and public accountability; they strengthen the ability of citizens to articulate their heterogeneous values and preferences and to hold public representatives and officials accountable to meeting these needs through the efficient and fair use of public resources. Demand-side mechanisms rely on (or seek to create) both an empowered, vocal citizenry and downwardly accountable public representatives. Examples of efforts undertaken on the demand side in Ethiopia's decentralization process include the transparency of the budget processes component and the social accountability component of the Protection of Basic Services project.

Supply-side mechanisms build the capacity of the public administration to efficiently, equitably, and honestly perform its tasks, which include providing services and infrastructure, providing effective regulation, and ensuring the rule of law and access to justice. Public sector capacity is influenced by the availability and management of the many types of resources necessary "to get the job done" (for example, time, funds, information, and technical and managerial expertise); the structure of incentives that shape a will for public responsiveness; and the existence of "horizontal accountability," or formal relationships of authority and supervision among agents of the state. Examples of donor-supported supply-side efforts in the Ethiopian context include the National Capacity Building Program, the Public Sector Capacity Building Program, the Capacity Building for Service Delivery project, and the resource transfer through the government's block grant system of the Protection of Basic Services project. The introduction of gender desks is a supply-side measure that seeks to improve gender equity.

The framework displayed in Figure 8 shows that the performance of service delivery depends on the "fit" of demand- and supply-side factors with context-specific conditions. On the demand side, these conditions encompass the socioeconomic and cultural characteristics of local communities, including gender roles and social structure. In Ethiopia, one can expect that these characteristics differ among ethnic and religious groups. The effectiveness of supply-side measures depends on the extent to which they actually address the prevailing problems in the public administration. The framework also points to the fact that supply- and demand-side measures need to be well coordinated. Obviously, improving the

demand side of local governance has little effect if the public administration lacks the capacity and incentives to respond, for example. Figure 8 also indicates that reforming governance at both the demand side and the supply side is a political process, and both the design and the implementation of demand- and supply-side measures are subject to political economy factors.

Figure 8. Demand- and supply-side strategies to improve quantity and quality of public services



Source: Authors' compilation.

The framework illustrated in Figure 8 is intentionally devised very broadly, so as to illustrate and capture the big picture of demand- and supply-side processes that would contribute toward public service outcomes. In so doing, the framework offers a very rich array for empirical application—in fact, an array rich enough to warrant several distinct studies. For example, it may be interesting, but it would go well beyond the scope of this paper, to discuss the extent to which the above-mentioned government- and donor-supported reform strategies to improve demand- and supply-side processes have or have not been successful. To stay within the scope of this research, we focus on the right half of the framework depicted in Figure 8 and consider immediate indicators of supply- and demand-side factors for the three services of interest, where applicable (that is, selected immediate indicators and outcomes associated with the thick boxes in the figure), as well as some indicators of sociocultural factors (the uppermost box in the figure).

Table 24 presents the summary statistics for the variables used in the subsequent analysis. Since the agricultural extension models are at the individual level and the water services and FSP models are at the household level, the means and standard deviations for the variables used are reported at the level at which they are used in the analysis.

Table 24. Description and summary statistics for variables

	Variable	Description	Household level		Respondent level	
			Mean	Std. dev.	Mean	Std. dev.
1	Access to improved drinking water	Household uses an improved water source as its primary source in both dry and wet seasons	0.357	0.479		
2	Access to extension services	Respondent has received agricultural extension services in the past 1 year			0.354	0.478
3	Beneficiary of selected components of the FSP	HH has ever been beneficiary of HH transfers made via the public works, direct support, or "Other FSP" components of the FSP	0.237	0.425		
4	Beneficiary of public works	HH has ever been beneficiary of HH transfers made via the public works component of the FSP	0.159	0.366		
5	Beneficiary of direct support	HH has ever been beneficiary of HH transfers made via the direct support component of the FSP	0.090	0.287		
6	Number of water facilities in *kebele*	Number of water facilities existent in the *kebele* in which HH resides	2.251	3.014		
7	Number of DAs in *kebele*	Number of DAs assigned to the *kebele* in which respondent resides			2.342	1.755
8	DA coverage of gotts	Share of all gotts in the *kebele* of the respondent's residence that is covered by one DA			0.652	0.402
9	Health extension for HH	Either head or spouse was visited by health extension worker in past year	0.150	0.357		
10	Health extension for woman in HH	Woman (whether head or spouse) was visited by health extension worker in past year	0.122	0.328		
11	Member of a cooperative	Respondent is a member of an agricultural cooperative			0.119	0.324
12	Number of high social contacts	Number of people in local leadership positions with whom respondent had had contact in past year	3.399	2.248		
13	Number of high social contacts (excluding DAs)	As #12, but not considering contacts with Das			1.682	2.109
14	Number of high social contacts (excluding WC)	As #12, but not considering contacts with water committee leaders/members	3.275	2.142		
15	Social leadership	Either head or spouse (respondent) is or used to be in local leadership position	0.237	0.425	0.141	0.348
16	Access to media	Uses a mass media source once or more times a week	0.326	0.469	0.186	0.389
17	Education	Years of education	2.038	3.004	1.427	2.629
18	Education of woman	Years of education of woman in the HH (whether head or spouse)	0.593	1.693		
19	Assets	Value of all HH physical assets (livestock, agricultural equipment, consumer assets) ('000 birr)	53.008	56.583		
20	Assets per capita	Value of HH physical assets per capita ('000 birr)	9.985	12.246		
21	Land	HH owns land	0.839	0.368		
22	Improved housing	House's walls are made of improved materials: wood, iron sheets, and/or bamboo	0.234	0.424		
23	Gender	Head (respondent) is male	0.790	0.407	0.458	0.498
24	Age	Age of head (respondent)	43.289	14.949	39.544	14.177
25	Household size	Number of HH members	5.747	2.486		
26	Number of working-age HH members	Number of HH members between the ages of 15 and 65	2.811	1.470		
27	Number of children and women	Number of children in the HH under the age of 12 and women under the age of 50	3.924	2.061		
28	Afar	Ethnic group of head (respondent)is Afar	0.126	0.332		
29	Anuak	Ethnic group of head (respondent) is Anuak	0.122	0.327	0.110	0.313

Table 24. Continued

	Variable	Description	Household level		Respondent level	
			Mean	Std. dev.	Mean	Std. dev.
30	Oromo	Ethnic group of head (respondent) is Oromo	0.274	0.446	0.280	0.449
31	Tigraian	Ethnic group of head (respondent) is Tigraian	0.145	0.352	0.130	0.337
32	Muslim	Religion of head (respondent) is Muslim	0.280	0.449	0.263	0.440
33	Orthodox	Religion of head (respondent) is Orthodox Christian	0.402	0.491	0.382	0.486
34	Protestant	Religion of head (respondent) is Protestant	0.363	0.481	0.320	0.467
35	Food-insecure area	Respondent resides in an FSP *wereda*: Bati, Ofla, Sekota, or Telalak			0.464	0.499
36	Bati	Household (respondent) resides in Bati	0.117	0.322	0.125	0.331
37	Gog	Household (respondent) resides in Gog	0.139	0.346	0.114	0.318
38	Ibantu	Household (respondent) resides in Ibantu	0.134	0.340	0.140	0.347
39	Ofla	Household (respondent) resides in Ofla	0.106	0.308	0.115	0.319
40	Sekota	Household (respondent) resides in Sekota	0.122	0.328	0.123	0.332
41	Sheko	Household (respondent) resides in Sheko	0.136	0.343	0.134	0.340
42	Telalak	Household (respondent) resides in Telalak	0.113	0.317	0.109	0.312
43	Yaso	Household (respondent) resides in Yaso	0.134	0.340	0.136	0.343

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: Std. dev. = standard deviation; HH = household; FSP = Food Security Program; DA = development agent; WC = water committee.

Table 25 first considers the supply- and demand-side correlates of access to agricultural extension. It is perhaps not surprising that the extent of supply of a service clearly matters for households' likelihood of uptake of the service. After controlling for the *wereda* in which individuals reside, having a greater number of DAs in one's *kebele* is associated with greater likelihood of receiving extension services. However, for a given number of DAs, higher coverage of gotts (villages) by DAs does not imply that on average individuals are more likely to receive extension services. On the contrary, the results suggest robustly that the greater (territorial) coverage in the *kebele* that DAs achieve, the lower the probability of the average *kebele* resident's receiving extension.

This situation may arise from high transaction costs of achieving coverage; in Ethiopia many DAs travel by foot to farm households, so greater coverage may come at the cost of fewer households visited in a given amount of time. In fact, anecdotal evidence from field visits in the context of this research project showed that despite the policy that each DA (who has specific individual expertise in crop, livestock, or natural resources management) is to serve households across the *kebele* specifically in that area of specialization, in several cases DAs in a *kebele* actually arrange to allocate gotts among themselves; each DA then serves only his or her gotts and addresses issues both within and outside the individual's specialization as helpfully as possible for households in these gotts. The discussion with the DAs who are undertaking such arrangements suggested that this situation is due to the time inefficiency of each DA covering all gotts.

Whereas the base model controls for location of respondents in *weredas*, one of the alternative specifications, Model 3, considers location by food-secure versus food-insecure *weredas* rather than including *wereda* effects. It is apparent that residents of *weredas* designated as food-insecure (as per the designation for the FSP) are significantly more likely to access extension services; here, being in a food-insecure *wereda* is associated with a 20 percent greater probability of access to the service. A possible supply-side placement decision could be driving this: One of the features of the FSP is the provision of subsidized input packages, including extension provision on the use of the packages, as discussed in Section 3. That is, the OFSP effectively includes agricultural extension services. However, as noted in the description of the FSP-related data, our sample found only a very small share of FSP beneficiaries receiving OFSP packages, so it remains inconclusive whether the OFSP is the primary reason for this result.

