



Disability and Household Welfare in Ghana: Costs and Correlates

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Abstract

Persons with disabilities face substantial barriers that impede their integration and participation in social and economic activities. Households with disabled members may be vulnerable to poverty due to the extra cost of living with a disability. However, there exists a knowledge gap in the magnitude of the extra cost of disabilities in sub Saharan Africa. Using data from a nationally representative household survey, this paper estimates the extra cost of disabilities in Ghana. The paper further examines the welfare effects of households with persons with disabilities. Based on the standard of living approach, we estimate the extra cost to households with a person with disability to be 26% of annual household consumption expenditures. Adjusting for the extra cost of poverty, the incidence of poverty increases from 38.5 to 52.9% amongst households with a disabled member. Our findings suggest the need to improve the efficiency of support programs to persons with disabilities to mitigate the extra costs of disabilities and reduce their vulnerability to poverty. In addition, enhancing access to economic opportunities and social services for persons with disabilities will be imperative to improve their quality of life and dignity.

Keywords Disability · Household welfare · Poverty · Standard of living · Ghana

The last two decades have seen increased global commitments towards reducing poverty in all its forms as well as promoting inclusive, accessible and sustainable development. These commitments have been expressed in two sets of global development objectives—the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs). The period of the MDGs (2000–2015) saw significant reductions in the prevalence of poverty, with global extreme poverty declining from 47 in 1990 to 14% in 2015 (UN 2015). Despite the successes of the MDGs, the incidence of poverty remains endemic among some subpopulations. One such group is persons with disabilities (PWDs) and households that include a person with disability

(PWD) (Mitra et al. 2013; Trani et al. 2015; Mont and Nyugen 2011; Hoogeveen 2005; Palmer et al. 2019). Though accounting for about 10% of the world's population (WHO and World Bank 2011), the MDGs excluded targets and indicators directed at the needs and conditions of PWDs. The succeeding SDGs (2016–2030) on the other hand include seven targets and eleven indicators specific to PWDs, covering improving standards of living and access to basic and essential social services, as well as improving the integration, participation and empowerment of PWDs (UN 2019).

The strong correlation between disability and poverty implies that understanding the economic and social conditions of PWDs is essential to global poverty reduction efforts (Groce et al. 2011). Poverty may increase the likelihood of the onset of disability through poor health and environmental conditions that increase the likelihood of injuries (Mitra 2006). Persons with disabilities may also have limited schooling (Filmer 2008; Mizunoya et al. 2018) and employment opportunities (Mitra 2008; Mitra and Sambamoorthi 2008; Mizunoya and Mitra 2013; Mont and Nyugen 2011; Trani and Loeb 2012), resulting in lower productivity and earnings potential, compared to non-disabled persons (Mitra and Sambamoorthi 2009). Mont and Nyugen (2013) also show that parental disability reduces school enrolment of children. PWDs face significant discrimination and

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stigmatization that inhibit their integration and participation in social and political activities. In addition, Sen (2004) argues that disabilities impose a *conversion handicap* on individuals and households; a situation in which PWDs or households that include PWDs may require additional resources in order to attain the same standard of living, compared to persons without disabilities or households without a disabled member. The *conversion handicap*, therefore, refers to the extra cost of disability (Mitra et al. 2013).

There is a growing body of literature that has measured the extra cost of disability (Mont and Nyugen 2011; Palmer et al. 2019; Cullinan et al. 2011; Cullinan et al. 2013; Loyalka et al. 2014) as well as the effect of disability on welfare and poverty (Mitra et al. 2013; Hoogeveen 2005; Trani et al. 2015; Quintana and Malo 2012). These studies focused predominantly on middle- and high-income countries (Mitra et al. 2017), with significant gaps of evidence from low-income countries due to the absence of quality data on disability. Mont and Nyugen (2011) and Palmer et al. (2019) estimate the extra cost of disability for Vietnam and Cambodia respectively. In Africa, Hoogeveen (2005) examines the welfare of households headed by PWDs in Uganda, whilst Trani and Loeb (2012) and Loeb et al. (2008) examine the relationship between disability and access to social services in Zambia and South Africa respectively. Other studies such as Trani et al. (2015) and Mitra et al. (2013) have assessed the effect of disability on poverty within a multidimensional context using comparable data for selected countries. The evidence from these studies have been heterogenous, owing to variations in methodologies and definitions of disability. Overall, these studies show that the extra costs of disabilities are significant in both developed and developing countries. Considering the extra cost of disabilities, Mont and Nyugen (2011) and Palmer et al. (2019) find substantial increases in poverty headcount among households that include a PWD in Vietnam and Cambodia.

Measuring the extra cost of disability to households is important for policy purposes. First, the magnitude of the extra cost of disability to households has important implications for the measurement of poverty among households that include a member with disability. In low resource settings where formal government transfers and benefits to PWDs are limited, understanding the welfare implications of living with disabilities is essential for the design of policies that are targeted at improving the living standards of PWDs. Using recent data from a nationally representative household survey, this paper estimates the cost of disability to households that include a member with disability. The study measures the cost associated with disability by the age of the PWD and examines rural–urban differences in the extra cost of disability to households. Based on the extra cost of disability, the paper proceeds to estimate disability-adjusted poverty headcount among households with a member with disability. Finally, the paper assesses the welfare effects

of disability in Ghana by examining the relationship between disability and household welfare at the extensive and intensive margins.

The remaining sections of the paper are organized as follows: the next section presents an overview of disability and poverty in the context of Ghana. This is followed by a description of the data employed for the estimations and a section on the methodology adopted for the study. We then proceed to present descriptive statistics of the sample used for the analysis, followed by a discussion of the results of the estimations. The paper concludes with policy recommendations based on the findings from the analysis.

Disability and Poverty in the Context of Ghana

Disability in Ghana is considered both a human rights concern and a developmental issue due to its strong links to exclusion, discrimination, and poverty. To this end, several legislative and policy initiatives have been undertaken, aimed at improving the standard of living of PWDs, as well as to promote the integration and participation of PWDs in social, political and economic activities. Despite these initiatives, PWDs face substantial systemic, institutional and sociocultural barriers that result in low self-esteem, limited mobility, lack of access to education and healthcare, and limited employment opportunities (Kuyini et al. 2011).

The 1992 Constitution of Ghana guarantees the rights of all citizens, including PWDs. The Constitution specifically imposes an obligation on Parliament to enact legislation to protect and promote the rights of PWDs. A National Disability Policy was adopted in 2000 to provide equal opportunities for PWDs to participate in the national development process and improve the quality of life of PWDs. However, the policy lacked appropriate legal backing to ensure that the objectives of the policy were fully implemented.

In 2006, the Parliament of Ghana passed the Persons with Disability Act, 2006 (Act 715). The Act protects the rights of PWDs and makes specific provisions to guarantee the right to education, healthcare, employment and movement of PWDs. The Act also established the National Council on Persons with Disability. The Council is charged with the responsibility of proposing and evolving policies and strategies to enable PWDs to integrate and fully participate in national development. In addition to Act 715, other legislations such as the Children's Act, 1998 (Act 560) and Labour Act, 2003 (Act 651) include provisions targeting the needs of PWDs. Ghana is also a signatory to several international treaties such as the United Nations Convention on the Rights of Persons with Disabilities and the African Charter

on Human and People's Rights that seek to safeguard the rights of PWDs.

