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# Falling behind in school: Mother's economic empowerment and its association with children's grade progression in Malawi

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## ABSTRACT

Malawi has experienced slow and uneven progress in school progression and completion rates, thus there is need to rethink the approaches needed for reforming education systems. Mothers are more likely to invest in children's nutrition and well-being and take primary responsibility for children's education. However, the association between women's economic empowerment and their offspring's school progression rates is not systematically understood in Malawi, or elsewhere. We investigate how economic empowerment of mothers is associated with children's progression through grades at appropriate ages. Using the 2016/17 Malawi Integrated Household Survey data, we show that women's economic empowerment is positively associated with being on-time for grade, with a steeper slope for girls than boys, particularly at secondary school level. The stronger association for girls in secondary school, who otherwise typically experience a higher risk of dropping out of school than boys, implies higher education attainment, and probably lower teen pregnancies and early marriage. We conclude that investment in women's economic empowerment can significantly enhance school progression and completion rates and can contribute to human capital development and poverty reduction in Malawi and elsewhere in sub-Saharan Africa.

## 1. Introduction

Women's economic empowerment (WEE) is a process enabling women to access economic resources and have economic agency (Golla et al., 2011). It has attracted high-level policy interest in recent years, and is recognized as an essential catalyst for human and economic development. WEE is also integral to each of the 17 Sustainable Development Goals (SDGs) (United Nations, 2016), especially playing a critical role in improving children's education and health outcomes. Mothers often devote more time to children than fathers (Ceka and Murati, 2016; Tansel, 1997). Yet, little is known about how WEE improves education outcomes of children particularly in sub-Saharan Africa.

Most studies focus on women's empowerment at a more general level addressing a range of dimensions including economic, social, political and psychological influences on outcomes measures such as child health (Abreha et al., 2020; Izraelov and Silber, 2019; Pratley, 2016; Santoso et al., 2019; Yaya et al., 2020). However, a few studies have explored the association between women's empowerment and children's education

outcomes. Evidence from research studies show an association between women's empowerment and increased access to education and higher literacy scores among all children, as well as a reduced gender gap in education outcomes (Afridi, 2010; Hatlebakk and Yogendra, 2016; Malapit et al., 2019). Other studies show that girls are disadvantaged in terms of education access and attainment compared to boys, if their mothers are less empowered (Delprato, 2023; Frola et al., 2024).

It is not clear which aspects of empowerment are key to explaining children's education outcomes. We reckon economic empowerment plays a key role, because it not only increases women's autonomy in decision-making, but also provides women with economic resources thus enabling them to provide tuition fees and school supplies including uniform and stationery (Buvinic et al., 2020a,b; Golla et al., 2011). It is in this context WEE warrants a study of its own, as the inclusion of economic indicators in overall empowerment measurement is often limited, leaving aside key indicators such as economic agency. The existing evidence focuses on individual indicators which are typically included in measuring economic empowerment, such as employment, education attainment, and asset ownership, and their links to children's

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education outcomes are rather mixed (Baum, 2004; Chevalier et al., 2013; Dunifon et al., 2013; Hendrick and Marteleto, 2017; Zhan and Sherraden, 2003). Further, there is little understanding of the gendered associations between women's economic empowerment and education outcomes of daughters versus sons especially in a high fertility African context.

Because WEE is a multidimensional concept, an aggregate score provides a more meaningful measure than individual indicators (Buvinic et al., 2020a,b). Focusing on a single indicator overlooks feedback loops between and among various indicators underlying WEE and its relationships with other factors at the household or societal level.

In this research, we focus on school grade progression at appropriate ages (being on-time for grade). Students are considered to be on-time for grade if they are at most one year older than the official age for their grade, and over-age if they are two or more years older (UNESCO Institute for Statistics, 2004). Being on-time for grade is an outcome of an accumulation of factors including enrolling on time, continued school attendance, and good performance to allow promotion from one grade to the next. It represents school completion and prepares children for life transitions, including higher education and the job market or negative outcomes such as drop-out of schools (Lewin, 2007; Sunny et al., 2017). This is particularly relevant in societies which give preference to boys' schooling and promote early marriage for girls. Over-age for grade may mean that puberty starts while a girl is still in primary school thus increasing the likelihood of pregnancy and/or marriage. Had they progressed at the appropriate age for grade, their primary completion rates would likely increase and gender differences in school completion up to age 14 would narrow (Lewin, 2009).

There are many studies on enrolment rates, attendance rates, and measures to improve educational outcomes in young children (Ganimian and Murnane, 2016; Kamanda and Sankoh, 2015; Roby et al., 2016). The literature on grade progression, including age-for-grade heterogeneity, and measures to improve congruence is however patchy and limited (Hossain, 2010; Kamanda and Sankoh, 2015). There is little attention being paid to how children progress in the education system once they enter school (Lewin, 2007). Enabling universal access must entail strategies to improving age-grade congruence. We hypothesize that economic empowerment of mothers may positively influence the age-grade congruence due to the mechanisms described above and thus reduce education exclusion. The goal of this research is to examine the association between WEE and children's timely progression through grades in Malawi. To the best of our knowledge, no studies have systematically explored the role of WEE in improving age-grade congruency.

Malawi offers an interesting perspective for various reasons. First, it is among the poorest countries globally characterized by low human capital development, poor access to education with low transition rates to secondary and tertiary levels, and low completion rates at both primary and secondary levels (Chimombo, 2009, 2005; Ravishankar et al., 2016). Second, more than a third of households (35 %) are headed by women (National Statistical Office 2019a), which is a higher percentage than in the region in general (28 %) and implies more economic independence. Third, about four in ten women solely own land, which is among the highest in Africa (ICF, 2021), which also increases economic empowerment. Fourth, Malawi has a dual lineage system (matrilineal or patrilineal), which presents an opportunity to understand how WEE varies under these different family systems.

The factors that operate at the household level are key to enabling WEE. Household heads usually control and make economic decisions, even if they may not be a sole decision-maker (Djurfeldt et al., 2018). Given the relatively high representation of female-headed households, we believe women in Malawi have such decision-making powers. Secondly, asset ownership, particularly land, is associated with high bargaining and decision-making power at the household level (Behrman, 2017; Kabeer, 2011; Williams et al., 2022). Land is identified as a basic source of women's survival and economic advancement, providing a

more stable financial resource than liquid assets such as livestock (Rehman et al., 2019). Finally, women in matrilineal communities are often more autonomous than those in patrilineal communities because they have access to land and have more control over household labor decisions (Lowes, 2018).

## 2. Background

### 2.1. Children's access to and progress in education

Access to education is one of the salient features of economic growth and development (Barro, 2013; Ozturk, 2001; Tilak, 1989; World Bank, 2018), and its underlying influence on sustainable development is addressed in the SDG 4 on inclusive and equitable education. Enrolment, regular attendance, timely progression through grades, transition to higher levels of education and meaningful, appropriate-for-age learning are key indicators of education access (Lewin, 2007). School enrolment rates, particularly in basic primary education have increased consistently across all global regions, including in sub-Saharan Africa (SSA), where net enrolment rates in primary school increased from 53 % in 1990 to 78 % in 2018 (World Bank, 2022).