The results also point to a strong association of extension access with access to complementary services, for example, to services of cooperatives. Being a cooperative member is associated with an

approximately 20 percent higher probability of receiving agricultural extension. In Ethiopia agricultural cooperatives, though in principle often multipurpose, very often have the role of facilitating the purchase of agricultural inputs, especially fertilizer, by their members. This strong association is consistent with the reality that agricultural advice is commonly centered on encouraging farmers' adoption of agricultural input packages, and that thus cooperative and extension services are highly complementary to each other.

At the core of this study is the benefit incidence of public services on different wealth groups, on women versus men, and on FHHs versus MHHs; the findings on the incidence of extension are detailed in Section 6. When controlling for a range of factors in the regression analysis in Table 25, including controlling for *wereda* location of respondents—that is, in all but Models 2 and 3—household wealth is not statistically significantly related to access to extension. However, without considering locational effects, a negative relationship to physical assets emerges, consistent with the findings of the earlier incidence analysis. The same obtains with another indicator of household wealth, namely, quality of housing.

Table 25. Access to extension services

	(1)		(2)		(3)		(4)	
Supply-side factors								
Number of DAs in *kebele*	.0261**	(.0112)	–.0253***	(.0084)	–.0157*	(.0087)	.0257**	(.0111)
DA coverage of gotts	-.1170***	(.0348)	–.1831***	(.0310)	–.1579***	(.0317)	–.1209***	(.0345)
Food-insecure area					.1938***	(.0491)		
Demand-side factors:								
Access to complementary services								
Member of a cooperative	.2071***	(.0466)	.2093***	(.0438)	.2028***	(.0440)	.2080***	(.0465)
Household wealth								
Assets	.0004	(.0003)	–.0009***	(.0003)	–.0004	(.0003)	.0005	(.0003)
Land	–.0211	(.0413)	.0985***	(.0382)	.1115***	(.0383)	–.0240	(.0410)
Higher-quality housing	–.0214	(.0335)	–.0922***	(.0276)	–.0593**	(.0298)	–.0208	(.0335)
Human capital, vertical social capital, and information								
Number of high social contacts (excl. DA)	.0468***	(.0081)	.0382***	(.0078)	.0397***	(.0079)	.0480***	(.0081)
Access to media	.0923**	(.0368)	.1035***	(.0367)	.1079***	(.0369)	.0909**	(.0367)
Education	–.0074	(.0052)	–.0081	(.0053)	–.0066	(.0053)	–.0064	(.0052)
Other respondent characteristics								
Household and respondent demographics								
Gender	.1214***	(.0379)	.0548	(.0365)	.0438	(.0365)	.1166***	(.0378)
Age	.0142***	(.0049)	.0169***	(.0051)	.0157***	(.0051)	.0138***	(.0049)
Age-sq.	–0002***	(.0001)	–.0002***	(.0001)	–.0002***	(.0001)	–.0002***	(.0001)
Household size	.0060	(.0057)	.0025	(.0057)	.0043	(.0057)	.0061	(.0057)
Social group affiliation (ethnicity and religion)								
Oromo	–.1268**	(.0627)	–.0281	(.0337)	–.0157	(.0343)		
Tigraian	.0469	(.1023)	.3496***	(.0455)	.2730***	(.0513)		
Anuak	–.0681	(.1721)	.1468***	(.0533)	.2066***	(.0557)		
Protestant	.1184*	(.0698)	.0728	(.0696)	.0725	(.0700)	.1057	(.0694)
Orthodox	.0687	(.0707)	.1200*	(.0708)	.0704	(.0721)	.0618	(.0703)
Muslim	.1445	(.1006)	–.0494	(.0706)	–.1721**	(.0694)	.1423	(.1007)
Location effects								
Bati	-.2185***	(.0661)					–.2857***	(.0368)
Gog	–.1364	(.1425)					–.1852***	(.0428)
Ibantu	-.2900***	(.0457)					–.3411***	(.0253)
Ofla	–.0217	(.1044)					.0219	(.0603)
Sheko	-.3193***	(.0268)					–.3235***	(.0260)
Telalak	-.4175***	(.0176)					–.4201***	(.0175)
Yaso	-.2942***	(.0296)					–.3058***	(.0273)
Number of observations	1,885		1,885		1,885		1,885	
pseudo-R^2	.2597		.2005		.2068		.2579	
Log-likelihood	–907.7		–98.2		–972.5		–909.8	
LR χ^2	636.71		491.74		507.12		632.48	
P-value	0.0000		0.0000		0.0000		0.0000	

Table 25. Continued

	(5)		(6)		(7)		(8)	
Supply-side factors								
Number of DAs in *kebele*	.0242**	(.0111)	.0242**	(.0110)	.0267**	(.0112)	.0284**	(.0111)
DA coverage of gotts	–.1159***	(.0342)	–.1187***	(.0339)	–1184***	(.0348)	–1204***	(.0347)
Demand-side factors								
Access to complementary services								
Member of a cooperative	.2065***	(.0465)	.2071***	(.0464)	.2082***	(.0466)	.2037***	(.0465)
Household wealth								
Assets	.0004	(.0003)	.0004	(.0003)			.0003	(.0003)
Assets per capita					.0005	(.0014)		
Land	–.0193	(.0412)	–.0215	(.0410)	–.0220	(.0413)	.0616	(.0383)
Higher-quality housing	–.0263	(.0332)	–.0251	(.0332)	–.0213	(.0335)	.0005	(.0339)
Human capital, vertical social capital, and information								
Number of high social contacts (excl. DA)	.0469***	(.0081)	.0480***	(.0081)	.0468***	(.0081)		
Social leadership							.0769**	(.0384)
Access to media	.0952***	(.0366)	.0940***	(.0365)	.0949***	(.0368)	.1203***	(.0367)
Education	–.0067	(.0052)	–.0060	(.0051)	–.0075	(.0052)	–.0056	(.0052)
Other respondent characteristics								
Household and respondent demographics								
Gender	.1164***	(.0378)	.1121***	(.0377)	.1210***	(.0379)	.1513***	(.0373)
Age	.0137***	(.0049)	.0135***	(.0049)	.0145***	(.0049)	.0162***	(.0049)
Age-sq.	–.0002***	(.0001)	–.0002***	(.0001)	-.0002***	(.0001)	-.0002***	(.0001)
Household size	.0056	(.0057)	.0056	(.0057)	.0075	(.0059)	.0049	(.0057)
Social group affiliation (ethnicity and religion)								
Oromo	–.1198*	(.0632)			–.1319**	(.0622)	–.1554**	(.0607)
Tigraian	.0461	(.1020)			.0491	(.1025)	.0413	(.1024)
Anuak	–.0376	(.1799)			–.0816	(.1674)	–.1109	(.1540)
Protestant					.1203*	(.0697)	.1295*	(.0697)
Orthodox					.0705	(.0706)	.0681	(.0704)
Muslim					.1442	(.1006)	.1294	(.0993)
Location effects								
Bati	–.1751***	(.0586)	–.2493***	(.0265)	-.2128***	(.0678)	-.2027***	(.0705)
Gog	–.1365	(.1428)	–.1668***	(.0411)	–.1280	(.1458)	–.0784	(.1596)
Ibantu	–.2742***	(.0480)	–.3290***	(.0250)	-.2778***	(.0480)	-.2934***	(.0452)
Ofla	–.0098	(.1059)	.0324	(.0606)	–.0262	(.1038)	–.0287	(.1039)
Sheko	–.3046***	(.0273)	–.3101***	(.0264)	-.3127***	(.0279)	-.2971***	(.0298)
Telalak	–.4079***	(.0152)	–.4100***	(.0152)	-.4157***	(.0176)	-.4067***	(.0174)
Yaso	–.2885***	(.0289)	–.3004***	(.0267)	-.2854***	(.0307)	-.3103***	(.0274)
Number of observation	1,885		1,885		1,885		1,885	
pseudo-R^2	.2578		.2563		.2592		.2473	
Log-likelihood	–91.0		–911.8		–908.3		–922.9	
LR χ^2	632.19		628.56		635.55		606.33	
P-value	0.0000		0.0000		0.0000		0.0000	

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: Estimates of probit marginal effects. Standard errors are in parentheses. DA = development agent.
* $p < .1$; ** $p < .05$; *** $p < .01$.

In contrast, landholders are more, not less, likely to also receive agricultural extension services. Even though other farmers—for example, those who only lease in or sharecrop in land—would of course in principle have no less need for advisory services from DAs, this result is nevertheless not too surprising, as the category of nonlandholders may include not only sharecroppers but also farm laborers and others who will not have as immediate a need for agricultural advice as those making farming decisions.

The other major focus of this study is the gender incidence of services, and the regression results strongly conform to the findings on benefit incidence. Controlling for several factors, including location, gender plays a driving role in the chances of receiving extension. Considering the range of models, being

male increases the probability of accessing this service by 11–15 percent, holding other factors constant. Older age of the respondent also increases the odds of receiving extension (and does so at a decreasing rate).

There is a pronounced positive association between vertical social capital and extension access, as there is between the use of mass media sources and extension access. Across all specifications, respondents who engage with a wider range of individuals in local leadership positions are also more likely to have access to agricultural extension. (The measure of vertical social capital excludes contacts with any DA, due to the obvious fact that having extension directly entails such contacts.) In contrast, human capital does not seem to play a role in the chances of receiving agricultural advice, controlling for the range of other factors.

