

Childcare in Transition: Evidence That Patterns of Childcare Differ by Degree of Market Integration in Northwestern Tanzania

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HIGHLIGHTS

- This study uses novel data on multiple childcare types from both kin and nonkin in two culturally similar communities with varying market integration.
- It tests the hypothesis that market integration is associated with reduced kin support.
- Who provides support and the type of support vary by level of market integration.
- Market integration disrupts childcare support from paternal but not maternal kin.
- Distant kin and nonkin substitute for reduced support from close kin in the study's town.

ABSTRACT Women have received help with child-rearing throughout human history, and much of this help would have come from kin. Market integration presumably reduces kin numbers in social networks, which may transform the patterns of support that mothers receive. Yet, few empirical studies have quantified the role of market integration in childcare arrangements. Using survey data from 808 under-5 children from Mwanza, Tanzania, we explore differences in childcare arrangements between a village that is less market-integrated and a town that is more market-integrated. We consider low-intensity and high-intensity childcare from fathers, siblings, maternal grandparents, paternal grandparents, maternal aunts/uncles, paternal aunts/uncles, and distant kin or nonkin. We generate data on, and investigate, an often assumed but rarely tested hypothesis: that market integration is associated with (1) lower odds of childcare support from kin and (2) higher odds of support from nonkin. We find mixed support: fathers, siblings, and paternal kin have lower odds, and distant kin/nonkin have higher odds, of providing care in the town than in the village. Maternal kin caregiving is not associated with place of residence. Our findings suggest that market integration disrupts paternal kin childcare arrangements but not care from maternal kin, who may overcome greater physical distances to maintain contact. Distant kin/nonkin appear to substitute for reduced support from close kin in the town.

KEYWORDS Allomaternal childcare • Support networks • Kinship • Market integration • Tanzania

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Introduction

Evolutionary anthropologists have demonstrated that humans adopt a system of cooperative reproduction, in which women require help to raise children, also known as “allomaternal care” (Bentley and Mace 2009; Hrdy 2005; Sear and Coall 2011). This help with raising children has potential implications for women and children’s well-being, for example, fertility decisions, growth metrics, and even survival (Kramer 2005; Sadruddin et al. 2019; Schaffnit and Sear 2017; Sear and Coall 2011; Sear and Mace 2008). Allomothering has been documented in many societies around the world but there is diversity in who helps and the types of help provided (Emmott and Page 2019; Kramer and Veile 2018; Meehan 2008; Meehan et al. 2013; Scelza 2009), including from fathers in the communities where the current study took place (Hassan et al. 2019). Whom mothers receive support from is contingent on the composition of their support networks, that is, the people whom women regularly interact with and who are able to offer them support. Many factors may cause variation in who helps; here we examine if market integration is associated with differences in allomaternal care, given that it can alter or cause variation in the composition of social networks and thus available support in child-rearing.

Market integration (often also referred to as modernization or industrialization) is a complex process, involving several economic and societal changes, but it is most commonly described as a transition from agriculture-based or subsistence economies to wage-based or market economies (e.g., those reliant on education-based employment) (Lu 2007; Mattison et al. 2022). Market integration is tricky to capture using a single variable (Mattison et al. 2022), not least because it is a heterogeneous process that can follow a multitude of context-dependent pathways, with individuals, households, and communities partaking variably (Tucker et al. 2015). Nonetheless, market integration has previously been operationalized by indicators such as the commodification of labor, capital, land, and goods and services (Lu 2007); occupation (Schaffnit et al. 2023); and household income (Mattison et al. 2023).

Although market integration is often measured using economic variables, it is also associated with a range of social, demographic, and cultural shifts, as contact between new and diverse social groups increases (Broesch and Hadley 2012; Colleran et al. 2014). This dynamism in turn impacts women’s support networks. As a broad generalization, market integration is assumed to weaken kin networks by reducing the availability and influence of kin in social networks (Newson et al. 2005; Notestein 1953; Turke 1989). Yet, this relationship has rarely been directly tested (for exceptions, see Colleran 2020; Janssens 1986; Nelson 2020) and may rest mainly on generalizations about historical patterns of market integration in high-income countries (Thornton 2001).

There is indirect evidence for market integration being associated with a weakening of kin networks. For example, both residential patterns and fertility affect who is available to form close relationships with, and some studies have suggested both differ according to degree of market integration. Extended family coresidence and higher fertility tend to be more common in less market-integrated populations (Bentley et al. 1993; Hedges et al. 2018; Walker 2014; Walker et al. 2013) compared with market economies that feature less complex family systems (e.g., smaller households, extended families not resident nearby) and lower fertility (Adams

2010; Allendorf 2013; Gurven et al. 2015; Kaplan 1996; Mattison and Neill 2013). Such shifts in family structure (smaller family sizes, delayed age at first marriage, increase in monogamous vs. polygamous marriage) have been documented alongside urbanization in sub-Saharan Africa (Ekane 2013).

Studies that have directly tested whether availability of kin declines with market integration have found some evidence for this. Links between market integration and geographic dispersion of kin networks have been demonstrated in some contexts in Europe and the United States (Colleran 2020; Janssens 1986; Nelson 2020), likely owing to declining dependence on agriculture leading to families living farther apart in their search for work (Nelson 2020). For example, between 1790 and 1940 in the United States, living close to patrilineal kin declined from nearly 50% of households to 17%—a decline partially attributed to urbanization (Nelson 2020). Similarly, in Poland, nonmarket economies are characterized by large, kin-dense support networks (i.e., a high proportion of the support network is composed of kin who are also connected to each other), and women living in households that are more market-integrated tend to have less kin-dominated networks (Colleran 2020).

