

Boots are made for walking: interactions across physical and social space in infrastructure-poor regions

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ABSTRACT

While detailed data are available on people's travel behavior in industrialized countries, little is known about the spatial characteristics of activities of those living in vast infrastructure-poor areas in the developing world where walking is still the dominant form of transport. We have interviewed 297 randomly selected inhabitants of Tiyo District, Ethiopia, and by random name cues identified 4158 individuals who are a representative cross-section of everyone the informants knew and met. Consequently, we inquired about the distance to these individuals, frequency of contacting them, and the mode of contact. Half of the respondents' social contacts lived within 15-min walking distance and the interviewed inhabitants contacted 98% of all people that they knew only by walking and meeting face-to-face. After examining the determinants of the size, density, and geographical extent of the inhabitants' personal networks, we employed multilevel analysis to explore the relevance of physical and social distance as well as personal characteristics for frequency of interaction. We found that in addition to the strong impact of walking time (–), common organization membership (–), the same religious affiliation (+), kinship (+), and patience (–) also predict the frequency of meetings. From this we present comparisons of the variables' relative effects and conclude with practical implications.

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1. Did distance matter before the horse?

The interest in the interplay of transportation and social interactions has been growing in recent years (Dugundji et al., 2008, 2011). It has been recognized that the spatial distribution of social networks influences social travel (Axhausen, 2008; Carrasco et al., 2008b; Larsen et al., 2005) and that available means of transportation alter the effects of distance-decay (Ellegård and Vilhelmson, 2004; Fotheringham, 1981) and presumably also influence whom we know and with whom we interact. To improve our understanding of the actual relevance of transportation opportunities for the geography of human interactions, it is informative to look into regions in which transportation infrastructure is yet to be developed.

A rigorous study of travel behavior in such contexts could have important practical implications for the improvement of living conditions in developing countries. For example, health education initiatives rely on social diffusion, hoping that people who frequently meet with those that have received the education will eventually imitate the new practices. However, it is not well-

understood how to efficiently target such programs and how far their benefits can reach because little is known about the patterns of travel behavior among members of pedestrian societies. More generally, for as long as the geography of the inhabitants' movement remains unexplored, it will continue to be problematic to model any social diffusion process or predict disease epidemics in regions without transportation infrastructure (Pyle, 1969).

It is well-established that even those with access to high-speed transportation interact more frequently with physically and socially closer others (Blake et al., 1956; Caplow and Forman, 1950; Latané et al., 1995; McPherson et al., 2001). A number of studies from several cities in industrialized countries have quantified the relevance of physical distance for the probability of knowing someone, for forming or dissolving friendships or for frequency of communication and travel (Carrasco and Miller, 2006, 2008; Carrasco et al., 2008a,c; Gonzalez et al., 2008; Greenbaum and Greenbaum, 1985; Hipp and Perrin, 2009; Onnela et al., 2011; Preciado et al., in press; Schaefer, 2012; Song et al., 2010; van der Berg et al., 2010; Wellman and Tindall, 1992). This literature is partially motivated by the explosive expansion of information-communication technologies and it confirms that the predictions of “death of distance” by Cairncross (2001) and others were wrong (Hampton and Wellman, 2001; Larsen et al., 2007; Stern, 2008; Tillema et al., 2010). In summary, it is now known both how much distance mattered with respect to the frequency of interaction in industrialized countries

