

Women's Labour Force Participation in Sri Lanka's North

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ISID

INSTITUTE FOR THE STUDY
OF INTERNATIONAL DEVELOPMENT

GrOW Working Paper Series
GWP-2018-18 – Research Contribution Paper

Abstract

The study uses data from a survey of roughly 4,000 women in Sri Lanka's Northern Province to investigate the factors associated with workforce participation of women heads of household and women in male-headed households. It also decomposes the difference in probability and the probabilities themselves into contributory factors using the Fairlie and Shapley value decomposition techniques. The analysis suggests that economic distress drives women heads of household to find paid work. Many factors contribute to economic distress for women including poor health and the responsibility to care for young children, whereas receiving cash or direct transfers and living with men who are employed can help to relieve financial pressure. The analysis also finds that the need to engage in paid work is far less compelling for women in male-headed households and their labour supply is much more elastic in relation to age. These women also appear more capable of leveraging assets such as crops and farm animals for their employment compared to women heads of household. The decomposition analysis suggests that interventions which help women to build assets, including social capital, can have positive impacts on their workforce participation. Strategies to address the physical and psychological issues faced by women heading their households are critically important to improve conditions for women entering the workforce in Sri Lanka's north, as are interventions to increase the regional concentration of work available in the trade and service sectors.

Keywords

Women's labour force participation, employment, Sri Lanka

Introduction

Sri Lanka's female labour force participation rate, at 36 percent of the population over 15 years of age in 2016, is one of the lowest in the region. Yet women's workforce participation in Sri Lanka's Northern Province is even lower (25 percent in 2016) and an even greater cause for concern. The region suffered significant damage during the decades long military conflict which ended in 2009, making economic recovery and the creation of decent work opportunities an ongoing challenge. Most northern districts remain among the poorest in the country, despite some recent improvements in poverty rates (Department of Census and Statistics (DCS) 2017a). While analyses of female labour force participation at the national level have identified underlying factors such as unpaid care and household work, skills deficits and gender discrimination (Gunatilaka 2013, 2016; Gunewardena 2015; Solotaroff et al. 2018), few comparative studies exist for women in Sri Lanka's Northern Province.

Workforce participation for women in the north was low during and even before the conflict began in 1983. By 1985, 18 percent of women aged 10 years and above were in the workforce, compared to 32 percent across the country. Only in Eastern Province were participation rates lower, at 15 percent (DCS 1987). By 2016, only the participation rates of women 15 years and older were reported, but even according to these data, women's participation rates in all but one of the Northern Province's five districts (Vavuniya) were below the national average, including two districts (Kilinochchi and Mannar) that reported some of the lowest rates in the entire country, at 24.3 percent and 20.6 percent, respectively (DCS 2017a). Women's representation in the workforce in the north has remained low, but improved from just a fifth (20 percent) in 1985 to a quarter (25 percent) in 2016 (DSC 1987, 2017a). In contrast, women's representation in the national economy has been higher, rising from 29 percent to 36 percent over the same period (DCS 1987, 2017a).

This paper addresses the gap in the literature related to women's labour force participation in Sri Lanka's Northern Province. It uses the United Kingdom Government's Sustainable Livelihoods Approach (SLA) framework and primary data drawn from a survey of roughly 3,000 women-headed households and 1,000 male-headed households, to understand the extent to which demographic and household-related characteristics, assets (including skills), and conflict-related shocks, have influenced the participation of these two groups of women (DFID 1999). It also decomposes the difference in participation into contributing factors and further, applies the Shapley value decomposition methodology to quantify the contribution of these characteristics to the probability of participation in order to identify priority areas for policy intervention.

The analysis finds that economic distress drives women heads of household to find paid work. Receiving cash or direct transfers and living with men who are employed appears to ease some of the financial pressure on women, while poor health and the responsibility to care for young children are financial stressors. The need to engage in paid work is far less compelling for

women in male-headed households and their labour supply is much more elastic in relation to age. These women also appear more capable of leveraging assets such as crops and farm animals for their employment compared to women heads of household. The decomposition analysis suggests that interventions which help women to build assets, including social capital, can have positive impacts on their workforce participation. Strategies to address the physical and psychological issues faced by women heading their households are critically important to improve conditions for women entering the workforce in Sri Lanka's north, as are interventions to increase the regional concentration of work available in the trade and service sectors.

The paper is structured as follows. The next section describes the background and regional context for the study, followed by a review of the theoretical and empirical literature on women's labour force participation. Then, a description of the research methodology and data is provided, followed by the study results, and lastly, the conclusion, which also identifies the policy implications of the research.

Background and study context

The decades long ethnic conflict in Sri Lanka was rooted in unequal access to good jobs and higher education that prevailed in the late 1960s and early 1970s. During this period, an individual's ethnicity and language conditioned their chances of obtaining a university degree or quality employment. When Sri Lanka became independent of Britain in 1948, English was the language of the administration, and economic and social privilege the monopoly of the English-speaking middle class. But in 1956, the language of administration was changed to Sinhala, and, after bitter protests, changed again two years later to Tamil in Tamil-majority areas. The change eroded the hegemony of English-speaking Tamils in the administrative service at a time when a restrictive trade regime, nationalization of industries and anti-private sector policies (including in education) made employment in the public service the only option for most educated young people (de Silva 1999). This left large numbers of educated youth across the country without jobs, and in fact, it was the educated but unemployed Sinhalese youth in the South who first revolted in a bloody insurrection against the state in 1971 (Abeyratne 2004). In a knee-jerk response to the crisis, the government implemented a language-based standardization policy and district quota system to govern university admissions. This reduced the proportion of Tamils entering university – and subsequently, the public sector – and heightened ethnic tensions to the point of revolt against the state.

Many of these language-based standardization policies were dismantled by the late 1970s. The economy was liberalised in 1977 to encourage foreign direct investment and private sector-led export and job growth (Athukorala and Jayasuriya 1997). Standardization policy for university entrance ended in 1977, and in 1986 Tamil was made an official language alongside Sinhala, with English as the link language between the country's ethnic groups. But by that time, the

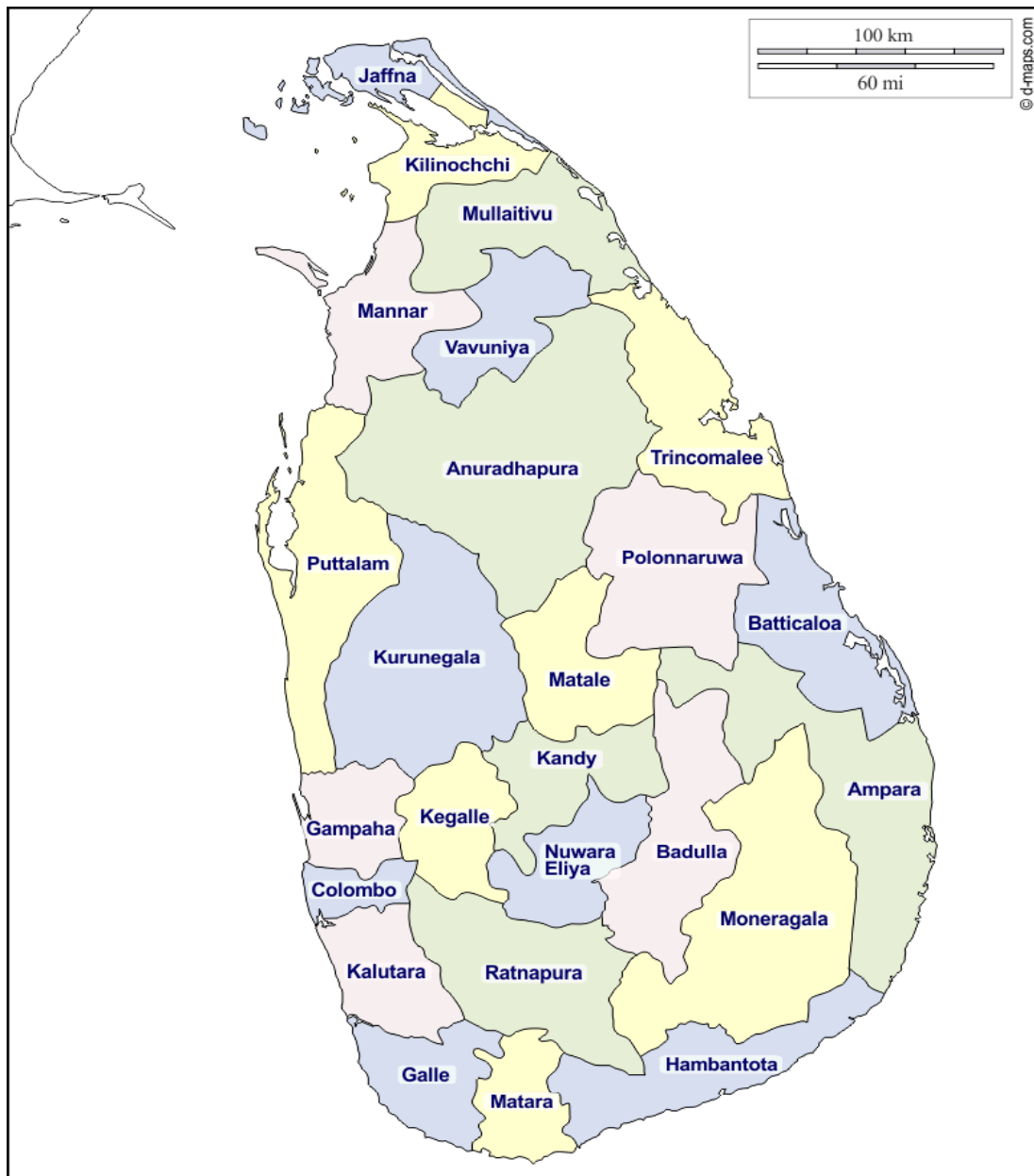
country's Tamil-majority areas in the North and East were already engulfed in a violent military conflict, spurred on by sub-continental geopolitical forces and financed by the Tamil Diaspora (de Silva 1999).

Economic growth in the southern parts of the country did not reach the north, but following the defeat of the Liberation Tigers of Tamil Eelam (LTTE) by government forces in 2009, Sri Lanka's government invested heavily in post-war reconstruction and the development of infrastructure. While this investment created the necessary conditions for economic growth, it has not been sufficient to generate the required number of decent job opportunities. In fact, across the entire country, only a quarter of the number of jobs created between 2006 and 2014 were in the formal sector (Majid and Gunatilaka 2017), and as of 2016, half of all jobs in the non-agricultural sector remained in the informal sector (DCS 2017b). But while the proportion of non-agricultural informal sector jobs was 40 percent in economically advanced Colombo and Gampaha districts in the Western Province, only in Northern Province's Vavuniya district was the share at 48 percent close to the national average of 50 percent. In the other four Northern districts, shares of employment in the non-farm informal sector ranged from 57 percent in Mannar to 68 percent in Mullaitivu, among the highest country-wide (DCS 2017b).

An adverse geography constrained economic growth and development in Northern Province long before the war broke out and continues to hinder efforts to generate employment in the region. Much of the province's land mass is located in the 'dry zone,' while Jaffna peninsula and the province's western seaboard belongs to the 'arid zone' despite being irrigated by underground aquifers. Numerous lagoons and islands impede intra-provincial connectivity. The province's capital city, Jaffna, is located in the northern-most part of the country, nearly 400 km from Sri Lanka's capital, Colombo, and seven and a half hours drive by road (see map in Figure 1). Nearly half of the province's population of one million inhabitants lives in Jaffna peninsula while the rest is distributed thinly across its four southern districts, making Mullaitivu, Kilinochchi, Vavuniya and Mannar among the least densely populated of all of Sri Lanka's districts (DCS 2015a).

The province's share of the total number of non-farm commercial establishments is also small, and may have even been smaller before the war. While Jaffna District accounted for 3 percent of non-farm commercial establishments nation-wide in 2013-14, the other northern districts accounted for less than 1 percent each (DCS 2015b). While Northern Province was the least industrialised in 1996 when provincial GDP data was first estimated, it remains the province with the smallest manufacturing sector and the largest services sector. The region continues to contribute the least to the national economic output: its share of 2.4 percent in 1996 had increased only marginally to 4.2 percent in 2016; whereas Western Province, where the country's capital city of Colombo is located, accounts for about 40 percent of GDP (Central Bank of Sri Lanka 2008, 2018).