Continuity in school attendance, completion and transition to higher levels, however, remain low in many SSA countries, hampered by year or grade repetition and (temporary) withdrawal and drop-out from school (Roser and Ortiz-Ospina, 2016). One in five children of primary school age in Africa remain out of school, one in three children do not complete primary school on time and one in four never complete it (UNESCO et al., 2022).

The Consortium for Research on Educational Access, Transitions and Equity (CREATE) model of educational access identifies six zones of exclusion, with access to education presented as a continuum from pre-school until the end of secondary education (Lewin, 2007). These zones of exclusion are illustrated in Table 1 (Lewin, 2007). Thus, for education to be universal, simply enrolling a child into school is inadequate. Children must also be able to regularly attend school, progress from one grade to the next, and complete a full course of primary and secondary education at the appropriate age-for grade.

Children who are older than expected for their grade have a greater probability of drop-out and non-completion, and experience lower achievement than those on track (Taylor et al., 2010). Although grade progression at appropriate ages is fundamental to reducing education exclusion, there is little evidence on how grade progression is influenced by WEE and related household characteristics (Sunny et al., 2017).

### 2.2. Education context in Malawi

Education attainment is generally low in Malawi, with those aged 25 and older having received on average only 4.6 years of schooling (National Statistical Office 2019a; United Nations Development

**Table 1**

Zones of exclusion for educational access among children of school-age as defined by Consortium for Research on Educational Access, Transition, and Equity (CREATE).

Zones of Exclusion	Description
Zone 0	No pre-school access
Zone 1	Children who never enroll in school
Zone 2	Primary school dropouts
Zone 3	Children who are older for their grade, irregular attenders, and low achievers at primary level who are 'silently excluded' and learn little
Zone 4	Primary leavers not entering secondary school
Zone 5	Secondary dropouts
Zone 6	Children who are older for their grade, irregular attenders, and low achievers and those 'silently excluded' at secondary level

Source: Adapted from Lewin (2007): page 22.

Programme, 2020). This is partly due to many children being older than expected for their grade. The official school entry age is six years, but one in three grade one entrants were older than the expected age in 2021 (Ministry of Education, 2021, 2022). Moreover, one in three girls enrolled in the last grade of primary school in Malawi were aged 14–17 years instead of the expected 13 years, while almost two thirds of girls in the last grade of secondary school were aged 18–23 years instead of 17 (Ministry of Education, 2022; UNESCO Institute for Statistics, 2012). In 2020, about 43 % of girls and 52 % of boys in primary school were older for their grades, while the corresponding figures for secondary school grades were 48 % and 67 % for girls and boys, respectively (National Statistical Office, 2021).

In the same year, 85 % of secondary school age children (14–17 years) were out of school, compared to 10 % at primary school ages (Ministry of Education, 2021). Other problems during educational journeys include class repetition, which is very prevalent and has increased since 2011. Only 19 % of students in Malawi proceed from grade 1 to grade 8 without repeating a year (Ravishankar et al., 2016), which is dismally low when compared to other African countries.

The school completion rates are also low. Between 2018 and 2022, primary school completion rate increased from 52 % to 56 %, although the trend was not linear (Ministry of Education, 2022). Of those who completed primary school, about 43 % transitioned to secondary school but only 19.4 % of these completed this level. Among those who completed, 8 % transitioned from secondary school to tertiary education, and men represented 15 %-points more than women (Ministry of Education, 2021, 2022; Ministry of Education Science and Technology, 2016, 2018). This shows that many children are left behind in the education system in Malawi. Both quality and access to education remain major challenges in Malawi, but the magnitude of exclusion is far greater at secondary school than at primary level.

### 2.3. WEE and children's education outcomes: a conceptual framework

Examining the importance of WEE on children's education outcomes in a context of a low-income country with overall poor education outcomes provides an opportunity for rethinking education policies and sector prioritisation. Based on the existing literature, we developed a conceptual framework to understand the pathways through which WEE can influence being on-time for grade, which is discussed below.

We expanded Mayra et al.'s (2020) framework which shows the multi-dimensional nature of WEE, and the combination of both direct and indirect measures of economic opportunities and women's capabilities to expand their agency, eventually leading to economic empowerment. Economic empowerment entails access to economic resources such as money and financial inclusion, production assets, and employment, among others. These interact with women's capabilities including education attainment, self-confidence, among others, to increase financial autonomy, autonomy in household decision-making, and her social capital.

Mothers are typically more likely than fathers to invest in children's wellbeing, including their education and health (Dasgupta and Mani, 2015; World Bank, 2012). In addition, mothers often spend more time with children than fathers, thus more heavily influencing their developmental and cognitive outcomes (Kotila et al., 2013; Tansel, 1997). A recent survey in Malawi reported that 62 % and 58 % of children read or were read to at home, and were receiving help with homework, respectively. The survey also reported that 12 % of mothers compared to 2 % of fathers were engaged in activities to support learning and school readiness (National Statistical Office, 2021). Given this evidence, it is worth exploring whether children whose mothers are economically empowered have better education outcomes than those with less economically empowered mothers.

Few studies in LMICs have examined the association between WEE indicators and school enrolment or attendance, while studies on grade progression are almost nonexistent. Generally, higher levels of

autonomy in maternal decision-making within the household and maternal education attainment are positively associated with better primary and secondary school enrolment rates of children (Gebremedhin and Mohanty, 2016; Glick and Sahn, 2000; Kabubo-mariara and Mwabu, 2007; Luz and Agadjanian, 2015; Pufall et al., 2016) and progress through grades at appropriate ages (Gebremedhin and Mohanty, 2016), particularly among girls. In Malawi, however, the association between maternal autonomy in decision-making was stronger for sons than daughters, although girls in matrilineal households showed higher school attendance than boys (Boccia and Mazzotta, 2018).

Maternal employment and financial inclusion and autonomy including access to credit is mostly associated with negative school outcomes, particularly among girls (Adjei et al., 2009; Barnes et al., 2001; Batinge, 2018; Egyir, 2010; Glick, 2002; Lokshin et al., 2000; Peprah, 2018; Shimamura and Lastarria-Cornhiel, 2010). This is because girls, especially older girls, are more likely to substitute their mother's chores in the household or take up small business enterprises managed by mothers. In Malawi, access to credit was associated with delayed primary school enrolment for girls, as well as slower school progression, and grade repetition was more frequent for boys at the primary level when compared to secondary level (Shimamura and Lastarria-Cornhiel, 2010).

The association between women's ownership of assets and children's education outcomes has not been systematically investigated. Maternal ownership of land, house and/or livestock increased the odds of children's school enrolment and attendance, with higher school enrolment among girls than boys (Fafchamps et al., 2009; Gebremedhin and Mohanty, 2016).

In light of this evidence, we propose that WEE influences education outcomes through three main intermediate outcomes: 1) provision of school resources and supplies; 2) mothers' ability to make decisions on how resources are used and deciding to use that for children's education, and 3) enhancing learning motivation and aspirations. An increase in influence of women on household's financial decisions may increase resource allocation to school needs and decisions to enroll children, particularly girls, in school (de Hoop et al., 2018; Hendrick and Marteleto, 2017; Luz and Agadjanian, 2015). Similarly, having an income coupled with financial autonomy may enable mothers to meet financial costs of school, improving the likelihood of children attending and remaining in school (Cooper and Stewart, 2021). In addition, WEE may safeguard children in poor households from temporary dropping out of school to work or to support the household, because economically empowered women may be more likely to value education and prompt them to ensure their children stay in school. These intermediate outcomes, in turn, can influence children's grade progression, increasing the likelihood of being on-time for grade.