Market integration can impact the provision of allomaternal care, at times through changes in family relationships and support networks. For example, in a Yucatec Maya community in Mexico, households engaging primarily in wage-based labor rely less on kin support compared with agricultural or mixed-economy households (Hackman and Kramer 2021); a previous study in this community found that higher levels of market integration were associated with increased allomaternal care from fathers (Schacht et al. 2018). In Nairobi, Kenya, family coresidence, or living in close proximity to family compared with living away, is correlated with more frequent and consistent childcare provision from families (Clark et al. 2017). In contexts of high fertility, women's older children are available to help with domestic tasks, including childcare, demonstrating children's significant role in allomaternal care (Kramer 2005; Mweru 2017; Page et al. 2021). Other changes associated with market integration may also affect allomaternal care. The rise of formal education takes children out of the home, leaving fewer older siblings to provide help (Hedges et al. 2018; Kaplan et al. 2002; Lawson and Mace 2011; Lawson and Mulder 2016; Shenk et al. 2013). Women living in more market-integrated communities may also participate in wage labor, meaning both that they come into contact with nonkin more frequently but also that their need for childcare may be higher than for women engaging primarily in farmwork or other subsistence labor, which may be more compatible with childcare. An increased need for childcare together with the higher availability of nonkin, and potentially a higher proportion of nonkin within women's support networks, may mean women in more market-integrated neighborhoods receive more help from nonkin than women in less market-integrated areas.

Not all evidence, however, points in the direction of the weakening of kin networks with market integration. For urban migrants in southern Zambia, continuing to foster strong connections with their village-based families and communities is important if they want to maintain goodwill or move back; many migrants maintain some form of contact, including hosting their village-based families in their new homes (Cliggett 2003). Among an Igbo community in Nigeria, kinship systems and community ties have strengthened despite increasing market integration, as social ties are used to navigate structures of power (Smith 2001). Evidence from a historical

Dutch cohort study spanning a 40-year life cycle in industrializing Tilburg shows that rapid industrial and demographic change did not result in the dissolution of extended family households (Janssens 1986). Shenk et al. (2016) argued that in Matlab, Bangladesh, instead of weakening the kinship systems associated with agricultural subsistence, increasing engagement in a market economy has prompted shifts toward a more extensive kinship system through increased preference for nonkin over consanguineous marriages.

In the present study, we provide a descriptive demographic perspective on childcare provision in two neighboring communities in northwestern Tanzania, a village and a town. Although they are geographically close and culturally and historically similar, previous research in the communities (see Hedges et al. 2018), and our observations during data collection, suggests that the two vary in their levels of market integration, with the village being less market-integrated than the town. Our overarching objective is to examine if women's allomaternal networks differ between these two communities. While acknowledging nuances in the literature, given the common assumptions that market integration results in greater mobility and thus potentially reduces contact with kin and increases interactions with nonkin, we expect that higher levels of market integration will be associated with less childcare support from kin and more childcare support from nonkin. We use survey data collected on five measures of allomaternal care and seven categories of carers from a relatively large sample. Using these data, we first confirm key differences in socioeconomic and demographic markers of market integration between the two communities. We then address two research questions: (1) Do children in the village have higher odds of receiving allomaternal care from their kin compared with children in the town? (2) Do children living in the town have higher odds of receiving allomaternal care from nonkin compared with children living in the village?

Data and Methods

Data Collection

We collected data from two neighboring communities in northwestern Tanzania, situated within the Magu Health and Demographic Surveillance System (HDSS). The Magu HDSS, 20 km east of Mwanza City, is managed by the Tanzanian National Institute for Medical Research; the HDSS had an estimated population of approximately 35,000 people in 2015 (Kishamawe et al. 2015). In 2016, the Magu HDSS recorded 1,829 households containing 9,157 residents within the town of Kisesa and an estimated 495 households containing 3,006 residents in the village of Welamasonga. Data were collected through cross-sectional surveys from July through October 2017 for the requirements of a larger project studying marriage and the well-being of women and their children (Lawson et al. 2021; Schaffnit et al. 2019). Households were selected through simple random sampling using the 2016 HDSS census as sampling frame and were eligible for inclusion in the study if they had resident at least one girl/woman aged 15–35. This age range was chosen for the requirements of the larger project (Lawson et al. 2021; Schaffnit et al. 2019). Of the women who were successfully contacted, less than 1% refused participation. Data

used in this study come from surveys conducted in 506 of those households that had a resident child aged under 5 years ($n=808$). Consent for participation was obtained from all adults before the interviews, as was consent from parents/guardians to collect information on their children. At each household, we conducted a household survey with the household head or, if they were not available, another resident adult. This survey recorded household membership, size and composition, the demographic characteristics of all household members, and household socioeconomic status. A child survey was conducted with eligible children's biological mothers or primary guardians and collected data on all indicators used in this study pertaining to the child and the child's parents. All interviews were conducted in Swahili or Sukuma using Open Data Kit Collect, an electronic data collection software (Brunette et al. 2013). Ethical approval was granted by the National Institute for Medical Research, Tanzania (MR/53/100/463), the Tanzanian National Ethical Review Committee (NIMR/HQ/R.8a/Vol.IX/3104), the London School of Hygiene and Tropical Medicine (13809), and the University of California Santa Barbara (1-17-0405).

Study Population

The population is primarily Sukuma, an ethnic group that according to recent estimates comprises approximately 17% of the national population (Malipula 2016). Sukuma households tend to be larger than those of other ethnic groups (Lawson et al. 2015) and often contain affinal kin and fostered children (Hedges et al. 2019; Urassa et al. 1997). Almost all individuals get married, but both divorce and remarriage are common (Boerma et al. 2002).

The two communities in this study represent different levels of market integration within the HDSS. Previous work in these communities showed that more village residents than town residents rely on farming and livestock as their primary livelihood (village, 38%; town, 10%); they are more likely to farm and sell agricultural produce (45% vs. 4% in the town) and to own and herd cattle (44% vs. 7%), and village children contribute to farmwork to a greater extent (Hedges et al. 2018). In contrast, the town has experienced recent increases in owning or working in small businesses or partaking in petty trading, laboring, or skilled work; more households in the town have a business or shop (33% vs. 10% in the village), and more have salaried (13% vs. 2%) and skilled members (20% vs. 3%) (Hedges et al. 2018). The town bestrides the main road linking Mwanza to Kenya. At the time of study, the town was relatively densely populated with regular public transport links to Mwanza City and with its own marketplace. Employment and business prospects in the town were more diverse and abundant than in the village. The village is situated close to the town (about 10 km away), yet it was more sparsely populated and mostly removed from the main road. Although the majority of children aged 7–19 in both communities were enrolled in school in 2016 (75% in the village and 85% in the town), educational attainment was higher in the town, with progression to secondary school being much higher than in the village (73% vs. 31% of 14–19-year-olds) (Hedges et al. 2018). Further economic and demographic differences between the two sites, based on the data collected during this study, are described in Results.