The findings on the analysis of correlates of access to improved drinking water have some notable similarities to the corresponding analysis of agricultural extension. First, the supply-side factor is equally (and again, unsurprisingly) determining. The greater number of water facilities in a household's *kebele* makes it statistically significantly more likely that a household will use an improved water source as its primary source, although the magnitude appears modest: one additional facility in a *kebele* increases the probability of using drinking water by only 4–5 percent (Table 26). There is even stronger evidence in the case of water than in the case of extension that on average, less wealthy households (especially based on the wealth indicator of housing quality) are more likely to access improved water facilities. This finding is consistent with the results from the benefit incidence analysis, even as, here, locational effects are controlled for.

There are also interesting parallels to the findings on extension with respect to how vertical social capital, human capital, and information relate to access of this public service. Again, having vertical social capital through a wide set of local leadership contacts is significantly positively related to the use of safe drinking water. Also, frequent consumption of media bears such a positive relationship. And again as in the case of extension, education does not seem to matter in the likelihood of safe water use *ceteris paribus.* Here we considered two measures of education: education of the head and education of the woman (whether head or spouse) in the household, based on the a priori hypothesis that since the woman typically is responsible for fetching water, it may be the level of human capital of the woman, not that of the (male) head, that matters. The different specifications include those considering only the education of head (Model 10) or only that of the woman (Model 9), to see whether high collinearity may be diminishing the statistical significance of results. In all specifications, however, this relationship, although positive, did not emerge as statistically significant.

Other results, on the other hand, contrast with the findings on extension. Although individuals who made use of the key service that is complementary to agricultural extension—cooperative services—were significantly more likely to access extension, the analogous is not true here. It can be reasonably argued that health extension services—which provide information on, among other things, the health effects of hygiene and the household use of clean water—are complementary to the provision of a safe drinking water supply.

The models in Table 26 consider access to the household in general, and access specifically by the woman in the household, since, as mentioned in various placed above, women tend to be responsible for fetching water. Models 7 and 8 consider these two measures of access to complementary services separately, given that they will be strongly related to each other. Across all specifications, however, it is not the case that access to health extension workers is positively and statistically significantly related to greater probability of reliance on improved drinking water sources. This could of course be a placement effect; that is, health extension workers may attend specifically to households with poorer health outcomes or health and hygiene practices. This analysis examines correlates of access to services; further research—and perhaps fruitfully with a single focus on one sector and one or very few hypotheses—should seek to flesh out how key factors affect access and use of a service.

Finally—and consistent with the results from the benefit incidence analysis—after controlling for the factors discussed above, as well as for additional household characteristics and location, there remains a strong gender effect, in that members of FHHs are more likely to fetch water from an improved source

than are members of MHHs. Section 8 had offered some thoughts on the possible reasons behind this relationship. Given that this is indeed an interesting finding, with important policy implications if the reasons proposed earlier are true, it may be useful to further hone in on this matter in future research to more rigorously explore how the gender of decisionmakers and investment in clean water are related.

Table 26. Access to improved drinking water

	(1)	(2)	(3)	(4)	(5)
Supply-side factors					
Number of water facilities in *kebele*	.0432*** (.0087)	.0490*** (.0070)	.0403*** (.0086)	.0433*** (.0088)	.0403*** (.0086)
Demand-side factors					
Household access to complementary services					
Health extension for household	–.0385 (.0540)	–.0408 (.0510)	–.0369 (.0539)	–.0298 (.0544)	–.0287 (.0543)
Number of children and women	–.0084 (.0191)	–.0063 (.0186)	–.0085 (.0190)	–.0111 (.0188)	–.0120 (.0187)
Household wealth					
Assets	–.0003 (.0004)	–.0006 (.0004)	–.0002 (.0004)	–.0003 (.0004)	–.0003 (.0004)
Land	.0280 (.0745)	.0621 (.0544)	.0262 (.0724)	.0339 (.0746)	.0270 (.0725)
Improved housing	–.1479*** (.0418)	–.0249 (.0407)	–.1473*** (.0418)	–.1470*** (.0420)	-.1452*** (.0420)
Human capital, vertical social capital, and information					
Number of high social contacts (excl. WC)	.0295*** (.0099)	.0048 (.0088)	.0298*** (.0099)	.0268*** (.0098)	.0272*** (.0098)
Access to media	.0795* (.0419)	.0676* (.0409)	.0740* (.0416)	.0992** (.0415)	.0945** (.0412)
Education of head	.0104 (.0074)	.0121* (.0072)	.0105 (.0074)	.0081 (.0074)	.0080 (.0074)
Education of woman	.0045 (.0119)	.0002 (.0112)	.0062 (.0117)	.0038 (.0118)	.0061 (.0116)
Other household characteristics					
Household demographics					
Gender of head	–.1329*** (.0514)	–.0812 (.0493)	–.1290** (.0512)	–.1270** (.0510)	–.1226** (.0508)
Age of head	.0008 (.0075)	.0007 (.0074)	.0010 (.0075)	.0020 (.0075)	.0024 (.0075)
Age-sq.	.0000 (.0001)	.0000 (.0001)	.0000 (.0001)	.0000 (.0001)	–.0000 (.0001)
Household size	.0152 (.0166)	.0140 (.0161)	.0160 (.0165)	.0163 (.0164)	.0176 (.0163)
Social group affiliation (ethnicity and religion)					
Oromo	–.0197 (.0926)	–.1588*** (.0447)		–.0376 (.0911)	
Tigraian	.2936** (.1404)	–.0068 (.0614)		.2937** (.1398)	
Anuak	.0938 (.3103)	.2621*** (.0684)		.0337 (.2951)	
Protestant	–.0380 (.0673)	–.0347 (.0633)	–.0458 (.0666)		
Orthodox	.0262 (.0669)	.0850 (.0637)	.0320 (.0666)		
Muslim	.2860** (.1122)	.2064** (.0826)	.2833** (.1121)		
Location effects					
Bati	–.1897* (.1122)		–.2075** (.0829)	.0373 (.1291)	–.0167 (.0796)
Gog	.0664 (.2982)		.1468 (.0928)	.0879 (.3017)	.0968 (.0766)
Ibantu	–.2929*** (.0704)		–.3158*** (.0464)	–.3034*** (.0648)	-.3380*** (.0371)
Ofla	–.2761*** (.0666)		–.1098* (.0634)	–.2661*** (.0717)	–.0891 (.0658)
Sheko	–.2900*** (.0484)		–.3033*** (.0448)	–.2704*** (.0485)	-.2911*** (.0434)
Telalak	–.2015** (.0935)		–.2212** (.0862)	.0203 (.1033)	–.0244 (.0955)
Yaso	.1624 (.1089)		.1289 (.1042)	.1398 (.0995)	.0920 (.0931)
Number of observations	938	938	938	938	938
pseudo-R^2	.2018	.1484	.1978	.1936	.189
Log-likelihood	–488.4	–521.1	–49.9	–493.5	–496.2
LR χ^2	246.99	181.63	242.08	236.92	231.50
P-value	0.0000	0.0000	0.0000	0.0000	0.0000

Table 26. Continued

	(6)	(7)	(8)	(9)	(10)
Supply-side factors					
Number of water facilities in *kebele*	.0432*** (.0087)	.0455*** (.0087)	.0432*** (.0087)	.0428*** (.0087)	.0420*** (.0085)
Demand-side factors					
Household access to complementary assets and services					
Health extension for household	–.0330 (.0545)	–.0194 (.0550)		–.0362 (.0542)	–.0427 (.0529)
Health extension for woman in household			.0161 (.0586)		
Number of children and women	–.0089 (.0190)	–.0105 (.0190)	–.0088 (.0190)	–.0085 (.0190)	–.0090 (.0188)
Household wealth					
Assets		–.0002 (.0004)	–.0003 (.0004)	–.0003 (.0004)	–.0002 (.0004)
Assets per capita	–.0028 (.0021)				
Land	.0326 (.0741)	.0471 (.0726)	.0284 (.0745)	.0264 (.0751)	.0347 (.0722)
Improved housing	–.1488*** (.0417)	–.1269*** (.0422)	–.1475*** (.0418)	–.1517*** (.0415)	–.1497*** (.0408)
Human capital, vertical social capital, and information					
Number of high social contacts (excl. WC)	.0292*** (.0099)		.0285*** (.0098)	.0313*** (.0098)	.0301*** (.0098)
Social leadership		.0226 (.0435)			
Access to media	.0803* (.0418)	.0976** (.0417)	.0823** (.0418)	.0917** (.0411)	.0839** (.0414)
Education of head	.0103 (.0074)	.0130* (.0074)	.0102 (.0074)		.0094 (.0066)
Education of woman	.0050 (.0119)	.0010 (.0118)	.0045 (.0119)	.0116 (.0107)	
Other household characteristics					
Household demographics					
Gender of head	–.1314** (.0514)	–.1168** (.0509)	–.1473*** (.0514)	–.1205** (.0504)	–.1292** (.0502)
Age of head	.0012 (.0075)	.0026 (.0075)	.0004 (.0075)	.0003 (.0075)	–.0013 (.0072)
Age-sq.	.0000 (.0001)	–.0000 (.0001)	.0000 (.0001)	.0000 (.0001)	.0000 (.0001)
Household size	.0108 (.0167)	.0154 (.0166)	.0150 (.0165)	.0156 (.0166)	.0161 (.0164)
Social group affiliation (ethnicity and religion)					
Oromo	–.0227 (.0922)	–.0453 (.0908)	–.0216 (.0925)	–.0241 (.0924)	–.0218 (.0920)
Tigraian	.3023** (.1399)	.2936** (.1408)	.2914** (.1408)	.2981** (.1405)	.2392* (.1371)
Anuak	.0716 (.3073)	.0422 (.3002)	.0874 (.3094)	.1143 (.3113)	.0406 (.2948)
Protestant	–.0380 (.0672)	–.0336 (.0671)	–.0384 (.0673)	–.0339 (.0674)	–.0531 (.0658)
Orthodox	.0261 (.0669)	.0210 (.0665)	.0255 (.0668)	.0235 (.0667)	.0201 (.0658)
Muslim	.2855** (.1125)	.2678** (.1130)	.2795** (.1125)	.2751** (.1120)	.2664** (.1111)
Location effects					
Bati	–.1783 (.1160)	–.1751 (.1181)	–.1702 (.1185)	–.1798 (.1156)	–.1812 (.1133)
Gog	.0966 (.3055)	.1646 (.3095)	.1018 (.3037)	.0514 (.2931)	.1292 (.3025)
Ibantu	–.2786*** (.0754)	–.2849*** (.0741)	–.2775*** (.0758)	–.2828*** (.0741)	–.2883*** (.0703)
Ofla	–.2800*** (.0649)	–.2832*** (.0653)	–.2767*** (.0664)	–.274*** (.0680)	–.2482*** (.0728)
Sheko	–.2755*** (.0520)	–.2451*** (.0567)	–.2761*** (.0516)	–.2908*** (.0485)	–.2933*** (.0465)
Telalak	–.1794* (.1011)	–.1650 (.1052)	–.1808* (.0999)	–.2014** (.0939)	–.1980** (.0929)
Yaso	.1943* (.1106)	.1272 (.1075)	.1966* (.1083)	.1772 (.1085)	.1643 (.1071)
Number of observations	938	938	938	938	962
pseudo-R^2	.2030	.1947	.2015	.2002	.2005
Log-likelihood	–487.7	–492.8	–488.6	–489.4	–501.0
LR χ^2	248.44	238.35	246.58	245.02	251.23
p-value	0.0000	0.0000	0.0000	0.0000	0.0000