Other mechanisms through which WEE may influence education outcomes is through maternal education attainment that increases her vocabulary thus stimulating children's cognitive development. Maternal social networks may help in accessing information that can influence children's education (Harding et al., 2015). The individuals in these networks may also act as role models, thus socializing children to aim to excel in school (Miller et al., 2001). Notably, these pathways are inter-related, and the temporal order in which they influence each other is unclear.

These mechanisms are affected by both structural and social factors at the societal and household level, and by the socio-demographic characteristics of the families. Important social and structural factors include prevailing social, cultural and gender norms around education access, the education laws, regulations and policies, school factors, and gender discrimination (Moyi, 2010; Palardy, 2008; Sarkar, 2014). Relevant household factors include socio-economic status (Filmer and Pritchett, 1999; Li and Qiu, 2018; Moyi, 2010; Sirin, 2005; Sunny et al., 2017); family size (Downey, 1995; Farah, 2016; Patrinos and Psacharopoulos, 1997); and place of residence (Fentiman et al., 1999; Moyi, 2010; Sunny et al., 2017). Moreover, children in female-headed

households are more likely to have higher education attainment compared to those headed by men (Bammeke, 2010; Bose-Duker et al., 2020; Lloyd and Blanc, 1996). Relevant child-level factors include age and gender (Fentiman et al., 1999; Moyi, 2010; Sunny et al., 2017; Wils, 2004), health (Fentiman et al., 1999; Sridhar, 2008), and cognitive development (Bruwer et al., 2014; UNICEF 2012a, 2012b).

The conceptual diagram in Fig. 1 shows how WEE may influence being on-time for grade and also the household and societal level factors that influence both WEE and children's education outcomes.

## 2.4. Research questions

This study has two inter-related research questions: (i) How is WEE associated with children's progression through grade at appropriate ages (being on time for grade)? and (ii) Does this association depend on the sex of the child, household lineage system (matrilineal and patrilineal), or their geographical region of residence?

## 3. Data and methods

### 3.1. Data and analytic sample selection

We analyzed the 2016/17 Malawi Integrated Household Survey (IHS), a nationally representative household survey covering a sample of 53,885 individuals aged 0–85 years from 12,447 households with a response rate of 99.7 %. Our population of interest was primary and secondary school-age children aged 6–25 years<sup>1</sup> co-residing with their mothers. Of the total survey sample, about half (26,272) consisted of school-age children. Of these, we excluded 8999 who did not reside in the same household with their mother. Another 48 children were excluded because the person identified as the mother was a male household member (this could result from data entry errors). The final analysis sample thus includes 17,225 children from 7063 households. In most of the sampled households, a mother co-resided with her school-age child(ren). In the 1.3 % households with multiple mothers with school age children (either polygamous marriages, or multi-generational households), we selected the mother with the most school-age children. Among the school-aged children excluded (8999), 76 % did not have education qualification, while 11 % and 12 % had primary and secondary school qualifications, respectively.

### 3.2. Variables and measurement

#### 3.2.1. Outcome variable

Our outcome variable is children's school progression through grades (i.e., being on-time vs. older for grade). In Malawi the official age for starting school is 6 years, thus children in grade 1 aged 6 or 7 years are on-time, while those 8 years and above are old-for-grade.

#### 3.2.2. Main explanatory variable

The main explanatory variable is women's economic empowerment (WEE), presented as an aggregate score of six variables: being in employment, earning income (any amount), post-primary education attainment, financial inclusion, land ownership (alone or jointly with a partner), and participation in decision-making at household level. Employment was defined as working for a wage. For education attainment, women were classified as empowered if they were literate in English and/or the national language (Chichewa) and had attained at least a secondary-level qualification. We chose secondary or higher education as the limit, because gains in education attainment tend to

<sup>1</sup> The official age of starting school in Malawi is 6 years, and the age group for primary and secondary is 6–18 years, but 25 years was chosen as the upper limit for completing school because high grade repetition and children's delayed school enrolment obscures the attending age.

become more substantial from this level onwards (Wodon et al., 2018). For many indicators used globally (e.g., full-time labor-force participation and living standards), having a primary education does not make a large difference compared to no education (Kabeer, 2009; Wodon et al., 2018). Women who had (access to) bank accounts or those with responsibility for repayment of loans were counted as empowered through financial inclusion. Participation in decision-making is based on three measures: decision-making regarding use of own income earnings; crops to be planted; and use of earnings from land sale. Women who participated in any of these decisions were considered economically empowered.

The details of the method and sensitivity analysis of the WEE score is described in Williams et al. (2022). For each of the variables, women were coded economically empowered (1) or not (0), depending on their responses. Thus, the WEE score ranged from 0 (not economically empowered) to 6 (highly economically empowered). We categorized the score into low (0–2), medium (3–4) and high (5–6) economic empowerment. These categories were based on distribution of cases and indicator similarities for each level of score. Thus, the first category (35 %) consists mainly of women who participate in decision-making and/or who own land. Half of the women scored either three or four and thus the middle category consists of women, who were mainly employed and earned an income in addition to the characteristics in the lowest group. The last category (15 %) consists mostly of women who scored high in the other economic empowerment indicators, including financial inclusion and post-primary education.