Variables

We measured seven sources of allomaternal care: the child's biological father, maternal grandparents, paternal grandparents, siblings, maternal aunts/uncles, paternal aunts/uncles, and distant kin/nonkin (usually comprising nonkin such as mother's friends or neighbors). Data were not collected separately for grandmothers and grandfathers, aunts and uncles, or brothers and sisters. For each category of allomother, the child's mother/guardian was asked if that allomother had provided different types of care to the child in the two weeks preceding the survey. This measure was irrespective of the allomother's presence/absence or residence in the household at the time, as we do not have data on the residence status of any allomother apart from the focal child's parents.

Physical care—activities that require physical contact or interaction with the child (Meehan 2008)—was measured via five binary variables. Each represented a different activity and indicated whether the child had received that particular care from each allomother in the two weeks preceding the survey. The five types of physical childcare were supervising, playing with, washing, feeding or cooking for, and caring for the child if they had been sick in the two weeks preceding the survey (27% of children had been sick in this time period, $n=215$). The proportion of children who received each of these five types of care from each allomother, by village and town residence, is presented in Figure S1 (shown in the online appendix, along with all other figures and tables designated with an "S"). We categorized the five measures of care into two variables—high-intensity care and low-intensity care—as adapted by Meehan (2005, 2008) from Kleiman and Malcolm (1981) and Marlowe (1999, 2005). High-intensity care requires either close contact with the child, direct attention given to the child, or actions that can interrupt the carers' other activities, whereas low-intensity care requires relatively low levels of energy expenditure on the part of the carer—for example, being in close proximity to or watching the infant (Meehan 2005, 2008). High-intensity care in our study comprised four variables: washing, feeding/cooking, playing, and caring when sick ($n=808$ for all allomothers, except $n=807$ for playing with maternal aunts/uncles and paternal aunts/uncles). Low-intensity care comprised one variable: supervising ($n=808$ for all allomothers, except $n=807$ for paternal aunts/uncles). If, in the two weeks preceding the survey, children received any of the four care types categorized as high intensity, they were considered to have received high-intensity care from that allomother; similarly, if children received supervision from a particular allomother, they were considered to have received low-intensity care from that allomother.

Our primary independent variable was whether the child lived in the village or the town, as a proxy for level of market integration. To verify if the village and town were indeed different in their extent of market integration, we examined the following demographic and socioeconomic characteristics: household size and number of 0–5-year-olds in the household, assumed to be predictive of extended family coresidence and higher fertility; investment in human capital, measured by the household head's educational attainment; and reliance on agriculture versus wage-based labor or market work as a form of livelihood, measured by the household head's occupation. We ran bivariate associations between village/town residence and these socioeconomic and demographic variables, as well as several other child- and household-level characteristics (see Table 1), using Pearson chi-square tests and t tests ($n=808$).

Data Analysis

We used logistic regression analyses to address our research questions concerning childcare arrangements. Separate regression models were run to analyze the association between village/town residence and each type of care from each category of allomother. For example, the effect of living in the town on receiving low-intensity care from fathers was one regression model. Thus, a total of 14 regression models were run: 12 models to explore our first research question (two types of care and six categories of kin members) and two models to explore our second research question (two types of care and one category of distant kin/nonkin allomother). The first stage of our analysis (bivariate associations between town and village) also allowed us to narrow down which variables may be important in explaining differences between the town and village, information that was used while building our regression models. While we a priori retained child's age (measured continuously in years) as a potential confounder in all models, child's sex and parity were not included because of results from bivariate analyses that indicated no difference in child's sex or parity between the village and town (Table 1). Although several sociodemographic characteristics were strongly associated with village/town residence, including household size and household head's education level and primary occupation, these were not adjusted for in the regression models as we suspect these indicators to be on the causal pathway between residence and caregiving. Models were restricted to children who coresided with their biological mothers ($n = 728$) so that provision of care reflects allomaternal support (i.e., care provided to help mothers). For this subsample, we surveyed an average of 1.55 children per household (1.78 in the village and 1.38 in the town); we chose not to run multilevel models because fixed and random effects may both be overestimated in two-level models when clusters are unbalanced and observations per group are sparse, that is, fewer than two observations per group (Clarke 2008). We acknowledge that this may result in standard errors being biased downward.

Results

Variation in Household Characteristics by Village and Town

Households in the village compared with the town were larger (village: mean 8.5 people, SD 3.2; town: mean 7.1 people, SD 2.9; t test = 5.2; $p < .001$) and had more resident children under the age of 5 (village: mean 2 children, SD 1.1; town: mean 1.6 children, SD 0.9; t test = 4.9; $p < .001$; see Table 1). The household head's educational attainment varied between the village and town ($\chi^2(3) = 52.6$; $p < .001$). Although most had achieved a primary school education in both the town (68%) and the village (63%), substantially fewer had progressed further than primary school in the village (2% vs. 18% in the town), and more had no education in the village (34% vs. 13% in the town). The household head's primary occupation also differed between the village and the town with the starkest difference seen for farming ($\chi^2(3) = 130.5$; $p < .001$): while the majority of households in the village farmed to earn their livelihoods (85%), only one third of households in the town did so. In contrast, many more households in the town relied on trading or market-based work to earn wages (30%)

Table 1 Bivariate analyses showing correlation between child's residence (village or town) and selected child-, parent-, and household-level sociodemographic characteristics