FIGURE 1. SRI LANKA'S ADMINISTRATIVE DISTRICTS



Source: https://d-maps.com/carte.php?num_car=109503&lang=en Accessed 4 July 2018.

Northern Province also suffered the worst damage during the war. The region was the LTTE's headquarters and the focus of government offensives to defeat it. The war further prevented the region from benefiting from the country's economic liberalization policies during the late 1970s which catalysed growth in the southern part of the country. Jobs in Northern Province have been confined to the agriculture and service-sector, particularly in government. While the region accounted for only 6 percent of five million Sri Lankans working in 1985-86, this share had slipped to 4.5 percent by 2012 due to outmigration southwards, particularly of skilled individuals (DCS 2015a). By 2016, the contribution of agriculture in total employment in the province had

dropped to 49.5 percent, while the services industry had virtually stagnated at 28.4 percent (DCS 2017b). Today, foreign remittances from relatives in the Tamil Diaspora sustain many northern households.

Review of the literature

Whether women choose to participate in the labour market is conditioned by many factors, ranging from individual characteristics which may be demographic, education- or skills-related, to household characteristics including the employment levels of other family members and the amount of unpaid household and care work, as well as local demand and labour conditions. Gender norms dictating the role that women are expected to play in the family and the community are also factors influencing women's workforce participation. In fact, the more obvious factors such as age and education can interact with other attributes, such as the level of household income and the extent of local economic development, to influence workforce participation rates.

Early theoretical literature relating to women's workforce participation derives from the standard neo-classical model (Blundell and MaCurdy 1999), and focuses on the role of the expected market wage. The theory predicts that an increase in the expected wage, given local market conditions and an individual's human capital, can either increase or decrease the supply of an individual's labour depending on the combined effect of the income and substitution effect. The individual may want to work less because she can enjoy more leisure for the same amount of work (income effect), or she may want to work more because she can earn more with a higher wage (substitution effect). The income effect can also work at the level of the household: the individual may no longer need to work if other household members are working or experience a wage increase. The converse occurs if the household is poor, or in times of economic hardship and recession, when women's labour force participation increases to offset the shortfall in household income caused by the impact of recession on men's employment and wages (Fallon and Lucas 2002; Attanasio et al. 2005).

While neoclassical theory sees choices being made between work and leisure, the real choice is often between the unpaid work demands on women and the time left over to take up paid work. Historical and cultural norms burden women with the bulk of unpaid work related to household chores and responsibility to provide caregiving (West and Zimmerman 1987; Badgett and Folbre 1999; Malhotra and De Graf 2000; Braun et al. 2008; Rupanner 2010). Young children prevent women from participating in the workforce, while the provision of affordable or subsidized childcare facilitates it (Chevalier and Viitanen 2002). Meanwhile, concerns about sexual purity or social status discourage women from wealthier households or certain ethnic groups from participating in paid work (Malhotra and De Graf 2000). Access to social capital, often correlated with wealth status, can also influence participation. For example, Stoloff et al. (1999)

found that the greater quality and diversity of social resources available to women through social networks in urban Los Angeles, the more likely it was that she worked for pay.

A change in the wage structure that increases women's wages can trigger a reallocation of paid and unpaid work within the household that may enable the woman to participate in paid work, because the new earnings opportunity would increase her household bargaining power (Hoddinot et al. 1997). It could also have the opposite effect given local labour market conditions. Dasgupta (1999) showed that expanding employment opportunities for women in India may lower informal sector wages and actually weaken their bargaining power within the household. Their welfare may consequently decrease and intra-household gender inequality increase. Relatedly, Heath (2014) showed that paid work increased the incidence of domestic violence for some women in Bangladesh, as their husbands resorted to violence to neutralise their increased bargaining power.

Cultural norms and issues of status can interact with structural change in the economy to produce a U-shaped relationship between female labour force participation and economic development (Goldin 1995; Mammen and Paxson 2000). Structural change in the endowment of human capital, mediated by education can also interact with this process, producing a U-shaped relationship between economic or educational status and women's labour force participation at a given point in time (Klasen and Pieters 2015). For example, women's labour force participation may be high in agricultural economies where women work on family-owned farms. With industrialization men find jobs in manufacturing in cities as they are relatively better educated. Their wives withdraw from the labour market so as to preserve the household's newfound social status and because they cannot get jobs commensurate with that social status given their lower skill endowment. But women's labour force participation rises again as a growing service sector expands white-collar job opportunities which women, who are now better educated, can take up. Thus, before industrialization, poorly educated women are forced to combine farm work with care work and better education may not increase labour force participation if the jobs available are not commensurate with the social aspirations fuelled by more schooling. However, further education may enable women to get jobs in higher-skilled occupations which further validate the household's higher social status and make it acceptable for them to work.

Women's access to resources such as land may also condition their labour market participation. For example, Emran and Shilpi (2017) used a historical quasi experiment in land policy restricting the sale of crown land distributed for settlement under Land Development Ordinance of 1935 in Sri Lanka to estimate the effects of the restrictions on women's labour market outcomes. They found that land restrictions increased women's labour force participation and reduced women's wage rates by increasing the costs of migration. They also found little evidence of impact through the channel of restrictions affecting the collateral value of land.

Participation in livelihood development programmes that provide support in cash, in kind (such as skills training), or in both, can also mediate women's labour force participation. Blattman and

Ralston (2015) in a review of the relevant empirical literature argued that it is possible to improve poor people's work portfolios cost-effectively on a large scale, and that it requires a mix of interventions that addresses both the demand side and the supply side of labour. Safety net programmes such as workfare that shore up consumption together with infusions of capital with or without skills training can help raise productivity and incomes. In a recent study of business training, female enterprise start-up and growth in greater Colombo and greater Kandy, Sri Lanka, de Mel et al. (2014) suggested that providing training plus a grant to potential female business owners was found to speed up the process of starting a more profitable business. But this entry effect was found to dissipate 16 months after training. This suggests that "getting women to start subsistence businesses is easier than getting these businesses to grow" and the authors point out that "the binding constraints on growth may lie outside the realm of capital and skills" (de Mel et al. 2014, p. 207). Brudevold-Newman et al. (2017), in their evaluation of a multifaceted franchise programme which provided poor young women in Nairobi with business and life skills training, vocational training, business-specific capital and supply chain linkages, and ongoing mentoring, agreed. They found that while both the cash grant and the franchise programme increased the likelihood of self-employment among participants and had significant impacts on increasing incomes a year after, these impacts did not persist into the second year. The authors concluded that credit constraints were not the main obstacle preventing the poor — particularly poor women — from launching and expanding profitable, sustainable businesses.

The implications of armed conflict for women's labour force participation

War can change women's labour market prospects in several different ways. War intensifies women's burden of unpaid work, especially their work in providing care. Caregiving constrains mobility, while damage to infrastructure renders household activities much more laborious and time consuming (Rehn and Sirleaf 2002). Dislocation and displacement also destroy assets necessary for income generation. Health status as a dimension of human capital is often impaired due to poor nutrition and psychological trauma (Blattman 2010). The formation of skills and human capital through schooling is disrupted, and equipment, arable land, productive trees, livestock and equipment is destroyed. Social capital and social networks are decimated (El Jack 2003). Traditional gender inequalities in access to resources, information or basic services, and income are compounded by displacement (Birkeland 2009). Even where women benefit from displacement – in the form of training and development programmes in health, education and income-generating activities – they do not necessarily help create more equitable gender relationships (El Jack 2003).

Nevertheless, war and violence can also increase women's workforce participation by propelling them into jobs that are often precarious and involving self-employment and unpaid family work (Iyer and Santos, 2012). As primary breadwinners, women can become entrepreneurs in the informal sector and exploit opportunities created by the conflict such as selling supplies to the rebels or providing food to the displaced (Hudock et al. 2016). Since armed conflict makes it dangerous for people to engage in traditional income-generating activities like agriculture in the

open, such opportunities for informal livelihood activities can enable survival in labour markets stressed by conflict (Kumar 2001; Petesche 2011). Post-conflict, women's informal employment can increase as it requires little heavy investment, whereas the formal sector, which needs larger investments, may resuscitate only after political stability is restored (Kumar, 2001; Bouta and Frerks 2002). A study of the impact of the 1996–2001 civil conflict in Nepal showed that women's likelihood of employment was strongly and positively related to the conflict, while an economic shock such as the loss of job for a man at home had no impact (Menon and Van der Meulen Rodgers 2015).

The gendered socio-economic impacts of Sri Lanka's conflict have received some attention in the literature. Ruwanpura and Humphries (2003) looked at the female headship of households in the conflict-affected Eastern Province and argued that while the conflict may have increased their number, women-headed households were poor even before the war began. They were also heavily dependent on support networks of relatives and community, and financial support from male relatives outside the immediate family was much less important than the women's own efforts and the contributions of their children. Amirthalingam and Lakshman (2009) investigated how women leveraged assets that they held, mainly jewellery, to survive the economic consequences of displacement brought about by both the war and the 2004 tsunami. In another study of gendered differences in the holding of assets after the war ended in Eastern Province, Kulatunga (2017) found considerable differences between female-headed and male-headed households. Kulatunga attributed these differences to ethnic differences, differences in the age of household head and the gender of children, as well as to differences in access to public resources, labour markets and spatial factors. While economic backwardness and gender-based marginalization were important in explaining gender-based differences in patterns of income generation, some of the differences could be attributed to cultural, religious and social attributes, as Kulatunga (2014) found in the Eastern district of Trincomalee after the war.

The war may have also compounded institutional disadvantages that women face in accessing productive resources. The inheritance schedules of Sri Lanka's Land Development Ordinance stipulate that if the person allotted with the land dies without making a will, only the eldest son could inherit the land (Alailima 2000). These provisions may have resulted in women from such households losing access to land with the loss of their husbands and sons during the war. Meanwhile, the customary law of *Thesawalamai* that applies to those born in Sri Lanka's Northern Province recognises women's ownership of land but not their command over it. Such restrictions may have also had a bearing on women's labour market outcomes in Northern Province. But Sarvananthan et al. (2017) argue that gender-based discrimination by state institutions or the presence of the military in the north have been less hostile to women's non-traditional employment than the covert ethno-feminist and sub-nationalist agendas of those who have criticised the recruitment of Tamil women into Sri Lanka's armed forces. The authors point out that 90 percent of women so recruited have remained with the army even four years afterwards.