#### 3.2.3. Control variables

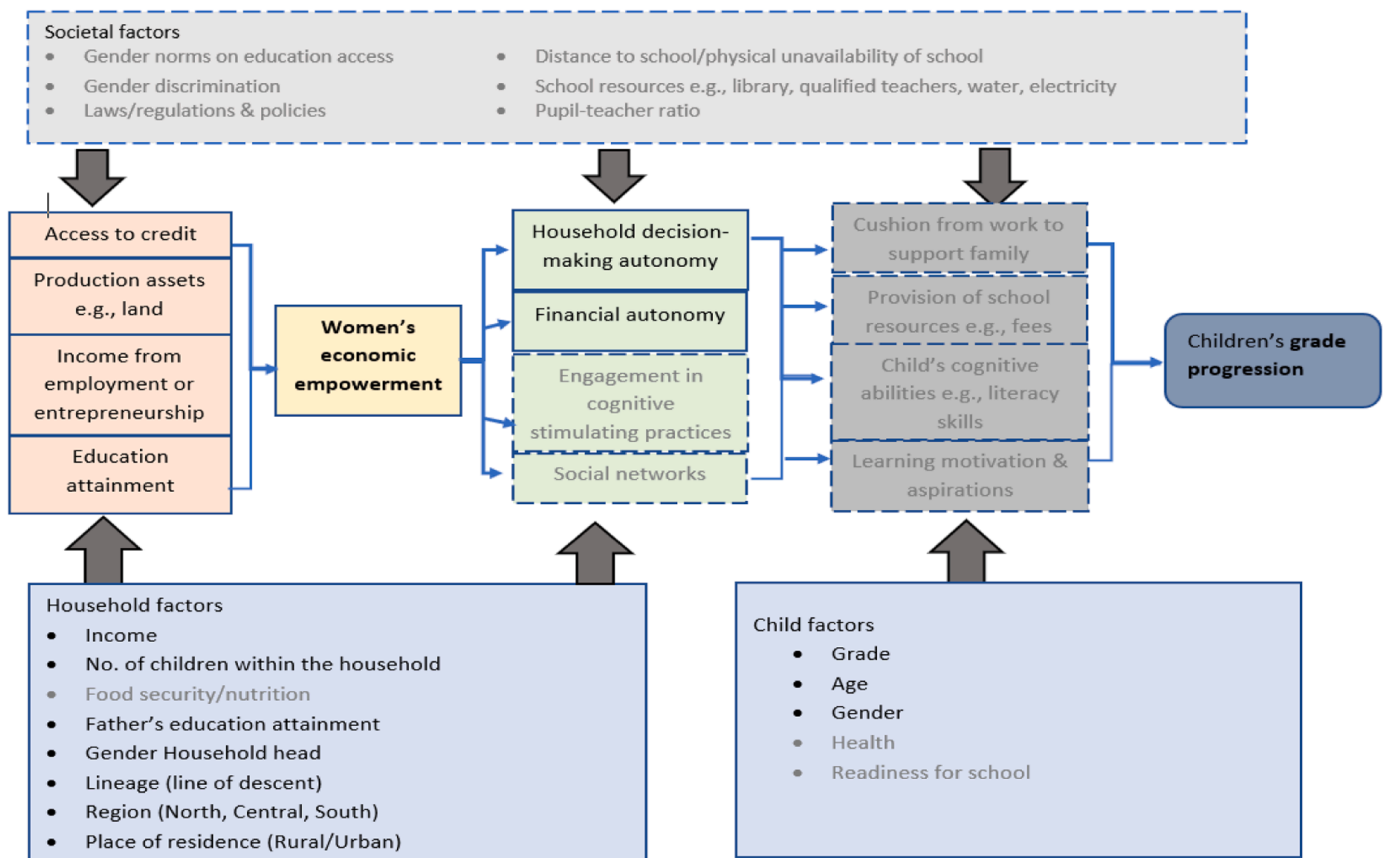
We controlled for potential confounders at child and household levels in the models (measured at the time of the survey). At the child level, we controlled for the child's gender and age. At household level, we adjusted for age of mother, father's education attainment, number of school-age siblings within the household, lineage (patrilineal or matrilineal), place of residence (urban or rural), household wealth, and geographical region (North, Central and Southern). We controlled for geographic region because of observed differential regional education patterns that have been attributed to historical, cultural, and geographical factors that disadvantaged the South and Central regions compared to the Northern region (Al-Samarrai and Zaman, 2007; Chimombo, 2009; Galafa, 2019; Makwemba et al., 2019). The survey did not include a wealth index, so we constructed one using the Filmer and Pritchett (1999) method. The wealth index was then categorized into quartiles from the poorest 25 % to the richest 25 %. Appendix 1 provides details of the methodology including the items and measurement of wealth index.

To avoid dropping a large number of observations due to missing data in the lineage variable ( $n_{\text{missing}}=1601$  out of 7063), we imputed observations by combining the lineage question and the district of residence variable. Using information about the most common lineage in each district (Berge et al., 2014), we assigned missing observations to either lineage system, if they resided in a district where more than 70 % of the villages follow that system. Districts where the lineage is not clearly defined (more than 30 % both matrilineal and patrilineal co-residence) were coded under "Don't Know" category. For sensitivity analysis, regression models with both the original and imputed variables were fitted, and the results were similar.

### 3.3. Methods and analytic strategy

After examining univariate and bivariate descriptive statistics, we fitted two-level random-intercept (mixed-effects) logistic regression models in which children ('level 1') were clustered within households ('level 2'). The basic form of the fully adjusted model is presented in the following equation:

$$y_{ij} = \beta_0 + \beta_1 x_{1j} + \beta_2 x_{2ij} + \beta_3 x_{3j} + u_{0j} + e_{0ij}$$



Notes: Grey text and boxes with dashed-line borders denote aspects not measured or otherwise controlled for in the study; Bold denotes outcome variables.

Fig. 1. Mechanisms of relationship between WEE and children's education outcomes.

Where:

$y_{ij}$  denotes the outcome: likelihood of being on time for grade for child  $i$  in household  $j$ ;

$\beta_0$  is the intercept when all the independent variables take the value zero;

$x_{1j}$  is the main explanatory variable, WEE an aggregate of 6 indicators;  $x_{2ij}$  is a vector of control variables at the child level (age and sex), while  $x_{3j}$  is a vector of explanatory factors at the household level (lineage, place of residence, geographical region and household wealth).

$\beta_1, \beta_2,$  and  $\beta_3$  are the coefficients that capture the effects associated with  $x_{1j}, x_{2ij}$  and  $x_{3j}$ , respectively.

$u_{0j}$  is the estimated effect or residual for household  $j$ , while  $e_{0ij}$  is the individual-level residual or error term for child  $i$  in household  $j$ . We assume that the residuals at the household and individual levels are normally distributed, and that the household-level residuals are independent of the individual-level residuals and uncorrelated with all of the independent variables.

We fitted five models including different groups of children: one including all children at all grades; one including all urban children at all ages and the same for rural children separately; one including all children at primary grades; and finally, one including all children at secondary school grades.

We disaggregated results by primary and secondary school levels as some associations could vary by these levels of education. Because most of the indicators used in the measurement of WEE were more common in rural than urban areas, we fitted separate models for rural and urban households to explore whether this influenced the results. We limited this analysis to combined (all) grades because the sample size broken down by both place of residence and level of schooling would have been

too small. As girls tend to have better educational outcomes than boys when their mothers are more economically empowered (Malapit et al., 2019) and women in matrilineal households are often more likely to be more economically empowered than those in patrilineal households (Le Roy, 2017; Peters, 2010; Slavchevska et al., 2017), three interactions were tested in three separate models: WEE and gender of children, WEE and lineage, and WEE and geographical region, but none of the interactions were significant and thus not included in the final models.

All analyses were weighted using survey sample weights provided in the IHS. Data were analyzed using STATA 17 (Stata Corporation, College Station, TX).

#### 4. Results

##### 4.1. Descriptive statistics (mothers)

The average age of mothers was 38.1 years (range 20–75 years,<sup>2</sup> not shown). Four in every five women (81 %) did not have any educational qualifications. The majority lived in rural areas (81 %), and less than 10 % lived in the Northern region (Table 2). Among the 77 % of women that were married, almost two in three resided in matrilineal households. The average WEE score was 3.1, and only 1.6 % of women were empowered in all the indicators. Half of the mothers had medium economic empowerment score, while 15 % had high economic empowerment score (Table 2).

There were significant differences in WEE by age, place of residence,

<sup>2</sup> The age of 75 years means that the mother was at least 50 years at the time of birth. This could also be due to incorrect reporting of age.

