Neighbourhood Ethnic Diversity and Child Health Outcomes in Ethiopia

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Abstract

Using a nationally representative sample from Ethiopia's Demographic and Health Survey 2011 (EDHS-2011) and applying instrumental variables estimators, this paper provides new evidence on the link between ethnic heterogeneity and child health outcomes. Contrary to the long-held view that ethnic fractionalisation hampers collective efficacy, undermines provision of local public goods and negates social and economic benefits associated with them, our study shows that children in relatively diverse communities are better nourished and more likely to receive full vaccination. There is also some evidence that women in ethnically diverse communities are better informed about health issues and more empowered in making health care decisions than their counterparts in homogenous communities. Our results have an important implication for policy. Politicians and policy makers should promote inclusion and intergroup tolerance through legal and institutional support.

Key words: Children; Health outcome; Ethnic diversity; Ethiopia

1. Introduction

Poor health continues to be a serious policy challenge in Ethiopia. Nutritional disorders and preventable communicable diseases are still the main causes of morbidity. Public health policy emphasises both the prevention of malnutrition through health education and the supply of micronutrients and a national immunisation scheme that following the recommendations of the World Health Organisation (WHO).[1] Immunisation is free in all public health centres (FMOH, 2010).

[1] According to the WHO Expanded Program on Immunisation (EPI), by the age of 12 months, children should receive one dose of BCG vaccine, one dose of measles vaccine, four doses of oral poliovirus vaccine (OPV) and three doses of diphtheria-pertussis, tetanus (DPT-3) (WHO, 2008).

Despite some progress in reducing child mortality,[2] a recent national survey shows that the country is unlikely to achieve the goal of reducing under-five mortality by 25 deaths per 1000 lives by 2030. Over 2012-2016, the under-five mortality rate is estimated to have been 67 deaths per 1000 live births. More than 40 percent of children under five are severely malnourished. The rate of immunisation is also extremely low: only 39 percent of children between the ages of 12 and 23 months received all the basic vaccines recommended by the WHO (CSA & ICF, 2016).

These problems have a number of potential explanations. On the supply side, there are factors such as shortage of medical personnel, inadequate supply of drugs and equipment, a poor referral system and under-financing of health service. On the demand side, health care utilization could be inhibited by traditional social norms, the physical inaccessibility of health services and the opportunity cost of seeking care (FMOH, 2014).

The burgeoning literature on ethnic fractionalisation and intergroup contact suggests that neighbourhood ethnic diversity could be an important determinant of these demand and supply side factors.[3] One strand of the literature shows that ethnic diversity engenders intergroup conflict (Blalock, 1967; Bobo, 1999) and undermines norms of interpersonal trust and reciprocity, which are key components of social capital (Delhey & Newton, 2005; Putnam, 2007; Soroka, Helliwell, & Johnston, 2003; Tolsma, Van der Meer, & Gesthuizen, 2009). Low level of social capital can in turn hamper collective efficacy (Alesina & La Ferrara, 2000; Costa & Kahn, 2003a; Fukuyama, 1995; Putnam, 1993; Uslaner, 2002). When social sanctions are absent, individuals' incentive to engage in corrupt and rent-seeking behaviours will increase (Easterly, 2001; Easterly & Levine, 1997; Montalvo & Reynal-Querol, 2005). In ethnically heterogeneous communities, the dilemma of collective action and corruption can result in the under-provision of public goods (Banerjee & Somanathan, 2007; Khwaja, 2009; Miguel & Gugerty, 2005) and poor social and economic outcomes (Alesina, Devleeschauwer, Easterly, Kurlat, & Wacziarg, 2003).

[2] Ethiopia already achieved the millennium development goal of reducing child mortality by two-thirds in 2012.

[3] In other parts of the world, religious differences could be a more salient factor. In Ethiopia, however, ethnicity has become more salient. Over the last 25 years, ethnic assertiveness and tribalism have created a strong sense of ethnic identity which appears to supersede national identity. While the majority of communities in the country are ethnically diverse because of resettlement programs by previous governments, the growing salience of ethnic identity could have weakened community cohesion and undermined the social and economic benefits associated with collective action.

On the other hand, another strand of literature suggests that negative attitudes and stereotypes towards outgroups are mitigated by intergroup contact (Allport, 1954; Pettigrew, 1979). Personal contact with members of an outgroup helps to overcome negative stereotypes and a sense of threat; making it easier to trust members of the outgroup (Pettigrew, 1998; Pettigrew, Christ, Wagner, & Stellmacher, 2007; Rothbart & John, 1993). Different ethnic groups may have different perspectives on particular issues (Hong & Page, 2004), so as the neighbourhood become more ethnically diverse so does its knowledge base (Bates, 2000). It is therefore possible for diversity to promote heterogeneous perspectives and complementary skills beneficial to the provision of both public and private goods (Portes & Vickstrom, 2011; Reynal-Querol, 2002). Diversity can also promote adherence to health behaviours that comply with recommendations of the formal health care system (Suchman, 1966). Interaction with outgroup members can weaken pressure on individuals to conform to group norms and traditions and can provide access to information about disease prevention and health care service location (Langlie, 1977; Salloway & Dillon, 1973).

The impact of ethnic diversity on child health outcomes has been rarely examined in the economics literature. To the best of our knowledge, only Alesina et al. (2003) attempt to examine the relationship between ethnic diversity and health outcomes. Their cross-country analysis shows that ethnic fractionalisation is positively associated with rate of infant mortality. However, estimation procedure suffers from data and methodological problems. First, given the multidirectional nature of ethnicity, their ethnic fractionalisation index is prone to problems of measurement and comparability between countries. For instance, in the US and many Latin American countries, ethnic diversity is defined based on racial identity, whereas in many of the African and Asian countries, ethnic identity is determined based on language (Laitin & Posner, 2001; Reynal-Querol, 2002). Second, while both infant mortality and ethnic diversity can be simultaneously affected by a country's geographical location and level of economic development (Fedderke, Luiz, & De Kadt, 2008; Stichnoth & Van der Straeten, 2013), the authors do not account for such endogeneity issues in their empirical model.

This paper aims to contribute to the empirical literature by investigating the link between neighbourhood ethnic diversity immunisation uptake and nutritional status. Our data come from Ethiopian Demographic and Health Survey 2011, a nationally representative sample.

We believe that the within-country variation in levels of ethnic diversity provides better data quality and greater comparability across jurisdictions. To account for factors that confound our identification strategy, we apply instrumental variables (IV) estimators. Provincial ethnic composition is used as instrument for neighbourhood ethnic diversity.

We find that a ten percentage point increase in the probability that two individuals drawn randomly from a neighbourhood[4] are of different ethnicities is associated with a three percentage point increase in the probability of a child receiving full immunisation and a 0.07 standard deviation increase in the z-score of weight-for-height. Both of these effects are statistically significant at the one percent level. These results contradict the conventional wisdom that ethnic fractionalisation is harmful to social and economic development. Policy makers should be mindful of the positive externalities associated with diversity and multiculturalism, and consider ways to enhance this diversity.

The rest of the paper is structured as follows. Section 2 discusses the literature on the impact of intergroup contact on social capital and its implications for child health outcomes. Section 3 provides a generalised conceptual framework and discusses the empirical identification strategy. Section 4 explains the data and reports some descriptive statistics. Section 5 presents the empirical results and discusses the key transmission mechanisms for the effects of neighbourhood diversity. Section 6 concludes and outlines policy implications.

2. Literature Review

2.1 Social Capital and Health Outcomes

The incentive to consume health services is higher when there is full information about the benefits of the service. Making an optimal decision requires access to full information about the risk of exposure to illness and the efficacy of different treatments. Unfortunately, understanding the relationship between health care and health outcomes requires medical knowledge that is lacking in most consumers (McGuire, Henderson, & Mooney, 1998).[5] An ill-informed consumer may underestimate the severity of health risks and avoid seeking treatment (Kenkel, 1990). This is especially true of preventive measures such as immunisation, because the person does not actually experience any illness at the time of the

[4] On average, each neighbourhood constitutes about 180 households (CSA, 2008)
[5] Sometimes treatment outcomes may not be fully predicted even by the medical professional (Arrow, 1963).

decision. Better information about the benefits of treatment can facilitate health care decision making (Weisbrod, 1978). However, in developing countries like Ethiopia, the formal communication infrastructure is often too poor to provide such information, and people rely on informal channels instead (Dupas, 2011). Moreover, the incentive to spread erroneous information could be high (Mackian, Bedri, & Lovel, 2004). Poorly informed health choices could then worsen the existing situation and even lead to death (McGuire et al., 1998).