Several interventions and programs have been implemented to support and improve the wellbeing and dignity of PWDs. For example, the National Community Based Rehabilitation Program (CBR) was initiated in 1992 to provide home-based rehabilitation services delivered by household members of PWDs with the support of locally trained supervisors. However, the program was severely challenged with the withdrawal of donor funding (Kuyini et al. 2011). Also, under the Livelihood Empowerment Against Poverty (LEAP), a cash transfer program, PWDs who are living in poverty receive unconditional transfers through a local pay point. In addition to the cash transfer, LEAP beneficiaries receive complimentary services such as agricultural support. The National Health Insurance Scheme on the other hand provides free access to healthcare to PWDs.

To support the provision of services to improve the welfare of PWDs, the Government of Ghana established the Disability Fund in 2005. Three percent of the District Assemblies Common Fund (DACF), an intergovernmental transfer from central government to local government units, received by each assembly, is allocated to the Fund to assist in the activities of PWDs within the district. The purpose of the Fund is to reduce poverty among persons with disability, especially those within the informal sector, and enhance their social image through dignified labor. The Fund aims to support the income generating activities of PWDs as a means of economic empowerment, assist PWDs to access technical aids and assistive devices as well as build the capacity of organizations of persons of disabilities within the district to enable them to advocate and assert the rights of PWDs. Over a decade since its inception, the Fund faces several challenges including delays in the disbursement of funds to beneficiaries and the lack of awareness among PWDs on the existence of such a fund.

Ghana was one of a few sub Saharan African countries to achieve the MDG target to halve extreme poverty. The proportion of persons living below a poverty line of 1.25USD a day declined from 51.7% in 1991 to 24% in 2013. Recent data from the seventh round of the Ghana Living Standards Survey (GLSS 7) estimate that poverty headcount declined marginally to 23.4% in 2017. Despite the progress towards poverty reduction, some segments of the population remain vulnerable and exposed to high levels of poverty. One such vulnerable group is households with PWDs. Table 1 presents poverty headcount ratios for households with and without a person with disability based on data from GLSS 7. Poverty headcount rates are higher among households with PWDs compared to households without PWDs. Nationally, 38.5% of households with PWDs are below the national poverty line compared to 22.6% of households without a person with disability. In rural areas, we find a high incidence of poverty

Table 1 Poverty headcount ratios by disability status and other characteristics

Variables	All Households	Without PWD	With PWD
All households	23.41 (0.9058)	22.57 (0.9037)	38.54 (2.7805)
Male-headed households	25.75 (1.0452)	24.93 (1.0460)	40.99 (3.4138)
Female-headed households	17.58 (1.0254)	16.66 (1.0264)	33.01 (4.3460)
Urban households	7.76 (0.7672)	7.27 (0.7247)	19.05 (4.5119)
Rural households	39.52 (1.5628)	38.69 (1.5610)	51.50 (3.3072)

Estimates are adjusted for survey design

Standard errors in parentheses

among households with a person with disability (51.5%) compared to 38.7% among households without PWDs. The high incidence of poverty within households with PWDs requires that poverty reduction strategies pay special attention to the needs and wellbeing of households with PWDs to ensure inclusive and equitable poverty reduction.

Data

The study drew on data from the Ghana Living Standards Survey (GLSS). The GLSS is a nationally representative cross-sectional survey that provides information on consumption expenditures on both food and non-food items and assets owned by households interviewed during the survey. The survey also collects information on the demographic characteristics, education, employment, health status and healthcare utilization of each member of the survey households. The survey follows a two-stage sampling design. At the first stage, sampling units or clusters are selected to constitute the enumeration areas. At the second stage, households in the selected enumeration areas are listed and a pre-determined number of households are randomly selected from each cluster to constitute the sample size of the survey. The survey is conducted by the Ghana Statistical Service.

To date, seven rounds of the GLSS have been conducted (1987, 1988, 1991/1992, 1998/1999, 2005/2006, 2012/2013 and 2016/2017). The first five rounds of the survey did not include questions on the disability status of respondents. The definitions of disability appear to differ between the sixth and seventh rounds of the survey. Whilst disability is defined by GLSS 7 as the consequences of lifetime impairment, the definition of disability in the sixth round of the survey is unclear. To this end, the present study employed data from

the seventh round of the survey conducted in 2016/17. GLSS 7 interviewed 14,009 households in 1000 enumeration areas. The analysis included households with non-missing entries for the variables selected. The sample for the estimation was therefore restricted to 13,208 households.

Methodology

Estimating the Cost of Disability

Several approaches have been employed by previous studies to quantify the economic cost of disability (Mitra et al. 2017; Wilkinson-Meyers et al. 2010). These approaches include direct cost estimations such as the direct survey and expenditure diary approaches. The direct survey approach involves directly asking PWDs or their caregivers the additional cost incurred on specific items because of the disability. The expenditure diary approach on the other hand involves analyzing the differences in the expenditures between a sample of households with a member with disability and a corresponding sample of households without a disabled member. Cullinan et al. (2013), Mitra et al. (2017) and Wilkinson-Meyers et al. (2010) provide detailed summaries of the approaches for estimating the extra cost of disability.

In this paper, we followed a growing body of recent studies that have employed an alternative method, the standard of living approach, an indirect framework to measure the extra cost of disability. The standard of living approach was proposed by Zaidi and Burchardt (2005) and applied by Palmer et al. (2019), Mont and Nyugen (2011), Loyalka et al. (2014), and Cullinan et al. (2013) to measure the additional costs of disability in both developed and developing countries. Unlike the direct survey and expenditure diary approaches, the standard of living technique does not require disability specific expenditure measurements (Palmer et al. 2019).

The standard of living method to estimating the cost of disability is based on the concept of compensating variation and assumes that households with a member with disability divert a portion of household resources to cover disability-related costs. These disability-related costs lead to reduced standard of living for households with a member with disability compared to households without a disabled member. Thus, at a given level of household resources, if households that include a member with disability have lower standards of living compared to households without a disabled member, then the difference in the standards of living between the two groups of households is attributed to the presence of a disabled member in the household. This implies that households with a member with disability will require more resources to attain the same standard of living as households without a disabled member.

The standard of living approach estimates the cost of disability through a parametric regression technique that

models the standard of living (S_{ij}) of household i in community j as a linear function of household resources (Y_{ij}), an indicator of the presence of a PWD in the household (D_{ij}), a vector of household and head of household characteristics that affect household standard of living (X_{ij}) and unobserved heterogeneity (ε_{ij}). The model is written as

$$S_{ij} = \beta Y_{ij} + \delta D_{ij} + \theta X_{ij} + \varepsilon_{ij} \quad (1)$$

The standard of living of the household (S_{ij}) is measured as a composite index of household ownership of durable assets, housing characteristics, source of drinking water and sanitation facilities. Filmer and Pritchett (2001) demonstrates that an index based on assets ownership, access to basic services and living conditions is a valid proxy for household wealth and long-run economic status. The standard of living index is constructed using a principal component analysis (PCA). Previous studies such as Palmer et al. (2019), Mont and Nyugen (2011), Loyalka et al. (2014), Cullinan et al. (2013) and Zaidi and Burchardt (2005) have applied the household asset index to proxy standard of living. The standard of living index we constructed is based on household ownership of assets such as furniture, sewing machine, cooking stove (kerosene, gas and electric), refrigerator, freezer, air condition, electric fan, radio, cassette player, CD player, home theatre, VC and VCD player, desktop and laptop computers, digital camera, satellite dish, washing machine, television, video camera, electric iron, bicycle, motorcycle, car, microwave oven, blender, vacuum cleaner, rice cooker, toaster, electric kettle, water heater, mobile phone, tablet, generator and bed. Additional variables included in the index are type of toilet facilities, main construction materials of walls, roofs, and main source of lighting and cooking fuels in the household. The distribution of the standard of living index is presented in “Appendix”.