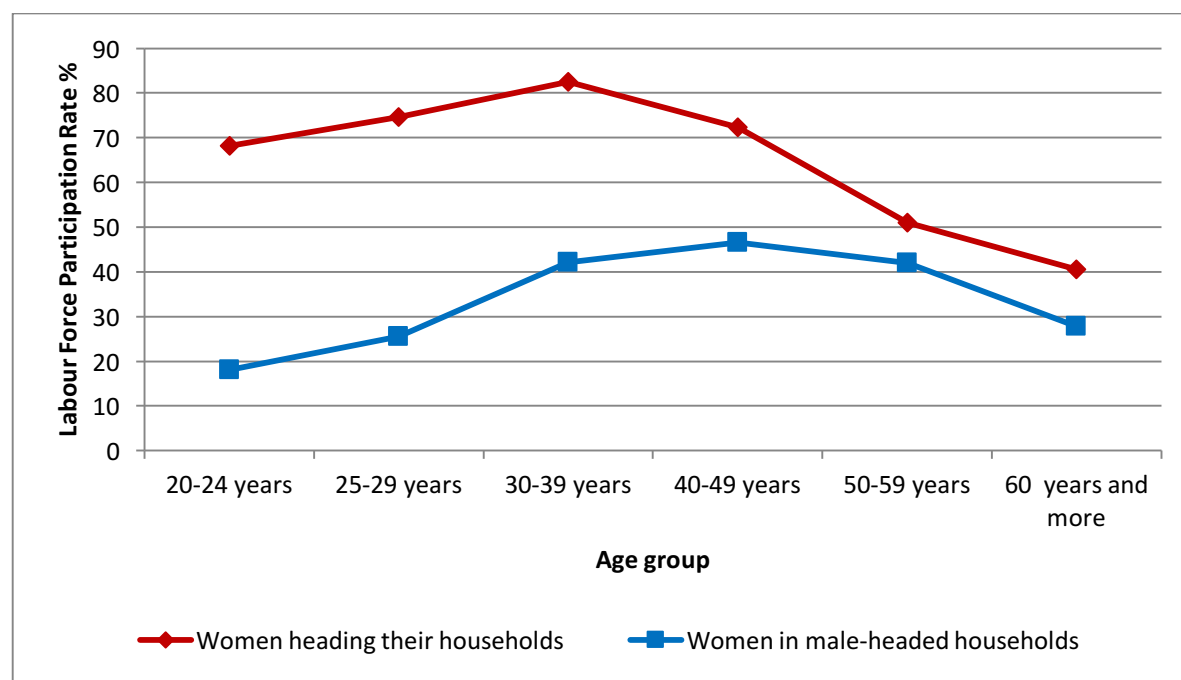
Research data, methodology and overview

Data

The analysis in this paper uses data collected through a household survey conducted in the poorer divisions of the five districts of Northern Province during the latter half of 2015. The survey covered 3,021 households headed by women and 1,004 women in households headed by men. Women-headed households have been defined variously in the literature as: households where there are no males present; households whose members identify a woman as their head; as households where either no adult male is present, owing to divorce, separation, migration, non-marriage, or widowhood; or households where the men, although present, do not contribute to the household income, because of illness or disability, old age, alcoholism or similar incapacity (but not because of unemployment) (ILO 2007). However, as selecting the sample according to these definitions would have involved considerable costs the sample of women-headed households was randomly selected from the lists of women-headed households available from the Divisional Secretariats in the five districts. These lists are comprised of women who have registered themselves with the Divisional Secretariats as heading their households for administrative purposes. In other words, we go by the respondents' own identification of themselves as women heading their households. Of these women, we included in the sample only those who did not have a spouse living with them. The closest male-headed household to every third such female-headed household in the sample was selected to make up the sample of women in male-headed household.

The respondents in the sample of female heads were thereafter selected for interview only if they were between 20 and 65 years of age and were primarily responsible for managing household affairs. Of them, 68 percent were widows, 23 percent had separated, 5 percent were single and just one percent was married. The women in male-headed households were selected as the primary respondents if they were of the same age cohort, and if they were married to the male head and responsible for managing the household. As may be expected, female heads of households tended to be older: 60 percent were between 40 and 60 years of age and 17 percent, were less than forty years of age. In contrast, nearly half the women from male-headed households were less than forty. In fact, as Figure 2 shows, women heading their households appear to be propelled into the labour market earlier, and more of them seem to continue to work even into their sixties.

FIGURE 2. LABOUR FORCE PARTICIPATION RATES BY AGE COHORT



Source: Survey conducted for GrOW Study on Identifying Post-War Economic Growth and Employment Opportunities for Women in Sri Lanka's Northern Province, 2015.

An overwhelming 92 percent of the sub-samples of women-headed and male-headed households were ethnic Sri Lankan Tamils. The long war and ethnic cleansing by the LTTE of Muslims and Sinhalese who had long been residents in the north, displaced most to other provinces. Nearly half the sample was from Jaffna district, in keeping with its share of the total population in Northern Province according to the Population Census of 2012 (Table 1).

TABLE 1— DISTRIBUTION OF SAMPLE POPULATION ACROSS DISTRICTS IN NORTHERN PROVINCE

	% Share of Population in Northern Province 2012	% Share of sample population	
		Women heading their households	Women in male-headed households
Jaffna	55	57	58
Kilinochchi	11	10	10
Mullaitivu	9	10	10
Vavuniya	16	13	12
Mannar	9	10	10
Total (number)	1,061,315	3,021	1,004

Source: Data on total population by district in Northern Province is based on the Population Census of 2012 from Department of Census and Statistics (2015)

Methodology

The probability of women's participation in the workforce was estimated separately for the sub-samples of women-headed and male-headed households, using the following model:

$$p_i = F(\alpha + \beta X_i) \quad (1).$$

In equation (1), the binary dependent outcome p took the value one if respondent i was a participant, and zero if not. The parameters α and β of the logit function $F(z) = e^z / (1 + e^z)$ were estimated by maximum likelihood. The vector X consists of several groups of factors hypothesised as conditioning women's workforce participation and were derived from an adaptation of DfiD's (1999) Sustainable Livelihoods Framework. It should be noted that the model does not address the issue of causality to distinguish whether participation is a cause or a consequence of various individual and other characteristics.

We define the dependent variable first. Since none in the sample was seeking employment, those in the workforce were essentially those who were employed. The employed were in turn defined as those engaged in any income-generating activity during the previous month, a somewhat broader definition than the standard ILO definition of employment, which uses the previous week as the reference period. Participation rates among women heading their households were much higher than rates among women in male-headed households: 59 percent of the sub-sample of women heading their households was in the workforce compared to 39 percent of women in male-headed households.

The analysis focuses on the relationships between the probability of workforce participation and six groups of characteristics. Among them are the expected wage; individual demographic characteristics; household characteristics; human, physical and social capital attributes; spatial characteristics including connectivity; experiences with war-related shocks; and, features of the institutional environment.

According to neo-classical theory, the expected wage is a key determinant of workforce participation. However, since wages are observed only for employed persons, wages needed to be imputed for individuals who are not employed and whose decision to participate may be contingent on the wage that they are likely to earn. Therefore, we implemented the usual procedure to estimate a standard wage equation with Heckman selection bias correction (Heckman 1979, Blau and Kahn 2007; Heim 2007; Klasen and Pieters 2012) using Maximum Likelihood Estimation (MLE). We used Stata's Heckman command which executes a two-stage procedure where a selection equation of the same form as that of equation (1) is estimated with employment as the outcome variable. The explanatory variables were those likely to influence the probability of employment and comprised a sub-group of vector X in equation (1) as it included only those factors that enabled the estimation to converge. Maximizing the selection equation yielded the consistent parameter which was then embedded in the second equation. The log of the monthly wage which was the outcome variable for the wage equation was observed only for that part of the sample consisting of women working as employees. Among the independent variables for this equation were age and its square, educational achievement (defined below), job tenure and occupation. The parameters of this second (wage) equation, were

then used to predict the expected wage for all individuals and this was used as an explanatory variable for the labour force participation equation. Results of the estimation of the wage equation and the selection equation are presented in Tables A1 and A2 in the Appendix.

In addition to the expected wage derived in this way, the explanatory variables of equation (1) modelling the probability of labour force participation included the individual's age and its square. Household characteristics such as its demographic composition and economic situation that have been found to be important correlates of participation in the empirical literature were also included. Since a woman's childcare responsibilities can prevent her from taking up paid work we included three variables in the model to denote these commitments: *the proportion of household members who are children less than five years of age*, *the share children between 5 and 15 years of age*, and the reference category was the *share of children 16 years and above*. Since looking after elderly members of the household can also constrain engagement in paid work, we included the *share of elderly (more than 70 years of age) members in the household* as an explanatory variable as well as the *share of members who are ill*. The dummy variable that takes the value one if *her father is or was in a white-collar job* denotes the association between the class background of the respondent and the likelihood of her workforce participation. If the household has *male members who are employed*, this is likely to obviate the necessity for the principal female respondent to engage in paid work as well, due to the income effect of neo-classical wage theory. *Male household members in white-collar jobs* may encourage women's participation as the men may have access to social networks through their colleagues that can be leveraged to find suitable jobs (Malhotra and De Graff 1997; Amarasuriya 2010). They may also be better educated and may be more open to their women kin undertaking paid work, although this was found not to be the case in areas close to the metropolitan hub of Colombo (Gunatilaka 2016). On the other hand, the presence of male household members in white-collar jobs may constrain women's participation as men belonging to this social class may believe that if their women kin worked, it would lower the household's social status. The presence of *other adult females* to share some of the unpaid work has been found to free up a woman to engage in market work (Gunatilaka 2013). Additional variables denoting husband's characteristics were included in the model estimating the participation of women in male-headed households, to minimise problems of omitted variable bias. These variables were his *years of education*, whether he was in a *white-collar job*, and which *economic sector he is employed in, manufacturing or services*.

Economic need may drive women from poorer families to work (see Klasen and Pieters 2015 for a review of the theoretical and empirical literature). Since per capita consumption data in the survey was self-reported and dependent on respondent recall, we used a more reliable indicator of the household's economic standing based on observables such as materials used to build the dwelling. This was the *index of housing quality* with a minimum score of 0 and a maximum score of 11. A dummy variable that took the value one if *the household receives transfer income* denoted the income effect that may obviate the necessity for the respondent to work.

The model included many groups of independent variables related to the assets pentagon of the SLA framework. The dummy *in poor health* took the value one if the respondent said that she was under the weather or very sick, health status being an important dimension of human capital. The highest level of education that the individual had attained was represented by four variables with *primary or no schooling* being the reference category, while *GCE O' Levels* and *GCE A' Levels plus* denoted successful completion respectively of the 10th year examination, and progress including and beyond the 12th year examination which is also the university entrance examination. Land can be used by itself or as collateral for capital for livelihood activities, so the *extent of land owned by the household* and, whether the *household owns a house with a deed* were included. The *log of the value of financial assets owned by the respondent* herself, and the *log of net financial assets jointly owned* with other members of the household denoted access to financial capital. The dummy *livestock* took the value one if the household owned at least one of the following: cows, buffaloes, goats or chickens. The dummy variable *crop trees* took the value one if the household owned at least one of the following: mango, palmyrah (palm) and coconut.

To capture the relationship between social capital variables and the probability of participation, we constructed three variables. A dummy variable took the value one if the respondent was a *member* of any one of the following organizations: a microfinance organization, a death benevolence society, a women's rural development society or mothers' group, a national political party, or any other such community-based organization. Quantifying the social capital associated with friends and relatives was more challenging because of its subjective nature, so we also attempted to impute the value of social capital in terms of the strength of bonds with friends and with relatives. However, in the questionnaire, the data for these variables had to be drawn from questions which sought to find out *how strong her networks of friends* and her *network of relatives* were compared to when she first started managing her household. As such, the variable was cardinalised from a scale of one to five according to whether she thought that her network of relatives or friends was much stronger now, stronger now, just the same, weaker now or much weaker now. It should be noted that these variables were included in the analysis only as a subjective measure of the strength of bonds with friends and relatives so that the respondent was able to describe more accurately the strength of her networks in relation to a personal reference point, and not as a variable denoting change, as we cannot expect a change in social network strength since the respondent first started managing her household to affect her current labour force participation.

Spatial characteristics and connectivity are an important part of the asset pentagon of the SLA framework. We included three variables describing the local market to denote this; the log of the per capita shares of *establishments in industry and construction*, *trading establishments*, and *service sector establishments* in the Divisional Secretariat's Division where the respondent was resident. The population and establishments data was sourced from the Department of Census and Statistics' (2015a) *Census of Population and Housing 2012*, the official websites of the respective district and divisional secretariats, and from the listing of *Non-agricultural Economic Activities in Sri Lanka Economic Census of 2013/2014* (DCS 2015c). To denote connectivity, the

dummy variable *vehicle* took the value one if the household owned any of the following mechanised modes of transport: car, van, three-wheeler, or motor cycle. *Time taken to the nearest market* and *time taken to go to the Divisional Secretariat* denoted the extent of connectivity to markets and institutions. Other spatial characteristics were included in four dummy variables denoting district of residence: *Vavuniya*, *Mannar*, *Killinochchi* and *Mullaitivu*. *Jaffna district* was the reference category.

The influence of war-related experiences on the probability of labour force participation was captured by seven characteristics of the household: *displaced and stayed in a camp*; *displaced and stayed with relatives or friends*; *had incurred damage to property*; *had suffered loss of employment*; *had lost assets*; *whose members' education had been disrupted*; and, *who sustained other damages due to the war*. Family members dying or disappearing due to the war were not included because the sample used for analysis was made up of women who headed their households, and who may have headed their households because they had lost key family members due to these same reasons.

Two cardinalised variables captured the relationship between the institutional environment and women's workforce participation. The variables *Divisional Secretariat* and the village-level *Grama Niladhari's Office* show the extent to which the respondent found them helpful, with very helpful given the value five and very unhelpful, even obstructionist, given the value one. Also included in the model are three variables denoting whether the individual or her family participated in a livelihood development programme implemented by government agencies, donor agencies or non-governmental organizations. They are, *cash only*, *no cash but direct interventions only*, and *cash and direct interventions*, with the reference category being *neither cash nor direct interventions*. This categorization follows the insights about the efficacy of capital-centric interventions drawn from the recent empirical literature and reviewed by Blattman and Ralston (2015).