A large body of literature in social psychology suggests that health-seeking behaviour is relational. Health behaviour can be affected by an individual's interaction with the social environment (Mackian et al., 2004). In this regard, social capital[6] can influence parental health behaviour and child health outcomes in various ways. First, interpersonal interaction with neighbours may create access to reliable health information (Hochbaum, 1958; Norman, Bennett, Smith, & Murphy, 1998; Rosenstock, 1966). While interacting with others or participating in community activities, consumers can acquire information about health threats, treatment options and the efficacy of each treatment package (Edgeworth & Collins, 2006). Social interaction can also provide information about the institutional characteristics of a given health service and can reduce the transaction costs associated with locating affordable and high-quality health care providers (Deri, 2005). Most importantly, in countries where formal institutions are too weak to regulate the quality of information, consumers may disregard all information about health care, underestimate health risks and fail to seek appropriate treatment (Ozawa & Walker, 2011). Social cohesions can promote the flow of reliable information and so mitigate this effect (Thiede, 2005).

Secondly, social capital can affect parental health behaviour through group influences. The acceptance of group norms in order to demonstrate commitment and loyalty to the group (Mackian et al., 2004; Sheeran & Abraham, 1996) could help to prevent deviant health behaviour. This will be beneficial if group norms discourage behaviours such as alcoholism, domestic violence and child abuse (Kawachi, Subramanian, & Kim, 2008). A similar argument could apply to the avoidance of child vaccination.

[6] Social capital is a concept involving both cognitive and structural attributes of networking. The former includes attributes such as reciprocity, mutual trust and shared beliefs. The latter refers to interpersonal relationships and engagements in civic and political activities (Coleman, 1988; Putnam, 1993).

Thirdly, social networks can create an environment that promotes health care consumption (Ayé, Champagne, & Contandriopoulos, 2002). Parents may need to invest a large amount of money and time in order to access health care. Even when basic health services such as immunisation are free, concomitant costs such as transport and the time spent waiting can influence decisions about vaccination (Banerjee, Duflo, Glennerster, & Kothari, 2010). However, norms of mutual trust and reciprocity could promote social support that mitigates these costs (Andersen & Newman, 2005). Social capital can also serve as insurance against severe shocks and reduce the risk of child malnutrition (Morduch, 1995; Yamano, Alderman, & Christiaensen, 2005).

Fourthly, cooperative norms promoting collective action (Boix & Posner, 1998; Coleman, 1990) can affect health outcomes through the quality of local public goods such as roads, which are often funded by community members. Community cooperation facilitates the mobilization of resources needed to produce local public goods (Fukuyama, 1995; Putnam, 1993; Uslaner, 2002). Strong alliances between community members can also empower communities to lobby the government to provide public goods. When formal institutions are weak, local social capital makes it easier to hold public officials accountable for the quality of public good provision (Knack, 2002; Putnam, 1993).

2.2 Ethnic Heterogeneity and Social Capital

The link between social capital and ethnic heterogeneity features in both economics and social psychology. Civic engagement depends on trust, which induces a sense of belonging that promotes pro-social activities (Baxter, Eyles, & Elliott, 1999). However, trust itself is nurtured by familiarity, attachment and belief congruency. People tend to have more trust in those with whom they share similar cultural norms and values (Coleman, 1990; Dovidio & Gaertner, 1999; Gibson & Gouws, 2002; Rokeach, 1960).

In this regard, neighbourhood diversity could weaken social cohesion. For instance, an increase in the proportion of outsiders in a population can undermine the predictability of societal behaviour and cause information overload (Milgram, 1970) and alienation (Sampson, Raudenbush, & Earls, 1997). Moreover, positive sentiments towards one's own group can be associated with negative attitudes towards outgroups (Brewer, 1999; Sumner, 1906). If interpersonal trust is rooted in belief congruency, inter-group interactions could pose a threat

to indigenous norms (Blalock, 1967) and economic opportunities (Bobo, 1999), generating hostility towards outgroups (Sherif & Sherif, 1953) and weakening neighbourhood cohesion (Putnam, 2007). This literature connects to economic models in which individuals derive utility from socialising with people whose preferences are similar to their own (Conley & Wooders, 1996) or sort into groups providing specific types of good to meet the tastes of particular ethnic group (Alesina & La Ferrara, 2000).

However, in some circumstances regular interpersonal contact with outgroups could promote trust (Glaeser, Laibson, Scheinkman, & Soutter, 2000; McPherson, Smith-Lovin, & Cook, 2001; Tajfel, 1982). Such contact could challenge negative stereotypes and mitigate fear of alien influences (Pettigrew, 1998; Rothbart & John, 1993). This could lead to the creation of heterogeneous but socially cohesive neighbourhoods that are open to ideas from outside (Fukuyama, 1995).

The empirical evidence on the relationship between ethnic diversity and social capital is mixed. On the one hand, some studies show that individuals who live in a diverse community are more likely to form friendships with members of an outgroup (Savelkoul, Gesthuizen, & Scheepers, 2011; Sigelman & Welch, 1993; Stein, Post, & Rinden, 2000); thus, intergroup contact reduces outgroup prejudice (Oliver & Wong, 2003) and enhances formation of bridging social capital (Marschall & Stolle, 2004; Stolle & Harell, 2013; Stolle, Soroka, & Johnston, 2008).

On the other hand, other studies find that ethnic heterogeneity erodes generalised trust and social capital. For example, Alesina and La Ferrara (2002) find ethnic cleavage in the US to be one of the key drivers of trust and social interaction. People in ethnically heterogeneous communities are less trusting and prefer to socialise with people of a similar cultural and economic background. In another study, they find that engagement in community activities that require personal interaction between members is lower in relatively heterogeneous communities (Alesina & La Ferrara, 2000). Other US studies find ethnic heterogeneity to be associated with lower levels of social capital (Charles & Kline, 2006; Costa & Kahn, 2003a; Putnam, 2007). Putnam finds that inhabitants of diverse neighbourhoods have fewer friends, a weaker sense of community, and less trust in their neighbours, local government, politicians and the media.

Evidence from other countries also suggests that diversity is associated with lower levels of trust and civic engagement. For example, Costa and Kahn (2003b) find that community-level ethnic diversity in Western Europe is associated with less willingness to engage in civic activities. Several studies of the Netherlands find a negative association between ethnic diversity at a local level and trust or civic engagement (Gijsberts, Van Der Meer, & Dagevos, 2012; Lancee & Dronkers, 2008; Tolsma et al., 2009). Leigh (2006) reports similar results for Australia In the UK, diversity improves an individual's perception towards the outgroup but weakens neighbourhood cohesion (Laurence, 2009). Similarly, Karlan (2005) finds that in Peru there is a higher default rate in group lending schemes when the group comprises individuals from different cultural backgrounds.

In cross-country studies, Knack and Keefer (1997) find that level of trust and civic engagement are higher in societies that are relatively homogenous in terms of socioeconomic status and ethnicity. Delhey and Newton (2005) and Anderson and Paskeviciute (2006) find higher levels of trust in ethnically homogenous countries.

3. Implication for Child Health

Given the preponderance of evidence that ethnic heterogeneity undermines neighbourhood social cohesion, is it likely to be the case that ethnically diverse communities have more limited access to health care and therefore worse child health outcomes?

Social capital could affect child health through its impact on the quality of health information and resources that mitigate the opportunity cost of seeking health care. If ethnic heterogeneity impairs social cohesion then its effect on health outcomes is likely to be negative. Moreover, ethnically diverse neighbours may have different preferences over alternative public goods (for example, education and health care), weakening support for public good provision in general and making it more difficult to solve collective action problems (Alesina, Baqir, & Easterly, 1999)

Ethnic diversity could also weaken investment in public goods by facilitating corruption and rent-seeking activities. According to conflict theory, intergroup contact increases loyalty to one's own group in response to perceived outgroup threats (Giles & Evans, 1986; Quillian, 1995). Competition between ethnic factions may result in the allocation of public offices on

criteria other than personal merit (Easterly, 2001). Factional conflict can lead to competitive corruption and 'common pool' problems which leave few resources for investment in public goods (Persson, Roland, & Tabellini, 1997). Ethnically biased bureaucrats and politicians may pursue rent-seeking behaviour on behalf of their ingroup (Easterly & Levine, 1997).

Cross-country studies show that a higher level of ethnic diversity at the national level is associated with higher rates of child mortality and lower school attainment levels (Alesina et al., 2003), under-provision of public goods (Collier & Gunning, 1999), higher transaction costs in financial markets (Andrianova, Baltagi, Demetriades, & Fielding, 2014), higher levels of corruption (Mauro, 1995) and lower economic growth (Easterly & Levine, 1997; Montalvo & Reynal-Querol, 2005).

Country-specific studies also show similar results. In the US, local levels of public goods provision and welfare spending are negatively associated with ethnic diversity (Alesina et al., 1999; Poterba, 1997). Support for welfare spending is positively associated with the proportion of beneficiaries from one's own ethnic group increases (Luttmer, 2001). Rates of high school graduation are higher in relatively ethnically homogenous states (Goldin & Katz, 1999). Individuals in ethnically diverse communities are less willing to participate in surveys that would bring federal funding for local projects (Vigdor, 2004).