Source: Authors' compilation based on the EEPRI/IFPRI survey.
Note: Estimates of probit marginal effects. Standard errors are in parentheses. WC = water committee.
* $p < .1$; ** $p < .05$; *** $p < .01$.

Tables 27 and 28 display the results relating to the beneficiary status of selected components of the FSP. Table 27 considers the correlates of benefitting from the components combined, and Table 28 considers separately the two major components, access to DS and to PW transfers. In the latter, we examine how results may vary when accounting for the full sample, versus only the households in the food-insecure *weredas* (as was done in the benefit incidence analysis in the concentration curves of Figure 6).

In the case of standard public services—such as agricultural extension and water—there is an apparent supply-side factor to consider that may affect service use, but service use is still contingent upon individuals or households having the requisite complementary assets, services, or characteristics that would make use of the service feasible or attractive. In the case of a program such as the FSP, which is highly targeted and where uptake among households targeted/eligible for transfers is in nearly all cases attractive from the households' perspective, there is no apparent supply-side factor to be considered. Thus, the models in Tables 27 and 28 focus on demand-side factors and other household characteristics.

We first consider the key variables of interest in the benefit incidence analysis in Section 7 above: gender of the head and household wealth. In the regression analyses, controlling for other variables, FHHs have a greater probability of being included in the program than do MHHs. This overall result seems to be driven by the way the gender of the head is related to inclusion in the direct support program, where this relationship is statistically significant; the same is not true for the chances of receiving PW transfers. These results mirror those in the incidence analysis in Section 7. A further result that emerges robustly from Table 28 on the FSP is the strong positive relationship between endowment with vertical social capital and access to the program. Holding other factors constant, greater household size is also associated with greater probability of accessing FSP transfers.

In the models of the probability of being included in the FSP as a whole (for the selected components examined in this study), there is a consistent negative relationship between household physical assets and probability of inclusion. This pertains to household assets as captured in the incidence analysis; in contrast, however, having landholdings tends to be associated with a higher probability of accessing FSP transfers. These results mirror those on the correlates of access to extension, where asset-poorer, but landed, households tended to have higher chances of receiving agricultural advisory services. The results on the factors associated with public works and with direct support benefits provide tentative evidence that greater household wealth goes hand in hand with reduced chances of being included in the PW component. No such evidence can be discerned with respect to inclusion in the DS component.

Table 27. Participation in selected components of the Food Security Program combined

	(1)		(2)		(3)		(4)		(5)		(6)	
Demand-side factors												
Factors related to eligibility												
Number of working-age HH members	–.0306	(.0255)	–.0394	(.0250)	–.0323	(.0251)	–.0390	(.0247)	–.0334	(.0254)	–.0264	(.0254)
Household wealth												
Assets	–.0015**	(.0007)	–.0011*	(.0006)	–.0015**	(.0007)	–.0008	(.0006)			–.0015**	(.0006)
Assets per capita									–.0051*	(.0029)		
Land	.1575**	(.0790)	.0912	(.0586)	.1623**	(.0782)	.0827	(.0564)	.1514*	(.0789)	.1695**	(.0786)
Higher-quality housing	–.0427	(.0807)	–.0513	(.0793)	–.0495	(.0785)	.0014	(.0734)	–.0348	(.0807)	.0391	(.0766)
Human capital, vertical social capital, and information												
Number of high social contacts	.0435***	(.0153)	.0477***	(.0150)	.0440***	(.0151)	.0424***	(.0146)	.0430***	(.0153)		
HH in social leadership											–.0079	(.0692)
Access to media	.0683	(.0585)	.0529	(.0579)	.0504	(.0577)	.0547	(.0571)	.0625	(.0583)	.1123*	(.0574)
Education of head	.0007	(.0110)	–.0009	(.0107)	.0019	(.0109)	–.0012	(.0106)	.0009	(.0109)	.0045	(.0108)
Other household characteristics												
Household demographics												
Gender of head	–.1310**	(.0550)	–.1361**	(.0540)	–.1251**	(.0548)	–.1373**	(.0536)	–.1318**	(.0551)	–.0990*	(.0545)
Age of head	.0007	(.0088)	–.0004	(.0088)	–.0005	(.0087)	–.0011	(.0087)	.0010	(.0088)	.0045	(.0086)
Age of head-sq.	.0000	(.0001)	.0000	(.0001)	.0000	(.0001)	.0000	(.0001)	.0000	(.0001)	–.0000	(.0001)
Household size	.0363**	(.0146)	.0419***	(.0143)	.0365**	(.0146)	.0437***	(.0141)	.0279*	(.0152)	.0347**	(.0146)
Social group affiliation (ethnicity and religion)												
Oromo	.2736**	(.1273)			.1001	(.0679)			.2716**	(.1272)	.2765**	(.1271)
Tigraian	–.0132	(.0623)			–.0105	(.0620)			–.0125	(.0621)	–.0187	(.0620)
Afar	.3644***	(.1373)			.1833*	(.0993)			.3418**	(.1392)	.4105***	(.1297)
Orthodox	.9888	(2.5820)	.9724	(6.5540)					.9889	(2.5787)	.9929	(1.7296)
Muslim	.9754	(5.1068)	.9766	(5.5887)					.9755	(5.0807)	.9811	(4.0446)
Number of observations	543		543		547		547		543		543	
pseudo-R^2	.054		.045		.047		.040		.051		.043	
Log-likelihood	–355.46		–358.78		–36.75		–363.63		–356.38		–359.57	
LR χ^2	40.50		33.86		35.83		30.08		38.65		32.28	
p-value	0.0007		0.0013		0.0011		0.0015		0.0012		0.0092	

Source: Authors' compilation based on the EEPRI/IFPRI survey.

Note: Estimates of probit marginal effects. Standard errors are in parentheses. *Wereda* effects not included, sample design results in no variation in number of sample households that are beneficiaries. HH = household; FSP = Food Security Program.

* $p < .1$; ** $p < .05$; *** $p < .01$.

Table 28. Participation in direct support and public works components of the Food Security Program