Contribution of factors to the difference in probability of participation

Given the difference in participation rates between women heads of household, and women in male-headed households, we investigated the characteristics contributing to the gap in participation by using the non-linear decomposition technique developed by Fairlie (see Fairlie 1999 and 2014, and Fairlie and Robb 2007) to implement the Oaxaca-Blinder decomposition for categorical outcome variables. The technique uses the original non-linear equation for both estimation and decomposition and so avoids problems such as generating predictions outside the (0, 1) range or generating misleading estimates from the linear Oaxaca-Blinder decomposition technique when group differences are very large, powerful explanatory variables. The potential problem of path dependence is avoided by randomly ordering the variables and increasing the number of replications.

Following Fairlie (2014), we write the decomposition of the non-linear equation $Y = F(X\hat{\beta})$ as

$$\begin{aligned}\bar{Y}^{fhh} - \bar{Y}^{mhh} = & \left[\sum_{i=1}^{N^{fhh}} \frac{F(X_i^{fhh} \hat{\beta}^{fhh})}{N^{fhh}} - \sum_{i=1}^{N^{mhh}} \frac{F(X_i^{mhh} \hat{\beta}^{fhh})}{N^{mhh}} \right] \\ & + \left[\sum_{i=1}^{N^{mhh}} \frac{F(X_i^{mhh} \hat{\beta}^{fhh})}{N^{mhh}} - \sum_{i=1}^{N^{mhh}} \frac{F(X_i^{mhh} \hat{\beta}^{mhh})}{N^{mhh}} \right]\end{aligned}\quad (2).$$

In this equation, fhh and mhh denote female-headed households and females in male-headed households respectively. $\bar{Y}^{fhh}$ and $\bar{Y}^{mhh}$ are the average value of workforce participation of the two groups and N^{fhh} and N^{mhh} are their sample sizes. F is the cumulative distribution function from the logistic distribution. The first term in brackets stands for that part of the gap in participation that is due to group differences in the distributions of the vector of characteristics X . The second term denotes the part due to differences in the group processes determining levels of Y and also captures the portion of the gap due to group differences in unmeasurable or unobserved attributes. As Fairlie (2014) suggests, we do not focus on this “unexplained” portion of the gap as it is hard to interpret.

Equation (2) holds exactly for the logit model that includes a constant term because the average value of the dependent variable must equal the average value of the predicted probabilities in the sample.

The decomposition can also be expressed as,

$$\begin{aligned}\bar{Y}^{fhh} - \bar{Y}^{mhh} = & \left[\sum_{i=1}^{N^{fhh}} \frac{F(X_i^{fhh} \hat{\beta}^{mhh})}{N^{fhh}} - \sum_{i=1}^{N^{mhh}} \frac{F(X_i^{mhh} \hat{\beta}^{mhh})}{N^{mhh}} \right] \\ & + \left[\sum_{i=1}^{N^{fhh}} \frac{F(X_i^{fhh} \hat{\beta}^{fhh})}{N^{fhh}} - \sum_{i=1}^{N^{fhh}} \frac{F(X_i^{fhh} \hat{\beta}^{mhh})}{N^{fhh}} \right]\end{aligned}\quad (3).$$

In this configuration, the coefficient estimates for the participation model of women in male-headed households $\hat{\beta}^{mhh}$ are used as weights for the first term of the decomposition and the distributions of the independent variables for women heading their households, $\bar{X}^{fhh}$, are used as weights for the second term. Since this formulation can yield different estimates, the first term of the expression can be weighted with coefficient estimates from a pooled sample of the two groups (Oaxaca and Ransom 1994). The first terms of equations (2) and (3) provide an estimate of the contribution of differences in the entire set of independent variables between women heading their households and women in male-headed households to the gap in their workforce participation. This is estimated by calculating two sets of predicted probabilities and taking the difference between the average values of the two. Identifying the contribution of group

differences in specific variables (the second term of the equation) is more complicated due to the difficulty of matching observations one-to-one from the two groups as the groups are unequal in size, as well as to issues of path dependence as the order of the variables can influence outcomes.

The first of these two problems is resolved by drawing random samples of the group of female heads equal in size to the group of women in male-headed households and randomly matching them to the full sample of women in male-headed households to calculate separate decomposition estimates for each. They are then averaged across the replications to approximate the estimates for the entire sample of women heading their households. The second of these two problems is addressed by randomizing the order of the variables in a series of replications. To implement the decomposition we use Jann's (2006) algorithm for Stata, *fairlie.ado*, which randomises the order of the variables at the same time that it draws random samples of women heading their households.

Contribution of factors to the probability of participation

Identifying the factors contributing to the gap in workforce participation between women heads of household and women in male-headed households is useful for inequality analyses. Nevertheless, while participation rates among women heads of household are higher at every age cohort, the reasons why may not necessarily be useful to formulate policy measures to increase labour market engagement among either group. For example, if push factors such as economic distress rather than pull factors such as the expected wage dominate the participation decision of women heads and contribute most towards the gap in participation, that insight provides little by way of guidance to policy makers about how to increase the participation of women in male-headed households. Therefore, it may be even more important for the purposes of policy development to identify the contribution of each group of characteristics to the probability of participation of women heads and women in male-headed households separately, so that appropriate interventions that target the push and pull factors for each may be designed.

Therefore, in the analysis to follow, we also implement the Shapley value decomposition of the probability of participation. The method is based on Shapley's (1953) solution to the problem of calculating the real power of any given voter in a coalition voting game with transferable utility, when all orders of coalition formation are equally probable. The methodology ensures that the contributions sum to the amount that needs to be explained as it eliminates each of the contributing factors in succession, and then averages the marginal effects over every possible elimination sequence. Therefore, unlike other regression-based methods of decomposition, the Shapley value decomposition method decomposes the probability completely into its contributory factors as it accounts for all parts of the probability equation and the result is independent of the order in which the factors are eliminated. While Shorrocks (2012) showed that the Shapley value decomposition can be applied to any function, the method has been used in the economics literature to decompose income inequality (Chantreuil and Trannoy 1997; Sastre and Trannoy 2001a, 2001b; Gunatilaka and Chotikapanich 2009; Devicienti 2010),

inequality in health outcomes (Deutsche et al. 2017), and poverty (Kolenikov and Shorrocks 2005; D'Ambrosio et al. 2009). Gunatilaka (2013) used it to decompose the probability of women's labour force participation in Sri Lanka using national sample survey data, and just as in that study, we draw on D'Ambrosio et al.'s (2009) clear notation and concise explanation to describe the method.

Assume that $I(a, b)$ is the logit function modelling the probability of labour force participation that depends on two explanatory variables a and b . The Shapley decomposition then computes the impact on I of eliminating a and b in all possible sequences of elimination and averages the impact in each sequence, in order to estimate the contribution of each variable on the composition of I . Consider first the impact of variable a on I . The variable can be the first or the second to be eliminated. If it is the first, then the function $I(a, b)$ will be equal to $I(b)$. In this case, the contribution of a to $I(a, b)$ will be equal to $I(a, b) - I(b)$. If variable a is the second to be eliminated, the function I will be equal to $I(a)$. Since both elimination sequences are possible and assuming that the probability of the two sequences is the same, we can conclude that the (marginal) contribution $C(a)$ of the variable a to the function $I(a, b)$ is equal to

$$C(a) = \frac{1}{2} [I(a, b) - I(b)] + \frac{1}{2} I(a). \quad (4)$$

Similarly, it can be shown that the (marginal) contribution $C(b)$ of the variable b to the function $I(a, b)$ is

$$C(b) = \frac{1}{2} [I(a, b) - I(a)] + \frac{1}{2} I(b). \quad (5)$$

We combine equations (2) and (3) to produce,

$$C(a) + C(b) = I(a, b). \quad (6)$$

The procedure thus treats all factors even-handedly and is therefore symmetric in all variables.

In this section we follow D'Ambrosio et al. (2009) and apply the Shapley value decomposition methodology to decompose the following likelihood ratio,

$$LRI = 1 - (\ln L / \ln L_0). \quad (7)$$

In equation (7), $\ln L$ is the maximal value of the log-likelihood and $\ln L_0$ is the log-likelihood obtained when only a constant term is introduced. LRI is the Likelihood Ratio Index and is a measure of goodness of fit of the regressions that is similar to the R^2 used in linear regressions. The bounds of the index are 0 and 1 (Greene 1992, 651-653 as cited in D'Ambrosio et al. 2009). As do D'Ambrosio et al. (2009), we simplify the computation by computing the marginal contribution of each category of explanatory variables, rather than of each variable, to the log-likelihood. The sum of these marginal contributions is equal to the likelihood ratio itself. We implement the decomposition by extensively modifying and adapting Kolenikov's (2000) algorithm for Stata, *Shapley.ado*. While it is theoretically possible to generate standard errors for the Shapley values using bootstrap methods, the computational demands of doing were too prohibitive to do so.

Overview of analysis

The means and standard deviations of the characteristics hypothesised as correlating with the probability of participation for the two sub-samples of women are set out in Table 2. The table also presents the results of two-sample t-tests of the differences in means in the last column.

As far as workforce participation itself is concerned, the share of women heading their households participating in the workforce was 20 percentage points higher than for women in male-headed households and the difference was statistically significant at the 1 percent critical level. The differences in mean characteristics between the two groups of women were also statistically significant for the most part, and the gap favoured women in male-headed households along many key dimensions such the log of expected wage, attributes related to almost all types of assets including the extent of land held, ownership of house with deed, and all three characteristics of social capital. And of course, the share of employed males in the household was significantly higher in households headed by men. Thus, the table shows that women heading their households were disadvantaged relative to women in male-headed households along almost all of the dimensions explored in the analysis.

For example, as far as the human capital variables are concerned, proportionately more women heading their households suffered from ill-health, possibly because they tended to be older. They may also have experienced more psychological trauma than women in male-headed households. The struggle to make ends meet without the help of a spouse or partner would have entailed additional stress and ill-health. There were higher proportions of women heads of household in the lower educational attainment categories. Differences in educational attainment between the two groups could be because women heading their households tended to be older and the long war could have also disrupted their schooling. For example, at least a third of the households surveyed reported disruption of education of family members on account of the war. Moreover, outmigration of the better-educated may have affected the quality of teaching in the north, especially in the poorer divisions where the survey was conducted.

Proportionately more women heads had also experienced economic shocks related to the war and the differences in means are statistically significant. A bigger share of women heading their households also received cash or direct transfers. Proportionately more of them also took longer to go to the nearest market. Nevertheless, the differences in the means of characteristics of the two groups relating to location and perceptions about the helpfulness of institutions are not significant. From among livelihood development interventions, only the difference in the proportions of the two groups which had benefited from cash-only programmes was statistically significant and it favoured women heads of households.