	Village	Town	Test Statistic	<i>p</i> Value
Indicators of Market Integration (household level)				
Number of households with children aged 0–5	212	294		
Household size (mean, SD)	8.50 (3.24)	7.08 (2.86)	<i>t</i> test = 5.22	<.001
Number of children aged 0–5 in household (mean, SD)	1.99 (1.05)	1.57 (0.88)	<i>t</i> test = 4.90	<.001
Primary occupation of head (<i>n</i> , %)			$\chi^2(3) = 130.5$	<.001
Farmer	180 (84.91)	100 (34.01)		
Trader	16 (7.55)	89 (30.27)		
Other	10 (4.72)	85 (28.91)		
None	6 (2.83)	20 (6.80)		
Education level of head (<i>n</i> , %)			$\chi^2(3) = 52.63$	<.001
Primary	134 (63.21)	201 (68.37)		
More than primary	4 (1.89)	52 (17.69)		
None	71 (33.49)	38 (12.93)		
Don't know	3 (1.42)	3 (1.02)		
Land ownership (<i>n</i> , %)			$\chi^2(3) = 94.59$	<.001
Owens land	111 (52.36)	90 (30.93)		
Owens and rents land	59 (27.83)	30 (10.31)		
Rents land	28 (13.21)	46 (15.81)		
Neither owns nor rents land	14 (6.60)	125 (42.96)		
Livestock ownership (<i>n</i> , %)			$\chi^2(1) = 89.93$	<.001
Yes	172 (81.13)	114 (38.78)		
No	40 (18.87)	180 (61.22)		
Household Head Characteristics				
Age (mean, SD)	46.15 (13.35)	45.61 (12.65)	<i>t</i> test = 0.4635	.64
Sex (<i>n</i> , %)			$\chi^2(1) = 5.79$	.016
Female	29 (13.68)	65 (22.11)		
Male	183 (86.32)	229 (77.89)		
Marital status (<i>n</i> , %)			$\chi^2(4) = 9.48$	.05
Married (monogamous)	153 (72.17)	204 (69.39)		
Married (polygynous)	32 (15.09)	28 (9.52)		
Divorced/separated	9 (4.25)	18 (6.12)		
Widowed	18 (8.49)	41 (13.95)		
Never married (not engaged)	0 (0.00)	3 (1.02)		
Religion (<i>n</i> , %)			$\chi^2(2) = 101.49$	<.001
Roman Catholic	42 (19.81)	138 (46.94)		
Other established Christian	59 (27.83)	121 (41.16)		
Other	111 (52.36)	35 (11.90)		
Ethnicity (<i>n</i> , %)			$\chi^2(1) = 32.73$	<.001
Sukuma	210 (99.06)	246 (83.67)		
Other	2 (0.94)	48 (16.33)		
Child Characteristics				
Total number of children aged 0–5	393	415		
Sex (<i>n</i> , %)			$\chi^2(1) = 0.00$	.99
Girl	193 (49.11)	204 (49.16)		
Boy	200 (50.89)	211 (50.84)		
Father's first child (<i>n</i> , %) ^a			$\chi^2(1) = 3.78$	.05
Yes	305 (81.33)	300 (75.57)		
No	70 (18.67)	97 (24.43)		

Table 1 (continued)

	Village	Town	Test Statistic	<i>p</i> Value
Age in years (mean, SD)	2.39 (1.36)	2.48 (1.42)	<i>t</i> test = −1.01	.31
Parental residence (<i>n</i> , %)			$\chi^2(3) = 13.09$	<.001
Lives with both parents	278 (70.74)	255 (61.74)		
Lives with mother but not father	73 (18.58)	120 (29.06)		
Lives with father but not mother	9 (2.29)	5 (1.21)		
Lives apart from both parents (fostered)	33 (8.4)	33 (7.99)		
Parents' marital status (<i>n</i> , %)			$\chi^2(4) = 10.47$	.03
Officially married	291 (74.05)	264 (63.61)		
Live together as married	4 (1.02)	7 (1.69)		
Divorced	41 (10.43)	57 (13.73)		
Mother and/or father dead	6 (1.53)	8 (1.93)		
Unmarried and live apart	51 (12.98)	79 (19.04)		
Father in polygynous union (<i>n</i> , %) ^b			$\chi^2(1) = 11.33$	<.001
Yes	53 (18.21)	22 (8.40)		
No	238 (81.79)	240 (91.60)		

Note: *n* = 808 children for child-level variables and *n* = 506 households for household head variables.

^a Excludes missing data (*n* = 36).

^b Restricted to children with married parents and excludes don't know/refusal responses (*n* = 533).

than in the village (8%). Difference in the level of market integration between the village and town was also reflected in land and livestock ownership, with substantially more households in the village owning both land (52% vs. 31% in the town; $\chi^2(3) = 94.6$; $p < .001$) and livestock (81% vs. 39% in the town; $\chi^2(1) = 89.9$; $p < .001$).

There were more female-headed households in the town (22% vs. 14% in the village; $\chi^2(1) = 5.8$; $p = .02$), possibly partly owing to more household heads being widowed or divorced than in the village. Although almost all households in the village identified as Sukuma (99%), there was more variation in ethnicity in the town, where 84% identified as Sukuma ($\chi^2(1) = 32.7$; $p < .001$). Almost half of the village residents reported traditional religious beliefs or “no religion” and half Christianity, whereas a majority of the town residents identified as Christian (88%; $\chi^2(2) = 101.5$; $p < .001$).

Variation in Children's Characteristics by Village and Town Residence

There was no difference in the proportion of boys and girls or children's mean age between the two locations (Table 1). Children's parental residence patterns varied in two main ways ($\chi^2(3) = 13.1$; $p < .001$): more children in the village coresided with both parents (71% vs. 62% in the town), and fewer children in the village lived in father nonresident households (19% vs. 29% in the town). A similar proportion of children (8%) in both the village and town were foster children (i.e., residing without both living biological parents). Most children's parents were married to each other or were unmarried but lived together as a married couple. Fewer parents were recorded