Evidence from developing countries shows similar effects. In rural western Kenya, communities with higher level of ethnic heterogeneity have difficulties of raising funding for schools and water wells (Miguel & Gugerty, 2005). Ugandan, Indonesian and Pakistani studies find that willingness to contribute to funding for community projects is negatively associated with local ethnic and religious heterogeneity (Habyarimana, Humphreys, Posner, & Weinstein, 2007; Khwaja, 2009; Okten & Osili, 2004). Banerjee & Somanathan, (2007) find that in India, ethnic and caste diversity are positively associated with the under-provision of public goods such as water, electricity, health care and education.

On the other hand, if ethnically diverse neighbours can overcome their differences and live in harmony, this diversity could facilitate the development of complementarity of skills that improved the provision of public goods associated with better child health outcomes. Greater cultural diversity could be associated with greater cognitive diversity widening the knowledge base of the neighbourhood. The different experiences and perspectives of

neighbours could be combined in order to produce better solutions to social problems (Bates, 2000). Nettle and Romaine (2000) note survival rates are higher in systems with greater biologically diversity, and in a similar way ethnic heterogeneity could provide more opportunity for specialisation, competition and trade that are potentially beneficial for the community at large (Portes & Vickstrom, 2011; Reynal-Querol, 2002). In contradiction to the evidence discussed above, Cinyabuguma and Putterman (2011) find that ethnic heterogeneity is positively associated with favourable policy reforms and economic growth in Africa.

Further, while homogenous societies harbour cohesive social groups that can provide various opportunities for their members, they can also reinforce conformity to norms that are detrimental to healthy lifestyles (MacLeod, 1987). Examples include harmful practices such as alcohol consumption, unhealthy diet, genital mutilation, and the abuse of women and children (Berkman, Glass, Brissette, & Seeman, 2000). Ethnic diversity could create an environment in which such norms are challenged through contact with other ethnic groups who do not share them. Evidence for such an effect is provided by Clingingsmith, Khwaja, and Kremer (2009), who find that participation in the Hajj induces favourable attitudes towards equality between ethnic groups and women's education and employment. Similarly, Lépine and Strobl (2013) show that in Senegal, Fula women are more empowered in decision making when they live as a minority in Wolof-majority villages.

Finally, local ethnic diversity and intergroup contact could directly influence health care choices. Suchman (1966) notes that individuals belonging to relatively homogeneous and cohesive social networks lack of exposure to external sources of information, which induces a higher level of conformity with traditional beliefs and greater scepticism about the efficacy of modern medicine. Individuals participating in cross-cutting social ties are more likely to comply with action recommended by formal health care professionals. Interaction with members of an outgroup encourages people to pay attention to information about modern disease prevention (Langlie, 1977; Salloway & Dillon, 1973).

Empirical evidence also indicates that members of heterogeneous social groups are better informed about health issues than members of homogenous groups (Erickson, 2003). For instance, Deri (2005) shows that Canadian immigrants who live in areas with a high concentration of individuals speaking the same language are less likely to visit health care

provider. Similarly, Story (2014) shows negative association between child vaccination status and participation in homogenous social groups in India.

3. Empirical Method

3.1 Conceptual Framework

Figure 1 illustrates our conceptual framework. Child health outcomes such as immunisation uptake and anthropometric measures depend on health care utilisation and dietary practice. Health care utilisation and dietary practice can in turn be affected by factors such as information, income and the physical proximity of health services and micronutrient sources, as well as by household preferences.

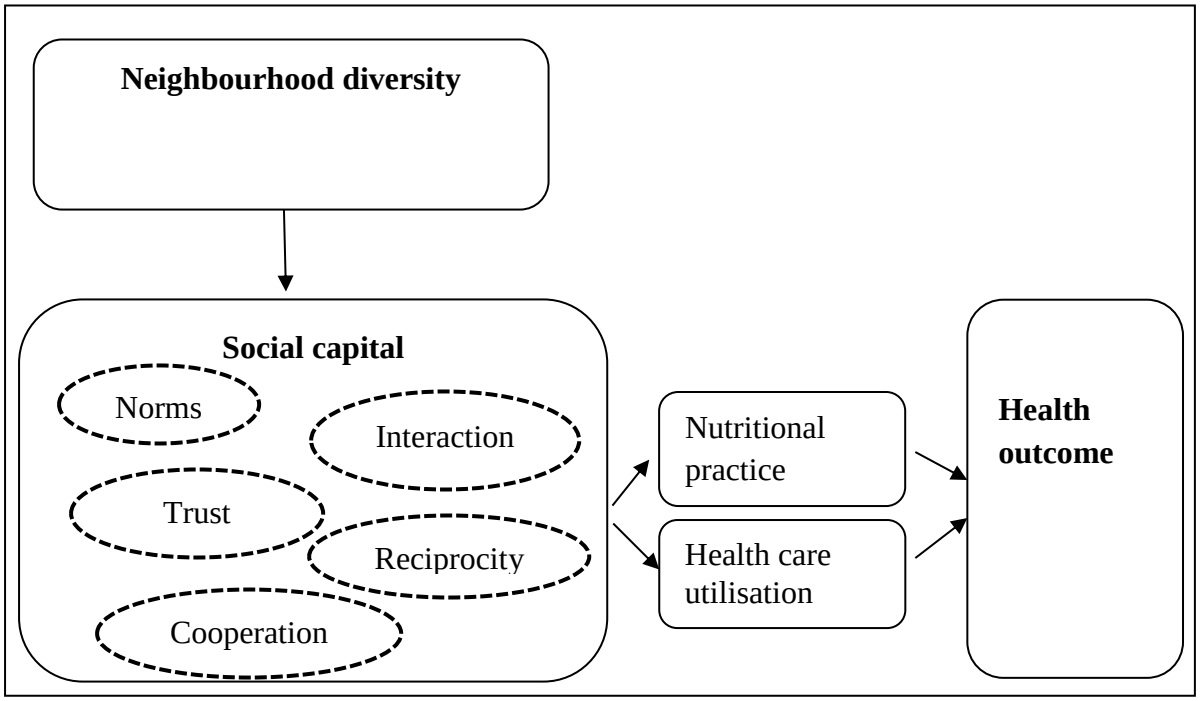

Figure 1 Link between ethnic diversity and child health outcomes

Neighbourhood social capital can influence these proximate determinants of child health in several ways. Interaction with neighbours can facilitate access to information regarding health threats and available treatment options (Deri, 2005). Participation in social networks can also influence health behaviour through peer pressure and group expectations that change parental attitude towards certain types of health service (Mackian et al., 2004; Sheeran & Abraham, 1996). Social capital can also provide financial support for the purchase of health

inputs when mutual trust creates an expectation of reciprocity (Andersen & Newman, 2005; De Weerdt & Dercon, 2006; Woolcock & Narayan, 2000). Social capital can help to mobilise local resources for provision of health care services by resolving conflicts of interest between neighbours and stimulating cooperative norms (Boix & Posner, 1998; Coleman, 1990).

However, this social capital depends on the ethnic composition of the local community. When intergroup contact is a threat to ingroup identity, ethnic diversity is likely to weaken neighbourhood cohesion. In this case, relatively heterogeneous communities will have worse child health outcomes. On the other hand, when intergroup contact challenges adherence to parochial social norms and promotes openness to new ideas, child health outcomes are likely to be better in relatively heterogeneous communities.

3.2 Empirical Model

In this section we discuss the empirical estimation of reduced form relationships between ethnic diversity and child health outcomes.

We use the following equation to model immunisation status:

$$imun_{ihj} = 1\left[x_{ihj}\beta + \varphi.nebdiv_j + \varsigma_{ihj} > 0\right] \quad (1)$$

Here, $imun_{ihj}$ is a dummy variable equal to one if child i in household h and community j is fully immunised, and is otherwise equal to zero; $1[.]$ represents a binary outcome function; x_{ihj} is a vector of child, household and community characteristics exogenous to immunisation status; $nebdiv_j$ is our measure of neighbourhood ethnic diversity; φ is the parameter of interest; β is a vector of other parameters, including an intercept, and ς_{ihj} denotes unobserved heterogeneity in immunisation uptake.

We fit a linear model for nutritional status:

$$zwfh_{ihj} = w_{ihj}\omega + \gamma.nebdiv_j + \xi_{ihj} \quad (2)$$

Here, $zwfh_{ihj}$ is a z-score of weight-for-height; w_{ihj} is a vector of child, household and community characteristics (some elements of w_{ihj} may be the same as those in x_{ihj}); γ is our measure of ethnic diversity on nutritional status; ω is a vector of other parameters including an intercept term vector including an intercept; and ξ_{ihj} captures unobserved heterogeneity.