TABLE 2—MEANS OF CHARACTERISTICS OF WOMEN HEADING THEIR HOUSEHOLDS AND OF WOMEN IN MALE-HEADED HOUSEHOLDS

	Sample means and proportions		Standard deviation		Results of t-test for difference in means
	Women heading households	Women in male-headed households	Women heading households	Women in male-headed households	
Participates in the labour force	0.5909	0.3904	0.4918	0.4881	11.2090***
Log of expected wage	8.9521	9.1301	0.3254	0.4077	-14.0510***
<i>Demographic and household variables</i>					
Age	50.3409	41.7241	10.1999	11.4682	22.4626***
Age squared	2638.2152	1872.2898	986.9737	997.6207	21.2456***
Share of children less than 5 years	0.0132	0.0722	0.0733	0.1297	-17.8801***
Share of children between 5 and 15 years	0.1142	0.1644	0.2102	0.1912	-6.7010***
Share of other adult females	0.6669	0.4726	0.3593	0.1727	16.5100***
Share of elderly household members (>70 years)	0.0279	0.0245	0.1022	0.0795	0.9656
Share of members who are ill	0.0196	0.0189	0.0936	0.075	0.2141
Share of employed males in the household	0.1283	0.3979	0.2175	0.1829	-35.3481***
Respondent's father a white collar worker	0.1106	0.1036	0.3136	0.3049	0.6146
Housing infrastructure score	9.1337	9.3765	1.8073	1.5442	-3.8181***
Household receives transfer income	0.8716	0.6793	0.3346	0.467	14.1869***
<i>Assets</i>					
In poor health	0.3532	0.1783	0.478	0.3829	10.5250***
Primary education or less	0.3436	0.1345	0.475	0.3413	12.8885***
Secondary education	0.3724	0.3536	0.4835	0.4783	1.0706
GCE O' Levels	0.234	0.3735	0.4235	0.484	-8.7151***
GCE A' Levels and more	0.0497	0.1384	0.2173	0.3455	-9.5458***
Extent of land held by household	4.5204	6.3343	10.4861	14.3951	-4.2980***
Household owns house with deed	0.4912	0.5319	0.5	0.4992	-2.2323**
Log of net financial assets held jointly	1.2549	1.4945	3.6125	3.9033	-1.7838*
Log of respondent's net financial assets	4.0897	3.9832	5.8399	5.9983	0.4972
Household has livestock	0.477	0.511	0.4996	0.5001	-1.8657*
Household has crop trees	0.7534	0.7958	0.4311	0.4033	-2.7444***
Strength of relationships with relatives *	3.048	3.3167	0.8585	0.7507	-8.8564***
Strength of relationships with friends *	3.09	3.3108	0.7533	0.7304	-8.1045***

Access to material support from relatives	3.5389	3.7859	1.0636	0.999	-6.4695***
Access to emotional support from friends	3.809	4.0269	0.9439	0.8101	-6.5555***
Respondent is a member of at least one community organization	0.2827	0.2709	0.4504	0.4447	0.7198
<i>Spatial variables and connectivity</i>					
Log of per capita share of industrial and construction establishments in DS division	4.6224	4.6218	0.3591	0.3606	0.0470
Log of per capita share of trading establishments in DS division	3.966	3.9634	0.3278	0.3312	0.2190
Log of per capita share of service establishments in DS division	4.0289	4.0253	0.3792	0.3790	0.2631
Household owns mechanised transport	0.1430	0.4273	0.3730	0.5484	-18.4228***
Minutes taken to go to the nearest market	23.8255	22.1165	19.8118	18.5939	2.4038**
Minutes taken to go to the Divisional Secretariat	44.9265	43.9541	31.0871	55.4348	0.6910
Jaffna	0.5713	0.5767	0.495	0.4943	-0.2973
Kilinochchi	0.0993	0.0996	0.2991	0.2996	-0.0272
Mullaitivu	0.0993	0.0996	0.2991	0.2996	-0.0272
Mannar	0.0993	0.0996	0.2991	0.2996	-0.0272
Vavuniya	0.1308	0.1245	0.3372	0.3303	0.5114
<i>War experiences</i>					
Displaced and stayed in camp	0.5839	0.5209	0.4930	0.4998	3.4957***
Displaced and stayed with relatives or friends	0.5396	0.5488	0.4985	0.4979	-0.5094
Damage to property	0.5789	0.5149	0.4938	0.5000	3.5470***
Loss of employment	0.4803	0.4472	0.4997	0.4975	1.8200*
Loss of assets	0.6696	0.6275	0.4704	0.4837	2.4426**
Education disrupted	0.3688	0.3357	0.4825	0.4725	1.8925*
Other damages due to war	0.0139	0.0110	0.1171	0.1041	0.7094
<i>Institutions</i>					
Perception of helpfulness of Divisional Secretariat	4.1401	4.1720	0.7160	0.6547	-1.2425
Perception of helpfulness of <i>Grama Niladhari</i>	4.2406	4.2652	0.7621	0.7088	-0.8994
<i>Interventions</i>					
Cash only	0.0692	0.0528	0.2538	0.2237	1.8245*
Direct interventions only	0.3724	0.3884	0.4835	0.4876	-0.9094
Cash and direct interventions only	0.1831	0.1863	0.3868	0.3895	-0.2269
Number of observations	3021	1004			

Source and notes: Estimated with data from the survey conducted for GrOW Study on Identifying Post-War Economic Growth and Employment Opportunities for Women in Sri Lanka's Northern Province, 2015. Data related to number of establishments and population in the divisions from Department of Census and Statistics (2015, 2015c).

In the next section, we present the results of the econometric analyses of the covariates of labour force participation, and the results of the decomposition of the gap in probability of participation.

Study results

Covariates of labour force participation

Table 3 compares the results of estimating the probability of labour force participation of women heads of household who were not living with a spouse, with the results for married women living with their husbands in male-headed households. The standard errors of the estimates are set out alongside. In order to test the robustness of the results to the addition or omission of different variables, we have followed the robustness check procedure implemented by Barslund et al. (2007) and the results are presented in Table A3 and Table A4 in the Appendix. Although Young and Holsteen (2017) have proposed a newer approach to robustness testing, their technique was too computationally intensive for our model given the large number of explanatory variables.

The table shows that the marginal effect of the expected wage is positive, large and significant at the 10 percent critical level only for women heading their households. This contrasts with the absence of a statistically significant relationship between the expected wage and workforce participation in earlier studies on India and Sri Lanka (Gunatilaka 2013; Klasen and Pieters 2015).

While the probability of participation of women in both sets of households increases with age, only the results for women in male-headed households are statistically significant. The probability that participation increases with age declines faster among women in male-headed households than among women heading their households. The results suggest that while workforce participation rates of women in male-headed households were sensitive to age, women heading their households were probably forced through circumstance to participate in the labour force regardless of how old or how young they were.

Having children less than five years of age is associated with a much smaller decline in the participation of women in male-headed households and the effect is not statistically significant. But this factor appears to be a significant constraint holding women heads back from participation. In contrast, an increase in the share of ill members in the household has a significant and positive effect on the participation of women in male-headed households whereas the effect is negative, but smaller and not significant for women heading their households.

The likelihood that a woman in a male-headed household participates in the labour market decreases by 45 percentage points as the share of employed males in the household increases, whereas the equivalent effect for women heading their households is larger at 51 percentage points. The results are statistically significant at the most stringent critical level. The wealthier the household, the significantly less likely it was that a woman heading her household would engage in paid work. This suggests that economic distress likely drives women heads from poor households to take up paid work. The income effect of receiving transfer income appears to significantly obviate the necessity of the woman heading her household going out to work (by about 13 percentage points). While more wealth and receipt of cash or direct transfers are associated with a decline in the probability of participation for women in male-headed households, too. These results are not statistically significant and the marginal effect of receiving

transfers is just a fraction of the marginal effect of this variable for women heading their households.

Poor health significantly reduces workforce participation of women in male-headed households, but only by 7 percentage points, compared to 17 percentage points among women heading their households. None of the marginal effects of educational attainment for women in male-headed households is significant, whereas secondary education is associated with a statistically significant decline in the probability of participation of women heading their households compared to the reference category of women with only primary education or less. Education up to GCE O' Levels is associated with a larger decline in participation of women heads but the result is not significant. However, education beyond the A' Levels is associated with an increase in the probability of participation although the results are not statistically significant. Thus, the relationship between education and labour force participation for women heading their households indicates a U-curve such as that suggested for India by Klasen and Pieters (2015).

A household's ownership of land has a slightly larger and positive effect on the participation of women heading their households than on the participation of women in male-headed households and the results are statistically significant. These findings recall Emran and Shilpi's (2017) findings that restrictions on the sale of land distributed by the government increased women's labour force participation in local labour markets in Sri Lanka. While the marginal effects of owning farm animals are positive for both groups, the magnitude of the effect is much larger and statistically significant for women in male-headed households. And having tree crops is significantly associated with a decline in the probability that women heading their households participate in the labour market, but the same characteristic is associated with a positive effect on the participation of women in male-headed households though not significant. Thus, the marginal effects on various forms of productive capital other than landholding, suggest that women in male-headed households may be better able to leverage these assets for the purposes of their employment.

TABLE 3— FACTORS ASSOCIATED WITH THE PROBABILITY OF WOMEN HEADING THEIR HOUSEHOLDS AND WOMEN IN MALE-HEADED HOUSEHOLDS, PARTICIPATING IN THE LABOUR FORCE: MARGINAL EFFECTS OF LOGISTIC REGRESSION

	Women heading households		Women in male-headed households	
	Marginal effect	Standard error	Marginal effect	Standard error
Log of expected wage	0.0879*	(0.043)	0.0208	(0.057)
<i>Demographic and household variables</i>				
Age	0.0057	(0.006)	0.0462***	(0.010)
Age squared	-0.0002*	(0.000)	-0.0006***	(0.000)
Share of children less than 5 years	-0.3371*	(0.145)	-0.0551	(0.149)
Share of children between 5 and 15 years	0.0819	(0.076)	0.0738	(0.073)
Share of other adult females	-0.0147	(0.024)	-0.0235	(0.068)
Share of elderly household members (>70 years)	-0.0800	(0.066)	-0.4362	(0.226)
Share of members who are ill	-0.0363	(0.090)	0.2737*	(0.136)
Share of employed males in the household	-0.5137***	(0.072)	-0.4482***	(0.111)
At least one male member in a white collar job	0.0192	(0.044)		
Respondent's father a white collar worker	-0.0107	(0.041)	-0.0570	(0.045)
Housing infrastructure score	-0.0135**	(0.004)	-0.0111	(0.011)
Household receives transfer income	-0.1315***	(0.033)	-0.0197	(0.041)

<i>Husband's characteristics</i>				
Husband's years of education			-0.0033	(0.008)
Employed in a white collar job			0.0916	(0.050)
Employed in the manufacturing sector			0.0039	(0.029)
Employed in the services sector			0.0351	(0.054)
<i>Assets</i>				
In poor health	-0.1697***	(0.020)	-0.0665**	(0.025)
Secondary education	-0.0469*	(0.024)	0.0478	(0.067)
GCE O' Levels	-0.0739	(0.039)	0.0172	(0.065)
GCE A' Levels and more	0.0399	(0.046)	0.1301	(0.094)
Extent of land held by household	0.0039***	(0.001)	0.0020*	(0.001)
Household owns house with deed	0.0178	(0.021)	0.0559	(0.030)
Log of net financial assets held jointly	-0.0007	(0.002)	0.0020	(0.003)
Log of respondent's net financial assets	-0.0001	(0.001)	0.0019	(0.003)
Household has livestock	0.0618	(0.040)	0.1752**	(0.066)
Household has crop trees	-0.0432***	(0.013)	0.0555	(0.033)
Strength of relationships with relatives '	-0.0543***	(0.013)	-0.0293	(0.021)
Strength of relationships with friends '	0.0418**	(0.015)	0.0551*	(0.027)
Respondent is a member of at least one community organization	0.1082***	(0.023)	0.1017*	(0.049)
<i>Spatial variables and connectivity</i>				
Log of per capita share of industrial and construction establishments in DS division	-0.5446	(0.307)	-1.2480***	(0.353)
Log of per capita share of trading establishments in DS division	0.3204*	(0.125)	0.5042**	(0.177)
Log of per capita share of service establishments in DS division	-0.1909	(0.124)	0.1697*	(0.077)
Household owns mechanised transport	-0.0413*	(0.017)	0.0051	(0.036)
Minutes taken to go to the nearest market	0.0012	(0.001)	0.0011*	(0.001)
Minutes taken to go to the Divisional Secretariat	-0.0002	(0.001)	0.0003	(0.000)
Kilinochchi	0.2943***	(0.083)	0.2740	(0.151)
Mullaitivu	0.3762***	(0.063)	0.0564	(0.136)
Mannar	0.6650***	(0.173)	1.1928***	(0.267)
Vavuniya	0.1025	(0.070)	-0.0397	(0.033)
<i>War experiences</i>				
Displaced and stayed in camp	-0.0065	(0.018)	-0.0469	(0.033)
Displaced and stayed with relatives or friends	-0.0379*	(0.018)	-0.0144	(0.039)
Damage to property	-0.0337	(0.025)	0.0420	(0.031)
Loss of employment	0.0227	(0.027)	-0.0523	(0.047)
Loss of assets	0.0337	(0.025)	0.0685	(0.054)
Education disrupted	-0.0428*	(0.021)	0.0147	(0.050)
Other damages due to war	0.0778	(0.051)	-0.0177	(0.098)
<i>Institutions</i>				
Perception of helpfulness of Divisional Secretariat	-0.0317	(0.022)	-0.0279	(0.027)
Perception of helpfulness of Grama Niladhari	0.0190	(0.013)	0.0367	(0.030)
<i>Interventions</i>				
Cash only	-0.0306	(0.047)	0.0948	(0.111)
Direct interventions only	0.0134	(0.035)	-0.0672	(0.047)
Cash and direct interventions only	0.0117	(0.036)	0.1290	(0.073)
Likelihood ratio index (LRI)	0.201		0.160	
Number of observations	2969		920	
Labour force participation rate	0.590		0.378	

Source and notes: Estimated with data from the survey conducted for GrOW Study on Identifying Post-War Economic Growth and Employment Opportunities for Women in Sri Lanka's Northern Province, 2015. Data related to number of establishments from Department of Census and Statistics (2015c). A constant term was included in the model. Reference categories for groups of dummy variables are as follows: Single; Number of children 16 years and older living in household; Primary, secondary and O' Levels (husband's education); Primary or no schooling (principal female respondent's education); Agricultural sector; Jaffna District, Neither cash nor direct interventions. The likelihood ratio index (indicating goodness-of-fit) is defined as $LRI = 1 - (\ln L / \ln L_0)$, where $\ln L$ is the maximal value of the log-likelihood and $\ln L_0$ is the log-likelihood obtained when only a constant term is introduced. ***, **, and * denote statistical significance at the one percent, five percent and ten percent levels respectively. Both models have been clustered at Divisional Secretariat's Division level for robust standard errors and include constants.