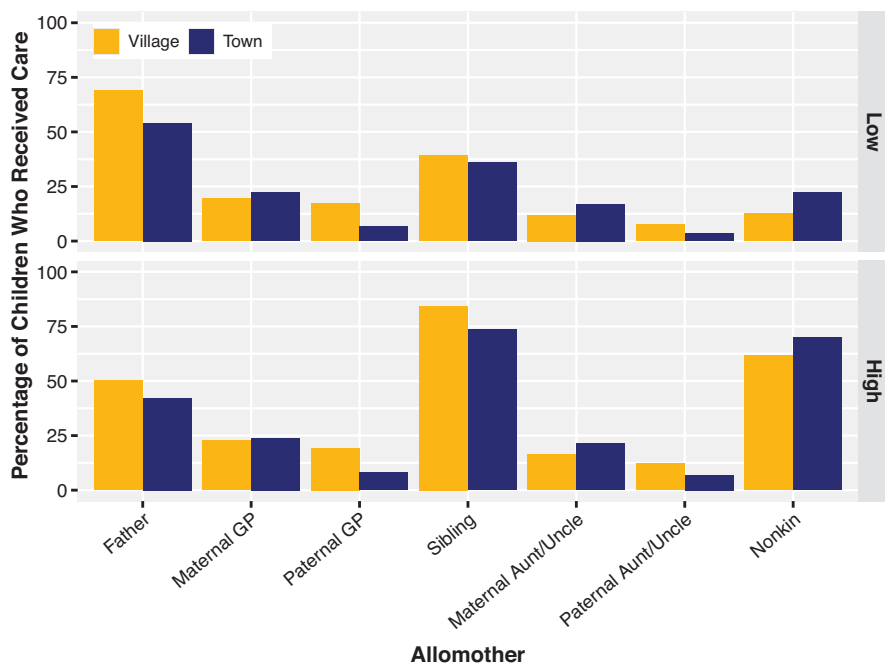


Fig. 1 Percentage of children who received low-intensity (supervising) and high-intensity care (washing, feeding, playing, caring when sick) from each allomother in the village and town samples. Observations are restricted to children with coresident mothers ($n=728$). GP = grandparent.

as married to each other in the town (65%) than in the village (75%), and a higher percentage of parents in the town were either divorced (14% vs. 10% in the village) or unmarried and living apart (19% vs. 13% in the village; $\chi^2(4) = 10.5$; $p=.03$). Fewer fathers were in a polygynous union in the town (8%) than in the village (18%; $\chi^2(3) = 11.3$; $p<.001$).

Variation in Allomaternal Care Provision

Provision of allomaternal care varied by village/town residence, by who the allomother was, and by whether the care was low or high intensity. In both the village and the town, children received most low-intensity care from their fathers, followed by siblings; most high-intensity care came from siblings, followed by distant kin/nonkin (Figure 1). Although fathers were the most common providers of care in both contexts, children in the town had lower odds of receiving low-intensity (OR: 0.52, 95% CI: 0.38–0.70) and high-intensity (OR: 0.74, 95% CI: 0.55–0.99) care from fathers than in the village. Children in the town had lower odds of receiving low-intensity (OR: 0.34, 95% CI: 0.21–0.56) and high-intensity (OR: 0.38, 95% CI: 0.24–0.60) care from paternal grandparents, as well as low-intensity (OR: 0.44, 95% CI: 0.22–0.86) and high-intensity (OR: 0.54, 95% CI: 0.32–0.91) care from paternal aunts/uncles. Children had lower odds of receiving low-intensity (OR: 0.85, 95%

Table 2 Logistic regression models showing associations between town residence (reference = village) and receiving low- or high-intensity care from each allomother: Analyses restricted to children with coresident mothers

	Low Intensity			High Intensity		
	Odds Ratio	95% CI	<i>p</i> Value	Odds Ratio	95% CI	<i>p</i> Value
Father						
Town residence	0.52	0.38–0.70	<.001	0.74	0.55–0.99	.04
Child's age	1.17	1.05–1.31	.01	0.89	0.80–0.99	.03
Intercept	1.57	1.13–2.18	.01	1.32	0.96–1.82	.09
Maternal Grandparent						
Town residence	1.21	0.84–1.73	.30	1.08	0.77–1.53	.65
Child's age	0.91	0.80–1.03	.15	0.86	0.75–0.97	.02
Intercept	0.30	0.20–0.44	<.001	0.42	0.29–0.60	<.001
Paternal Grandparent						
Town residence	0.34	0.21–0.56	<.001	0.38	0.24–0.60	<.001
Child's age	0.78	0.66–0.93	.01	0.83	0.70–0.97	.02
Intercept	0.35	0.23–0.55	<.001	0.36	0.24–0.56	<.001
Sibling						
Town residence	0.85	0.63–1.15	.29	0.48	0.33–0.70	<.001
Child's age	1.18	1.05–1.31	<.001	1.53	1.33–1.76	<.001
Intercept	0.44	0.32–0.62	<.001	2.28	1.56–3.36	<.001
Maternal Aunt/Uncle						
Town residence	1.52	1.00–2.32	.05	1.43	0.98–2.08	.06
Child's age	0.93	0.80–1.08	.32	0.92	0.81–1.06	.24
Intercept	0.16	0.10–0.25	<.001	0.23	0.15–0.35	<.001
Paternal Aunt/Uncle						
Town residence	0.44	0.22–0.86	.02	0.54	0.32–0.91	.02
Child's age	0.91	0.72–1.16	.45	0.75	0.62–0.90	<.001
Intercept	0.10	0.05–0.19	<.001	0.26	0.16–0.41	<.001
Distant Kin/Nonkin						
Town residence	1.97	1.32–2.94	<.001	1.43	1.04–1.96	.03
Child's age	1.13	0.98–1.30	.09	1.49	1.32–1.67	<.001
Intercept	0.11	0.07–0.17	<.001	0.68	0.48–0.94	.02

Note: For each model, *n* = 728, except *n* = 727 for low-intensity care from paternal aunts/uncles.

CI: 0.63–1.15) and high-intensity (OR: 0.48, 95% CI: 0.33–0.70) care from their siblings in the town, but 95% confidence intervals crossed 1.00 for low-intensity care. In contrast, children had much higher odds of receiving both low-intensity (OR: 1.97, 95% CI: 1.32–2.94) and high-intensity care (OR: 1.43, 95% CI: 1.04–1.96) from distant kin/nonkin in the town. Although maternal grandparents (low-intensity OR: 1.21, 95% CI: 0.84–1.73; high-intensity OR: 1.08, 95% CI: 0.77–1.53) and maternal aunts/uncles (low-intensity OR: 1.52, 95% CI: 1.00–2.32; high-intensity OR: 1.43, 95% CI: 0.98–2.08) also had higher odds of providing both types of care in the town, 95% confidence intervals crossed 1.00 for all estimates, indicating no difference between the two communities regarding care from maternal kin. Full results for each allomother and each type of care are provided in Table 2, and regression model results are in Table S1.