**Table 2**  
Distribution of women’s characteristics in the analytical sample (weighted % and Unweighted N).

Characteristic	Percent	N
<i>WEE Score</i>		
Low	34.6	2426
Medium	50.4	3545
High	15.0	1092
<i>Age group</i>		
20–30	24.8	1757
31–35	21.4	1508
36–40	18.8	1331
41–45	13.6	957
46+	21.4	1510
<i>Education Qualification</i>		
None	80.8	5565
Primary	8.6	664
Secondary+	10.6	834
<i>Marital status</i>		
Married	77.0	5465
Separated/widowed	22.7	1567
Never married	0.3	31
<i>Marital lineage</i>		
Patrilineal	33.7	2798
Matrilineal	64.4	4008
Don't Know	1.9	134
<i>Place of Residence</i>		
Urban	19.0	1280
Rural	81.0	5783
<i>Region</i>		
North	9.2	1408
Central	45.6	2440
South	45.2	3215
<b>Total</b>		<b>7063</b>

Data source; Author’s calculations Malawi IHS, 2016–17.  
Notes: columns add up to 100 %.

region and lineage system of the household. Rural residents showed a higher economic empowerment score than urban residents. Women in matrilineal households were more likely to be highly economically empowered than those in patrilineal households, while those residing in the Central region were more likely to be highly economically empowered than the other regions (Appendix Table 2).

The proportion of women empowered for each indicator varied widely, with participation in decision-making being the most common empowerment indicator (83 %), while post-primary education access was the least common (14 %) among women in the analytical sample (not shown). There were significantly more women with post-primary education and financial inclusion in urban areas than among rural residents, with women in urban areas being more than five times more likely to be educated beyond primary level compared to those in rural areas. The reverse was true for participation in decision-making, land ownership and earning an income, with more women in rural areas counted as empowered according to these measures compared to urban residents. There was no difference in employment between rural and urban areas (not shown).

**4.2. Descriptive statistics (children)**

Of the 17,225 children in the analytic sample, the average age was 12.4 years, and almost three out of four (75 %) were aged between 6 and 15 years, 52 % were male, and 81 % in primary school (Table 3). Among those currently attending primary and secondary school, about two in five (39 %) were on time for their current grade. The vast majority of children (82 %) were rural residents, which is reflective of Malawi on the whole.

In all grades both in primary and secondary schools, girls were more likely to be on-time for grade than boys. Further, being on-time for grade declined from the first grade in each school level to the last grade, except for girls in secondary school where the proportions increased from grade

**Table 3**  
Distribution of children’s characteristics in the analytical sample (weighted % and unweighted N).

Characteristic	Percent	n
On-time for grade	39.1	5753
<i>Age group</i>		
6–10	41.2	7017
11–15	33.2	5702
16–25	25.6	4506
<i>Sex</i>		
Male	52.0	8943
Female	48.0	8282
<i>Place of Residence</i>		
Urban	17.9	2883
Rural	82.1	14,342
<i>Region</i>		
North	9.1	3410
Central	46.8	6073
South	44.1	7742
<b>Total</b>	<b>100.0</b>	<b>17,225</b>

Data source; Author’s calculations, Malawi IHS, 2016–17

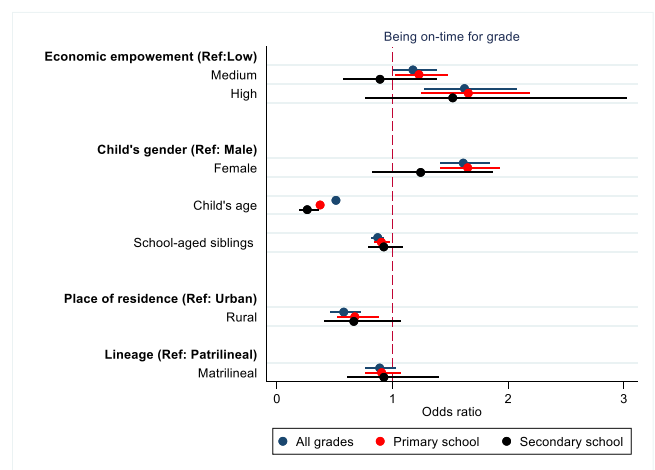
9–11, then dropped sharply in grade 12.

**4.3. Modelling the association between WEE and children’s grade progression**

Women’s economic empowerment was associated with higher odds of being on-time for grade after controlling for both child and household-level factors for primary and secondary school and when both primary- and secondary school were combined (Fig. 2). Children whose mothers scored medium or high in economic empowerment were more likely to be on-time for grade than children whose mothers scored low in WEE. The results were not statistically significant for secondary school.

Among the control variables of interest, girls were significantly more likely than boys to be on-time for grade, except in secondary school. Children in rural households had significantly lower odds of being on-time for grade while lineage was not associated with being on-time for grade (Fig. 2).

However, when we fitted separate models for urban and rural areas, there were no significant differences between urban and rural residences on being on-time for grade, although the point estimates show higher odds of being on-time for grade for children in urban areas whose mothers scored high on WEE than their rural counterparts. A t-test



**Fig. 2.** Adjusted odds ratios (ORs) and 95 % confidence intervals for being on-time for grade. Data source: Author’s calculations, Malawi IHS, 2016–17. Other control variables included maternal age, father’s education qualification and household wealth index.

confirmed that the two estimates were not statistically different. The point estimates in the association between residing in matrilineal households and being on-time for grade suggest different directions in rural areas and urban areas (Fig. 3).

To explore whether the association between WEE and being on-time for grade differed by sex of child, region or lineage system, we fitted models including the corresponding interaction terms (Appendix Table 3). The point estimates for girls in secondary school showed higher odds of being on-time for grade. In addition, children whose mothers were economically empowered and residing in matrilineal homes had higher odds of being on-time for grade, except in secondary school. However, none of the interactions were statistically significant.

4.3.1. Model fit and robustness

We fitted separate models with each WEE indicator as the main explanatory variable in separate models. This was to situate the results against the body of knowledge that finds associations between individual indicators of WEE and children’s education outcomes. Maternal post-primary education attainment and financial inclusion were significantly associated with higher odds of being on-time for grade for all combined and primary school grades (Table 4). The results were, however, not significant at secondary school, perhaps due to smaller statistical power. Maternal land ownership was significantly associated with being on-time for grade only in primary school. None of the other indicators showed significant associations with being on-time for grade (Table 4).

5. Discussion

This study investigated the association between WEE and children being on-time for grade at primary and secondary school in Malawi. We found that WEE was significantly associated with being on-time for grade, but with no significant differences between children in urban and rural households.

This study, to the best of our knowledge, innovatively quantifies the association between maternal economic empowerment and children’s school grade progression in Malawi – a country where many children do not complete secondary education or are old for their grade. It shows that WEE plays a role in children progressing through grades at appropriate ages. This finding is important, as children who are older for their grade are at a higher risk of dropping out of school. Being on-time for grade can be seen as a marker of school progress, having overcome both academic and structural (both financial and non-financial) challenges

Table 4

Adjusted odds ratios (ORs) and 95 % confidence intervals (CIs) for being on-time for grade by individual WEE indicators.

WEE indicators	ORs [95 % CI]		
	All grades	Primary school	Secondary school
Employment	1.102 [0.95,1.28]	1.102 [0.93,1.31]	1.232 [0.80,1.89]
Land ownership	1.174 [0.99,1.39]	1.297** [1.07,1.57]	1.214 [0.78,1.88]
Post-primary education	3.479*** [2.67,4.53]	3.424*** [2.52,4.66]	1.626 [0.92,2.87]
Financial inclusion	1.266** [1.08,1.49]	1.289** [1.07,1.55]	0.956 [0.62,1.47]
Earning income	1.004 [0.86,1.18]	0.977 [0.82,1.17]	1.194 [0.74,1.93]
Participation in decision-making	1.116 [0.90,1.39]	1.243 [0.97,1.60]	0.709 [0.43,1.16]
Observations	10,410	9140	1268

Control variables: Sex and age of child, number of school-age siblings within household, mother’s age, father’s education qualification, urban/rural residence, lineage, household wealth index and region. Other WEE indicators are not adjusted for.