Almost all the variables denoting access to social capital are statistically significant predictors of the participation of both groups of women, and the magnitudes of the marginal effects are similar between the two. A strong bond with relatives makes it significantly less likely that the woman

heading her household is engaging in paid work. The marginal effect suggests a reduction in the probability of participation by about 5 percentage points. The social capital denoted by this variable could influence workforce participation both directly and indirectly. Material help from relatives flowing from the strong relationship could obviate the need for the respondent to work. However, strong kinship ties could also subject women to more binding social norms which discourage labour force participation. The corresponding marginal effect in the model denoting the participation of women in male-headed households is not statistically significant. In contrast to the strength of bonds with relatives, the strength of the respondent's relationship with friends has a slightly smaller but positive and significant effect. Its effect for women heading in male-headed households being slightly larger. Compared to both these forms of social capital, membership in organizations is positively and significantly associated with an increase in the probability of participation by about 11 percentage points in both specifications. These results, however, need to be interpreted with some caution as the independent variables could be endogenous.

The marginal effects of the local market variables suggest that a local market with a relatively high density of trading and service sector establishments offer women more opportunities for engaging in livelihood activities. Greater per capita shares of industrial and construction establishments in the community are associated with a decline in participation for both groups but significantly so for women in male-headed households. But an increase in the per capita share of trading establishments is associated with a significant increase in participation for both, but the size of the marginal effect is bigger for women in male-headed households. A greater proportion of service sector establishments in the community is associated with an increase in the probability of participation of women in male-headed households by 17 percentage points. Living in Killinochchi, Mullaitivu or Mannar is significantly associated with workforce participation for women heads compared to otherwise identical women from Jaffna district. The results are positive for women in male-headed households but they are significant only for women living in Mannar.

From among the war-related experiences, only the experience of being displaced and having to live with friends and relatives and the disruption of education of a household member are associated with women heading their households being less likely to participate. Neither of the institutional variables is a significant predictor of women's labour force participation. Participation in livelihood interventions is not significantly associated with the workforce participation of either group of women.

Decomposition of the difference in the probability of participation

This section presents the results of the investigation of the factors underlying the difference in workforce participation of our two groups of respondents. We focus on the aspect of participation gaps that is due to group differences in the distributions of the vector of characteristics. Table 4 presents the results of the Fairlie decomposition based on the coefficients

of a pooled sample. The coefficients were estimated by drawing 1000 random samples with replacement from the larger group of women heads to match the number of women in male-headed households. The sequence of variables was also randomized.

Group differences in the distribution of characteristics explain 29 percent of the difference in participation when the coefficients of male-headed households are used for the decomposition. It explains 34 percent of the negative difference if the coefficients of female-headed households are used. The coefficients of almost all individual characteristics and characteristics related to assets are statistically significant. Spatial variables and the institutional environment are not significant predictors of the gap. While there are slight differences in the sizes of the contributions to the gap by each group of variables, their order in terms of magnitude are identical, regardless of whether the coefficients of women in male-headed households, or coefficients of female-headed households are used for the decomposition.

The biggest driver of differences in workforce participation between the two groups is employment outcomes of male household members, as can be expected. Differences in demographic characteristics, age and age squared, are the next largest contributors, but they do so by helping to reduce the difference. Differences in the health characteristics of the two groups and differences in their receipt of cash or direct transfers also help reduce the gap.

However, from a policy perspective, with the exception of health status, the characteristics that emerged as the most important drivers of participation gaps between the two groups are difficult to address. What remains are the characteristics related to assets. But in order to formulate and target appropriate strategies in relation to these attributes, we need to see their contributions to the probability that women heads, and women in male-headed households, participate. In the next section, we use the Shapley value decomposition to do exactly that.

Shapley value decomposition of the probability of participation

In the Shapley value decomposition, the marginal effects of the independent characteristics on the probability of labour force participation are eliminated one by one and weighted according to the stage of exclusion. The weights are assigned in such a way that all exclusion trajectories have equal weights. The results of this procedure applied to our data are set out in Table 5. The composition of the groups of factors, where different from the order in Table 3, is explained in the note to the table. The second and third columns show the Shapley values derived from the decomposition. The fourth and fifth columns show the results of their application to decompose the log likelihood ratio into contributing groups of factors.

The table shows distinct differences in the contributions of groups of factors to the probability of participation of the two groups of women that can provide information to both prioritise and target policy interventions. As far as women heads of households are concerned, demographic and household-related characteristics, including the productive characteristics of male members together account for more than half the probability that this group of women will participate in

the workforce. In fact, employment characteristics of male members contribute most to the likelihood of participation, accounting for 17 percent of the likelihood ratio whereas for women in male-headed households, access to physical and financial capital appear to matter almost as much. The productive characteristics of male members account for 13 percent of the LRI of this group. Age-related factors contribute almost as much for women heads while health conditions account for 14 percent. The latter is more amenable for policy intervention than either demographic or household characteristics.

TABLE 4—FAIRLIE DECOMPOSITION OF THE DIFFERENCE IN THE PROBABILITY OF PARTICIPATION

Pr (women heads of households)	0.590434	(N=2969)				
Pr (women in male-headed households)	0.378261	(N=920)				
Difference	0.212174					
	At coefficients of women in male-headed households	At coefficients of female-headed households				
	Coefficients	Standard errors	Contribution to total explained %	Coefficients	Standard errors	Contribution to total explained %
Expected wage	-0.0122**	0.004	-19.77	0.0124**	0.004	-17.44
Demographic characteristics	-0.0423***	0.009	-68.45	0.0365***	0.008	-51.35
Household characteristics	0.0004	0.009	0.64	-0.0001	0.009	0.14
Employment characteristics of male members	0.1415***	0.011	229.18	-0.1431***	0.012	201.10
Wealth status of household	0.0029**	0.001	4.69	-0.0032**	0.001	4.52
Receipt of transfers	-0.0153***	0.004	-24.72	0.0160***	0.004	-22.56
Respondent's health	-0.0278***	0.003	-44.96	0.0245***	0.003	-34.45
Respondent's education	0.0061	0.005	9.81	-0.0043	0.005	6.06
Physical and financial capital, livestock and crop trees	-0.0072***	0.002	-11.69	0.0083***	0.002	-11.66
Respondent's social capital	0.0043*	0.002	6.97	-0.0044*	0.003	6.16
Local market conditions and connectivity	0.0109	0.008	17.71	-0.0119	0.008	16.70
District characteristics	0.0009	0.006	1.48	-0.0025	0.006	3.54
War-related experiences	-0.0003	0.001	-0.49	0.0004	0.001	-0.54
Institutional environment	0.0003	0.001	0.48	-0.0003	0.001	0.38
Participation in livelihood interventions	-0.0005	0.001	-0.88	0.0004	0.001	-0.59
Total gap explained	0.0618		100.00	-0.0711		100.00
Unexplained	0.9382			0.9289		

Source and notes: Estimated with data from the survey conducted for GrOW Study on Identifying Post-War Economic Growth and Employment Opportunities for Women in Sri Lanka's Northern Province, 2015. Estimates generated by implementing Jann's (2006) fairlie.ado. See Fairlie (2014) for details of the methodology.

Notes: Grouping of variables where different from Table 3.

Demographic characteristics Age, age squared

Household characteristics, children less than 5 years of age, children between 5 and 15 years, proportion of other adult female household members, proportion of household members who are elderly; proportion of members who are ill; respondent's father employed in a white collar job.

Employment characteristics of male household members: Share of employed males in the household, any male males doing white collar job.

Spatial characteristics: Log of per capita share of industrial and construction establishments in DS division, Log of per capita share of trading establishments in DS division, Log of per capita share of service establishments in DS division, vehicles, distance to market, distance to DS Office.

Districts: Kilinochchi, Mullaitivu, Mannar, Vavuniya.

Other interventions that can help build up the productive assets of both types of households are also likely to bear fruit especially in areas with higher densities of trading and service establishments. This is evident in that the different types of capital and spatial factors together contribute more to the probability of women in male-headed households participating in the labour market than do demographic or household factors. Therefore, from the perspective of encouraging greater workforce participation by this group of women, it may make sense for policy-makers to focus on building productive assets, which women in male-headed households also appear to be better able to leverage (perhaps through the mediation of their husbands) for employment purposes. Although the institutional environment including participation in livelihood interventions appears to contribute relatively more to the probability that women in male-headed households taking up employment, none of the coefficients on which these results are based is significant. The results relating to the institutional environment hence suggest that the kind of institutional support that has been provided for livelihood purposes may not have been effective in achieving their objectives. This issue merits more rigorous investigation in future research.

TABLE 5—SHAPLEY VALUE DECOMPOSITION OF THE PROBABILITY OF LABOUR FORCE PARTICIPATION: MARGINAL CONTRIBUTIONS OF CHARACTERISTICS

	Shapley value		Marginal contribution to probability of participation %	
	Women heads	Women in male-headed households	Women heads	Women in male-headed households
Expected wage	0.0082	0.0056	4.09	3.53
Demographic characteristics	0.0713	0.0006	17.27	12.12
Household characteristics	0.0648	0.0006	12.94	5.88
Employment characteristics of male members	0.0438	0.0026	17.73	13.22
Wealth status of household	0.0042	0.0193	1.53	0.37
Receipt of transfers	0.0020	0.0093	2.28	0.38
Respondent's health	0.0398	0.0210	14.26	1.64
Respondent's education	0.0063	0.0068	2.23	4.27
Physical and financial capital, livestock and crop trees	0.0150	0.0265	5.32	16.66
Respondent's social capital	0.0201	0.0167	7.82	10.54
Local market conditions and connectivity	0.0133	0.0180	6.51	11.36
District characteristics	0.0053	0.0152	2.59	9.57
War-related experiences	0.0089	0.0052	2.81	3.27
Institutional environment	0.0122	0.0114	2.62	7.19
LRI or Total Explained	0.2005	0.1589	100.00	100.00
Residual	0.7995	0.8411		

Source and notes: Estimated with data from the survey conducted for GrOW Study on Identifying Post-War Economic Growth and Employment Opportunities for Women in Sri Lanka's Northern Province, 2015.

Notes: Grouping of variables where different from Table 3.

Demographic characteristics Age, age squared

Household characteristics children less than 5 years of age, children between 5 and 15 years, proportion of other adult female household members, proportion of household members who are elderly; proportion of members who are ill; respondent's father employed in a white collar job.

Employment characteristics of male household members: Share of employed males in the household, any male males doing white collar job.

Spatial characteristics: Log of per capita share of industrial and construction establishments in DS division, Log of per capita share of trading establishments in DS division, Log of per capita share of service establishments in DS division, vehicles, distance to market, distance to DS Office.