With the assumptions $E(\varsigma_{ihj}|x_{ihj}) = 0$ and $E(\xi_{ihj}|\, w_{ihj}) = 0$, consistency of the estimates of φ and γ hinges on the relationship between neighbourhood diversity and the error terms in (1) and (2), respectively. If we assume that the ethnic composition of a given community is uncorrelated with the unobserved factors, which may also include parental and location specific factors, we can use a standard Probit estimator for equation (1) and an OLS estimator for equation (2). However, estimates of φ and γ will be biased if observed differences in the ethnic composition of neighbourhoods are associated with unobserved heterogeneity that affects the health outcomes. Our specification strategy allows neighbourhood ethnic diversity to appear endogenously in both models.[7]

Neighbourhood ethnic diversity could depend on the movement of people from place to place. Residential choices that influence the ethnic composition of a neighbourhood could be driven by factors that also affect child health outcomes. Preferences for social capital and public goods can be important drivers of residential choice (Long, 1973; Mincer, 1978; Rhode & Strumpf, 2003). Moreover, evidence suggests that people belonging to the same ethnic group have similar preferences for public goods (Alesina et al., 1999; Kollman, Miller, & Page, 1997; Rhode & Strumpf, 2003). These effects could create neighbourhoods that are homogeneous both in terms of ethnicity and in terms of public goods preferences. These effects could be reinforced by negative attitude towards outgroups that motivate sorting into ethnically homogenous neighbourhoods (Alesina & La Ferrara, 2000).

It is therefore appropriate to consider an IV estimator for our health outcome model. Our instrumental variable should not be correlated with the error terms in equations (1) and (2): it should be associated with significant variation in neighbourhood ethnic diversity across communities, but should affect immunisation uptake and nutritional status only through this diversity. We use ethnic diversity at the province level as an instrument for neighbourhood

[7] We check for the exogeneity of ethnic diversity using both the Durbin and Wu- Hausman and Wooldridge (1995) score tests. The null-hypothesis that nediv_j is exogenous can be rejected at the 1 % significance level using the former (p=0.0041) and at the 5 % significance level using the latter (p=0.0331).

ethnic diversity.[8] Our neighbourhoods are the survey clusters in the EDHS-2011, and the survey indicates the latitude and longitude of each cluster. We use these co-ordinates to allocate clusters to administrative provinces.[9] Province-level diversity is measured using ethnic composition data from 2007 population and housing census.[10]

Suppose the level of ethnic heterogeneity of a given neighbourhood is given by:

$$nebdiv_j = k_{jh}\vartheta + \alpha.prdiv_p + v_{jhp} \quad (3)$$

Here k_{hj} is a vector of household characteristics including preferences for public goods and attitudes towards outgroups and location specific characteristics mainly related quality and availability of social and economic infrastructures, institutional support for multiculturalism; and $prdiv_p$ is province-level ethnic diversity; ϑ and α are parameters associated with the covariates; [11] and v_{jhp} is an error term.

There is good reason to suppose that province-level ethnic diversity is exogenous to households' locational choice. Empirical evidence indicates that the financial and psychic costs of migrating over long distances are considerable. Such costs are a convex function of the distance of the household's new home from work and from relatives and friends (De Jong, 2000; Long, 1973; Rhode & Strumpf, 2003). Households might be able to afford to move between proximate towns and villages, but it is much less likely that they can afford to migrate between provinces. In Ethiopia, local kinship networks are an integral part of the lives of the majority of poor households (Hoddinott, Dercon, & Krishnan, 2005; Krishnan & Sciubba, 2009). Moreover, nearly 85 percent of the population resides in rural areas, where farming as an important source of income. However, land is owned by the state and farmers have only usufruct rights. Farmers who move away from their home province will immediately lose their land. This is undoubtedly an important constraint on migration across provinces. Finally, but most importantly, Ethiopia adopts ethnic federalism. Official

[8] A similar approach has been used by Dustmann and Preston (2001). In their analysis of the link between outgroup prejudice and intergroup contact in England, the authors use district-level ethnic composition as an instrument for community-level ethnic composition.
[9] The appendix includes a map showing this matching.
[10] In the census, data on ethnic composition was obtained through the question "What is (NAME'S) ethnic group? The ethnic group of an individual is traced through his/her tribal origin (CSA, 2008).
[11] As shown in Table A1 of the appendix, there is a strong partial correlation between $nebdiv_j$ and $prdiv_p$.

languages and mediums of instruction in schools differ across states and in many across provinces too, which puts additional restrictions on cross-province migration.

As for the validity of the exclusion restriction, we argue that the ethnic diversity of a province does not directly affect our outcomes of interest in equation (1) and (2). It affects them only through neighbourhood diversity. As discussed in Section 2, ethnic diversity affects child health mainly through social capital. The interpersonal contact in which this social capital is embedded takes place at work or in places where people socialize (Huckfeldt, Plutzer, & Sprague, 1993) and people do not normally cross a province for work or leisure. Moreover, as the case in in many poor countries (Habyarimana et al., 2007; Khwaja, 2009; Miguel & Gugerty, 2005), funding for local public goods comes mainly from contributions made by community members. We expect ethnic composition of a province to play no direct role in determining child health outcomes.

We therefore use an IV probit estimator for the immunisation model and a linear IV estimator for the child nutrition model. In order to make appropriate statistical inferences that take into account the survey design and intragroup correlation, we cluster the standard errors at neighbourhood level.[12]

4. Data

Our data come from the EDHS-2011. It is a nationally representative sample drawn using two-stage stratified cluster sampling. To ensure that all clusters and households were given equal chance of being selected, the survey used the 2007 Population and Housing Census as a sampling frame. In the first stage, all clusters from the census were stratified into urban and rural areas, and a total of 624 clusters were randomly selected. In the second stage, a total of 17,817 households were randomly selected from sampled clusters. Of those, 17,018 households were found to be occupied during data collection and 16,702 of them were successfully surveyed. This high response rate, nearly 98 percent, is one of the attractive features of the survey (CSA & ICF International, 2012).

[12] The econometrics literature suggests clustering at the highest level of grouping (Bertrand, Duflo, & Mullainathan, 2004; Cameron & Miller, 2015; Moulton, 1986; Wooldridge, 2003), which in our case is a survey cluster.

The survey includes modules on the uptake of child immunisation, nutritional status, adult ethnicity, and a range of household characteristics that could affect child health outcomes. Our results are based on data for the immunisation status of children over 12 months and under five years of age, and for the nutritional status of all children under five.

We define the immunisation status of a child based on compliance with the national immunisation policy of the Ethiopian government. The immunisation policy, which adheres to the World Health Organisation's guidelines, requires a child to receive one dose each of polio and BCG vaccines at the time of birth or at first clinical contact, three doses each of polio and DPT-HepB-Hib vaccines at approximately 4, 8 and 12 weeks of age, and measles vaccine given by the age of 9 months or soon after but not later than 12 months of age (FMOH, 2010). Our dummy variable $imun$ equals one if a child has received all the recommended vaccines, and otherwise equals zero. We use z-score of weight-for-height to measure nutritional status ($zwfh$). The score is calculated based on the new growth standard of the WHO (WHO, 2006). One important advantage of the weight-for-height index is that, by measuring body mass in relation to height or length, it indicates both wasting caused by malnutrition and recent illness episodes in the period preceding the survey (CSA & ICF International, 2012).

We use the Herfindahl index of concentration to measure ethnic diversity:[13]

$$nebdiv_j = 1 - \sum_{i=1}^{n} s_{ij}^2 \qquad (4)$$

Here, $nebdiv_j$ indicates the probability that two randomly selected individuals in neighbourhood j will belong to different ethnic groups: higher values of the index mean greater diversity; s_{ij} is the population share of ethnic group i in neighbourhood j. In this paper, the survey clusters are treated as neighbourhoods.

Areal of the survey clusters in the EDHS-2011 is not uniform. In cities, it may cover only few blocks, where as in rural and sparsely populated areas it can cover several square kilometres. However, on average, each survey cluster constitutes 180 households (CSA, 2008). Unlike in

[13] Using the ethnicity data from the 2007 Population and Housing Census, we use the same method to compute ethnic diversity at the province level. Thus our index measures the probability that two randomly drawn individuals from the population of each province will come from different ethnic groups.

countries such as the US, where race and skin-colour are used as measures of ethnicity, in Ethiopia, tribal origin and language are the salient features of ethnic identity. In the 2007 Population and Housing Census, more than 80 ethnic groups were listed. The census shows that only 10 ethnic groups have had a population of more than one million. Together, these ethnic groups account for more than 86 percent of the country's population. The census shows that Oromo, Amhara, Somali, respectively, with 34.5 percent, 27 percent and 6.2 percent share of the population are the three most populous ethnic groups (CSA, 2008).

In addition to our variable of interest, immunisation uptake and nutritional status could be influenced by a range of other factors. Child characteristics such as gender, age, birth order and number of siblings could influence parental decisions. Parental characteristics such as the propensity for health-seeking behaviour and knowledge of good dietary practices could also be important factors. Household wealth could also affect the parents' ability to invest in children's health. Moreover, neighbourhood-specific attributes could influence preferences for health care and create an environment that enables health service utilisation.