Data source: Author’s calculations, Malawi IHS, 2016–17.

Exponentiated coefficients; 95 % confidence intervals in brackets.

Wald chi2: \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001.

that may lead to under-achievement or dropping out of school.

There are few available studies that focus on individual WEE indicators or on general empowerment, which, as highlighted earlier, tends to underestimate the value of economic empowerment. Our study captures the multidimensionality of WEE by including various indicators that contribute to economic empowerment. In Malawi, where free primary education has been in place for almost three decades with minimal improvement in education attainment and school completion (Chimombo, 2009; Sunny et al., 2017), additional strategies should be considered to improve school and grade completion. This study shows WEE may contribute to appropriate progression through grades in Malawi.

5.1. Economic empowerment of women is beneficial to grade progression in primary level

WEE was positively associated with being on-time for grade in primary school. This is of interest in Malawi, where about 36 % of primary school children in 2019 were older than expected in the last grade of primary school (UNESCO Institute for Statistics, 2021). While most children (70 %) start school at the appropriate age of six years (Ministry of Education, 2021), many will eventually fall behind due to prevalent grade repetition, temporary school withdrawal driven by financial constraints (lack of school supplies, exam fees, uniform) and non-financial experiences (family responsibilities, truancy, early marriage and pregnancy). If more mothers were economically empowered, children may be more often able to stay in school and perform better. WEE is likely associated with children’s education outcomes via, for instance, the family being better able to provide school resources, and cushioning children from needing to work to sustain the family, as shown in the conceptual framework.

5.2. Women’s economic empowerment may not translate to timely grade progression in secondary level

Unlike for primary school, WEE was not associated with being on time for grade in secondary school, possibly attributed to small sample: fewer than 15 % of the analytical sample ever attended secondary school (n = 2584). In Malawi, secondary school places are limited so that only one in three of those who complete primary school can transition to

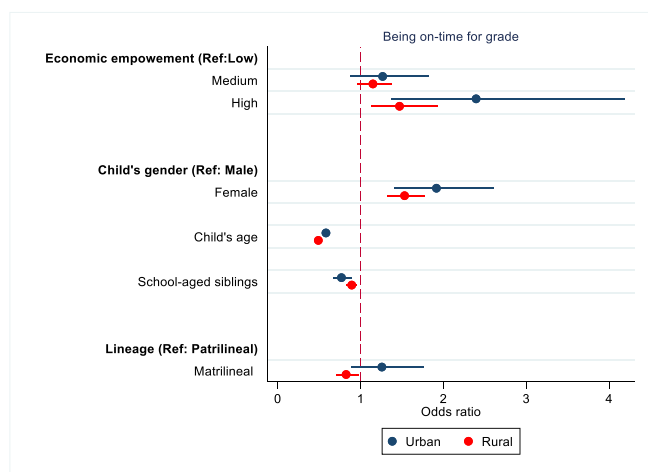


Fig. 3. Adjusted odds ratios (ORs) and 95 % confidence intervals for being on-time for grade disaggregated by urban and rural. Data source: Author’s calculations, Malawi IHS, 2016–17. Other control variables included maternal age, paternal education qualification and household wealth index.



public secondary schools (mostly the top performers in the final examination). Moreover, unlike in primary school, tuition fees were charged at the time of 2016/17 survey, (albeit later abolished in 2018 (Kadzamira et al., 2018)) which posed challenges for children from poor households (Grant, 2017). Given the high poverty rates in Malawi, especially in rural areas where about 60 % of the population live below the national poverty line (National Statistical Office 2019b), a very selected group of children transition to secondary school. This finding thus needs to be interpreted with caution.

### 5.3. No added advantage for being on-time for grade for children in urban areas or matrilineal households

Because of better access to schools and other services, and the sociocultural transformations associated with urban areas with women being more likely to be involved in decision-making at the household than in rural areas (Chant, 2013; Pozarny, 2016), we expected that children in urban areas whose mothers were economically empowered would have better outcomes than their rural counterparts, but this was not the case in Malawi.

Further, we expected that children in matrilineal households would have better outcomes than those in patrilineal families. This is because women in matrilineal households have access to and own land, a salient factor in household bargaining. The unexpected finding that lineage was not associated with being on-time for grade could however be an indication of the barriers that women face in translating land ownership to economic opportunities and benefits that may expand their strategic choices within the households (Peters, 2010; Djurfeldt et al., 2018).

There were no significant interactions between WEE and child's gender, lineage system or geographical region and being on time for grade. However, the interaction between gender and WEE suggested that girls in secondary school might benefit more in terms of being on-time for grade than boys. Given that girls are more likely to drop out of school than boys of the same age, higher odds for being on time for grade for girls with economically empowered mothers is important. Girls, who are old-for-grade in secondary school, are less likely to continue education than boys in the same situation, as they approach the age of entry to marriage and parenthood. In Malawi in 2016, 29 % of girls aged 15–19 years had already begun childbearing, and almost one in two women (47 %) were married by 18 years of age (National Statistical Office (NSO) (NSO), and ICF 2017). Almost one in four (23 %) girls dropped out of school to get married in 2014 (Mussa, 2016). The risk of pregnancy and marriage may start as early as age 10 (Glynn et al., 2018).

### 5.4. Strengths and limitations

This study is the first to investigate the association of economic empowerment of mothers with their children's education outcomes in Malawi. It makes a case for using cross-sectional data to advance the knowledge on WEE in the absence of the ideal longitudinal and qualitative data for measuring WEE as a process.

There are some limitations, mostly due to data constraints. First, there is no data on women's preferences or motivations for their choices, and indicators on gender norms around access to economic opportunities, which would add nuance to our measure of WEE. We acknowledge that inclusion of these indicators would provide a more comprehensive measurement of WEE. Despite this, these results provide a multi-factor measure of WEE based on the available data, which provides a contribution beyond most previous research that focus on single indicators. Future studies may improve the measurement of WEE, if more detailed data are included in the surveys.

Second, we measured WEE as a point estimate rather than as a process, although the definition of WEE describes the phenomenon as such. To measure WEE as a process, we would need longitudinal data at the individual level tracking whether women are becoming more or less

empowered over time, but such datasets are rarely available. Alternatively, comparing repeated cross-sectional measurements over time could help show the trends on WEE at country level, but not at the individual level. Although our results only apply to the period when the survey was conducted, they nevertheless serve as a baseline for future studies that seek to measure WEE as a process.

Thirdly, we created the WEE score based on equally weighted binary indicators, which means that we assumed that each indicator is equally important for women's empowerment and that there is a specific cut-off point after which one becomes empowered according to each indicator, although the association might be more fluid in reality. Empowerment is a progression, rather than a binary status of being empowered or not. Women move through a continuum from being disempowered to being empowered, and every economic resource, skills or agency helps them move along that continuum. Future studies should evaluate the relative importance of each indicator to develop more nuanced WEE scores, and to explore if some components are more empowering than others. Our study, however, shows that each of these variables contributes to the overall WEE, and thus reinforces the need for multifactorial approach to improving WEE.