Districts: Kilinochchi, Mullaitivu, Mannar, Vavuniya. *Income characteristics*

Institutional factors: Respondent's perception of how helpful the Divisional Secretariat is, how helpful the Grama Niladhari Office (village administration) is, and whether any member of the household participated in livelihood development programmes involving cash only, direct interventions only, or both.

Conclusion

This paper looked at the factors associated with women's workforce participation in Sri Lanka's north after the war using primary data from a survey comparing women heads of household with women in male-headed households. It disaggregated the gap in participation between the two groups into contributing factors using the Fairlie decomposition, and then decomposed the probability of participation of each group into contributing factors using the Shapley value decomposition. Given the nature of the data and the analytical methods that could be applied, we have not been able to establish causality, or correct for endogeneity of variables. Nevertheless, the analysis has identified some key covariates of women's labour force participation in Sri Lanka's north which can help inform policy and suggest directions for future research.

Differences in mean characteristics showed that women heading their households were disadvantaged relative to women in male-headed households along almost all of the dimensions explored in the analysis. Results of the analysis of the probability of workforce participation showed that the participation of women heads was positively and significantly responsive to the expected wage, and negatively and significantly responsive in relation to household's wealth. Additionally, the fact that their participation was not responsive to age suggests that economic distress forced them into paid work regardless of how old or how young they were. Receiving cash or direct transfers obviated this need while having young children held them back from paid work. Poor health, from which women heads seemed to suffer more, was associated with a much larger decline in the probability that they participate in paid work compared to the probability that women in male-headed households participate.

Access to all forms of productive capital other than on landholding are associated with a greater likelihood that women in male-headed households participate, compared to female heads, suggesting that women with husbands may be more capable of leveraging these assets for the purposes of their employment. Almost all of the variables denoting access to social capital were statistically significant predictors of the participation of both groups of women, while a local market with a relatively high density of trading and service sector establishments appeared to offer women more opportunities for engaging in livelihood activities.

The share of employed males in the household was the most powerful predictor of labour force participation for both groups of women – an increase in the share by one unit reducing the likelihood that women heads participate by 51 percentage points, and women in male-headed households by 45 percentage points. In fact, this factor emerged as the biggest driver of the explained difference between the participation rates of the two groups of women, as can be expected. Differences in demographic characteristics also contributed significantly, but by

helping to reduce the difference. Differences in the health characteristics of the two groups and differences in their receipt of cash or direct transfers also help reduce the gap.

The analysis showed that characteristics relating to male family members are of overwhelming importance to women's participation, as well as the differences between the two groups. This not only reflects prevailing social norms, but is also likely to be symptomatic of significant gender differences in the labour market prospects of men and women. Nevertheless, the significant contribution of human capital and other assets to the probability of participation suggests space for policy intervention. Strategies to address the physical and psychological health issues that women heading their households grapple with appear to be critically important. Interventions that help build assets including social capital can have positive impacts. A macroeconomic and investment climate in line with the comparative and competitive advantages of the region that will increase the concentration of trade and service sectors is also likely to make the economic environment more conducive to women entering the workforce in northern Sri Lanka.

Acknowledgements

This research was made possible by the generous financial support of the Growth and Economic Opportunities for Women (GrOW) Programme sponsored by Canada's International Development Research Centre (IDRC), the UK's Department for International Development (DFID) and the William and Flora Hewlett Foundation. The insightful comments of Nisha Arunatilake and two anonymous referees are gratefully acknowledged. Usual disclaimers apply.

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Appendix

Constructing the expected wage variable using the Heckman procedure

In order to impute a value for expected wage for the entire sample, we estimated a standard wage equation with the Heckman selection bias correction (Heckman, 1979) using Maximum Likelihood Estimation (MLE). Following a procedure similar to that followed by Klasen and Pieters (2012), we have regressed monthly nominal wages $\ln_wage$ on a woman's age, its square, education, tenure of the job as well as the skill level, and controlling for sample selection as follows.

$$\ln_wage = \beta_0 + \beta_1 Age_i + \beta_2 Age_i^2 + \beta_3 Education_i + \beta_4 JobTenure_i + \beta_5 Skill_i + \beta_6 \lambda_i + u_i \quad (A1)$$

The selection equation consists of a vector of factors that are likely to influence a woman's ability and willingness to take up paid employment such as her health and family situation, her social status, and the strength of social networks, as well as the availability of livelihood assistance programmes. These variables are a subset of those used in equation (1) as we excluded those variables that prevented the estimation from converging. Thus, for all women in the sample, the expected wage used in the participation equation is a linear prediction of equation A1, without the sample selection term. The results for the wage equation and selection equation are presented in Table A1.

The results show that having small children or elderly people in the household and being resident in the Mullaitivu district makes it significantly unlikely for women to be in the labour force, while having older children or a higher share of employed men in the household are statistically significantly associated with the probability of taking part in paid work. The wage equation portion shows that age, education up to Advanced Level or more as well as a permanent or temporary job (compared to a casual job) is associated with higher expected wages. However, age squared is negatively associated with expected wages.

TABLE A1— RESULTS OF THE HECKMAN PROCEDURE TO IMPUTE EXPECTED WAGE RATES: WAGE EQUATION ESTIMATION RESULTS

Log of wage	Coefficients	Robust SE
<i>Demographic variables</i>		
Age	0.0378**	(0.0152)
Age squared	-0.0005***	(0.0002)
<i>Educational variables</i>		
Secondary education	-0.0507	(0.0901)
GCE O' Levels	-0.0335	(0.0588)
GCE A' Levels and more	0.2557*	(0.1392)
<i>Job status variables</i>		
Permanent job	1.0595***	(0.1738)
Temporary job	0.3716***	(0.0631)
Low skill	0.0106	(0.0848)

Constant	8.2278***	(0.2597)
Fisher's z transformed correlation	-17.0982***	(0.0971)
Natural logarithm of the standard deviation of the residual of the wage equation	-0.4909***	(0.0589)

Note: Dependent variable is log of monthly wages. Education variables: reference - primary education; job status variables: reference - casual job. The model has been clustered at Divisional Secretariat's Divisional level for robust standard errors. Standard errors are in brackets, significance levels: *p<.10; **p<.05; ***p<.01

TABLE A2— RESULTS OF THE HECKMAN PROCEDURE TO IMPUTE EXPECTED WAGE RATES: SELECTION EQUATION, ESTIMATION RESULTS

Employed	Coefficients	Robust SE
<i>Demographic and household variables</i>		
Share of children less than 5 years	-1.0299***	(0.3624)
Share of children between 5 and 15 years	0.3483***	(0.1138)
Share of other adult females	-0.2081	(0.2556)
Share of elderly household members (>70 years)	-1.2657*	(0.7435)
Share of members who are ill	0.5022	(1.0547)
Share of employed males in the household	1.3245***	(0.2073)
<i>Assets</i>		
Log of net financial assets held jointly	-0.0194	(0.0123)
Log of respondent's net financial assets	0.0013	(0.0085)
<i>Spatial variables and connectivity</i>		
Mullaitivu	-0.5610***	(0.0452)
<i>Institutions</i>		
Perception of helpfulness of the Divisional Secretariat	0.0351	(0.0779)
<i>Interventions</i>		
Cash only	-0.187	(0.3406)
Constant	1.4231***	(0.2428)
N	513	

Note: Table shows estimated logit coefficients, with robust standard errors in brackets. Significance levels: *p<.10; **p<.05; ***p<.01

Robustness analysis of the labour force participation equation

In order to test the robustness of the results to the addition or omission of different variables, we have followed the procedure developed by Barslund et al (2007). Although Young and Holsteen (2017) have proposed a newer approach to robustness testing, we have not been able to apply it to our statistical model it would be too computationally demanding given the large number of explanatory variables.

The core variables are individual and household level characteristics, which number 36 for the model for female-headed households and 41 for male-headed households. The 12 secondary variables in both models include the district in which the respondents lived, the concentration of economic activities in the regions, the helpfulness of the institutional environment, and whether they took part in livelihood intervention programmes.

Results for the model relating to female heads of households are presented in Table A3 and Table A4 presents the results for the women in households headed by males. Columns 1 to 3 show the maximum, minimum and average point estimates respectively of all possible

regressions. Column 5 shows the share of regressions where the point estimate is significant at the 5 percent level, while Columns 6 and 7 show the share of positive and negative point estimates, respectively.

The core variables in the model of female-headed households appear to be the most robust. The majority of the variables do not change sign in any combination with the secondary variables. However, only nine of the core variables are always significant at the 5 percent significance level. Nevertheless, ten more core variables are on average significant at the 10 percent significance level. The results of the secondary variables are more mixed. Only three of them retain the same sign in all regressions, and none of the variables are significant at the 5 percent critical level.

In contrast, the model of estimated with the group of women in male-headed households appears much less robust. Although the majority of the core variables retain the same sign in all regressions, only 5 of them are significant at the 5 percent level. None of the secondary variables is significant at the 5 percent level.

TABLE A3— RESULTS OF ROBUSTNESS CHECKS: FACTORS ASSOCIATED WITH THE LABOUR FORCE PARTICIPATION OF WOMEN HEADING THEIR HOUSEHOLDS

Core variables	Max	Min	Mean	AvgSTD	PercSigni	Perc+	Perc-	AvgT	Obs
Log of expected wage	0.5355	0.4770	0.5017	0.2616	0.3621	1.0000	0.0000	1.9197	4096
Age	0.0422	0.0283	0.0347	0.0348	0.0000	1.0000	0.0000	1.0028	4096
Age squared	(0.0008)	(0.0009)	(0.0009)	0.0003	1.0000	0.0000	1.0000	2.5748	4096
Secondary education	(0.2135)	(0.2610)	(0.2292)	0.1275	0.0449	0.0000	1.0000	1.7988	4096
GCE O' Levels	(0.3617)	(0.4097)	(0.3772)	0.2069	0.0078	0.0000	1.0000	1.8229	4096
GCE A' Levels and more	0.2211	0.1512	0.1890	0.2663	0.0000	1.0000	0.0000	0.7097	4096
In poor health	(0.8199)	(0.9300)	(0.8567)	0.1028	1.0000	0.0000	1.0000	8.3562	4096
Share of children less than 5 years	(1.6432)	(1.8777)	(1.7147)	0.8455	0.9321	0.0000	1.0000	2.0286	4096
Share of children between 5 and 15 years	0.5653	0.4168	0.5052	0.4297	0.0000	1.0000	0.0000	1.1748	4096
Share of other adult females	(0.0547)	(0.1061)	(0.0829)	0.1337	0.0000	0.0000	1.0000	0.6199	4096
Share of elderly household members (>70 years)	(0.2857)	(0.4636)	(0.3544)	0.3925	0.0000	0.0000	1.0000	0.9117	4096
Share of members who are ill	(0.1736)	(0.2935)	(0.2417)	0.4919	0.0000	0.0000	1.0000	0.4909	4096
Share of employed males in the household	(2.6982)	(2.8130)	(2.7472)	0.3988	1.0000	0.0000	1.0000	6.8893	4096
At least one male member in a white collar job	0.1139	0.0668	0.0923	0.2351	0.0000	1.0000	0.0000	0.3927	4096
Respondent's father a white collar worker	(0.0325)	(0.0755)	(0.0550)	0.2208	0.0000	0.0000	1.0000	0.2495	4096
Housing infrastructure score	(0.0628)	(0.0849)	(0.0762)	0.0213	1.0000	0.0000	1.0000	3.5936	4096
Household receives transfer income	(0.6418)	(0.7495)	(0.6901)	0.1858	1.0000	0.0000	1.0000	3.7203	4096
Extent of land held by household	0.0271	0.0210	0.0248	0.0060	1.0000	1.0000	0.0000	4.1275	4096
Household owns house with deed	0.1561	0.0644	0.1139	0.1012	0.0000	1.0000	0.0000	1.1453	4096
Log of net financial assets held jointly	0.0026	(0.0066)	(0.0014)	0.0132	0.0000	0.3333	0.6667	0.1685	4096
Log of respondent's net financial assets	0.0072	(0.0009)	0.0051	0.0062	0.0000	0.9883	0.0117	0.8149	4096
Household has livestock	0.6035	0.3302	0.4527	0.1671	0.7493	1.0000	0.0000	2.9147	4096
Household has crop trees	(0.1316)	(0.2438)	(0.1722)	0.0761	0.8354	0.0000	1.0000	2.2762	4096
Strength of relationships with relatives '	(0.2827)	(0.3359)	(0.3128)	0.0740	1.0000	0.0000	1.0000	4.2300	4096
Strength of relationships with friends '	0.2515	0.2116	0.2326	0.0857	1.0000	1.0000	0.0000	2.7191	4096
Respondent is a member of at least one community organization	0.6613	0.5582	0.6259	0.1429	1.0000	1.0000	0.0000	4.3904	4096
Household owns mechanised transport	(0.1941)	(0.2372)	(0.2119)	0.1082	0.5056	0.0000	1.0000	1.9679	4096
Minutes taken to go to the nearest market	0.0095	0.0058	0.0084	0.0047	0.0916	1.0000	0.0000	1.7901	4096
Minutes taken to go to the Divisional Secretariat	0.0007	(0.0023)	(0.0011)	0.0042	0.0000	0.1450	0.8550	0.2742	4096
Displaced and stayed in camp	0.1022	(0.0764)	0.0168	0.1104	0.0000	0.6465	0.3535	0.2606	4096
Displaced and stayed with relatives or friends	(0.1473)	(0.2637)	(0.2045)	0.0952	0.7583	0.0000	1.0000	2.1518	4096
Damage to property	(0.1525)	(0.2435)	(0.2022)	0.1529	0.0000	0.0000	1.0000	1.3268	4096
Loss of employment	0.2313	0.0737	0.1499	0.1612	0.0000	1.0000	0.0000	0.9350	4096
Loss of assets	0.2438	0.0184	0.0991	0.1544	0.0000	1.0000	0.0000	0.6515	4096
Education disrupted	(0.1694)	(0.2774)	(0.2267)	0.1005	0.8430	0.0000	1.0000	2.2668	4096
Other damages due to war	0.6163	0.3049	0.4295	0.2910	0.0034	1.0000	0.0000	1.4765	4096
Secondary variables	Max	Min	Mean	AvgSTD	PercSigni	Perc+	Perc-	AvgT	Obs
Kilinochchi	2.1406	(0.3977)	0.1755	0.2248	0.1216	0.6860	0.3140	0.9033	2048
Mullaitivu	2.1070	0.1158	0.5767	0.3101	0.3076	1.0000	0.0000	1.7096	2048
Mannar	4.5397	(0.3043)	0.5311	0.5588	0.0947	0.6895	0.3105	0.8473	2048
Vavuniya	0.6527	(0.2218)	0.0351	0.3333	0.0000	0.4097	0.5903	0.5916	2048
Log of per capita share of industrial and construction establishments in DS division	1.3412	(4.9941)	(0.0279)	0.6083	0.1177	0.6870	0.3130	1.0576	2048
Log of per capita share of trading establishments in DS division	2.4839	(0.0532)	0.4820	0.3352	0.1885	0.9922	0.0078	1.5330	2048
Log of per capita share of service establishments in DS division	(0.1955)	(1.7603)	(0.7995)	0.5219	0.1724	0.0000	1.0000	1.5099	2048