The variables that we use as proxies for the various proximate determinates of child health outcomes are reported in Table 1.

Table 1 **Definition and summary statistics of main variables**

Variable	Definition	Mean	Std. Dev
imun	1 if a child is fully immunised	0.219	0.414
zwfh	z-score of weight-for-height	-0.610	1.225
chgend	child gender	0.509	0.500
chage	child age in months	29.422	17.255
border	birth order	3.937	2.495
siblings	number of siblings	2.768	2.131
motheduc	mother's years of education	1.718	3.272
mothage	mother's age	29.143	6.834
muslim	1 if mother is Muslim	0.430	0.495
christian	1 if mother is Christian	0.550	0.498
othrelg	1 if mother follows another religion	0.020	0.005
grndparnt	1 if a grandparent lives with the family	0.125	0.330
headage	household head's age	37.957	12.272
headeduc	household head's years of education	2.477	3.736
headgend	1 if household head is male	0.807	0.395
wi	wealth index quintiles		
	poorest	30.840	

	poorer	18.460	
	middle	16.580	
	richer	16.440	
	richest	17.670	
prdiv	province ethnic fractionalisation index	0.270	0.241
nebdiv	neighbourhood ethnic fractionalisation index	0.243	0.265
urban	1 if area of residence is urban	0.309	0.462
clustalt	cluster altitude in 1000 meters	1.668	0.670
shunfpa	1 if there is reproductive health program in the cluster	0.262	0.440
shrempt	proportion of women with employment	0.342	0.235
timwtr	average time (in hours) spent in fetching water	0.814	1.008
hcarediff	proportion of women having difficulties of accessing health services	0.654	0.258

Note: The sample size for *imun* is 7,631, whereas for all other variables it is 9,590. The difference reflects the exclusion of children younger than 12 months from the *imun* sample. The wealth index is constructed as a composite measure of ownership of durable assets such as televisions, radio and bicycles, the quality of sources of drinking water and sanitation facilities, the principal type of fuel used for cooking, dwelling characteristics such as the materials used for floors, walls and roofs, and whether the house is connected to electricity and telephone lines.

EDHS-2011 does not have special module for community characteristics. However, the household module includes information on important characteristics such as cluster altitude and whether or not the survey cluster is urban or rural. The survey also provides information whether the sample household is in an area where there is health intervention by the United Nations Population Fund (UNFPA).[14] The women's questionnaire also provides information on amount of time spent in fetching water, employment status of women and whether distance and transportation are big problems in seeking health care services. Given the representative nature of the sample, we use information by sample women to construct community level variables. Accordingly, $shrempt$ represent the proportion women reported fully employed and $hcarediff$ is a variable showing the proportion of women in a survey cluster experiencing difficulties in accessing health care services due to distance and transportation problems. We averaged the amount of time spent by each woman in the sample in fetching water and construct $timwtr$ to obtain cluster level information.

[14] The organisation is one of the non-government health service providers in the area of maternal and child health (CSA & CIF International, 2012).

5. Results and Discussion

5.1 Results

In this subsection we present the reduced form effects of neighbourhood ethnic diversity on child health outcomes.

Table 2 **Effects on immunisation uptake**

	(1)	(2)	(3)	(4)	(5)	(6)
Variable	AME	Std. Err.	AME	Std. Err.	AME	Std. Err.
nebdiv	0.301***	0.069	0.270***	0.073	0.296***	0.083
chgend	-0.002	0.008	-0.003	0.008	-0.001	0.008
chage/100	0.004	0.032	0.005	0.031	0.002	0.030
siblings	-0.020***	0.005	-0.018***	0.005	-0.018***	0.005
border	0.006	0.004	0.007	0.004	0.008*	0.004
mothage	0.005***	0.001	0.004**	0.001	0.013***	0.005
motheduc	0.007***	0.002	0.006***	0.002	0.006***	0.002
christian	0.044	0.040	0.037	0.041	0.033	0.034
muslim	0.004	0.041	0.011	0.042	0.056	0.038
wi						
poorer	0.048***	0.015	0.044***	0.016	0.025*	0.015
middle	0.057***	0.017	0.053***	0.017	0.033**	0.017
richer	0.051**	0.021	0.037*	0.020	0.020	0.020
richest	0.242***	0.040	0.153***	0.033	0.123***	0.032
headgend	-0.039**	0.015	-0.035**	0.015	-0.050***	0.015
headeduc	-0.003	0.002	-0.003	0.002	-0.002	0.002
headage	0.001	0.001	0.001	0.001	0.001	0.001
grndparnt	-0.049***	0.016	-0.037**	0.016	-0.022	0.015
timwtr			-0.005	0.008	0.006	0.009
hcarediff			-0.092**	0.042	-0.036	0.042
shrempt			0.012	0.040	-0.005	0.039
urban			0.055*	0.033	0.071	0.034
shunfpa			0.034*	0.021	0.022	0.024
shares of ethnic groups included	no		no		yes	
number of observations	7,631		7,631		7,631	

Note: The full set of control variables in columns (5-6) includes relative population shares of the Afar, Amhara, Gamo, Guragie, Hadiya,Oromo,Sidama,Somalie, Tigrie and Wolayta ethnic groups.
The value of $neibdiv$ ranges between 0 and 1. Therefore, a 0.1 increase in $nebdiv$ is the same as 10 percentage point increase in the probability of two randomly drawn individuals from the population are from different ethnic groups.
*** Statistically significant at the one percent level. ** Statistically significant at the five percent level.
* Statistically significant at the ten percent level.

Table 2 presents our IV probit results for immunisation uptake. Results are reported for three different model specifications. The results in columns (1-2) are for a model excluding community-level control variables and dummy variables for individual ethnic groups. Column (1) includes average marginal effects and column (2) the associated standard errors, which are robust to heteroscedasticity robust and clustered at the neighbourhood level. With respect to child characteristics, having fewer siblings and being born later in the birth order seem to have positive effect on probability of receiving full vaccination.[15] Personal attributes of the mother are also important for child immunisation uptake. The probability of receiving full immunisation increases with the mother's years of education: one more year of schooling is associated with an increase in the probability of receiving full immunisation by 0.7 percent. Age of the mother is also positively associated with immunisation uptake:[16] as the mother gets older by one year the probability of her child being immunised increases by 0.5 percent.

Full immunisation status is also strongly associated with some household characteristics. As expected, household wealth has positive and strong effect on immunisation uptake. For instance, children of households in the top 20 percent of the wealth quintile are 24 percent more likely than children of households in the bottom 20 percent of the wealth quintile to receive full immunisation. On the other hand, children of male-headed households are four percent less likely to receive the full range of vaccines. This seems a sizeable effect provided that about 80 percent of the households in the sample are male-headed. The probability of receiving full vaccination is also lower when a grandparent lives with the family. Presence of a grandparent in the family reduces a child's chance of receiving full vaccination by 5 parentage points.

With regard to neighbourhood diversity, the probability of a child receiving full vaccination will be 2.7 percentage points higher when the probability of two randomly selected individuals from the population are of different ethnic groups increases by 10 percentage points, an effect that is statistically significant at the one percent level. This result is at odds with the predominant view in the economics literature that ethnic heterogeneity hinders the provision of public goods and negates the benefits associated with them.

[15] The positive birth order effect might reflect learning-by-doing among parents,
[16] The estimated coefficient on square of the age of the mother is negative but not statistically significant.

In columns (3-4) we report results from a model that includes community-level covariates. The inclusion of these variables makes no substantial difference to the size or significance level of the effects in columns (1-2). However, there are some significant community-level effects. For instance, the estimated marginal effect associated with the variable $hcarediff$ shows that children in communities which find it more difficult to access health care are less likely to receive full vaccination. Although statistically significant only at 10 percent level, the estimated marginal effects associated with $urban$ and $shunfpa$, respectively, show that children in urban areas and communities where UNFPA provides reproductive health services have a higher chance of receiving full immunisation. The estimated effect of neighbourhood diversity seems to be less sensitive to the presence of the other community characteristics.

One potential criticism of the results in columns (1-4) is that they do not control for the relative size of different ethnic groups in the community. The effect of a particular group's influence on local cultural and politics could depend on its relative size (Rushton, 2008; Vigdor, 2002). We therefore include the population shares of the ten most populous ethnic groups,[17] as additional control variables.[18] Columns (5-6) present the results of this addition, showing that the addition of the ethnicity shares has no substantial effect on the effects in columns (1-4).

Table 3 pertains to the nutritional status model. Like Table 2, it includes results for three different model specifications. Comparison of the different columns again shows that the inclusion of community-level covariates and ethnic share variables makes no substantial difference to estimates of the household-level and neighbourhood diversity effects. The table shows that the child's gender and age are strongly associated with nutritional status. The estimated z-score of weight-for-height is 0.1 standard deviations lower for boys than for girls. As a child increases in age by 10 months, the z-score increases by 0.05 standard deviations.