In developing countries such as Ghana with a large informal sector and predominant subsistence rural agriculture, household incomes are difficult to measure and reported household incomes may be underestimated (Deaton, 1997). As such, we followed Palmer et al. (2019) and Mont and Nyugen (2011) who proxy household resources with household consumption expenditures. For this study, we defined household resources as real total household consumption expenditures. As such, Y_{ij} in Eq. (1) is the natural logarithm of real total annual household consumption expenditures. Household expenditures cover food, housing, and other non-food items, and include imputations for consumption from sources other than market purchases.¹

¹ For a detailed description of the computation of household consumption expenditures, see Ghana Statistical Service (2018) “Poverty Trends in Ghana, 2005–2017”. Ghana Statistical Service, Accra. Available at: https://statsghana.gov.gh/gssmain/fileUpload/pressrelease/Poverty%20Profile%20Report_2005%20-%202017.pdf

The Ghana Living Standards Survey 7 defines a PWD as an individual restricted in the performance of specific tasks or activities due to the loss of function of any part of the body as a result of impairment or malformation. Such loss of function or impairment may be physical, cognitive, intellectual, mental, sensory, developmental or some combinations of these. The survey considered a person to be disabled if despite the use of assistive devices or supportive environments, the limitations or restriction cannot be improved. The survey asked the disability status of each household members on six functional dimensions—sight (blind or partially blind), hearing, speech, physical, intellectual (learning), and emotional or behavioral disorders. Disability was measured as a lifetime loss of function or impairment. We defined the indicator variable (D_{ij}) to capture whether the household includes a member living with any form of disability. Specifically,

$D_{ij} = 1$ if household includes a member with disability
 $D_{ij} = 0$ Otherwise.

Following previous studies such as Glewwe (1991), Mont and Nyugen (2011) and Agyire-Tettey et al. (2018), the vector of household characteristics (X_{ij}) that influence the standard of living include the sex, age (and age squared), years of completed schooling, marital status and employment status of the household head. Additional household-level characteristics include the ratio of children (0–15 years), ratio of elderly (66 or more years), household size (and size squared), residence type and administrative region of household.

To derive the extra cost of disability (C), we solve for Y_{ij} in Eq. (1).

$$Y_{ij} = \left(\frac{1}{\beta}\right)S_{ij} - \left(\frac{\delta}{\beta}\right)D_{ij} - \left(\frac{\theta}{\beta}\right)X_{ij} - \left(\frac{1}{\beta}\right)\varepsilon_{ij} \tag{2}$$

The extra cost of living with a disability is measured as the difference in natural log of household expenditures between households with a PWD and those without a PWD, equal to

$$C = (Y_{ij}|D_{ij} = 1, X_{ij}) - (Y_{ij}|D_{ij} = 0, X_{ij}) = -\frac{\delta}{\beta} \tag{3}$$

Thus, the extra percentage cost of disability is approximately equal to

$$C = \frac{dY_{ij}}{dD_{ij}} = -\frac{\delta}{\beta} \tag{4}$$

In monetary terms, Palmer et al. (2019) estimates the extra cost to a household that include a PWD as

$$Y \left[\exp\left(-\frac{\delta}{\beta}D\right) - 1 \right] \tag{5}$$

where Y is real annual total household consumption expenditures.

Equation (5) is simply the percentage difference in consumption expenditures between households with a PWD and those without a PWD multiplied by total household expenditures.

We examined differences in the cost of disability by economic status of the household member with disability. We therefore estimated three mutually exclusive alternative specifications of Eq. (1) by redefining the indicator variable D_{ij} based on the age of the member with disability. The first specification defined the presence of a child (0–15 years) with disability in the household. The second specification identified the presence of a household member within the economic active years (16–65 years) with disability. The final specification estimated the cost of the presence of an elderly household member with disability. We estimated Eq. (1) for the various specification of disability status of the household using the full sample of households and separately for the rural and urban subsamples respectively. The standard errors of all estimation were clustered at the primary sampling unit to account for correlation between households within a primary sampling unit.

A common problem in estimating the Eq. (1) using cross-sectional data is the possibility that disability, consumption expenditures and standard of living may be endogenously determined (Cullinan et al. 2011). Our estimation strategy examined the differences in standard of living between households with disabled members and households without a disabled member, rather than estimating causal effect of disability on standard of living. Thus, the estimate of the extra cost did not reflect the change in household standard of living as a result of having a member with a disability.

The Relationship Between Disability and Household Welfare

The second objective of this paper sought to examine the relationship between the presence of a PWD on household welfare. Household welfare was proxied by per adult equivalent annual household consumption expenditures. To this end, we estimated a regression model of the form

$$\ln y_{ij} = \alpha + \beta D_{ij} + \delta X_{ij} + \varepsilon_{ij} \tag{6}$$

The dependent variable in Eq. (6), $\ln y_{ij}$ is the natural logarithm of per adult equivalent annual household consumption expenditures. D_{ij} defines the disability status of the household. Two alternative measures of the disability status of the

household are defined. First, D_{ij} is an indicator variable of the presence of a PWD in the household. In the second specification, D_{ij} measures the number of household members with disability. The first specification estimates the *extensive disability margin*. It estimates the relationship between the presence of PWD and household welfare. The second specification estimates the *intensive disability margin* and measures the effect of an additional PWD on household welfare. X_{ij} is a vector of household and head of household characteristics that influence household consumption expenditures as discussed in “[Estimating the Cost of Disability](#)” section. The standard errors of Eq. (6) are clustered at the primary sampling unit level.

The District Fund is administered by Metropolitan, Municipal and District Assemblies (MMDAs). As such there may exist district-level heterogeneity in the efficiency and effectiveness of the disbursement and utilization of the Disability Fund that affect both household consumption expenditures and disability status. In addition, there may exist local-level characteristics that affect both disability and household welfare. Mont and Nyugen (2011, 2018) found district level heterogeneity in the relationship between disability and poverty in Vietnam. As such, we included district-level fixed effects in Eq. (4). The district-level fixed effects model is thus specified as

$$\ln y_{ijd} = \alpha + \beta D_{ijd} + \delta X_{ijd} + \tau_d + \varepsilon_{ijd} \quad (7)$$

where y_{ijd} is the natural logarithm of per adult equivalent annual consumption expenditures of household i in primary sampling unit j in district d . D_{ijd} and X_{ijd} are an indicator variable of the disability status and characteristics of the household that affect the consumption expenditures of the household respectively. However, unlike Eq. (4), X_{ijd} does not include the administrative region of residence of the household. τ_d measures the district-level fixed effects. Districts are sub administrative units of regions. As such, district effects are collinear with regions. The inclusion of the district fixed effects enables us to estimate a small area fixed effects specification. ε_{ijd} is a random error term.