Perception of helpfulness of Divisional Secretariat	(0.0298)	(0.1716)	(0.0942)	0.1178	0.0000	0.0000	1.0000	0.7966	2048
Perception of helpfulness of <i>Grama Niladhari</i>	0.1232	(0.0479)	0.0443	0.0860	0.0000	0.7798	0.2202	0.6524	2048
Cash only	0.2477	(0.2399)	(0.0467)	0.2301	0.0000	0.2427	0.7573	0.3858	2048
Direct interventions only	0.1286	(0.1669)	0.0049	0.1795	0.0000	0.5830	0.4170	0.4085	2048
Cash and direct interventions only	0.5616	(0.0474)	0.2285	0.2100	0.0449	0.9941	0.0059	1.0916	2048

Source and notes: Estimated with data from the survey conducted for GrOW Study on Identifying Post-War Economic Growth and Employment Opportunities for Women in Sri Lanka's Northern Province, 2015. Estimates generated implementing Barslund et al.'s (2007) checkrob.do. See Barslund et al. (2007) for details of the methodology.

TABLE A4— RESULTS OF ROBUSTNESS CHECKS: FACTORS ASSOCIATED WITH THE LABOUR FORCE PARTICIPATION OF WOMEN IN MALE-HEADED HOUSEHOLDS

Core variables	Max	Min	Mean	AvgSTD	PercSigni	Perc+	Perc-	AvgT	Obs
Log of expected wage	0.2045	0.1091	0.1662	0.3401	0.0000	1.0000	0.0000	0.4889	4096
Age	0.2559	0.2375	0.2460	0.0602	1.0000	1.0000	0.0000	4.0865	4096
Age squared	(0.0028)	(0.0031)	(0.0029)	0.0007	1.0000	0.0000	1.0000	4.0991	4096
Secondary education	0.3268	0.2215	0.2828	0.3546	0.0000	1.0000	0.0000	0.7976	4096
GCE O' Levels	0.1384	0.0551	0.1088	0.3489	0.0000	1.0000	0.0000	0.3115	4096
GCE A' Levels and more	0.7939	0.6141	0.6866	0.5066	0.0000	1.0000	0.0000	1.3557	4096
In poor health	(0.2497)	(0.4476)	(0.3537)	0.1395	0.9348	0.0000	1.0000	2.5733	4096
Share of children less than 5 years	(0.1806)	(0.4343)	(0.3032)	0.7948	0.0000	0.0000	1.0000	0.3817	4096
Share of children between 5 and 15 years	0.4979	0.1284	0.2804	0.4064	0.0000	1.0000	0.0000	0.6902	4096
Share of other adult females	0.0009	(0.2434)	(0.0823)	0.3484	0.0000	0.0005	0.9995	0.2370	4096
Share of elderly household members (>70 years)	(1.3006)	(2.3886)	(1.8035)	1.2327	0.0037	0.0000	1.0000	1.4698	4096
Share of members who are ill	1.8313	1.3317	1.5783	0.7592	0.7537	1.0000	0.0000	2.0831	4096
Share of employed males in the household	(2.2138)	(2.4029)	(2.3089)	0.6169	1.0000	0.0000	1.0000	3.7451	4096
Respondent's father a white collar worker	(0.2676)	(0.3510)	(0.3070)	0.2345	0.0000	0.0000	1.0000	1.3113	4096
Husband's years of education	(0.0096)	(0.0226)	(0.0155)	0.0430	0.0000	0.0000	1.0000	0.3596	4096
Husband employed in a white collar job	0.5220	0.4429	0.4828	0.2742	0.0000	1.0000	0.0000	1.7614	4096
Husband employed in the manufacturing sector	0.0389	(0.0545)	(0.0150)	0.1622	0.0000	0.1877	0.8123	0.1159	4096
Husband employed in the services sector	0.1790	0.0885	0.1271	0.2772	0.0000	1.0000	0.0000	0.4585	4096
Housing infrastructure score	(0.0558)	(0.0816)	(0.0688)	0.0562	0.0000	0.0000	1.0000	1.2265	4096
Household receives transfer income	(0.0539)	(0.1697)	(0.1168)	0.1949	0.0000	0.0000	1.0000	0.6021	4096
Extent of land held by household	0.0133	0.0066	0.0099	0.0053	0.3647	1.0000	0.0000	1.8604	4096
Household owns house with deed	0.4503	0.2798	0.3751	0.1643	0.8911	1.0000	0.0000	2.2925	4096
Log of net financial assets held jointly	0.0141	(0.0012)	0.0060	0.0166	0.0000	0.9924	0.0076	0.3701	4096
Log of respondent's net financial assets	0.0157	0.0077	0.0125	0.0164	0.0000	1.0000	0.0000	0.7568	4096
Household has livestock	1.4651	0.5658	0.8737	0.2392	1.0000	1.0000	0.0000	3.8229	4096
Household has crop trees	0.3815	0.2601	0.3186	0.1834	0.1345	1.0000	0.0000	1.7415	4096
Strength of relationships with relatives ‘	(0.0474)	(0.1831)	(0.0947)	0.0991	0.0000	0.0000	1.0000	0.9554	4096
Strength of relationships with friends ‘	0.3009	0.2365	0.2673	0.1360	0.5247	1.0000	0.0000	1.9733	4096
Respondent is a member of at least one community organization	0.7164	0.5256	0.6448	0.2547	1.0000	1.0000	0.0000	2.5382	4096
Household owns mechanised transport	0.0418	(0.0844)	(0.0239)	0.1882	0.0000	0.1401	0.8599	0.1444	4096
Minutes taken to go to the nearest market	0.0098	0.0050	0.0082	0.0033	0.9709	1.0000	0.0000	2.5052	4096
Minutes taken to go to the Divisional Secretariat	0.0026	0.0010	0.0016	0.0015	0.0000	1.0000	0.0000	1.0995	4096
Displaced and stayed in camp	0.0344	(0.2921)	(0.1385)	0.1987	0.0000	0.0229	0.9771	0.7482	4096
Displaced and stayed with relatives or friends	0.1651	(0.0981)	0.0477	0.2014	0.0000	0.7708	0.2292	0.3138	4096
Damage to property	0.254	0.074	0.145	0.147	0.000	1.000	0.000	0.984	4096
Loss of employment	(0.2323)	(0.4755)	(0.3711)	0.2726	0.0000	0.0000	1.0000	1.3600	4096
Loss of assets	0.3995	0.1158	0.2348	0.2715	0.0000	1.0000	0.0000	0.8702	4096
Education disrupted	0.1928	(0.0451)	0.0641	0.2620	0.0000	0.8899	0.1101	0.2618	4096
Other damages due to war	0.1635	(0.2688)	(0.0895)	0.5100	0.0000	0.0972	0.9028	0.1927	4096
Secondary variables	Max	Min	Mean	AvgSTD	PercSigni	Perc+	Perc-	AvgT	Obs
Kilinochchi	2.6383	(1.2881)	(0.0094)	0.3695	0.1592	0.5093	0.4907	1.1385	2048
Mullaitivu	1.4691	(1.8176)	(0.5962)	0.3713	0.5239	0.0688	0.9312	2.0613	2048
Mannar	6.9844	0.7244	2.1733	0.6161	0.9658	1.0000	0.0000	3.5546	2048
Vavuniya	0.3405	(0.5804)	(0.1558)	0.3023	0.0273	0.2251	0.7749	0.7500	2048
Log of per capita share of industrial and construction	1.5391	(7.4117)	(0.8112)	0.7138	0.2939	0.5000	0.5000	1.8524	2048

establishments in DS division									
Log of per capita share of trading establishments in DS division	2.9967	(0.5477)	0.3845	0.5038	0.1982	0.6128	0.3872	0.9084	2048
Log of per capita share of service establishments in DS division	1.0770	(1.0186)	(0.1842)	0.4699	0.1392	0.3760	0.6240	1.0454	2048
Perception of helpfulness of Divisional Secretariat	0.0868	(0.2118)	(0.0706)	0.1288	0.0000	0.3687	0.6313	0.7297	2048
Perception of helpfulness of Grama Niladhari	0.3042	0.0536	0.1881	0.1355	0.0103	1.0000	0.0000	1.3536	2048
Cash only	0.9530	(0.2412)	0.2012	0.4703	0.0000	0.7178	0.2822	0.4993	2048
Direct interventions only	(0.2439)	(0.9051)	(0.4753)	0.2563	0.3506	0.0000	1.0000	1.8693	2048
Cash and direct interventions only	1.4228	(0.3885)	0.3879	0.3440	0.2524	0.8262	0.1738	1.2552	2048

Source and notes: Estimated with data from the survey conducted for GrOW Study on Identifying Post-War Economic Growth and Employment Opportunities for Women in Sri Lanka's Northern Province, 2015. Estimates generated implementing Barslund et al.'s (2007) checkrob.do. See Barslund et al. (2007) for details of the methodology.

Funding acknowledgement

This work was carried out with financial support under the *Growth and Economic Opportunities for Women* (GrOW) initiative. GrOW is a multi-funder partnership with the UK Government's Department for International Development, the William and Flora Hewlett Foundation, and Canada's International Development Research Centre. The views and opinions stated in this paper are those of the authors and do not necessarily reflect the views of the GrOW program or funding partners.