[17] These are Afar, Amhara, Gamo, Guragie, Hadiya,Oromo,Sidama,Somalie, Tigrie and Wolayta ethnic groups. According to the 2007 Census, these ethnic groups together account for more than 86 percent of Ethiopia's population (CSA, 2008).

[18] For the sake of space we do not include the parameter estimates associated with the ethnic groups. These are available on request.

Table 3 **Effects on nutritional status**

	(1)	(2)	(3)	(4)	(5)	(6)
Variable	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.
nebdiv	0.626***	0.170	0.782***	0.184	0.734***	0.211
chgend	-0.115***	0.024	-0.111***	0.024	-0.109***	0.024
chage	0.005***	0.001	0.005***	0.001	0.005***	0.001
siblings	0.021	0.015	0.022	0.015	0.025*	0.015
border	-0.022	0.013	-0.018	0.013	-0.019	0.013
mothage	-0.001	0.016	-0.004	0.016	-0.004	0.016
mothagsq/100	0.001	0.002	0.010	0.024	0.009	0.024
motheduc	0.023***	0.006	0.024***	0.006	0.024***	0.006
christian	-0.053	0.114	-0.091	0.106	-0.057	0.112
muslim	-0.221**	0.117	-0.180	0.110	-0.087	0.119
wi						
poorer	0.106***	0.040	0.029	0.040	0.023	0.038
middle	0.153***	0.041	0.063	0.041	0.067*	0.040
richer	0.212***	0.045	0.132***	0.042	0.137***	0.041
richest	0.282***	0.066	0.285***	0.063	0.288***	0.059
headgend	0.050	0.039	0.008	0.037	-0.004	0.037
headeduc	0.004	0.006	0.008	0.005	0.007	0.005
headage	-0.003	0.006	-0.002	0.006	-0.001	0.006
headagsq/100	0.001	0.007	0.001	0.004	0.001	0.006
grndparnt	-0.088**	0.042	-0.044	0.042	-0.065	0.041
timwtr			-0.010	0.016	-0.002	0.018
hcarediff			0.001	0.103	-0.080	0.101
shrempt			-0.037	0.099	-0.055	0.091
urban			-0.217***	0.081	-0.159***	0.086
clustalt			0.181***	0.029	0.153***	0.031
shunfpa			0.116***	0.044	0.141***	0.052
_cons	-0.826***	0.274	-1.000***	0.290	-0.941***	0.293
share of ethnic groups included	no		no		yes	
number of observations	9,590		9,590		9,590	

Note: The full set of control variables in columns (5-6) includes relative population share of Afar, Amhara, Gamo, Guragie, Hadiya,Oromo,Sidama,Somalie, Tigrie and Wolayta ethnic groups.
The value of $neibdiv$ ranges between 0 and 1. Therefore, a 0.1 increase in $nebdiv$ is the same as 10 percentage point increase in the probability of two randomly drawn individuals from the population are of different ethnic groups.
*** Statistically significant at one percent level. ** Statistically significant at five percent level.
* Statistically significant at ten percent level.

One additional year of mother's education is associated with a 0.02 standard deviation increase in the z-score. A child belonging to a household in the top 20 percent of the wealth distribution has a z-score that is 0.3 standard deviations larger than that of a child in a household in the bottom 20 percent of the distribution. Some community attributes also seem to be strongly associated with nutritional status. Children in urban areas have lower z-score of weight-for-height. On other hand, nutritional status improves with elevation: an increase in the altitude of area of residence by 1000 meters is associated with 0.16 standard deviations increase in z-score of weight-for-height. Children in areas with UNFPA's health intervention have better anthropometric result: children such areas have on average 0.12 higher standard deviations of the the z-score.

Neighbourhood ethnic diversity is positively and significantly associated with nutritional status. After controlling for child and household characteristics, we find that a 10 percentage point increase in diversity is associated with a 0.06 standard deviation increase in the z-score, an effect that is statistically significant at the one percent level.

Additional robustness checks are reported in the appendix. First, we fit the models in Tables 2-3 to samples comprising just urban and just rural households. The estimated effects of neighbourhood diversity on immunisation uptake and nutritional status are of similar order of magnitude to those obtained with the full sample, see Table A2. Secondly, we replace our measure of neighbourhood diversity with a binary variable that is equal to one if the diversity index is greater than zero, and otherwise equal to zero. In the case of both immunisation uptake and nutritional status, results presented in Table A3 columns (1-2) and (5-6), respectively, ethnically heterogeneous communities are found to have better health outcomes than homogenous ones. Finally, we fit a set of models using a logarithmic transformation of our ethnic diversity index. The transformed index is associated with significantly higher levels of immunisation uptake and nutritional status, results reported in Table A3 columns (3-4) and (7-8), respectively.

5.2 Discussion

In section, we discuss our empirical findings in relation to the existing the literature. In terms of magnitude, our study shows that a change in diversity status of a community from complete homogeneity (an index of zero) to complete heterogeneity (an index of one)

increases a child's probability of receiving full immunisation and z-score of weight-for-height by about 30 percentage points and 0.73 standard deviations, respectively. Our sample shows that most communities in the northern part of Ethiopia are relatively homogenous, whereas communities in the capital city and southern part of the country are relatively heterogeneous. Accordingly, up to 25 percentage points of the difference in immunisation status between a completely humongous community in the north and a highly heterogeneous community (for example, with an index of 0.85) in the south can be explained by the different the levels of ethnic diversity.

As outlined above, these effects could reflect both supply-side and demand-side factors in the health care system. Our results suggest that the diverse perspectives and skills contributed by heterogeneous neighbours could have broadened community knowledge and so led to a higher quality of health services. This in turn could have stimulated health service utilisation, leading to further improvement in health outcomes.

Regrettably, we do not have comprehensive data on level of development of local infrastructures to check if the availability of health care services is better in relatively heterogeneous communities. However, EDHS-2011 includes a special module on various difficulties that women experience in seeking medical help. Respondents were asked if distance to health care facilities, the availability of health care professionals and a lack of money were serious issues when making health care decision. In the appendix, Table A4, we report results from a set of models designed to test whether any of these issues is reported less frequently in ethnically diverse communities. None of the diversity effects is significantly different from zero, so there is no evidence that ethnically diverse communities benefit from better health care access.

Another possible channel for the diversity effect is that diversity influences norms that shape attitudes towards health care choices, dietary practices and gender equality.[19] In homogenous communities, individuals tend to process information more superficially and accept group decisions as reasonable (Portes & Vickstrom, 2011). According to MacLeod (1987), such behaviours can reinforce conformity to norms that hinder upward social mobility and healthy lifestyles. In contrast, members of culturally diverse communities, tend to scrutinise others'

[19] The welfare benefit of empowering mothers is well established in the literature (Basu, 2006; Duflo, 2012; Hoddinott & Haddad, 1995).

behaviour and rely more on impersonal norms that conform to advice from the formal health system (Langlie, 1977; Salloway & Dillon, 1973; Suchman, 1966). Previous studies have shown that people in heterogeneous social groups are more informed about health issues and have better health outcomes (Erickson, 2003; Story, 2014). Exposure to new cultures through intergroup contact is also found to change long-held beliefs and traditions that disempower women (Clingingsmith et al., 2009; Lépine & Strobl, 2013).

We use data on health knowledge and the decision making power of women to check if link between child health outcomes and neighbourhood diversity is mediated through the mother's access to health information or /and her participation in decision making. In EDHS-2011, the women's questionnaire includes questions that ask the respondent: (i) if she believes that people can get HIV by sharing food with a person infected with the virus; (ii) if she can make her own decision on seeking medical treatment; and (iii) if she believes that beating a wife is justifiable if the wife refuses to have sex with her husband. For our purpose, the response to the first question shows women's level of health awareness, whereas responses to the last two questions indicate their bargaining power in intra-household decision making.

Since the possible answers for all the three questions are: 'yes' or 'no', we construct three dummy variables: $deshcare$-takes the value one if the she makes her own decision on health care, otherwise takes zero; $knwhiv$-equals one if she believes people can catch HIV by sharing food with a person infected by the virus, otherwise equals zero; $beating$-taking the value one if she approves beating wife when refusing to have sex with husband, otherwise talking the value zero. We use a probit model to determine whether women in relatively heterogeneous communities are better informed about basic health issues and more empowered in making decisions. Estimates o are reported in Table A5 of the Appendix.