Summary Statistics

Based on the definition of disability applied in the GLSS 7 questionnaire, we estimated that about 5.3% of households included a member with disability. In terms of the age of PWDs, 58.1% were within the economically active age category (16–65 years) whilst 26.1% were elderly members of the household (66 or more years). Children with disabilities accounted for 15.4% of the PWDs. We found that the prevalence of disability was higher among males. Fifty-four percent of the PWDs were males, compared to 45.9% of females. The average number of persons with disabilities in households that included a member with a disability was

1.12. Finally, we found that 45.1% of the PWDs were physically impaired whilst 23.8% impaired in sight. Speech and hearing impairment accounted for 24.6% of the PWDs whilst intellectual and emotional impairment accounted for 15.5% of the PWDs.

In Table 2, we present summary statistics of the variables used in the empirical analysis. The table also shows estimates of the differences in the variables between households with and without members with disabilities. The results showed significant difference in the asset index. Total household expenditures and per adult equivalent consumption expenditures differed between households with and without a disabled member. Specifically, households without a disabled member had higher asset index scores and consumption expenditures compared to households with disabled members.

In addition, heads of households with disabled members were older and had completed fewer years of schooling compared to heads of households without disabled members. In terms of employment, we found that the proportion of heads of households with a disabled member in agricultural self-employment and unemployed or inactive was higher than heads of households without a disabled member. Households with disabled members were larger and included more elderly members compared to those without disabled members. Finally, a larger proportion of households without disabled members were in urban areas compared to households with disabled members.

Results

In this section, we present and discuss the results of the analysis. The section has three parts. The first part focuses on the cost of disability whilst the second part presents and discusses the correlates between household disability status and welfare. Finally, we discuss the potential mechanisms through which disability and poverty are correlated.

The Extra Cost of Disability

Table 3 presents a summary of the results from the estimation of the Standard of Living regression model in Eq. (1). The results are presented for the various categories of disability statuses of households and estimated for the full sample of households and urban and rural subsamples respectively. The findings showed a positive relationship between real total household consumption expenditures and the standard of living, and a negative relationship between the presence of a PWD and standard of living, holding other determinants of standard of living constant. These results are consistent with the findings of previous studies that have estimated the extra cost of disability using the standard of

Table 2 Summary statistics of sample

Variables	All Households	Without PWD	With PWD	Difference
Standard of living index	0.6502 (0.0654)	0.7048 (0.0653)	− 0.3266 (0.1840)	1.0314*** (0.1769)
Ln. Real total consumption expenditures	9.3126 (0.0173)	9.3227 (0.0174)	9.1318 (0.0422)	0.1909*** (0.0405)
Ln. Per adult equivalent expenditures	8.0327 (0.0185)	8.0512 (0.0185)	7.7014 (0.0488)	0.3497*** (0.0466)
Household head characteristics				
Age in years	46.95 (0.2102)	46.50 (0.2172)	55.00 (0.7409)	−8.50*** (0.7806)
Years of completed schooling	7.0782 (0.0945)	7.1480 (0.0955)	5.8288 (0.3018)	1.3192*** (0.3033)
Male	0.7133 (0.0062)	0.7146 (0.0063)	0.6891 (0.0238)	0.0255 (0.0238)
Marital status				
Never married	0.0596 (0.0025)	0.0617 (0.0026)	0.0216 (0.0049)	0.0401*** (0.0056)
Currently married	0.7510 (0.0059)	0.7532 (0.0061)	0.7114 (0.0212)	0.0418** (0.0216)
Previously married	0.1895 (0.0052)	0.1851 (0.0053)	0.2670 (0.0208)	− 0.0818*** (0.0210)
Employment status				
Unemployed/inactive	0.1648 (0.0062)	0.1581 (0.0063)	0.2844 (0.0250)	− 0.1263*** (0.0256)
Wage employee	0.2525 (0.0080)	0.2590 (0.0083)	0.1365 (0.0179)	0.1225*** (0.0196)
Non-agricultural self employed	0.2500 (0.0072)	0.2530 (0.0075)	0.1965 (0.0225)	0.0564** (0.0234)
Agricultural self employed	0.3328 (0.0112)	0.3300 (0.0114)	0.3826 (0.0259)	− 0.0527** (0.0263)
Household characteristics				
Ratio of children (0–15 years)	0.4037 (0.0032)	0.4053 (0.0033)	0.3745 (0.0118)	0.0308*** (0.0121)
Ratio of elderly (66 or more years)	0.0421 (0.0014)	0.0387 (0.0013)	0.1035 (0.0073)	− 0.0648*** (0.0074)
Household size	5.6035 (0.0707)	5.5616 (0.0719)	6.3534 (0.2171)	− 0.7919*** (0.2198)
Urban	0.5112 (0.0116)	0.5168 (0.0119)	0.4106 (0.0310)	0.1062*** (0.0317)

Estimates are adjusted for survey design

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

living approach such as Palmer et al. (2019), Mont and Nyugen (2011), Loyalka et al. (2014) and Cullinan et al. (2013).

Panel 1 of Table 3 shows the results for the presence of a PWD in the household. The results show that the presence of a member with disability reduced the index of household standard of living by 0.235 compared to similar household without a disabled member. Based on the coefficients estimated from Eq. 1, the extra cost of disability

to the household, defined in terms of the additional household consumption expenditures required by households with disabled members to achieve the standard of living as similar households without a disabled member, was estimated based on Eq. 4. At the national level, the extra cost to a household with a PWD was estimated to be 0.255. This implies that households with a PWD required 26 percent (95% CI 14.1–36.9) of additional household consumption

Table 3 The cost of living with disability in Ghana

Variables	1			2			3			4		
	Any member			Child (0–15 years)			Active member (16–65 years)			Elderly member (66+ years)		
	All	Urban	Rural	All	Urban	Rural	All	Urban	Rural	All	Urban	Rural
Ln household expenditures	0.923*** (0.035)	1.111*** (0.048)	0.820*** (0.046)	0.928*** (0.035)	1.117*** (0.048)	0.823*** (0.046)	0.924*** (0.035)	1.112*** (0.048)	0.821*** (0.046)	0.927*** (0.035)	1.117*** (0.048)	0.823*** (0.046)
Member living with disability	-0.235*** (0.053)	-0.266*** (0.087)	-0.217*** (0.063)	-0.243*** (0.111)	-0.290 (0.230)	-0.220* (0.118)	-0.227*** (0.067)	-0.252** (0.113)	-0.210*** (0.079)	-0.187*** (0.093)	-0.106 (0.164)	-0.214** (0.108)
Constant	-7.365*** (0.340)	-9.348*** (0.430)	-6.661*** (0.520)	-7.406*** (0.341)	-9.406*** (0.431)	-6.703*** (0.521)	-7.380*** (0.341)	-9.362*** (0.430)	-6.682*** (0.519)	-7.392*** (0.341)	-9.398*** (0.432)	-6.686*** (0.522)
Other controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cost of disability $\left(\frac{\delta}{\beta}\right)$	0.255*** (0.058)	0.239*** (0.079)	0.264*** (0.079)	0.262** (0.120)	0.260 (0.207)	0.267* (0.143)	0.246*** (0.073)	0.227** (0.102)	0.256*** (0.098)	0.202** (0.100)	0.095 (0.147)	0.260** (0.132)
Observations	13,208	5,749	7,459	13,208	5,749	7,459	13,208	5,749	7,459	13,208	5,749	7,459
R-squared	0.697	0.516	0.533	0.696	0.515	0.532	0.696	0.515	0.532	0.696	0.515	0.532