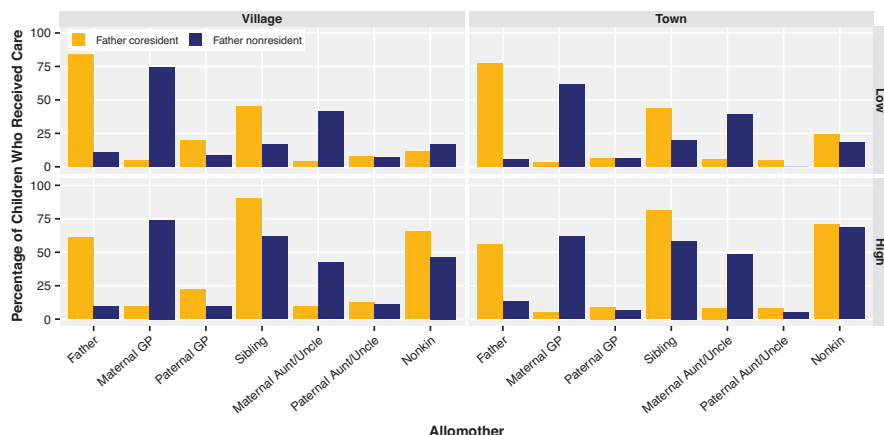


Fig. 2 Percentage of children who received low-intensity (supervising) and high-intensity care (washing, feeding, playing, caring when sick) from each allomother in the village and town samples, by father's residence. Father (and mother) coresident, $n=533$; father nonresident, $n=192$. GP = grandparent.

Are Results Similar for Children Living With and Without Their Fathers?

Our descriptive results indicated that parental relationships differed between the town and village (Table 1). Given the importance of parental relationships for allomaternal care, we explored a third research question: whether the father's coresidence with the child was associated with the differences in allomaternal care seen between the town and village. In Figure 2, we show a breakdown of care provided from the seven allomother categories by type of care (low or high intensity), village or town residence, and father's residence (with the focal child or away from the focal child). We also tested if care provision from fathers was correlated with their coresidence with the child and find moderate to high correlation between paternal coresidence and care provision (see Figure S2).

We used logistic regression analyses to test if allomaternal care in the town differs from that in the village for children who (1) reside with both parents (i.e., father coresident) and (2) reside with their mothers only (i.e., father nonresident). Two sets of models were run: 14 models (seven carers and two care types) for children with coresident parents (Table 3) and 14 models (seven carers and two care types) for children living with mothers in father nonresident households (Table 4). These analyses were restricted to children who lived with both biological parents ($n=533$) or coresided with mothers in a father nonresident household ($n=193$), leading to a sample of 726 children.

The results seen in Table 2 (for children with coresident mothers, regardless of father's residence) were broadly similar to when the analysis was restricted to children who also had coresident fathers (Table 3; full models are provided in Tables S2 and S3). Children with coresident mothers and fathers had lower odds of receiving low-intensity care from fathers (OR: 0.63, 95% CI: 0.40–0.97), both types of care from paternal grandparents (low-intensity OR: 0.30, 95% CI: 0.17–0.53; high-intensity OR: 0.36, 95% CI: 0.21–0.61), and high-intensity care from siblings

Table 3 Logistic regression models showing associations between town residence (reference = village) and receiving low- or high-intensity care from each allomother: Analyses restricted to children residing with both parents

	Low Intensity			High Intensity		
	Odds Ratio	95% CI	<i>p</i> Value	Odds Ratio	95% CI	<i>p</i> Value
Father						
Town residence	0.63	0.40–0.97	.04	0.84	0.59–1.19	.33
Child's age	1.13	0.96–1.32	.15	0.80	0.70–0.91	<.001
Intercept	4.08	2.53–6.56	<.001	2.65	1.78–3.93	<.001
Maternal Grandparent						
Town residence	0.61	0.25–1.49	.28	0.53	0.27–1.05	.07
Child's age	0.98	0.71–1.35	.90	0.91	0.71–1.16	.44
Intercept	0.06	0.02–0.14	<.001	0.13	0.07–0.25	<.001
Paternal Grandparent						
Town residence	0.30	0.17–0.53	<.001	0.36	0.21–0.61	<.001
Child's age	0.74	0.61–0.90	<.001	0.74	0.61–0.88	<.001
Intercept	0.48	0.29–0.79	<.001	0.55	0.34–0.88	.01
Sibling						
Town residence	0.93	0.66–1.31	.67	0.44	0.26–0.73	<.001
Child's age	1.10	0.97–1.25	.14	1.32	1.10–1.59	<.001
Intercept	0.65	0.45–0.95	.03	5.11	2.98–8.75	<.001
Maternal Aunt/Uncle						
Town residence	1.37	0.63–3.00	.43	0.88	0.48–1.60	.67
Child's age	1.05	0.79–1.40	.73	0.95	0.76–1.19	.66
Intercept	0.04	0.02–0.10	<.001	0.12	0.06–0.22	<.001
Paternal Aunt/Uncle						
Town residence	0.64	0.31–1.30	.22	0.61	0.34–1.10	.10
Child's age	0.85	0.66–1.10	.23	0.71	0.57–0.89	<.001
Intercept	0.12	0.06–0.24	<.001	0.29	0.17–0.51	<.001
Distant Kin/Nonkin						
Town residence	2.42	1.52–3.87	<.001	1.21	0.83–1.76	.32
Child's age	1.13	0.96–1.34	.14	1.44	1.25–1.66	<.001
Intercept	0.10	0.06–0.17	<.001	0.84	0.57–1.25	.40

Note: For each model, *n* = 533.