The coefficient on $nebdiv$ under the variable $knowhiv$ shows that, after controlling for individual, household and community characteristics, the association between ethnic heterogeneity and awareness of HIV/AIDS is statistically significant. Women in relatively homogenous communities have poorer understanding of the mechanisms by which HIV is transmitted. This implies that in such communities a mother may also be poorly informed about health risks that her child faces and underestimate the desirability of preventive health services such as vaccines, which undermines immunisation uptake. The estimated coefficients associated with $nebdiv$, under the variables $deshcare$ and $beating$ show that

level of neighbourhood ethnic diversity is strongly correlated with subjective measures of a woman's decision making-power. The more ethnically diverse the community, the more likely a woman is to have discretion in making her own health care choices and disapprove the culture of being beaten by husband. Either way, ethnic heterogeneity seems to create favourable conditions for women's empowerment and hence for the improvement of child health outcomes.

6. Conclusion

Despite Ethiopia making remarkable progress in reducing child mortality, poor child health remains a pressing public policy issue. Over the period 2012-2016, the mortality rate is estimated to be 67 deaths per 1000 live births (CSA & ICF, 2016). Nutritional disorders and preventable communicable diseases are identified as the main causes of mortality and morbidity, and progress towards alleviating these problems has been slow. Various supply and demand side constraints are reported to be key barriers for the progress. On the supply side, factors such as a shortage of medical personnel, under-provision of drugs, poor referral systems and under-financing of health care are important issues. On the demand side, traditional norms and a lack of awareness, physical inaccessibility of health services and financial problems are likely to be the most important issues (FMOH, 2014).

A large body of literature suggests that neighbourhood ethnic diversity can play a key role in determining both the demand- and supply-side factors. On the one hand, ethnic diversity is believed to weaken social cohesiveness of a society, hamper collective efficiency, induce corruption and rent-seeking behaviour and undermine the provision of public goods and negate social and economic benefits associated with them. On the other hand, different ethnic groups can have different perspectives and stocks of knowledge, so ethnic diversity can contribute to the knowledge base of the neighbourhood. Diversity can also promote adherence to the recommendations of the formal health care system. Interaction with members of outgroups can mitigate the pressure on individuals to conform to group norms and traditions and enhance information about disease prevention.

Yet the impact of neighbourhood diversity on child health outcomes has been rarely examined in the economics literature. The contribution of this paper is to investigate the link between neighbourhood ethnic diversity and child health outcomes such as immunisation uptake and nutritional status. We use a nationally representative sample from Ethiopia's

Demographic and Health Survey 2011. To account for factors that confound our identification strategy, we apply instrumental variables (IV) estimators: IV probit for immunisation uptake and a linear IV model for nutritional status. Provincial ethnic diversity is used as instrument for neighbourhood ethnic diversity. We find that a 10 percentage point increase in the probability of two randomly drawn individuals being from different ethnic groups is associated an increase in the probability of a child receiving full immunisation by about three percentage points and increase in the z-score of weight-for-height by about 0.8 standard deviations. The results are robust to alternative econometric specifications and a set of control variables.

Our findings contradict the conventional wisdom that ethnic fractionalisation is necessarily bad for social and economic development. Instead, our results support the alternative view that diversity can facilitate an exchange of cultural values and new ideas, helping to overcome conformity to social norms that inhibit healthy dietary and medical practices, and so improving child health outcomes.

The empirical finding has an important implication for timely policy issues. It seems that modern societies are becoming increasingly more diverse and meeting people of different faiths or ethnicities in places where we live, work and spend leisure time is becoming inevitable (Putnam, 2007). Unfortunately such intergroup contacts are often perceived as threats to social norms and economic benefits of own group (Quillian, 1995). In countries such as Ethiopia, there are political pressures which tend to reinforce outgroup prejudice and create social divisions along ethnic lines. By weakening the quality of institutions at the national level, such pressures can lead to greater homogeneity of local neighbourhoods, as people relocate to locations dominated by their own ethnic group. Our results indicate that the consequent reduction in neighbourhood diversity will lead directly to worse child health outcomes.

In this context, strong alliances between ethnic groups not only discourage wasteful rent-seeking behaviour but also empower local communities. Policy makers should be aware that diversity stimulates productivity and modernisation, so there are material benefits from the promotion of inclusion, tolerance and multiculturalism. There should be institutional and legal support for civil society groups which help to maintain high levels of diversity and the formation of social ties that transcend ethnic boundaries.

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Appendix: Supplementary Material

Table A1 **Ordinary Least Square (OLS) estimates using neighbourhood diversity as dependent variable**

Variable	Coef.	Std.Err.
prdiv	39.220***	0.917
urban	17.587***	1.130
clustalt	-0.914***	0.346
shunfpa	-1.326***	0.422
hcarediff	-5.695***	1.112
timwtr	-0.241***	0.172
motheduc	0.051	0.094
mothage	-0.009	0.030
headage	-0.024	0.017
headgend	-0.736	0.502
headeduc	0.163**	0.078
wi		
poorer	1.493***	0.537
middle	1.248**	0.577
richer	1.201*	0.625
richest	7.415***	1.094
shrempt	4.579***	1.029
_cons	7.518***	1.644
No.Obs.	6,926	
F(16,6909)	603.14	
Prob>F	0.0000	
R-Squared	0.53	

Note: standard errors clustered at community level.

We run the regression to check the strength of the partial correlation between neighbourhood diversity and ethnic diversity at province level,$prdiv$, which is used as an instrument in this paper. Since migration decision is made by parents not by children, we estimate the correlation at mother level. Thus number of observation refers to the number of mothers with children age under five.

*** Statistically significant at one percent level. ** Statistically significant at five percent level.

* Statistically significant at ten percent level.

Table A2 **Estimates obtained with rural and urban subsamples**

	Immunisation Uptake				Nutritional Status			
Variable	Urban		Rural		Urban		Rural	
	AME	Std.Err.	AME	Std.Err	Coef.	Std.Err.	Coef.	Std.Err
nebdiv	0.319**	0.134	0.266***	0.094	0.762***	0.209	0.653***	0.252
chgend	0.010	0.024	-0.005	0.008	-0.026	0.055	-0.125***	0.026
chage	-0.001	0.001	0.002	0.003	0.005***	0.002	0.005***	0.001
siblings	-0.048***	0.017	-0.014***	0.005	-0.017	0.042	0.029	0.016
border	0.036***	0.014	0.003	0.004	0.014	0.038	-0.020	0.014
mothage	0.004	0.019	0.004***	0.001	0.020	0.043	-0.013	0.017
mothagsq/100					0.021	0.001	0.022	0.026
motheduc	0.007*	0.004	0.003	0.003	0.035***	0.009	0.010	0.009
christian	0.198	0.106	0.020	0.037	0.183	0.526	-0.099	0.106
muslim	0.134	0.107	0.004	0.039	0.068	0.532	-0.189*	0.110
wi								
poorer	-0.009	0.155	0.041***	0.014	0.198	0.185	0.033	0.04
middle	-0.224	0.138	0.052***	0.016	0.044	0.358	0.075*	0.041
richer	-0.125	0.106	0.041**	0.019	0.295*	0.135	0.152***	0.044
richest	0.074	0.095	0.141***	0.037	0.478***	0.139	0.221***	0.067
headgend	-0.211***	0.047	0.009	0.016	0.025	0.083	0.004	0.041
headeduc	-0.001	0.004	-0.002	0.002	0.003	0.008	0.012**	0.006
headage	-0.001	0.002	0.001	0.001	0.004	0.014	-0.003	0.007
headagsq/100					0.003	0.013	0.001	0.007
grndparnt	-0.055	0.051	-0.026*	0.016	-0.208	0.132	-0.028	0.044
timwtr	-0.004	0.023	-0.008	0.008	0.061	0.051	-0.020	0.017
hcarediff	-0.260***	0.082	-0.049	0.049	-0.078	0.181	0.052	0.115
shrempt	0.179**	0.086	-0.019	0.044	0.133***	0.181	-0.051	0.119
shunfpa	0.050	0.046	0.026	0.024	0.046	0.093	0.108**	0.052
clustalt					0.255	0.068	0.163***	0.032
_cons					-2.499	0.933	-0.787	0.313
No.Obs.	1,225		6,406		1,540		8,050	

Note: standard errors are clustered at community level.
*** Statistically significant at one percent level. ** Statistically significant at five percent level.
* Statistically significant at ten percent level.