Robust standard errors in parentheses clustered at primary sampling unit level

***p < 0.01, **p < 0.05, *p < 0.10

expenditures annually to achieve a comparable standard of living as similar households without a PWD. For comparison, these estimated costs of disability were higher than the 19% for Cambodia (Palmer et al. 2019) and 11.5% for Vietnam (Mont and Nyugen 2011). Loyalka et al. (2014) on the other hand estimated the extra cost of disability in China between 8 to 43%. Cullinan et al. (2011) estimate the extra cost of disability to range between 30 to 33% depending on severity in Ireland. In monetary terms, the average extra cost to a household with a PWD was estimated to be 3661.79 Ghana Cedis (95% CI 3325.25–3998.33) in real total household consumption expenditures per annum. The extra cost of disability was equivalent to 857.36 USD (CI 778.56–936.16).²

We proceeded to examine the extra cost of disability between rural and urban areas. We found that the presence of a PWD reduced household standard of living by 0.266 in urban areas, whilst the presence of a PWD in a rural household reduced standard of living by 0.217. In urban areas, we estimated the annual extra cost of disability to be about 24% (95% CI 8.5–39.4) of real total household consumption expenditures. In rural areas, however, households with a PWD required about 26% (95% CI 11.0–41.9) additional resources in terms of annual real total consumption expenditures in order to attain the same standard of living compared to a similar household without a PWD. Despite the rural percentage being only modestly higher than the urban percentage, translating these into monetary differences revealed a notable gap. In monetary terms, the average extra cost of disability to an urban household with a PWD per annum was 4462.17 Ghana Cedis (CI 3833.51–5090.84) (USD 1044.76; 95% CI 897.57–1191.96) compared to 3030.47 Ghana Cedis (95% CI 2733.49–3327.44) (USD 709.55; 95% CI 640.01–779.08) for rural households with a PWD. The findings are consistent with Palmer et al. (2019) who found that the extra cost of living with disability is higher in urban areas than rural areas in Cambodia. The higher monetary cost of disability in urban areas may reflect the differences in access to services to assist PWDs between urban and rural areas (Loyalka et al. 2014). Loyalka et al. (2014) further explained that the lower prevalence of informal family and community-based support systems in urban areas may account for the higher cost of disabilities to urban households as such households may have to purchase these services.

Panels 2, 3 and 4 present the results of the three alternative categories of the presence of a disabled member of the household based on the age of the PWD, estimated for the national sample as well as the urban and rural subsamples respectively. The results showed that households that include PWDs were associated with lower standards of living, irrespective

² Conversion is based on official Bank of Ghana exchange rate of GHS 4.271 to 1 USD at the end of January, 2017.

Table 4 Estimates of disability adjusted poverty headcount (%)

Variables	Unadjusted Headcount	Adjusted Headcount
All households	38.54 (2.7805)	52.87 (2.7235)
Male-headed households	40.99 (3.4138)	53.82 (3.2296)
Female-headed households	33.01 (4.3460)	40.72 (4.5538)
Urban households	19.05 (4.5119)	33.64 (4.7334)
Rural households	51.50 (3.3072)	66.48 (3.1157)

Estimates are adjusted for survey design

Standard errors in parentheses

of the age of the member with disability. The presence of a child with disability reduced household standard of living by 0.243. The negative relationship between the presence of a child with disability on the household standard of living was marginally significant for rural areas. We also found that the presence of an economically active member with disability reduced the standard of living of the household by 0.246 for the full sample of households. The presence of an economically active member with disability reduced household standard of living in urban households by 0.252 compared to 0.210 in rural households. Further, we found that the effect of an elderly member with disability reduced household standard of living by 0.187 for the national sample and 0.214 for the subsample of rural households. From the results, the extra cost of disability was highest for a child with disability.

We followed Mont and Nyugen (2011) and Palmer et al. (2019) to estimate the poverty headcount for households with a member with disability by adjusting for extra cost of disability to the household. The disability adjusted poverty headcount was estimated by deducting the extra cost of disability from the total household consumption expenditure and then making a comparison to official poverty thresholds. Based on a national poverty line of 1760.855 Ghana Cedis adult equivalent annual consumption expenditures, we recalculated poverty headcount rates for households with disabled members. The disability adjusted poverty headcount rates are presented in Table 4. Taking into account the extra cost of disability, we found that poverty headcount for households with PWDs increased by 14.4 percentage points from 38.5% in the unadjusted poverty headcount to 52.9% in the disability-adjusted poverty headcount. For urban households that included a PWD, the poverty headcount increased from the unadjusted rate of 19.1% to an adjusted rate of 33.6%. In rural households on the other hand, the poverty headcount among households with a PWD increased from the unadjusted rate of 51.5% to the adjusted rate of 66.5%.

These results suggest that a substantial proportion of households with PWDs may be vulnerable to poverty as a result of the additional cost of disability. Our estimates of the disability-adjusted poverty headcount rates are higher than Mont and Nyugen (2011) who report a 5.2 percentage point increase in poverty headcount among households with a PWD in Vietnam. Our findings are however comparable to Palmer et al. (2019) who find a 18.4 percentage point increase in poverty headcount of households with a PWD after accounting for the extra cost of disability in Cambodia.

Relationship Between Disability and Household Welfare

In this section, we present and discuss the results of the OLS and district fixed effects regression of the relationship between disability and household welfare specified in Eqs. (6) and (7) respectively. The results are presented in Table 5. The results confirmed previous studies such as Hoo-geveen (2005) and Mont and Nyugen (2011) who reported lower consumption expenditures for households that included a member with disability in Uganda and Vietnam respectively. In addition, we found significant relationships between other household and head of household characteristics and household welfare measured by per adult equivalent consumption expenditures similar to Agyire-Tettey et al. (2018). The full results are included in “Appendix” of the paper.

The result of the OLS specification in Column 1 showed the presence of a PWD in a household reduced the adult equivalent consumption expenditures of the household by approximately 13.7% compared to households that did not include a PWD. In Column 2, we examine the relationship between the number of household members with disability and adult equivalent consumption expenditures. We found that an increase in the number of disabled household members by one, reduced adult equivalent consumption expenditures by 11.8%, holding all other variables constant.

We found significant effects of district-level heterogeneity in the relationship between disability and household welfare. The results of the district-level fixed effects are presented in Columns (3) and (4). The results showed that taking district fixed effects into account, the relationship between disability and household welfare reduced across the various definitions of the disability status of households. This suggests that failure to account for the district-level heterogeneity may bias upwards the relationship between disability and household welfare. Specifically, we found that households with a disabled member had 11.6% lower adult equivalent consumption expenditures compared to households that did not include a disabled member. Equally, an increase in the number of household members with disability reduced adult equivalent consumption expenditures by 9.0%.