Finally, by only considering co-resident mother-child pairs, we excluded children whose mothers did not co-reside, which could be due to the mother living elsewhere or being deceased. Although maternal death could disadvantage children, maternal migration for work or education may sometimes present an opportunity for greater economic resources, particularly where the mother remits resources to the host household. However, studies on children with non-resident mothers report poor education outcomes, even after controlling for maternal education attainment and employment status (Gaydosch, 2017; Townsend et al., 2002), which may mean that a more disadvantaged group of children was excluded from this analysis. Analyzing non-resident mothers would require additional data detailing the reasons for non-residence, which is not available in the household survey data used in this analysis, and such analysis is beyond the scope of the current study.

Despite these limitations, the findings clearly offer better insights to understanding the useful associations that have not been explored before, and provide policy relevant evidence, which can help advance the achievement of the SDGs. In the future, researchers and implementers of surveys should include a more comprehensive set of WEE indicators to enhance its measurement and progress its monitoring to inform the achievement of the SDGs.

## 6. Conclusion and policy implications

Given the importance of school progression and completion for human capital development, this study has clear policy implications regarding the beneficial role that WEE may play in improving children's education outcomes.

Although we did not examine causal relationships, the results show that WEE is one potential strategy to increase the number of children being on-time for grade, which is currently a major challenge in Malawi. Malawi's Vision 2063 identifies human capital development as one of the enabling factors (National Planning Commission, 2020). To attain the goal of 12 years of universal formal education, the country will need to not only address the existing structural challenges such as limited infrastructure at secondary school that hinder transition to secondary school, but also improve school completion rates and reduce the proportion of children who are not progressing through grades on time. WEE may help contribute towards this goal by helping children to progress through grades at appropriate ages, and this may lead to lower dropout rates particularly among girls, who are more likely than boys to drop out of school at older ages due to early marriage and teenage pregnancy.

**Author statement**

In response to Reviewer #1, we cited the two papers suggested by the reviewer in our literature review section (Page 3, para 2, lines 9–11)

To take fairer stance as suggested by Reviewer #1, we changed the language in the ‘Discussion’ section (1st line, 2nd paragraph, page 20) from “This study is, to the best of our knowledge, the first of its kind to quantify the association.....”, to “This study, to the best of our knowledge, innovatively quantifies the association between...”

Reviewed the manuscript to correct typos and other inconsistencies as highlighted by Reviewer #2, and highlighted where those changes have been made in the manuscript.

In response to the other suggestions by Reviewer #1, we have described in detail in our ‘Response to reviewer’ file where each issue is addressed in the manuscript, and thus did not make further changes to the manuscript in response to these suggestions.

**CRedit authorship contribution statement**

**Eunice Mueni Williams:** Conceptualization, Data curation, Formal

analysis, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Sabu Padmadas:** Conceptualization, Supervision, Writing – review & editing. **Heini Väisänen:** Conceptualization, Supervision, Writing – review & editing.

**Declaration of Competing Interest**

The authors declare no conflict of interest.

**Acknowledgement**

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*Declarations of interest*

None

**Appendix 1. Household wealth index development**

Because of the survey bias in using income to measure economic status particularly in LMICs due to large missing data and reporting biases, many studies construct a relative wealth index using household assets and household characteristics (Filmer and Pritchett, 2001). Instead of a simple summation of all assets, Filmer and Pritchett proposed use of PCA which determines the relative importance of each variable to the wealth index. The first component is extracted as the relative wealth index because it accounts for the largest possible variance across the variables, and weights assigned to each variable represent the variable contributions to the construction of the first component. As weights are assigned depending on their variation across households, the most common assets are assigned a weight closer to zero (Fry et al., 2014).

Since a wealth index was not provided in the dataset, we constructed one using variables on household durable assets, housing characteristics, agricultural land, livestock, and ownership of house and land. Housing characteristics included housing materials (walls, roof and floor), water and sanitation, energy for lighting, cooking, and number of members per room (Appendix Table 1). Using the UN Habitat Adequate Housing indicator list, we categorized housing characteristics into adequate or inadequate (UN-Habitat, 2018). We dichotomized all variables to indicate ownership of each asset. We excluded assets that were mainly for income generation, including motorcycles, buses and sewing machines. To account for differences in distribution of assets and household characteristics between urban and rural areas, we computed the weights separately for urban and rural areas, then pooled the dataset for the overall index.

We categorized households into four quartiles, with the lowest 25 % being the poorest and the highest 25 % being the richest households. To assess the internal validity of the wealth index constructed (whether the index discriminated well between the wealthy and poor), we tabulated the proportion that has access to each asset and the average wealth level across quintiles. Those in 4th quartile had more assets than the rest in the survey. We also correlated the index and education attainment, and those in the 4th quartile had higher education attainment compared to other quartiles.

**Appendix Table 1**

Wealth index using PCA for urban and rural households

Variable Description	Rural			Urban		
	Factor score	Mean	Std. dev.	Factor score	Mean	Std. dev.
<i>Livestock Ownership</i>						
Calf	0.043	0.003	0.056			
Cow	0.091	0.031	0.174	0.007	0.008	0.087
Bull	0.062	0.010	0.097			
Goat	0.062	0.190	0.392	-0.034	0.032	0.175
Sheep	0.011	0.003	0.051			
Pig	0.045	0.064	0.245	-0.017	0.030	0.170
Local Hen	0.076	0.235	0.424	0.004	0.136	0.343
Local Cock	0.070	0.147	0.354	0.020	0.091	0.288
Duck	0.013	0.018	0.132	-0.009	0.011	0.102
Pigeon	0.054	0.022	0.145	0.038	0.011	0.102
Ox	0.032	0.004	0.064			
Chicken Broiler	0.017	0.006	0.075	0.032	0.007	0.084
Turkey	0.038	0.004	0.061			
<i>Household Assets</i>						
Pestle	0.049	0.446	0.497	0.067	0.317	0.465
Bed	0.226	0.254	0.436	0.193	0.711	0.453
Table	0.211	0.223	0.416	0.136	0.476	0.500
Chair	0.171	0.310	0.462	0.105	0.464	0.499
Fan	0.209	0.010	0.102	0.228	0.162	0.369
Radio	0.108	0.336	0.472	0.020	0.434	0.496

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Appendix Table 1 (continued)