Table A3 **Estimates obtained with alternative definitions of neighbourhood diversity**

	Immunisation Uptake				Nutritional Status			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	AME	Std.Err.	AME	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err
nebdiv	0.361***	0.093	0.368***	0.040	1.008***	0.238	0.716***	0.190
chgend	-0.003	0.008	-0.003	0.007	-0.111***	0.024	-0.114***	0.025
chage	0.000	0.000	0.001	0.001	0.005***	0.001	0.005***	0.001
siblings	-0.018***	0.005	-0.019***	0.004	0.022	0.015	0.018	0.016
border	0.007	0.004	0.007*	0.004	-0.018	0.013	-0.016	0.014
mothage	0.004***	0.001	0.004**	0.001	-0.005	0.016	-0.001	0.017
mothagsq/100					0.011	0.024	0.007	0.026
motheduc	0.006***	0.002	0.007***	0.002	0.024***	0.006	0.028***	0.006
christian	0.037	0.041	0.007	0.039	-0.092	0.107	-0.146	0.129
muslim	0.011	0.042	-0.037	0.040	-0.184**	0.111	-0.316**	0.139
wi								
poorer	0.044***	0.016	0.035**	0.015	0.029	0.040	0.008	0.045
middle	0.052***	0.017	0.039**	0.016	0.062	0.041	0.035	0.046
richer	0.036**	0.020	0.019	0.017	0.131***	0.042	0.104***	0.048
richest	0.152***	0.033	0.139***	0.026	0.287***	0.063	0.297***	0.073
headgend	-0.035**	0.015	-0.033**	0.015	0.007	0.037	0.005	0.040
headeduc	-0.003	0.002	-0.003	0.002	0.008	0.005	0.005	0.006
headage	-0.001	0.001	-0.001	0.001	-0.002	0.006	-0.002	0.007
headagsq/100					0.008	0.006	0.001	0.007
grndparnt	-0.037**	0.016	-0.032**	0.014	-0.044	0.042	-0.064	0.047
timwtr	-0.005	0.008	-0.002	0.007	-0.010	0.016	0.006	0.021
hcarediff	-0.093**	0.042	-0.102***	0.036	-0.005	0.103	-0.082	0.128
shrempt	0.011	0.040	-0.026	0.036	-0.043	0.100	-0.213	0.146
urban	0.054**	0.033	0.087**	0.030	-0.214***	0.081	-0.201**	0.096
shunfpa	0.035**	0.021	0.016	0.018	0.117***	0.045	0.068	0.056
clustalt					0.179***	0.029	0.153***	0.040
_cons					-0.998***	0.290	-1.148***	0.339
No.Obs.	7,631		7,631		9,590		9,590	

Note: standard errors are clustered at community level.
The variable *nebdiv* is defined as a dummy in Column (1) and Column (5), where as in Column (3) and Column (7) it is defined in log forms.
*** Statistically significant at one percent level. ** Statistically significant at five percent level.
* Statistically significant at ten percent level.

Table A4 **Estimates obtained with multivariate probit , difficulties of accessing health service**

	hlthprof		*distprob*		*lckmony*	
Variable	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.
nebdiv	- 0.001	0.001	-0.001	0.002	0.001	0.001
motheduc	-0.016**	0.008	-0.025***	0.007	-0.061***	0.007
mothage	0.001	0.003	0.006**	0.003	0.011***	0.003
christian	-0.136	0.168	-0.417**	0.143	-0.201	0.127
muslim	0.222	0.175	-0.237	0.151	-0.201	0.133
headage	-0.002	0.002	-0.003**	0.002	-0.001	0.002
headgend	0.133***	0.046	-0.003	0.049	0.128***	0.047
headeduc	0.018	0.007	0.001	0.007	-0.008	0.006
wi	-0.093***	0.021	-0.173	0.021	-0.140***	0.019
shrempt	0.133	0.162	0.126	0.154	0.460***	0.128
shunfpa	-0.292***	0.074	-0.169**	0.079	-0.019	0.069
urban	-0.172***	0.095	-0.668***	0.1	-0.063	0.084
_cons	0.605***	0.205	1.580***	0.195	0.670***	0.167
/atrho21	0.335	0.029				
/atrho31	0.178	0.025				
/atrho32	0.445	0.029				
rho21	0.323	0.026				
rho31	0.176	0.024				
rho32	0.418	0.024				
No.Obs.	6,926		6,926		6,926	

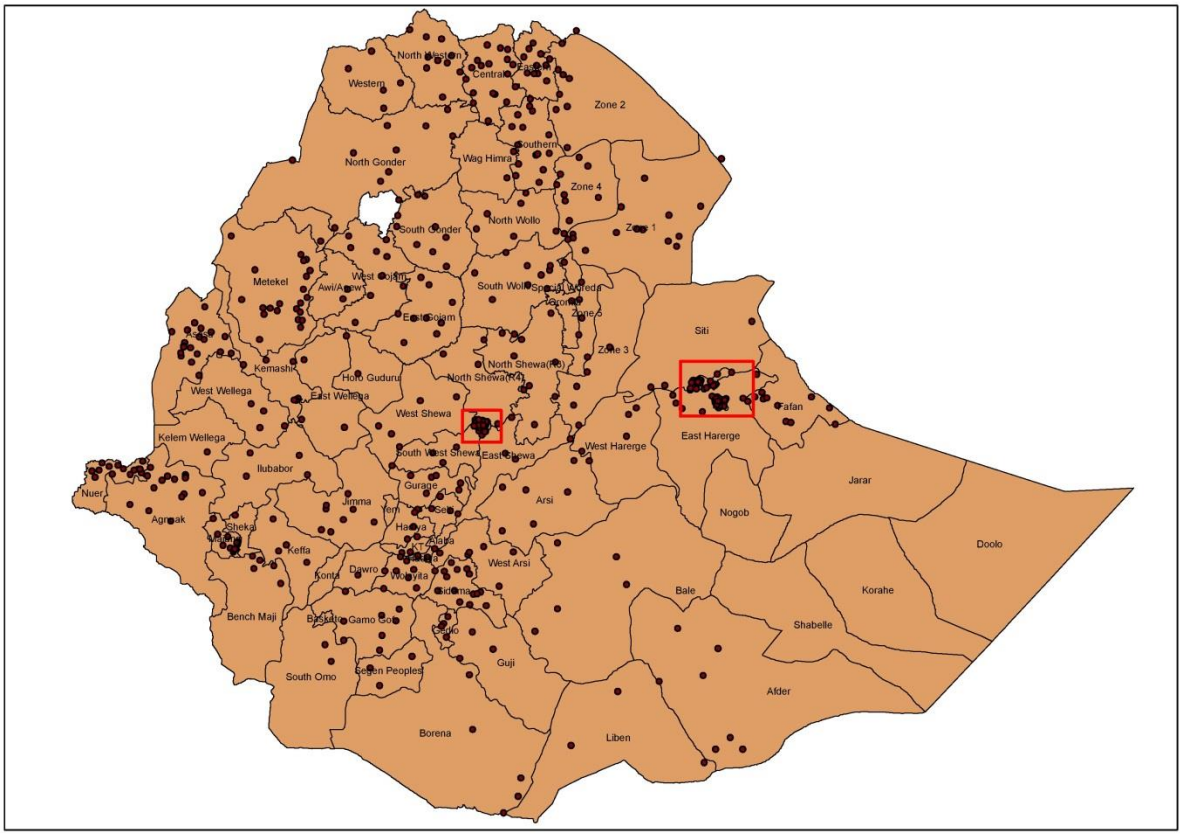
Note: standard errors are clustered at community level.
*** Statistically significant at one percent level. ** Statistically significant at five percent level.
* Statistically significant at ten percent level.

Table A5 **Estimates obtained with multivariate probit , measures of health information and decision making power**

	deshcare		*knowhiv*		*beating*	
Variable	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.
nebdiv	0.004**	0.002	0.006***	0.002	-0.007***	0.001
motheduc	0.029***	0.008	0.098***	0.012	-0.067***	0.007
mothage	0.001	0.003	0.001	0.003	-0.006*	0.003
christian	0.359**	0.16	0.271**	0.132	-0.099	0.129
muslim	0.026	0.162	0.024	0.136	-0.184	0.135
headage	0.001	0.002	-0.002	0.002	0.001	0.002
headgend	0.081***	0.047	0.052	0.051	-0.025	0.052
headeduc	0.001	0.007	0.019***	0.007	-0.020***	0.006
wi	0.088***	0.02	0.111***	0.018	-0.021	0.018
shrempt	-0.236*	0.137	0.383**	0.15	-0.045	0.127
shunfpa	0.247***	0.079	0.165**	0.066	-0.104*	0.053
urban	0.315***	0.112	0.167	0.105	-0.259***	0.094
_cons	-0.194	0.195	-0.323	0.177	1.405***	0.176
/atrho21	0.125	0.024				
/atrho31	-0.082	0.025				
/atrho32	-0.044	0.023				
rho21	0.124	0.023				
rho31	-0.082	0.025				
rho32	-0.044	0.023				
No.Obs.	6,926		6,926		6,926	

Note: standard errors are clustered at community level.
*** Statistically significant at one percent level. ** Statistically significant at five percent level.
* Statistically significant at ten percent level.

Figure A1 **Areal map of Administrative provinces of Ethiopia and geographical distribution of survey clusters**



Note: The map shows that South Eastern part of the country has no survey clusters. This area is sparsely populated due to the harsh environmental condition and the unrest in neighbouring Somalia. As noted in the survey report by CSA and ICF International (2012), national representativeness of the sample is not affected by the fact that the area was not surveyed.