	Direct support			Public works			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Demand-side factors							
Factors related to eligibility							
Number of working-age household members	–.0310 (.0497)	–.0078* (.0042)	–.0334** (.0166)	.0084 (.0207)	–.0003 (.0012)	.0055 (.0193)	.0103 (.0187)
Household wealth							
Assets	.0000 (.0003)	–.0001(.0001)	–.0000 (.0003)	–.0056 (.0056)	–.0005 (.0003)	–.0056 (.0075)	–.0058*** (.0010)
Land	.0439 (.0841)	.0101(.0086)	.0700 (.0486)	.0616 (.0823)	.0034 (.0039)	.0493 (.0852)	.0695 (.0521)
Higher-quality housing	.1275 (.1733)	.0236(.0156)	.1209* (.0729)	–.1204 (.1459)	–.0069 (.0056)	–.1193 (.1962)	–.1312*** (.0349)
Human capital, vertical social capital, and information							
Number of high social contacts	.0131 (.0222)	.0012(.0019)	.0141 (.0101)	.0385 (.0391)	.0011 (.0010)	.0347 (.0479)	.0396*** (.0113)
Access to media	.0248 (.0558)	.0064(.0090)	.0204 (.0418)	.0747 (.0824)	.0045 (.0045)	.0595 (.0875)	.0559 (.0460)
Education of head	–.0024 (.0087)	–.0003(.0016)	.0001 (.0081)	.0005 (.0073)	–.0002 (.0005)	.0003 (.0068)	.0020 (.0072)
Other household characteristics							
Household demographics							
Gender of head	–.1276 (.1738)	–.0313* (.0162)	–.1310*** (.0436)	–.0516 (.0667)	.0016 (.0026)	–.0416 (.0693)	–.0445 (.0457)
Age of head	–.0048 (.0091)	–.0001(.0011)	–.0043 (.0055)	.0123 (.0139)	.0013 (.0010)	.0117 (.0171)	.0104 (.0068)
Age of head-sq.	.0001 (.0001)	.0000(.0000)	.0001 (.0001)	–.0001 (.0002)	–.0000 (.0000)	–.0001 (.0002)	–.0001* (.0001)
Household size	.0081 (.0153)	.0008(.0019)	.0067 (.0093)	.0236 (.0255)	.0010 (.0010)	.0234 (.0331)	.0226** (.0110)
Social group affiliation (ethnicity and religion)							
Oromo	–.0205 (.0832)	.0032(.0126)		.4579* (.2672)	.0388 (.0258)		.1128 (.1695)
Tigraian	.0915 (.1378)	.0496* (.0275)		–.0079 (.0407)	.0074 (.0070)		.0458 (.1041)
Afar	.4941 (.3975)	.370*** (.1326)		–.1686 (.2019)	–.0084 (.0071)		–.2403*** (.0461)
Protestant	–.1188*** (.0295)	–.0338* (.0186)		.8469*** (.0310)	–.0075 (.0079)	.8639*** (.0323)	
Orthodox	–.9934(2.3312)	.0135(.0260)		.99998*** (.0102)	.1656** (.0695)	.999998*** (.0431)	
Muslim	–.9969(1.2712)	.0246(.0383)		.9997*** (.1268)	.2581** (.1297)	.9997*** (.1534)	
Location effects							
Bati			–.0059 (.0568)			.7539*** (.2574)	.1112 (.1739)
Ofla			.1127* (.0625)			.0049 (.0390)	–.0487 (.0870)
Telalak			.5656*** (.1175)				
Number of observations	547	1,105	547	547	1,105	547	547
pseudo-R^2	.2571	.3923	.2615	.2753	.3937	.2839	.2567
Log-likelihood	–193.3	–205.3	–192.1	–249.0	–293.7	–246.1	–255.4
LR χ^2	133.78	265.12	136.09	189.21	381.53	195.09	176.42
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Source: Authors' calculations.

Note: Estimates of probit marginal effects. Standard errors are in parentheses. Telalak is not included in public works models, as no sample households received PW transfers.

* $p < .1$; ** $p < .05$; *** $p < .01$.

10. SUMMARY AND DISCUSSION

This study examined the benefit incidence of public spending on, and access to, three important services and programs in Ethiopia: agricultural extension, drinking water supply, and the FSP. Broadly speaking, we examined the wealth incidence of agricultural extension services in four different ways. One is through concentration curves, which are similar to Lorenz curves in that they provide a visual illustration of the extent of equity in an indicator, but distinct from Lorenz curves in several important ways that make them suitable for examining the wealth or income incidence of public services. The analysis of the two main modes of extension access, as well as of all types of extension access taken together, suggests that the provision of agricultural extension services is relatively progressive: lower-wealth individuals receive agricultural extension services at a greater rate than better-endowed individuals. The concentration curves also show that there are differences in progressivity of different types of extension services, with advice provided through community meetings somewhat less progressive than advice through home visits by DAs.

A second type of analysis, the more discretized (that is, by quintile) analysis of the incidence of public investments in agricultural extension, reveals additional elements of incidence that do not emerge in the continuous analysis that concentration curves constitute. Overall incidence may be progressive, but there are departures from this conclusion when considering the behavior of incidence at the two ends of the wealth spectrum, specifically, through the BP ratios of the spending incidence shares of each quintile. Public spending benefit incidence actually increases from the poorest to the second poorest quintile, and again increases markedly—specifically, doubles—from the second highest to the highest quintile. In other words, the incidences for the least well endowed and for the highest endowed farmers cause the cross-quintile incidence to depart from depicting a consistently pro-poor trend.

A third analysis considers the correlates of agricultural extension, based on a framework of demand- and supply-side factors that may bear on the quality, quantity, and equity of public services. The regression analysis shows that once a range of factors, including location effects, are controlled for there is no statistically significant positive or negative correlation of wealth with access to extension services. However, when location effects are not controlled for, the negative relationship that is implied by the concentration curves, and that is partially implied by the public spending incidence analysis, reemerges. This suggests that the placement of extension services across different localities may be driving the wealth incidence, rather than features of how the poor and nonpoor access extension within a given locality.

A final type of analysis compares the average with the marginal incidence of agricultural extension. Whereas the former considers how on average different wealth groups benefit from the supply of the service, the latter estimates the differential incidence across wealth groups of an additional expansion of the service. We find that the largest benefits from a service expansion would accrue to the poorest individuals. However, the marginal benefits to the poorest are somewhat lower than their average benefits, while the marginal benefits of the third and fourth quintile are greater than their incidence on average. Thus, while service expansion would still come to the benefit of the less well off, the poor benefit less from this expansion than they do from supply on average.

The benefit incidence for selected components of the FSP has similarly been analyzed using various, but related, methods. Overall, the average incidence of participation in the program is pro-poor. Whether we consider the results from the quantile-based public spending incidence or the distributive features shown in the concentration curves, incidence is higher for households with lower endowments and vice versa. Unlike what was found in the case of agricultural extension, here this is true with regard to the whole wealth spectrum. The regression analysis of factors associated with access to the overall program conveys a relationship between wealth and access that is consistent with the incidence analysis (however, this only holds for wealth as measured in physical assets; land appears to be positively associated with access to the program).

We also consider the incidence of the two major components of the program reaching study households—namely, the food/cash-for-work program, referred to also as *public works (PW)*, and the free food and/or cash aid to households, referred to as *direct support (DS)*. Although the incidence of

participation in the public works component is pronouncedly progressive, no clear progressivity is discerned in the incidence of the DS component. In the analysis across all study *weredas*, although the poorest quintile has the highest incidence and the wealthiest quintile has the lowest, there is no decreasing-incidence trend across all quintiles. The concentration curve for participation in the DS component similarly offers a mixed picture.

In addition to examining the incidence of participation, this study also considered how the value of cash plus in-kind receipts from the program's transfers have reached the poorer and the less poor households. In analysis considering both beneficiaries and nonbeneficiaries (for whom receipts are naturally zero), the pattern of incidence of monetized benefits is quite similar to the incidence of participation in the program; overall, the incidence is progressive, with pronounced progressivity of PW transfers and nonprogressivity of DS transfers. In an alternative incidence analysis of receipts only among beneficiaries, we find that the highest-wealth quintile receives the greatest value of transfers. The lack of a pro-poor distribution of benefit values is once again driven by the way that DS transfer amounts are distributed among households, where the latter are in fact quite regressive among beneficiaries.

Both participation and value of transfer incidence are also examined for the subset of *weredas* that are food-insecure. The finding is consistent with a conclusion that households in those sample *weredas* that have been declared food-insecure by the program are generally lower wealth than households in the remaining *weredas*. After removing the latter, all concentration curves, whether for participation or receipts, depict a less progressive distribution. Finally, results from the marginal incidence analysis draw conclusions similar to those for agricultural extension: while the poor benefit not only on average but on the margin from an extension of the program, their gain from an expansion is less than their gain on average; in contrast, the higher quintiles' marginal incidence is greater than their average incidence.

Two main measures of access are used in assessing the benefit incidence of drinking water supply: physical access through proximity, which is likely to correlate with water quantity, and the extent of use of improved drinking water facilities, which proxies water quality. The results show that there do not seem to be any clear distinctions between lower- and higher-wealth households in terms of (the proxy for) drinking water quantity. However, there is a clear incidence trend of drinking water quality, favoring poorer households. We considered several variations in the measure of access to safe sources of water, including the use of a safe source as one's primary source versus the exclusive use of safe water sources, as well as the use in dry seasons, wet seasons, and both seasons. The conclusion is broadly similar for all variations: poorer households use improved water sources at a greater rate than better-off households. It should be said, however, that in the case of the more comprehensive measure of exclusive use of safe water, the incidence is less progressive, and the incidence of the highest-wealth quintile violates the overall trend. Also, in contrast to the marginal incidence findings for the other two programs, in the case of water services there is no distinct departure of marginal incidence from average incidence trends.

This study also examined the gender incidence of public sectors in the three programs of focus. For agricultural extension, it was possible to consider how men and women differentially benefited from the service. In the case of drinking water services, however, the gender dimension examined was the gender of the head of the household. From the supply side, water services are not delivered separately to men or women in the household; from the demand side, it is not the case that either men or women in the household consume (or do not consume) water from improved drinking sources. This does not mean that the quantity of water consumption is necessarily identical between a head and spouse in the household—as it is known to not necessarily be for food consumption, as several intrahousehold food consumption studies have shown. However, since the study did not consider the physical quantity of water consumed but rather assessed access to safe water infrastructure, it was deemed appropriate in this case to assess gender incidence by the gender of the household head. The same approach was used with respect to the FSP, since the program targets households for eligibility as beneficiaries rather than assessing eligibility and noneligibility of specific individuals within the household.

As was expected, our findings showed a substantial gender gap in access to extension. The female-to-male ratio of access to extension is approximately 0.53, suggesting that women receive extension services at about half the rate as men. This is capturing two dynamics—both a gender element

and a head-status element—as women are less likely to be household heads than men. The gender element can be isolated when, for example, looking at the gender gap of only household heads, which is 0.7. The "headship gap" just among women is also 0.69. The BP ratio of the public spending incidence of agricultural extension with respect to gender shows a similar picture: the BP odds ratio, which would be 1 for both men and women under perfectly equitable incidence, is 0.73 for women and 1.31 for men. This finding can be interpreted as showing that men receive 31 percent more of the benefits from public investments in agricultural extension than they would under perfect gender equity.