Table 5 Regressions of disability and household consumption expenditures

Variables	OLS		District FE	
	(1)	(2)	(3)	(4)
Any PWD	– 0.147*** (0.0281)		– 0.123*** (0.0221)	
No. of PWDs		– 0.118*** (0.0307)		– 0.090*** (0.0195)
Constant	8.6374*** (0.0628)	8.6377*** (0.0628)	8.2254*** (0.0474)	8.2248*** (0.0474)
Other controls	Yes	Yes	Yes	Yes
District FE	No	No	Yes	Yes
Region FE	Yes	Yes	No	No
Observations	13,382	13,382	13,382	13,382
R-squared	0.5642	0.5640	0.3519	0.3514

Standard errors in parentheses

Standard errors for OLS regressions are robust and clustered at primary sampling unit

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Potential Mechanisms Through Which Disability Affects Household Welfare

There are several potential pathways through which disability and household welfare may be correlated. Poverty may increase the risk of the onset of disabilities (Mitra et al. 2013). The relationship between poverty and disability may be vicious and reinforcing. Children with disabilities may have limited access to schooling opportunities and consequently lower human capital accumulation (Mizunoya et al. 2018; Lamichhane and Kawakatsu, 2015; El Saadani and Metwally 2019). In support of this, Filmer (2008) found lower school enrolment rates among PWDs in developing countries. Mont and Nyugen (2013) showed that parental disability reduced the probability of school enrolment for children. Such limited access to educational opportunities and human capital accumulation may result in lower productivity, earnings and employment opportunities in adulthood (Mitra et al. 2013; Mitra and Sambamoorthi, 2009). Again, children with disabilities may require adjustments to parental labor force participation and employment (Porterfield, 2002) in order to provide caregiving services within

the household. Zhu (2016) and Kvist et al. (2013), for example, found negative effects of child disability on maternal employment.

For persons with onset of disability in adulthood, the loss of function and impairment may prevent employment or limit the amount and nature of work that can be done. Mont and Nyugen (2011) found that disability reduced the probability of employment in Vietnam. Trani and Loeb (2012) confirmed the negative relationship between disability and the likelihood of employment in Afghanistan and Zambia whilst Mitra (2008) reported a decline in the labor force participation and employment of PWDs in South Africa. The reduced labor force participation and employment of parents or the PWD may affect household income, especially in situations where there are no disability benefits to compensate for reduced labor market activity due to a disability. In such circumstances, households with PWDs may be left vulnerable to poverty and may suffer welfare losses.

Further, disability may increase households' vulnerability to poverty through the additional expenditures incurred by the individual or household for the provision of essential services such as healthcare, assistive device, transportation and personal care. Such additional expenditures constrain household expenditures on goods and services that improve household welfare as well as household's ability to invest in income generating activities. Mitra et al. (2013) found that households with a disabled member had higher health expenditures compared to households without a disabled member. Trani et al. (2011) reported a disability gap in access to healthcare in Sierra Leone, with persons with severe disabilities being less likely to have access to healthcare. Mitra et al. (2009) found that PWDs had higher health expenditures than their counterparts without disabilities. Also, there exists significant stigmatization and discrimination against PWDs, resulting in their limited participation in economic, social and political activities (Yeo and Moore 2003; Groce et al. 2011). Thus, there exist substantial systemic, institutional, cultural and environmental barriers that perpetuate poverty among PWDs and their households.

It should also be noted that there exists the potential for reverse causation between poverty and disability status. First, poverty may lead to poor health and nutrition as well as lack of access to public health interventions that may increase the potential for the onset of disability (Mitra et al. 2013; Groce et al. 2011). Maulik and Damstadt (2007) found

evidence that malnutrition may lead to disability in childhood in developing countries. Second, poverty may result in poor household living conditions such as lack of sanitation and safe drinking water, exposure to indoor air pollution from biomass cooking fuels and inability to access public health interventions such as immunization that exposes children to illnesses and diseases that may result in disabilities. Third, poor households are also more likely to reside in communities that may be prone to violence, thus increasing the probability of being disabled as a result of violence (Yeo and Moore 2003). Also, poor people with limited educational attainment and skills development may be employed in hazardous and unsafe environments that increase the likelihood of disabilities through injury. However, we are unable to account for the possible reverse causation between disability and welfare in Ghana due to data limitations.

Conclusion and Policy Recommendations

Using data from GLSS 7, this paper measures the extra cost of disability and investigates the welfare implications of living with disabilities in Ghana. The paper employs the standard of living approach to measure the extra cost of disabilities and estimate both OLS and district-level fixed effects regressions to assess the effect of disability on household welfare. The paper has three main findings. First, the paper shows that the extra cost of disability to households in Ghana is non-trivial and estimated to be about 26% of annual total household consumption expenditures. Second, considering the extra cost of disability, the paper finds that poverty headcount among households with a person with disability increases significantly. Finally, the paper establishes a negative relationship between disability and household welfare in Ghana. Collectively, our findings suggest that the extra cost of disability has severe financial and welfare consequences for households and increases household vulnerability to poverty.

Our estimates of the extra cost of disability must be taken with caution. First, the extra cost of disability may be downward biased as the estimates do not include the opportunity costs of foregone earnings and the cost of

caregiving. Often times, PWDs are cared for by other household members. As a result, the participation of such carers in income generating activities may be limited, thus affecting household economic resources and increasing household vulnerability to poverty. Also, measurement errors of disability status, asset ownership and expenditures may lead to biased estimates of the cost of disability. Disability status used in this paper is self-reported and not medically diagnosed, as such the severity of the disability may be unreliable. In addition, respondents with intellectual disabilities may not disclose their disability due to the social stigma attached to intellectual disability in Ghana. Thus, it is likely our estimate of the cost of disability will not include some households with persons with intellectual disabilities. Finally, household expenditures include imputed values of home-produced goods. In most rural areas with informal markets, imputed values of home-produced goods may not reflect the true market values of the goods. As such, household expenditures may be underestimated and lead to lower estimated costs of disabilities. The standard of living index used in this paper is based on household assets ownership. However, the index may not accurately reflect household standard of living given the assets owned by households may differ in value and quality. Finally, the estimates of the cost of disabilities does not include the cost of household labour towards caring for the disability.

From the findings some policy recommendations may be made. First, it is important to collect better data on disability and indicators of household wellbeing in Ghana. Such data may be longitudinal in nature to enable the analysis of the dynamic relationship between disability and household welfare. Second, national poverty estimates that fail to account for the extra cost of disability to households with a PWD may fail to estimate the incidence and intensity of poverty among such vulnerable and marginalized groups. Third, there may be the need to improve the efficiency of support programs to PWDs and their households in order to mitigate the extra cost incurred by such households and reduce their vulnerability to poverty. It may also be suggested to improve access to economic opportunities and social services to PWDs to improve

their quality of life and dignity. Equally, programs may be put in place to create an enabling environment to help eliminate the stigma and discrimination faced by PWDs. Existing public education programs may also be expanded and intensified to create a safe and secured environment for persons with disability. Finally, there is the need for further studies to identify the channels through which disabilities affect household welfare as well as better understand the source of the disability-related expenditures incurred by households. It is equally important to understand the coping strategies adopted by households with a person with disability to mitigate the extra cost of disability in order to design effective policies to reduce the social and economic consequences of disabilities in Ghana.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interests.