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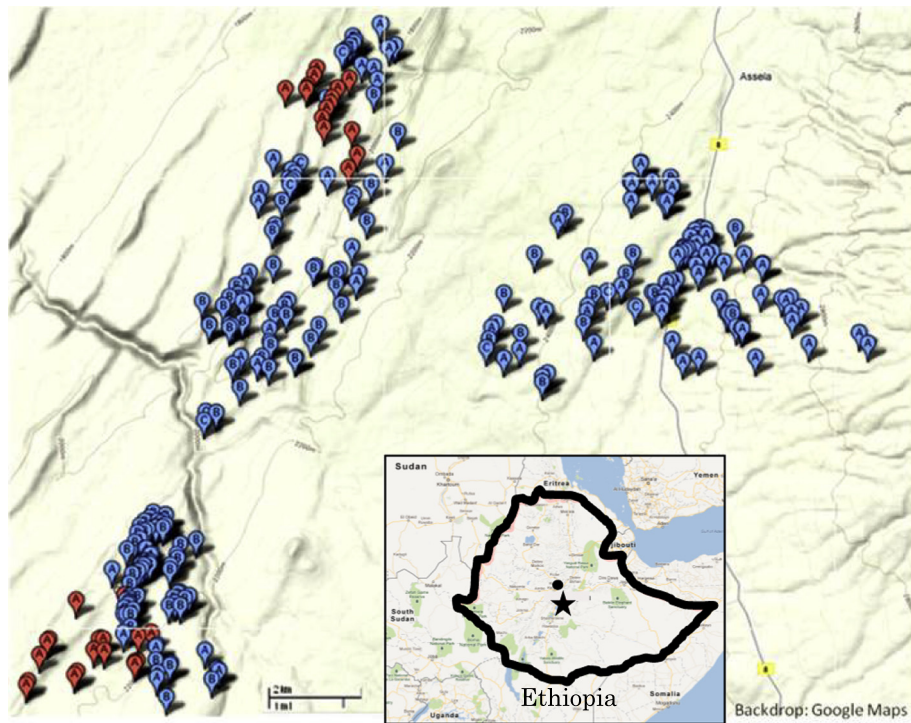


Fig. 1. Geography of the sample. Each marker represents one respondent. Colors indicate religion. Letters indicate ethnicity. In the inserted overview map of Ethiopia, the star shows the location of the research area relative to Addis Ababa, the capital, which is indicated by the round dot. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

before the advent of the Internet and how much it matters today (e.g. Mok and Wellman, 2007; Mok et al., 2010); but in contrast to this, little attention has been paid to spatial patterns of people's interactions in the vast areas of the planet where transportation and communication technologies have not yet altered the frictional impacts of distance (Apicella et al., 2012; Knowles, 2006).

Using data collected from the Ethiopian countryside, this paper aims to uncover how walking distance in combination with social distance and attitudinal predispositions influence the frequency of social interactions in one of the many regions of the developing world, where inhabitants lack access to motorized transport. We employ an innovative low-burden method of data collection to map the *complete* extent of the local inhabitants' networks. We obtain a representative sample of people that each respondent knows and meets and compare its spatial distribution with the spatial distribution of people in specific roles. Next, we examine how the geographical extent of the generated personal networks relates to household and neighborhood characteristics. Finally, we employ multilevel-models to examine how tie-level characteristics (such as walking time, type of the relationship, and alter³ characteristics) in combination with individual-level characteristics (such as socio-demographic household characteristics, household head's psychological characteristics, and geography of the neighborhood) influence the frequency of meeting others.

2. Methods

The research team gathered the data for this study through extensive fixed-form face-to-face interviews that included sections on social network, geographical, and personal characteristics. After

³ In social network terminology, the individuals from whose position networks are referenced (in our case the respondents) are called *egos* and individuals connected to ego by a direct social relationship (in our case all individuals named by the respondents) are called *alters*.

briefly describing the research area, the main features of the dataset are overviewed and the analytical approach is introduced in this section.

2.1. Research area and sample description

The data in this paper come from a household survey organized by the authors between December 2009 and February 2010 in Tiyo District of the Arsi Zone (Ethiopia). This district is composed of 18 administrative units called *kebeles*. One kebele was randomly selected for the survey from high altitude areas (over 2700 m), one from mid-altitude areas (around 1800–2700 m), and one from low-altitude elevations (below 1800 m). The settlements were accessible by unpaved roads but the inhabitants did not own motorized vehicles. Each selected kebele had around 600 households scattered among fields; 100 households were randomly selected from the list of households in each kebele. Among the total of 300 households, 8 were not available for an interview; 5 were randomly added, so a total of 297 households were surveyed; 99 from each kebele (Fig. 1). Research assistants interviewed the self-identified head of each selected household. There was a mobile phone in one quarter of the households (73). The average measured population density of the three kebeles is 17 households per square kilometer. The description of the sample and the main variables used in the analysis are shown in Table 1.

The inhabitants of the research area belong to community-based organizations called *Iddirs*. The earliest Ethiopian *Iddirs* were apparently formed in the beginning of the 20th century as funeral insurance organizations and became common across the country after the Italian occupation in the late thirties (Dercon et al., 2006). Currently, these organizations are involved in a large variety of communal activities. *Iddirs* are non-market institutions, independent from the state but they are well-organized and have clear rules. The government, NGOs, and international institutions ap-

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