The overall gender incidence of the examined components of the FSP offers a more gender-equitable picture—though, as discussed above, it should be reemphasized that comparison across programs can be only tentative given the different dimensions of gender considered in extension versus the other two programs. The BP odds ratio of public spending on the components of the FSP under study is 0.95 for FHHs and 1.02 for MHHs. This finding suggests indeed practically equitable incidence. However, this overall result is the outcome of opposite incidence trends in the two main components studied: The BP odds ratio for FHHs and MHHs in the PW component favors the latter, at 0.64 and 1.14, respectively. In contrast, the ratios for the DS component are 2.77 and 0.29, respectively, an incidence strongly in favor of FHHs. Analysis of the magnitude of receipts from the program conveys a similar picture.

Interesting and not necessarily expected findings emerge from the gender incidence analysis for drinking water supply. FHHs travel longer distances to their main water source, but they select safe water sources at a greater rate than do MHHs. The latter (reverse from the common) gender gap in safe water access is quite pronounced in the case of use of safe sources as the primary source, and less pronounced but still present in the case of exclusive use of improved water sources. These results seem to partially be the "gender-mirror image" of the wealth incidence of water access, and the symmetry appears to simply be the consequence of FHH's also being poorer. The regression analysis suggests that one is not merely an outcome of the other; there is both a strong gender and a wealth effect (with improved housing being the wealth indicator) that is consistent with the incidence analysis.

In addition to the importance of these three types of public services in the Ethiopian context, as discussed in the introduction to this paper, it is also of interest to view the findings on incidence of these programs through the prism of their different characteristics. We will discuss four such characteristics: (1) targeted versus nontargeted services; (2) complementary assets, services, and resources needed to be able to access or fruitfully use the services; (3) the private or public good character of these services; and (4) pathways through which access to the services affects welfare.

First, what makes the FSP distinct in this group of services is that it is a targeted program, with defined eligibility criteria. The FSP's *Program Implementation Manual* details which type of households should receive it, albeit with some built-in flexibility for local (*kebele*)-level determination of beneficiaries. Agricultural extension services and improved drinking water supply (aside from their provision in the context of the FSP) are not formally targeted programs, although of course household and community characteristics may determine placement of these services.

Our findings on the benefit incidence of certain components of the FSP can, to some extent, be viewed in light of the features of their targeting. The PW component has a partial self-targeting aspect—only those with a low enough opportunity cost will select into the program to provide unskilled manual labor against a modest cash or in-kind wage—in addition to the administrative targeting of eligibility based on certain criteria. In contrast, the DS component lacks a self-targeting feature. This raises the question of whether the incidence patterns observed in this study point to relatively strong self-targeting mechanisms and relatively weaker implementation of administrative targeting procedures.

Having said that, it is important to highlight again that, although the key elements on the basis of which we conduct the benefit incidence analysis are likely to correlate with the criteria that the FSP administration chose for eligibility assessment, the basis for our analysis—household wealth and gender of household heads—is not the same as the FSP targeting criteria. Thus, the analysis should not be taken as a direct assessment of the effectiveness of the FSP's targeting (an early-stage assessment of PSNP targeting is given in Sharp, Brown, and Teshome 2006), but rather as an examination of how households

of different wealth groups and gender are reached with this service, as these are important questions in their own right.

As mentioned above, water services are in the category of untargeted programs. However, the results of the benefit incidence analysis above may point to the placement of water facilities by governments and NGOs closer to the poor. It is also possible that poorer households are just more prone to use safe water sources; however, this explanation is counterintuitive, as the poor may have less access to information regarding the benefits of safe water choices and also have fewer resources available to pay for safe water. With these two possibilities in mind, the results certainly point to the need for further research on the possible drivers of these incidence results.

Second, the services differ in terms of the extent to which complementary assets, services, and resources on the part of the user are required to be able to access the service, or to be able to benefit from it if accessed. Examples include access to complementary cooperative public services, in order to be able to access fertilizer or improved seeds, to which agricultural extension agents' advice would be linked. Complementary assets could also be private financial resources in order to be able to pay for the water use costs of improved facilities, or time resources that are used up especially when there is a trade-off between going to a nearby unimproved natural source or walking longer to reach a facility providing clean water. The findings in this study should be viewed in this light. For example, the public spending incidence of agricultural extension, while broadly pro-poor, is not so for the full-wealth spectrum. The "kinks" in the incidence trend should not be surprising, since the poorest of the poor may not have the complementary financial resources to purchase the inputs that the DA may advise them to use. The incidence results on water are particularly interesting and somewhat unexpected, since one may intuit that water fees (if required for the use of facilities) are more easily borne by better-off households. A reverse relationship with wealth indicators is identified also in the regression analysis, after controlling for location effects.

Third, although none of the services falls into either extremes of a pure private or public good, they differ with regard to their locus on the private-to-public-goods spectrum. This has some implications for how incidence results should be judged. The household transfers of the FSP can be thought of as more of a private than a public good. Thus, the key argument for its public provision would be to improve equity—and indeed, the main goal and targeting mechanism as described in the program's design is quite related to equity, namely, better equity in Ethiopian households' food security. Agricultural extension services have a more local public goods character than household transfers, in that their provision may directly benefit more than the individual or household receiving the advisory services, through diffusion of knowledge among farmers. Thus, the nature of its public provision—and its immediate (that is, ignoring such diffusion effects) incidence—can be driven and justified by efficiency concerns, in addition to any possible equity goals. Finally, drinking water supply has an even more pronounced (local) public goods character: its provision through the construction of water facilities will directly serve a community of households (subject to congestion effects), where this locally nonrivalrous feature of the service does not rely on the assumption of diffusion.

Finally, the pathways through which the services translate into improved welfare differ for each of the three services. Conceptually speaking, household food and cash transfers have direct welfare effects, by increasing food security and income. Agricultural extension services have indirect welfare effects, in that they improve agricultural productivity, which in turn improves food security and incomes. Access to improved water services has both indirect and direct welfare effects: The improved health outcomes from drinking safe water have intrinsic welfare implications, as good health can be considered an inherently desirable condition. But better health also increases labor productivity, which in turn has a positive impact on incomes. Although what is the actual impact of these public services is an empirical question, these conceptual effects—that is, the direct welfare effects of the FSP, indirect welfare effects of extension provision, and both direct and indirect welfare effects of a clean water supply—should be taken into account when normatively evaluating the incidence of these services.

REFERENCES

Abate, H. 2007. *Review of extension systems applied in Ethiopia with special emphasis to the Participatory Demonstration and Training Extension System*. Addis Ababa: Food and Agriculture Organisation.

Abate, T. 2009. *Local government discretion and accountability mechanisms in Ethiopia's agriculture extension*. Social Development Department Background Paper. Washington, D.C.: World Bank.

ACF (Action Contre la Faim). 2010. Water, sanitation and hygiene intervention for AWD and drought affected pastoral communities of Borena zone, Oromiya region. Project Document. Addis Ababa: Action Contre la Faim.

Adi, B. 2007. Determinants of agricultural and non-agricultural livelihood strategies in rural communities: Evidence from eastern Nigeria. *Journal of Developing Areas* 40 (2): 93-109.

Ainsworth, M., K. Beegle, and G. Koda. 2005. The impact of adult mortality and parental deaths on primary schooling in north-western Tanzania. Journal of Development Studies 41 (3): 412-439.

Ajwad, M. I., and Q. Wodon. 2007. Do local governments maximize access rates to public services across areas? A test based on marginal benefit incidence analysis. *Quarterly Review of Economics and Finance* 47: 242-260.

Alene, A. D, and R. M. Hassan. 2005. The efficiency of traditional and hybrid maize production in eastern Ethiopia: An extended efficiency decomposition approach. *Journal of African Economies* 15 (1): 91-116.

_____. 2008. Efficiency of food production under old and new technology: The case of farmers within and outside the Extension Package Program in Ethiopia. *Journal of Developing* Areas 41 (2*)*: 233-249.

Andersson, C., A. Mekonnen, and J. Stage. 2010.Impacts of the Productive Safety Net Program in Ethiopia on livestock and tree holdings of rural households. *Journal of Development Economics* 94 (1): 119-126.

Baiyegunhi, L., G. Fraser, and M. Darroch. 2010. Credit constraints and household welfare in the Eastern Cape Province, South Africa. *African Journal of Agricultural Research* 5 (16): 2243-2252.

Benin, S., A. Nin Pratt, S. Fan, C. Breisinger, T. Mogues, J. Thurlow, and X. Diao. 2008. *Growth and poverty reduction impacts of public investments in agriculture and rural areas: Assessment techniques, tools, and guide for practitioners*. Regional Strategic Analysis and Knowledge Support System (ReSAKSS) Paper 7. Washington, D.C.: International Food Policy Research Institute.

Bernard, T., E. Gabre-Madhin, and A. S. Taffesse. 2007. *Smallholders' commercialization through cooperatives: A diagnostic for Ethiopia*. Discussion Paper 722. Washington, D.C.: International Food Policy Research Institute.

Bigman, D., S. Dercon, D. Guillaume, and M. Lambotte. 2000. Community targetting for poverty reduction in Burkina Faso. *World Bank Economic Review* 14 (1): 167-193.