Informed Consent Informed consent was obtained from all available participants included in the study.

Research Involving Human Participants and/or Animals This article does not contain any studies with human participants or animals performed by any of the authors.

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Appendix

See Fig. 1, Tables 6 and 7.

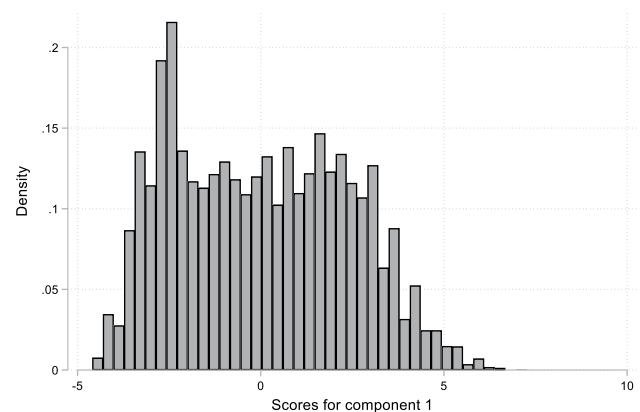


Fig. 1 Distribution of standard of living index

Table 6 The cost of living with disability in Ghana

Variables	I			II			III			IV		
	Any member			Child (0–15 years)			Active member (16–65 years)			Elderly member (66+ years)		
	All	Urban	Rural	All	Urban	Rural	All	Urban	Rural	All	Urban	Rural
Ln household expenditures	0.923*** (0.035)	1.111*** (0.048)	0.820*** (0.046)	0.928*** (0.035)	1.117*** (0.048)	0.823*** (0.046)	0.924*** (0.035)	1.112*** (0.048)	0.821*** (0.046)	0.927*** (0.035)	1.117*** (0.048)	0.823*** (0.046)
Any PLWD	-0.235*** (0.053)	-0.266*** (0.087)	-0.217*** (0.063)	-0.243*** (0.111)	-0.290 (0.230)	-0.220* (0.118)	-0.227*** (0.067)	-0.252** (0.113)	-0.210*** (0.079)	-0.187** (0.093)	-0.106 (0.164)	-0.214** (0.108)
Female	0.060* (0.035)	-0.078* (0.047)	0.170*** (0.051)	0.059* (0.035)	-0.077 (0.047)	0.167*** (0.051)	0.059* (0.035)	-0.078* (0.047)	0.168*** (0.051)	0.059* (0.035)	-0.078* (0.047)	0.168*** (0.051)
Age	0.008 (0.005)	0.027*** (0.008)	-0.004 (0.006)	0.008 (0.005)	0.027*** (0.008)	-0.004 (0.006)	0.008* (0.005)	0.027*** (0.008)	-0.004 (0.006)	0.007 (0.005)	0.027*** (0.008)	-0.005 (0.006)
Age squared/100	-0.005 (0.005)	-0.023*** (0.008)	0.007 (0.006)	-0.005 (0.005)	-0.023*** (0.008)	0.006 (0.006)	-0.006 (0.005)	-0.024*** (0.008)	0.006 (0.006)	-0.005 (0.005)	-0.023*** (0.008)	0.007 (0.006)
Currently in union	0.190*** (0.047)	0.235*** (0.059)	-0.007 (0.077)	0.194*** (0.047)	0.239*** (0.059)	-0.003 (0.077)	0.191*** (0.047)	0.237*** (0.059)	-0.008 (0.077)	0.195*** (0.047)	0.239*** (0.059)	-0.000 (0.077)
Previously in union	0.083 (0.052)	0.092 (0.070)	-0.109 (0.081)	0.086* (0.052)	0.092 (0.070)	-0.103 (0.081)	0.085 (0.052)	0.094 (0.070)	-0.108 (0.081)	0.084 (0.052)	0.091 (0.070)	-0.105 (0.081)
Years of schooling	0.097*** (0.004)	0.093*** (0.005)	0.094*** (0.005)	0.097*** (0.004)	0.093*** (0.005)	0.094*** (0.005)	0.097*** (0.004)	0.093*** (0.005)	0.094*** (0.005)	0.097*** (0.004)	0.093*** (0.005)	0.094*** (0.005)
Wage employee	0.433*** (0.051)	0.028 (0.057)	0.855*** (0.081)	0.438*** (0.050)	0.033 (0.057)	0.861*** (0.081)	0.434*** (0.051)	0.029 (0.057)	0.857*** (0.081)	0.438*** (0.050)	0.033 (0.057)	0.861*** (0.081)
Non-agric. self-employed	0.350*** (0.048)	0.042 (0.056)	0.622*** (0.079)	0.353*** (0.048)	0.046 (0.056)	0.624*** (0.079)	0.350*** (0.048)	0.042 (0.056)	0.623*** (0.079)	0.354*** (0.048)	0.047 (0.056)	0.625*** (0.079)
Agric. self-employed	-0.653*** (0.056)	-0.947*** (0.105)	-0.399*** (0.065)	-0.646*** (0.056)	-0.941*** (0.105)	-0.393*** (0.065)	-0.650*** (0.056)	-0.944*** (0.105)	-0.396*** (0.065)	-0.648*** (0.056)	-0.943*** (0.106)	-0.394*** (0.065)
Ratio of children (0–15 years)	-0.210*** (0.069)	-0.152 (0.101)	-0.261*** (0.095)	-0.192*** (0.069)	-0.136 (0.100)	-0.240** (0.094)	-0.212*** (0.070)	-0.157 (0.101)	-0.261*** (0.095)	-0.199*** (0.069)	-0.142 (0.100)	-0.249*** (0.094)
Ratio of elderly (65+ years)	-0.064 (0.081)	0.017 (0.120)	-0.149 (0.105)	-0.074 (0.081)	0.018 (0.119)	-0.165 (0.106)	-0.089 (0.082)	0.008 (0.120)	-0.182* (0.106)	-0.052 (0.081)	0.025 (0.119)	-0.131 (0.106)
Household size	-0.157*** (0.015)	-0.157*** (0.029)	-0.156*** (0.020)	-0.161*** (0.015)	-0.163*** (0.029)	-0.160*** (0.020)	-0.159*** (0.015)	-0.159*** (0.029)	-0.158*** (0.020)	-0.161*** (0.015)	-0.162*** (0.030)	-0.159*** (0.020)
Household size squared	0.427*** (0.070)	0.270 (0.217)	0.475*** (0.084)	0.445*** (0.070)	0.300 (0.218)	0.491*** (0.085)	0.433*** (0.070)	0.279 (0.217)	0.481*** (0.085)	0.440*** (0.070)	0.299 (0.218)	0.487*** (0.084)
Rural	-1.169*** (0.070)	-1.171*** (0.070)	-1.171*** (0.070)	-1.171*** (0.070)	-1.171*** (0.070)	-1.171*** (0.070)	-1.171*** (0.070)	-1.171*** (0.070)	-1.171*** (0.070)	-1.170*** (0.070)	-1.170*** (0.070)	-1.170*** (0.070)
Western	-0.379*** (0.123)	0.112 (0.162)	-1.341*** (0.313)	-0.377*** (0.123)	0.115 (0.162)	-1.334*** (0.315)	-0.380*** (0.123)	0.109 (0.162)	-1.336*** (0.312)	-0.377*** (0.123)	0.114 (0.162)	-1.335*** (0.314)