Variable Description	Rural			Urban		
	Factor score	Mean	Std. dev.	Factor score	Mean	Std. dev.
DVD Player	0.222	0.034	0.180	0.232	0.324	0.468
Television	0.275	0.044	0.206	0.267	0.398	0.490
Paraffin Stove	0.037	0.002	0.040	0.038	0.012	0.107
Hotplate	0.137	0.003	0.059	0.233	0.157	0.364
Refrigerator	0.221	0.011	0.104	0.263	0.220	0.415
Bicycle	0.127	0.388	0.487	0.047	0.278	0.448
Car	0.101	0.003	0.056	0.191	0.085	0.280
Sofa set	0.224	0.040	0.196	0.226	0.396	0.489
Coffee Table	0.192	0.045	0.207	0.172	0.341	0.474
Cupboard	0.172	0.016	0.127	0.185	0.153	0.360
Lantern	0.031	0.018	0.134	-0.005	0.011	0.104
Desk				0.074	0.011	0.103
Clock	0.204	0.038	0.192	0.188	0.285	0.451
Iron	0.212	0.090	0.286	0.233	0.433	0.496
Computer	0.123	0.004	0.066	0.198	0.104	0.306
Satellite Dish	0.212	0.011	0.103	0.242	0.166	0.372
Solar Panel	0.125	0.072	0.259	0.046	0.042	0.201
Generator	0.079	0.004	0.064	0.089	0.020	0.140
Working Telephone	0.056	0.000	0.017	0.071	0.009	0.093
Working Electricity	0.235	0.032	0.177	0.258	0.423	0.494
Household Cell phone	0.180	0.396	0.489	0.156	0.810	0.393
Land Owned	-0.034	0.745	0.436	-0.003	0.386	0.487
<i>House Materials</i>						
Durable Walls	0.167	0.569	0.495	0.153	0.650	0.477
Durable Roofing	0.209	0.392	0.488	0.143	0.875	0.331
Durable Floor	0.240	0.166	0.372	0.191	0.709	0.454
Clean Lighting Energy	0.027	0.879	0.326	0.130	0.775	0.418
Clean Cooking Energy	0.165	0.054	0.225	0.154	0.717	0.451
Safe Drinking Water	0.032	0.861	0.346	0.066	0.934	0.248
Improved Sanitation	0.106	0.682	0.466	0.128	0.806	0.396
None-Shared Toilet	0.077	0.650	0.477	0.129	0.485	0.500
Agriculture Land	-0.058	0.899	0.301	-0.070	0.324	0.468
<b>Largest Eigenvalue</b>	<b>6.477</b>			<b>8.600</b>		
<b>Proportion Of Variance Explained</b>	<b>12.95</b>			<b>18.7</b>		

Data source: Malawi IHS 2016–17.

Appendix Table 2

Distribution of mothers' WEE by sociodemographic characteristics

Category		Low (0–2)	Medium (3–4)	High (5–6)	Total
Lineage (%) ***	<i>Matrilineal</i>	31.6	52.3	16.1	4099
	<i>Patrilineal</i>	40.2	47.0	12.9	2914
	<i>Don't Know</i>	56.2	30.8	13.0	50
Place of residence (%) ***	<i>Urban</i>	43.3	42.3	14.5	1280
	<i>Rural</i>	32.6	52.3	15.1	5783
Age group (%) **	<i>20–30</i>	35.2	50.2	14.6	1757
	<i>31–35</i>	34.7	50.3	15.0	1508
	<i>36–40</i>	31.1	51.9	17.1	1331
	<i>41–45</i>	33.8	50.0	16.2	957
	<i>46+</i>	37.8	49.6	12.6	1510
Region***	<i>North</i>	45.9	42.4	11.7	1408
	<i>Central</i>	35.1	49.3	15.6	2440
	<i>South</i>	31.9	53.1	15.0	3215
<b>Total</b>	<b>%</b>	<b>34.6</b>	<b>50.4</b>	<b>15.0</b>	<b>7063</b>

Data source: Author's Calculations, Malawi IHS, 2016–17; Row totals 100 % Pearson's  $\chi^2$ : \* $p < 0.05$ , \*\* $p < 0.01$  and \*\*\* $p < 0.001$ .

Table Appendix 3

Adjusted odds ratios (ORs) and 95 % confidence intervals (CIs) for being on-time for grade (with variable interactions)

Variables	OR [95 % CI]		
	All grades	Primary school	Secondary school
<i>WEE</i>			
Medium	1.250 [0.88,1.78]	1.375 [0.92,2.06]	0.924 [0.39,2.17]
High	1.552 [0.86,2.79]	1.781 [0.90,3.54]	1.440 [0.38,5.48]
<i>Sex &amp; WEE</i>			
Female	1.757 [1.42,2.17]***	1.868 [1.46,2.39]***	1.164[0.64,2.12]
Medium & Female	0.833 [0.63,1.10]	0.785 [0.57,1.09]	1.155 [0.49,2.74]
High & Female	0.967 [0.63,1.48]	0.869 [0.53,1.43]	1.001 [0.26,3.87]
Children' age	0.510 [0.49,0.53]***	0.374 [0.35,0.40]***	0.260 [0.19,0.36]***

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Table Appendix 3 (continued)

Variables	OR [95 % CI]		
	All grades	Primary school	Secondary school
School-age siblings	0.872 [0.82,0.93]***	0.907 [0.84,0.98]**	0.926 [0.79,1.09]
Place of residence			
Rural	0.516 [0.41,0.65]***	0.657 [0.50,0.86]**	0.679 [0.42,1.11]
Lineage and WEE			
Matrilineal	0.926 [0.70,1.23]	0.968 [0.71,1.33]	1.178 [0.57,2.44]
Medium & Matrilineal	1.132 [0.78,1.64]	1.145 [0.75,1.74]	0.598 [0.20,1.76]
High & Matrilineal	1.661 [0.95,2.90]	1.811 [0.95,3.44]	0.542 [0.11,2.79]
Region and WEE			
Central	0.649 [0.47,0.91]*	0.594 [0.41,0.87]**	0.914 [0.42,1.99]
Southern	0.669 [0.47,0.95]*	0.605 [0.41,0.90]*	1.062 [0.45,2.49]
Medium & Central	0.965 [0.61,1.53]	0.890 [0.53,1.50]	1.416 [0.44,4.51]
Medium & Southern	0.991 [0.62,1.60]	0.993 [0.58,1.70]	0.986 [0.28,3.51]
High & Central	0.599 [0.29,1.23]	0.541 [0.23,1.25]	0.967 [0.15,6.19]
High & Southern	0.983 [0.46,2.10]	0.870 [0.36,2.11]	2.732 [0.40,18.50]
Mother's age			
30–35	0.946 [0.76,1.18]	1.163 [0.91,1.48]	
36–40	1.163 [0.91,1.49]	1.142 [0.87,1.50]	2.064 [1.00,4.27]
41–45	1.233 [0.93,1.63]	1.196 [0.87,1.64]	1.774 [0.82,3.82]
46+	1.252 [0.95,1.65]	1.263 [0.92,1.73]	2.382 [1.09,5.21]*
Father's education qualification			
Primary	1.914 [1.58,2.32]***	2.015 [1.62,2.50]***	1.164 [0.70,1.95]
Secondary+	8.697 [6.52,11.60]***	6.213 [4.43,8.72]***	2.775 [1.50,5.13]**
Wealth Quartiles			
2nd	1.771 [1.40, 2.24] ***	1.923[1.48,2.49]***	1.873 [0.52,6.73]
3rd	2.993 [2.37, 3.78] ***	3.546 [2.73,4.61]***	2.427 [0.73,8.09]
4th	8.179 [6.16, 10.86] ***	9.311 [6.72,12.89]***	4.387 [1.31,14.72]*
Constant	0.0586 [0.04,0.10]***	0.0301 [0.02,0.05]***	0.945 [0.21,4.27]
Household Level Variance	1.270 [1.12,1.43]***	1.326 [1.15,1.53]***	0.515 [0.04,6.48]
Observations	10,410	9140	1268

Data source: Author's Calculations, Malawi IHS, 2016–17.

Exponentiated coefficients; 95 % confidence intervals in brackets

Wald chi2: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

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