Bigsten, A., and A. Shimeles. 2008. Poverty transition and persistence in Ethiopia: 1994-2004. *World Development* 36 (9): 1559-1584.

Boisson, S., W. P. Schmidt, T. Berhanu, H. Gezahegn, and T. Clasen. 2009. Randomised controlled trial in rural Ethiopia to assess a portable water treatment device. *Environmental Science and Technology* 43 (15): 5934-5939.

Brandolini, A., S. Magri, and T. M. Smeeding. 2010. Asset-based measurement of poverty. *Journal of Policy Analysis and Management* 29 (2): 267-284.

Brown, T., and A. Teshome. 2007. *Implementing policies for chronic poverty in Ethiopia*. Background Paper. London: Chronic Poverty Research Centre.

Buchy, M., and F. Basaznew. 2005. Gender-blind organizations deliver gender-biased services: The case of Awasa Bureau of Agriculture in southern Ethiopia. *Gender, Technology and Development* 9(2): 235-251.

Carter, M. R., and C. Barrett. 2006. The economics of poverty traps and persistent poverty: An asset-based approach. *Journal of Development Studies* 42 (2): 178-199.

Castro-Leal, F. 1999. *The impact of public health spending on poverty and inequality in South Africa*. Informal Discussion Paper Series 19333.Washington, D.C.: World Bank.

Castro-Leal, F., J. Dayton, L. Demery, and K. Mehra. 1999. Public social spending in Africa: Do the poor benefit? *World Bank Research Observer* 14 (1): 49-72.

_____. 2000. *Public spending on health care in Africa: Do the poor benefit?* Bulletin of the World Health Organisation 78 (1): 66-74.

Croppenstedt, A., and C. Muller. 2000. The impact of farmers' health and nutritional status on their productivity and efficiency: Evidence from Ethiopia. *Economic Development and Cultural Change* 48 (3): 475-502.

Croppenstedt, A., M. Demeke, and M. M. Meschi. 2003. Technology adoption in the presence of constraints: The case of fertilizer demand in Ethiopia. *Review of Development Economics* 7 (1): 58-70.

Davis, K., B. Swanson, and D. Amudavi. 2009. *Review and recommendations for strengthening the agricultural extension system in Ethiopia*. Washington, D.C.: International Food Policy Research Institute.

Demery, L. 2003. *Analysing the incidence of public spending*. In The impact of economic policies on poverty and income distribution: Evaluation of techniques and tools, ed. F. Bourguignon and L. A. Pereira da Silva. New York**:** Oxford University Press.

Devereux, S., R. Sabates-Wheeler, M. Tefera, and H. Taye. 2006. *Ethiopia's Productive Safety Net Program (PSNP): Trends in PSNP transfers within targetted households*. Sussex, U.K.: Institute of Development Studies, and Addis Ababa: Indak International.

Devereux, S., R. Sabates-Wheeler, M. Tefera, T. Brown, and A. Teshome. 2008. *Ethiopia's Productive Safety Net Program (PSNP): 2008 assessment report*. Brighton: Institute of Development Studie.

Dom, C. 2009. *Macro level policies, Programs and models entering rural communities: 2003-2009*. Long Term Perspectives on Development Impacts in Rural Ethiopia: Stage 1 Paper. Oxford: Mokoro Limited.

DSA (Development Studies Associates). *2006. Study on improving the efficiency of input market*. Final Report, Vol. 1. Addis Ababa: Ministry of Agriculture and Rural Development.

EEA/EEPRI (Ethiopian Economic Association/Ethiopian Economic Policy Research Institute). 2006. Evaluation of the Ethiopian Agricultural Extension with particular emphasis on the Participatory Demonstration and Training Extension System (PADETES). Addis Ababa: EEA/EEPRI.

Efa, N., M. Gorman, and J. Phelan. 2005. Implications of an extension package approach for farmers' indigenous knowledge: The Maize Extension Package in south-western Ethiopia. *Journal of International Agricultural and Extension Education* 12 (3): 67-78.

FAO/WFP (Food and Agriculture Organization of the United Nations/World Food Program). 2006. Special report— FAO/WFP Crop and Food Supply Assessment Mission to Ethiopia. Rome, February 24.

FSCB (Food Security Coordination Bureau). 2004. The new Coalition for Food Security in Ethiopia— Monitoring and evaluation plan October 2004-September 2009. Addis Ababa: Food Security Coordination Bureau.

Gebremedhin, B., D. Hoekstra, and A. Tegegne. 2006. *Commercialization of Ethiopian agriculture: Extension service from input supplier to knowledge broker and facilitator*. Improving Productivity and Market Success Working Paper 1. International Livestock Research Institute.

Gibson, M. A., and R. Mace. 2002. Labour-saving technology and fertility increase in rural Africa. *Current Anthropology* 43 (4): 631-677.

Gilligan, D. O., J. Hoddinott, and A. Seyoum. 2009. The impact of Ethiopia's Productive Safety Net Program and its linkages. *Journal of Development Studies* 45 (10): 1684-1706.

Gilligan, D. O., J. Hoddinott, N. R. Kumar, and A. Seyoum. 2009a. Can social protection work in Africa? Evidence on the impact of Ethiopia's Productive Safety Net Program on food security, assets, and incentives (August 18, 2009). Available at SSRN: http://ssrn.com/abstract=1457172.

_____. 2009b. Do public works crowd out private transactions? Evidence on labour market participation and credit in Ethiopia. Working Paper. Washington, D.C.: International Food Policy Research Institute.

Gilligan D. O., J. Hoddinott, A. Seyoum, S. Dereje, N. Tefera, and Y. Yohannes. 2007. *Ethiopia Food Security Program: Report on 2006 baseline survey*. Washington, D.C.: International Food Policy Research Institute.

Glick, P., and M. Razakamanantsoa. 2002. *The distribution of social services in Madagascar, 1993-99*. Cornell University Food and Nutrition Policy Program Working Paper 128.

_____. 2006. The Distribution of Education and Health Services in Madagascar over the 1990s: Increasing Progressivity in an Era of Low Growth. Journal of African Economies 15(3): 399–433.

Glick, P., R. Saha, and S. D. Younger. 2004. *Integrating Gender into Benefit Incidence and Demand Analysis*. Cornell Food and Nutrition Policy Program Working Paper 167. Ithaca, NY: Cornell University.

Hoddinott, J., D. O. Gilligan, and A. Seyoum. 2010. The impact of Ethiopia's Productive Safety Net Program on schooling and child labour. *In Social protection for Africa's children*, ed. S. Handa, S. Devereux, and D. Webb. London: Routledge.

Howard, G., and J. Bartram. 2003. *Domestic water quantity, service level and health*. Geneva, Switzerland: World Health Organization.

IFPRI/EEPRI (International Food Policy Research Institute/Ethiopian Economic Policy Research Institute). 2008. Making rural services work for the poor and women: Local public investments in agricultural and water services in Ethiopia—Guideline for field supervisors of the Household Survey. Mimeo.

IFPRI-WB (International Food Policy Research Institute-World Bank). 2010. Gender and governance in rural services: Insights from India, Ghana and Ethiopia. Washington, D.C.: World Bank.

Jalan, J., and M. Ravallion. 1999a. Are the poor less well insured? Evidence of vulnerability to income risk in rural China. *Journal of Development Economics* 58 (1): 61-81.

_____. 1999b. Benefit incidence, public spending reforms, and the timing of program capture. World Bank Economic Review 13 (2): 257-273.

_____. 2001. Behavioural responses to risk in rural China. Journal of Development Economics 66: 23-49.

_____. 2002. Geographic poverty traps? A micro model of consumption growth in rural China. Journal of Applied Econometrics 17 (4): 329-346.

_____. 2003. Estimating the benefit incidence of an antipoverty Program by propensity-score matching. Journal of Business and Economic Statistics 21 (1): 19-30.

Lanjouw, P., M. Pradhan, F. Saadah, H. Sayed, and R. Sparrow. 2001. *Poverty, education and health in Indonesia: Who benefits from public spending*? Policy Research Working Paper 2739. Washington, D.C.: World Bank.

Lemma, M. 2007. *The agricultural knowledge system in Tigray, Ethiopia. Recent history and actual effectiveness*. Weikersheim, Germany: Margraf Publishers.

Liverpool-Tasie, S. O., and A. Winter-Nelson. 2010. *Asset versus consumption poverty and poverty dynamics in rural Ethiopia*. Agricultural Economics, forthcoming.

Lybbert, T. J., C. B. Barrett, S. Desta, and D. L. Coppock. 2004. Stochastic wealth dynamics and risk management among a poor population. *Economic Journal* 114: 750-777.

MoARD (Ministry of Agriculture and Rural Development). 2004. Productive Safety Net Program—Program implementation manual. Addis Ababa: Ministry of Agriculture and Rural Development.

_____. 2009a. DAs and FTC data at national level. Addis Ababa: Ministry of Agriculture and Rural Development.

_____. 2009b. Food Security Program 2010-2015. Addis Ababa: Ministry of Agriculture and Rural Development.

MoFED (Ministry of Finance and Economic Development). 2005. Ethiopia building on progress: A Plan for Accelerated and Sustained Development to End Poverty (PASDEP). Addis Ababa: Ministry of Finance and Economic Development

MoPED (Ministry of Planning and Economic Development). 1993**.** Agricultural Development-Led Industrialisation (ADLI). Addis Ababa: Ministry of Planning and Economic Development.

Mukherjee, S., and T. Benson. 2003. The determinants of poverty in Malawi, 1998. *World Development* 31 (2): 339-358.