Table 6 (continued)

Variables	I			II			III			IV		
	Any member			Child (0–15 years)			Active member (16–65 years)			Elderly member (66+ years)		
	All	Urban	Rural	All	Urban	Rural	All	Urban	Rural	All	Urban	Rural
Central	-0.195* (0.105)	-0.183 (0.121)	-0.835*** (0.306)	-0.198* (0.106)	-0.187 (0.122)	-0.832*** (0.308)	-0.196* (0.105)	-0.187 (0.121)	-0.830*** (0.305)	-0.197* (0.106)	-0.187 (0.122)	-0.833*** (0.308)
Volta	-0.676*** (0.097)	-0.537*** (0.118)	-1.410*** (0.297)	-0.686*** (0.097)	-0.544*** (0.120)	-1.416*** (0.299)	-0.682*** (0.097)	-0.546*** (0.119)	-1.409*** (0.296)	-0.685*** (0.097)	-0.544*** (0.119)	-1.416*** (0.298)
Eastern	-0.777*** (0.119)	-0.549*** (0.125)	-1.559*** (0.323)	-0.779*** (0.119)	-0.551*** (0.125)	-1.555*** (0.325)	-0.778*** (0.119)	-0.552*** (0.125)	-1.553*** (0.322)	-0.779*** (0.119)	-0.552*** (0.125)	-1.556*** (0.324)
Ashanti	-0.044 (0.096)	0.177* (0.097)	-0.916*** (0.317)	-0.041 (0.096)	0.180* (0.097)	-0.908*** (0.319)	-0.044 (0.096)	0.176* (0.097)	-0.910*** (0.316)	-0.041 (0.096)	0.180* (0.097)	-0.909*** (0.318)
Brong-Ahafo	-0.709*** (0.107)	-0.554*** (0.117)	-1.442*** (0.311)	-0.707*** (0.107)	-0.551*** (0.117)	-1.434*** (0.313)	-0.708*** (0.107)	-0.554*** (0.117)	-1.435*** (0.310)	-0.708*** (0.107)	-0.551*** (0.117)	-1.437*** (0.313)
Northern	-1.118*** (0.116)	-1.121*** (0.129)	-1.782*** (0.314)	-1.118*** (0.116)	-1.122*** (0.129)	-1.776*** (0.316)	-1.120*** (0.116)	-1.124*** (0.129)	-1.777*** (0.313)	-1.117*** (0.116)	-1.122*** (0.129)	-1.777*** (0.316)
Upper East	-1.374*** (0.117)	-1.343*** (0.228)	-2.081*** (0.302)	-1.375*** (0.117)	-1.347*** (0.229)	-2.077*** (0.303)	-1.374*** (0.117)	-1.344*** (0.229)	-2.075*** (0.300)	-1.376*** (0.117)	-1.349*** (0.229)	-2.079*** (0.303)
Upper West	-0.935*** (0.111)	-0.792*** (0.171)	-1.683*** (0.303)	-0.934*** (0.112)	-0.790*** (0.173)	-1.676*** (0.305)	-0.935*** (0.111)	-0.794*** (0.171)	-1.675*** (0.302)	-0.934*** (0.112)	-0.793*** (0.173)	-1.678*** (0.304)
Constant	-7.365*** (0.340)	-9.348*** (0.430)	-6.661*** (0.520)	-7.406*** (0.341)	-9.406*** (0.431)	-6.703*** (0.521)	-7.380*** (0.341)	-9.362*** (0.430)	-6.682*** (0.519)	-7.392*** (0.341)	-9.398*** (0.432)	-6.686*** (0.522)
Observations	13,208	5,749	7,459	13,208	5,749	7,459	13,208	5,749	7,459	13,208	5,749	7,459
R-squared	0.697	0.516	0.533	0.696	0.515	0.532	0.696	0.515	0.532	0.696	0.515	0.532

Standard errors in parentheses are clustered at primary sampling unit

***p < 0.01, **p < 0.05, *p < 0.1

Table 7 Regressions of disability and household consumption expenditures

Variables	OLS		District FE	
	1	2	3	4
Any PLWD	– 0.1469*** (0.0281)		– 0.1234*** (0.0221)	
No. of PLWDs		– 0.1181*** (0.0307)		– 0.0901*** (0.0195)
Female	0.1279*** (0.0167)	0.1278*** (0.0167)	0.1299*** (0.0140)	0.1298*** (0.0140)
Age	0.0049** (0.0023)	0.0049** (0.0023)	0.0060*** (0.0021)	0.0060*** (0.0021)
Age squared/100	– 0.0041* (0.0023)	– 0.0041* (0.0023)	– 0.0050** (0.0021)	– 0.0050** (0.0021)
Currently in union	0.1085*** (0.0218)	0.1090*** (0.0218)	0.0939*** (0.0194)	0.0945*** (0.0194)
Previously in union	0.0027 (0.0236)	0.0027 (0.0236)	– 0.0148 (0.0221)	– 0.0146 (0.0221)
Years of schooling	0.0389*** (0.0017)	0.0389*** (0.0017)	0.0376*** (0.0012)	0.0377*** (0.0012)
Wage employee	0.2255*** (0.0237)	0.2255*** (0.0236)	0.1998*** (0.0166)	0.2002*** (0.0166)
Non-agric. self-employed	0.2674*** (0.0221)	0.2674*** (0.0221)	0.2316*** (0.0165)	0.2319*** (0.0165)
Agric. self-employed	0.0633** (0.0276)	0.0634** (0.0276)	0.0572*** (0.0157)	0.0578*** (0.0157)
Ratio of children (0–15 years)	– 0.3346*** (0.0362)	– 0.3337*** (0.0362)	– 0.3277*** (0.0286)	– 0.3266*** (0.0287)
Ratio of elderly (65 + years)	– 0.0992** (0.0398)	– 0.1005** (0.0399)	– 0.0925*** (0.0342)	– 0.0940*** (0.0342)
Household size	– 0.1633*** (0.0109)	– 0.1637*** (0.0109)	– 0.1655*** (0.0059)	– 0.1659*** (0.0059)
Household size squared	0.6321*** (0.0805)	0.6346*** (0.0798)	0.6596*** (0.0349)	0.6619*** (0.0350)
Rural	– 0.3111*** (0.0263)	– 0.3113*** (0.0263)	– 0.3024*** (0.0138)	– 0.3025*** (0.0138)
Constant	8.6374*** (0.0628)	8.6377*** (0.0628)	8.2254*** (0.0474)	8.2248*** (0.0474)
District FE	No	No	Yes	Yes
Region FE	Yes	Yes	No	No
Observations	13,382	13,382	13,382	13,382
R-squared	0.5642	0.5640	0.3519	0.3514

Robust standard errors in parentheses

***p < 0.01, **p < 0.05, *p < 0.1

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