(OR: 0.44, 95% CI: 0.26–0.73), and had higher odds of receiving low-intensity care from distant kin/nonkin (OR: 2.42, 95% CI: 1.52–3.87) in the town versus the village (Table 3). As before, there appeared to be no difference in care from maternal kin between the two communities, with 95% confidence intervals crossing 1.00 for all point estimates. For children with coresident mothers but nonresident fathers, there appeared to be no difference in allomaternal care provision between the town and village for any category of kin (Table 4), except that children residing in father non-resident households had higher odds of receiving high-intensity care from distant kin/nonkin in the town (OR: 2.59, 95% CI: 1.38–4.86). This finding indicates that while fathers, paternal kin, and siblings are less likely to provide care in the town, this caregiving is limited to children with coresident fathers; for children with nonresident fathers, care from kin is the same across the village and town.

Table 4 Logistic regression models showing associations between town residence (reference = village) and receiving low- or high-intensity care from each allomother: Analyses restricted to children residing with mothers in father nonresident households

	Low Intensity			High Intensity		
	Odds Ratio	95% CI	<i>p</i> Value	Odds Ratio	95% CI	<i>p</i> Value
Father						
Town residence	0.50	0.17–1.45	.20	1.62	0.63–4.15	.31
Child's age	1.01	0.69–1.46	.97	0.80	0.58–1.10	.17
Intercept	0.12	0.04–0.35	<.001	0.16	0.06–0.41	<.001
Maternal Grandparent						
Town residence	0.56	0.29–1.06	.07	0.59	0.31–1.12	.11
Child's age	1.09	0.88–1.35	.43	0.94	0.76–1.17	.60
Intercept	2.40	1.23–4.67	.01	3.19	1.61–6.31	<.001
Paternal Grandparent						
Town residence	0.81	0.27–2.45	.71	0.65	0.23–1.89	.43
Child's age	0.89	0.60–1.32	.56	1.17	0.81–1.70	.41
Intercept	0.11	0.04–0.34	<.001	0.08	0.02–0.24	<.001
Sibling						
Town residence	1.21	0.56–2.62	.63	0.80	0.42–1.52	.50
Child's age	1.35	1.04–1.75	.02	1.79	1.41–2.26	<.001
Intercept	0.10	0.04–0.25	<.001	0.54	0.29–1.04	.07
Maternal Aunt/Uncle						
Town residence	0.96	0.53–1.73	.89	1.31	0.73–2.35	.37
Child's age	0.99	0.81–1.21	.90	1.02	0.84–1.25	.82
Intercept	0.72	0.39–1.33	.29	0.70	0.38–1.30	.26
Paternal Aunt/Uncle						
Town residence	1.00	—	—	0.44	0.15–1.33	.15
Child's age	1.18	0.62–2.26	.62	0.81	0.54–1.22	.32
Intercept	0.05	0.01–0.29	<.001	0.18	0.07–0.50	<.001
Distant Kon/Nonkin						
Town residence	1.12	0.52–2.44	.77	2.59	1.38–4.86	<.001
Child's age	1.10	0.85–1.43	.48	1.56	1.24–1.96	<.001
Intercept	0.16	0.07–0.37	<.001	0.36	0.18–0.70	<.001

Note: For each model, *n* = 193, except *n* = 73 for low-intensity care from paternal aunts/uncles.

Discussion

We explored variation in allomaternal childcare provision, contrasting the less market-integrated village of Welamasonga with the neighboring, more market-integrated town of Kisesa. Children were cared for by several allomothers in both communities. Concurrent with other literature, care was commonly received from kin members, particularly fathers (Boyette et al. 2018; Hewlett 1992; Hill and Hurtado 2009; Opondo et al. 2016), siblings (Borgerhoff Mulder and Milton 1985; Kramer 2002, 2005; Lee and Kramer 2002; Meehan 2008; Sear and Mace 2008), and maternal kin (Isiugo-Abanihe 1985; Pollet et al. 2009; Sear and Mace 2008). Many children also received care from distant kin/nonkin, especially high-intensity care. Consistent with our overall hypothesis, living in the town versus the village is associated with differences in childcare networks. Children were less likely to receive both low- and high-intensity care from

their fathers and paternal kin, and low-intensity care from their siblings, in the town compared with the village. However, maternal kin (aunts/uncles and grandparents) had the same odds of providing support to mothers in both communities. We tested if mothers would be more likely to receive support from nonkin in the town, and we found that this was the case for both types of care.

Households in the town had fewer residents on average than households in the village, a common characteristic seen in urban neighborhoods in sub-Saharan Africa (Hedges et al. 2018; Pick and Obermeyer 1996) and elsewhere (Bentley et al. 1993; Walker 2014; Walker et al. 2013). Town-living was also associated with more variation in children's parental residence. Although the lower odds of fathers providing childcare in the town could reflect the lower levels of father-child coresidence documented here compared with the village, our results suggest otherwise. Fathers are much more likely to provide care to children they coreside with; however, even among households in which fathers coreside with their children, they have a lower likelihood of providing care in the town than in the village. This finding indicates that other factors are driving the variation in paternal care between the two communities. For instance, the higher likelihood of father care in the village may be attributed to the different demands of wage-based labor in the town. Farming in the village is primarily subsistence farming on family land surrounding a complex of houses and outbuildings. As such, fathers are likely spending a larger portion of their time in or near their household. In contrast, fathers in the town are laborers or traders, own or work at market shops, or have migrated away from home for employment, which may help explain the distinction between fathers' provision of low- and high-intensity care. Overall, a higher proportion of children received low-intensity care from their fathers than high-intensity care, indicating fathers are perhaps more inclined toward providing childcare that is not disruptive of their other activities. Furthermore, although fathers were more likely to provide both types of care in the village than the town, this difference was greater for low-intensity care (i.e., supervision), which suggests fathers may be less able to passively supervise children in the town.

Fathers in a Yucatan Maya community spent more time with their families after their community became more market-integrated, as they were able to repurpose time gained from efficient agricultural production strategies (e.g., via technology) toward family investment. However, these changes coincided with reduced opportunities of wage labor and higher returns for investing in children that accompany market integration (e.g., the increased value of education) and were facilitated by the fathers being in monogamous unions (Schacht et al. 2018). Wage-based labor may have a reverse effect by increasing the demands on men's time and pulling them away from the family. However, although fathers may engage in less physical care in the town, this does not mean they invest less overall; they may instead be shifting the form of their investment into other types of care, such as provisioning via monetary resources.