Nigussa, F., and I. Mberengwa. 2009. Challenges of Productive Safety Net Program implementation at local level: The case of Kuyu Wereda, North Shewa Zone, Oromia region, Ethiopia. *Journal of Sustainable Development in Africa* 11 (1): 248-267.

Pradhan, M., and L. B. Rawlings. 2002. The impact and targeting of social infrastructure investments: Lessons from the Nicaraguan Social Fund. *World Bank Economic Review* 16 (2): 275-285.

Reynolds, T. W., J. Farley, and C. Huber. (2009). Investing in human and natural capital: An alternative paradigm for sustainable development in Awassa, Ethiopia. *Ecological Economics* 69 (11): 2140-2150.

Sabates-Wheeler, R., and S. Devereux. 2010. Cash transfers and high food prices: Explaining outcomes on Ethiopia's Productive Safety Net Program. *Food Policy* 35 (4): 274-285.

Segers, K., J. Dessein, J. Nyssen, M. Haile, and J. Deckers. 2008. Developers and farmers intertwining interventions: The case of rainwater harvesting and food-for-work in Degua Temben, Tigray, Ethiopia. *International Journal of Agricultural Sustainability* 6 (3): 173-182.

Sharp, K., T. Brown, and A. Teshome. 2006. *Targetting Ethiopia's Productive Safety Net Program (PSNP)*. London: Overseas Development Institute and The IDL Group.

Slater, R., S. Ashley, M. Tefera, M. Buta, and D. Esubalew. 2006. *PSNP policy, Program and institutional linkages*. London: Overseas Development Institute, The IDL Group, and Indak International.

Spencer, B. G., and I. Winkowska. 1991. *A multivariate analysis of mortality in rural Africa*. African Studies Review 34 (2): 81-96.

Spielman, D. J., D. Byerlee, D. Alemu, and D. Kelemework. 2010. Policies to promote cereal intensification in Ethiopia: The search for appropriate public and private roles. *Food Policy* 35 (3): 185-194.

Sumarto, S., A. Suryahadi, and L. Pritchett. 2003. Safety nets or safety ropes? Dynamic benefit incidence of two crisis programss in Indonesia. *World Development* 31 (7): 1257-1277.

Tekle-Haimanota, R., Z. Melakua, H. Kloosb, C. Reimannc, W. Fantayea, L. Zerihuna and K. Bjorvatn. The geographic distribution of fluoride in surface and groundwater in Ethiopia with an emphasis on the Rift Valley. *Science of The Total Environment* 367(1): 182-190.

van de Walle, D. 1994. The distribution of subsidies through public health services in Indonesia, 1978-87. *World Bank Economic Review* 8 (2): 279-309.

WDI (World Development Indicators). 2010. World Bank. <http://data.worldbank.org/data-catalog/world-development-indicators/wdi-2010>. Accessed 2010.

Wegener, A., G. Yaron, and B. Alemu. 2007. *Wereda/City Government Baseline and Benchmarking Survey (WCBS II 2007) phase I survey manual*. Ethiopia: Institutional and Governance Review.

WHO (World Health Organization). 2006. Mortality country fact sheet 2006.

WHO/UNICEF. 2010. Joint Monitoring Program (JMP) for Water Supply and Sanitation. <http://www.wssinfo.org/>.

Wokodala, J., N. Magidu, and M. Guloba. 2010. *Public spending in the water sub-sector in Uganda: Evidence from benefit incidence analysis*. Kampala: Economic Policy Research Centre.

World Bank. 2004. Productive Safety Net Project in support of the first phase of the Productive Safety Net Program. Report 29767-ET. Washington, D.C.

_____. 2006. Productive Safety Net APL II Project in support of the second phase of the Productive Safety Net Program. Report 37224-ET. Washington, D.C.

_____. 2008. Ethiopia: Agriculture and rural development public expenditure review 1997/98-2005/06. Report 41902-ET. Washington, D.C.

_____. 2009a. European Union Food Crisis Rapid Response Facility for the Ethiopia Productive Safety Net Project (APL II). Report 48403-ET. Washington, D.C.

_____. 2009b. Productive Safety Net APL III Project in support of the third phase of the Productive Safety Net Program. Report 48633-ET. Washington, D.C.

WSP (Water and Sanitation Program). 2004. Ethiopia Water Supply Sector resource flows assessment. Sector Finance Working Paper 10.Washington: D.C.: Water and Sanitation Program.

Yamano, T., and T. S. Jayne. 2005. Working-age adult mortality and primary school attendance in rural Kenya. *Economic Development and Cultural Change* 53 (3): 619-653.

Younger, S. D. 2003. Benefits on the margin: Observations on marginal benefit incidence. *World Bank Economic Review* 17 (1): 89-106.

RECENT IFPRI DISCUSSION PAPERS

For earlier discussion papers, please go to http://www.ifpri.org/publications/results/taxonomy%3A468. All discussion papers can be downloaded free of charge.

1056. *The gender implications of large-scale land deals*. Julia Behrman, Ruth Meinzen-Dick, and Agnes Quisumbing, 2011.

1055. *Impact of global change on large river basins: Example of the Yellow River basin*. Nicola Cenacchi, Zongxue Xu, Wang Yu, Claudia Ringler, and Tingju Zhu, 2011.

1054. *Strategic grain reserves in Ethiopia: Institutional design and operational performance*. Shahidur Rashid and Solomon Lemma, 2011.

1053. *Foreign aid to agriculture: Review of facts and analysis*. Nurul Islam, 2011.

1052. *Impacts of global change on the Nile Basin: Options for hydropolitical reform in Egypt and Ethiopia*. Anja Kristina Martens, 2011.

1051. *Estimating the role of spatial varietal diversity on crop productivity within an abatement framework: The case of banana in Uganda*. Norman Kwikiriza, Enid Katungi, and Daniela Horna, 2011.

1050. *Strengthening innovation capacity of Nigerian agricultural research organizations*. Catherine Ragasa, Suresh Babu, Aliyu Sabi Abdullahi, and Baba Yusuf Abubakar, 2010.

1049. *Asset dynamics in northern Nigeria*. Andrew Dillon and Esteban J. Quiñones, 2010.

1048. *Review of agricultural extension in India: Are farmers' information needs being met?* Claire J. Glendenning, Suresh Babu, and Kwadwo Asenso-Okyere, 2010.

1047. R*ecent findings on trade and inequality.* Ann Harrison, John McLaren, and Margaret S. McMillan, 2010.

1046. *An analysis of institutions and policy processes for selected antipoverty interventions in Bangladesh*. Akhter U. Ahmed and Mubina Khondkar, 2010.

1045. *Clustering as an organizational response to capital market inefficiency: Evidence from handloom enterprises in Ethiopia*. Merima Ali, Jack Peerlings, and Xiaobo Zhang, 2010.

1044. *Access to improved water source and satisfaction with services: Evidence from rural Ethiopia*. Degnet Abebaw, Fanaye Tadesse, and Tewodaj Mogues, 2010.

1043. *Valuing the environment in developing countries: Modeling the impact of distrust in public authorities' ability to deliver public services on the citizens' willingness to pay for improved environmental quality*. Ekin Birol and Sukanya Das, 2010.

1042. *Climate change impacts on food security in Sub-Saharan Africa: Insights from comprehensive climate change scenarios*. Claudia Ringler, Tingju Zhu, Ximing Cai, Jawoo Koo, and Dingbao Wang, 2010.

1041. I*n-depth assessment of the public agricultural extension system of Ethiopia and recommendations for improvement.* Kristin Davis, Burton Swanson, David Amudavi, Daniel Ayalew Mekonnen, Aaron Flohrs, Jens Riese, Chloe Lamb, and Elias Zerfu, 2010.

1040. *Do geese migrate domestically? Evidence from the Chinese textile and apparel industry*. Ruan Jianqing and Xiaobo Zhang, 2010.

1039. *In pursuit of votes: The capture of the allocation of local public goods by the central state in Ghana*. Leah Horowitz and Nethra Palaniswamy, 2010.

1038. *An econometric investigation of impacts of sustainable land management practices on soil carbon and yield risk: A potential for climate change mitigation*. Edward Kato, Ephraim Nkonya, Frank Place, and Majaliwa Mwanjalolo, 2010.

1037. *Effects of inclusive public agricultural extension service: Results from a policy reform experiment in Western China.* Ruifa Hu, Yaqing Cai, Kevin Z. Chen, Yongwei Cui, and Jikun Huang, 2010.

1036. *Food as the basis for development and security: A strategy for Yemen*. Clemens Breisinger, Olivier Ecker, Jose Funes, and Bingxin Yu, 2010.

1035. *Purpose and potential for commodity exchanges in African economies*. Shahidur Rashid, Alex Winter-Nelson, and Philip Garcia, 2010.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

www.ifpri.org

IFPRI HEADQUARTERS

2033 K Street, NW
Washington, DC 20006-1002 USA
Tel.: +1-202-862-5600
Fax: +1-202-467-4439
Email: ifpri@cgiar.org

IFPRI ADDIS ABABA

P. O. Box 5689
Addis Ababa, Ethiopia
Tel.: + 251 (0) 11-617-2500
Fax: + 251 (0) 11-646-2927
Email: ifpri-addisababa@cgiar.org

IFPRI NEW DELHI

CG Block, NASC Complex, PUSA
New Delhi 110-012 India
Tel.: 91 11 2584-6565
Fax: 91 11 2584-8008 / 2584-6572
Email: ifpri-newdelhi@cgiar.org

IFPRI ACCRA

CSIR Campus
Airport Residential Area, Accra
PMB CT 112 Cantonments,
Accra, Ghana
Tel.: +233 (0) 21 780-716
Fax: +233 (0) 21 784-752