We examined care from matrilineal and patrilineal relatives separately because a large body of research indicates that maternal and paternal relatives have different roles and impacts with regard to childcare (King and Elder 1995; King et al. 2003; Pashos and McBurney 2008; Perry and Daly 2017; Pollet et al. 2009; Sear and Mace 2008; Sear et al. 2000; Volland and Beise 2002). Our previous research in these two communities also shows that receiving care from relatives of the same lineage is positively associated and paternal care is negatively associated with care from maternal

kin (Hassan et al. 2025), which is demonstrated in both the town and the village in this study. Differences seen between patrilineal caregiving in the two communities in this sample may be partially explained by higher levels of patrilocal residence in the village and shifts toward neolocality in the town (for evidence from a different context that allocare depends on residence patterns, see Meehan 2005). Although we did not collect data on whether the focal child resided with their matrilineal or patrilineal family, we did find that paternal relatives had a higher likelihood of providing care in the village, and this was limited to father-resident households, which may be indicative of patrilocal residence. Furthermore, our results show that children's mothers in the town were more likely to be divorced or living apart from the children's fathers than in the village. In these cases, mothers may seek help from nonkin or may even be residing with their natal kin (i.e., children's maternal kin) and receiving support from them. However, women's own parents (i.e., the focal child's maternal grandparents) and their siblings (i.e., the child's maternal aunts/uncles) are equally likely to help in both communities, suggesting that maternal kin provide care equally whether the child and mother reside patrilocally, matrilocally, or neolocally. Dense housing and accessible transport links in towns also make within-town mobility easier, which may allow maternal relatives to travel more conveniently and provide support to mothers even if they reside far away or patrilocally. In rural Ethiopia, maternal grandmothers not residing with their married daughters continue to provide physical support regardless of the distance between their households (Gibson and Mace 2005). Other studies have also shown the importance of investment from maternal kin even in patrilocal and patrilineal societies (Perry 2021; Pollet et al. 2007).

Siblings had lower odds of providing high-intensity allocare in the town than in the village, but no difference was seen between the two communities for low-intensity care. This finding could be attributed to the higher odds of school enrollment and progression to secondary school in the town than in the village (Hedges et al. 2018), which may decrease older children's availability to provide high-intensity allocare to younger siblings. Hedges et al. (2018) showed that among those not attending school, children in the village (and girls in particular) participated in more productive work, including household chores, than children in the town. This finding is potentially reflected in our study because household chores can consist of high-intensity childcare tasks—for example, washing and feeding. The difference seen between low- and high-intensity care could also be driven by the inclusion of “playing” in the high-intensity care category. Children may be more likely to play with their siblings in the village perhaps because there are more coresident children here (average of 2 under-5 children per household), whereas in the town there are slightly fewer coresident children (average of 1.5 under-5 children per household) and children have more access to nonkin playmates such as neighbors. Playgroups consisting of neighboring preschool-age children were very commonly observed in the town, with ages appearing to range between one and seven years old.

Lastly, we find that distant kin/nonkin were more likely to provide care to children in the town than in the village. Previous research has emphasized covariance between relatedness and living close by (Crittenden and Marlowe 2008; Gurven 2004; Koster and Leckie 2014), attributing cooperation between kin to the reduced geographic distances between them that help lower the costs of providing support (Clutton-Brock 2002; Nolin 2010; Page et al. 2019). If residential proximity spurs cooperation, and

children are living closer to nonrelatives in the town than in the village, then it is unsurprising that we find nonkin playing a larger role in childcare in the town than in the village.

Limitations

All measures of care we have used are binary, that is, measuring whether each allomother provided care in the two weeks preceding the survey. Thus, we do not know the frequency of care provision, only whether it was provided at least once or not at all. This limits us from estimating an actual quantification of the level of care provided and how this varies between the village and town, and between allomothers. However, we believe our measure of care provision (or lack of) is informative. Second, we use the village and town as proxies for market integration. It remains possible that the differences we observe reflect some unmeasured characteristic of each location, or perhaps a peculiarity of our sampled locations. That said, the two locations benefit from being geographically close and largely culturally and historically similar, thus limiting the scope for unmeasured differences; we have also demonstrated that the town and village do differ on characteristics such as subsistence strategy and education in accordance with our assumption that the town is more market-integrated. Other studies have also effectively used comparisons between different neighborhoods as representative of changing socioecology (Hedges et al. 2018; Nettle 2012). An ideal follow-up to our work would be to test our research questions using longitudinal data that allow for observation of changes in allomaternal networks as a community becomes more market-integrated.

Conclusion

Understanding how the level of market integration correlates with types and sources of allomaternal support can elucidate how different patterns of support can drive real-world differences in fertility and health between more and less market-integrated populations. We tested whether allomaternal care would be less likely from kin and more likely from distant kin/nonkin in a town than in a village in Tanzania. Our predictions were partially supported, in that paternal kin and siblings were less likely to provide allocare and nonkin more likely in the town. However, there were no differences in care from maternal kin. This finding may reflect differences in the consistency of support from maternal kin across contexts, as well as the more facultative nature of support from paternal kin. It may also be related to matrilocal/patrilocal differences in residence, or driven by any of the features of market integration (i.e., smaller household size, higher education level, increase in wage-based labor or trade) or children's sociodemography (e.g., parents' marital or residence status) that we find associated with town residence. Although the scope of this study allowed us to explore only one of these factors (father's residence), it would be instructive to investigate others in future research. While we were unable to demonstrate whether the frequency, duration, or quality of allomaternal helping varies by level of market integration, we have

clearly shown that patterns of allomaternal support vary by level of market integration in terms of source and type of care. ■

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Reproducibility and Data Availability The data analyzed in this study are not public because of ethical restrictions but are available from the corresponding author upon reasonable request.

Author Contributions A.H.: conception and design, funding, data collection, data analysis, interpretation of data, and drafting and revising the manuscript. D.W.L.: conception and design, funding, data collection, interpretation of data, and revising the manuscript. S.B.S.: data collection, interpretation of data, and revising the manuscript. M.U.: data collection, interpretation of data, and revising the manuscript. R.S.: conception and design, interpretation of data, and revising the manuscript.

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