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ARTICLE

Reflections on using mobile GPS with young informal vendors in urban Tanzania

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Abstract

This paper will explore how mobile-based GPS methods can advance insights into young itinerant vendors' informal livelihood mobilities. It examines the practicalities of using a GPS-based method in a Majority World context whilst also discussing the merits of combining this approach with mobile methods. The ethical issues of using GPS technology 'on the move', and the impact that my presence had whilst I accompanied participants, is also discussed.

KEYWORDS

itinerant vendors, mobile GPS methods, Tanzania, urban spaces, youth

1 | INTRODUCTION

The "new mobilities" paradigm signalled a shift in how researchers conceptualise, and engage with, everyday movements and interactions of people and objects. Sedentary research practices which had become dominant within academia (Kusenbach, 2012) were critiqued for being unsuitable for understanding the diverse and intricate movements of people, and the common interactions that occur with local environments (Sheller & Urry, 2006). Practices commonly viewed as "unremarkable", such as walking, may hold greater significance than is often afforded to them (Bell et al., 2015). To interrogate these, researchers have developed creative approaches to generate more meaningful and in-depth understandings of everyday embodied experiences (Ross et al., 2009).

Recent developments in mobile Global Positioning System (GPS) technology have presented social scientists with contemporary opportunities to expand their mobile methods "toolkits." It is an exciting time for human geographers, who have long been interested in the "space-time movements of people and objects" (Shoval et al., 2014, p. 1). Recent studies focusing on green space (Bell et al., 2015), informal transport (Evans et al., 2018), and travel behaviour patterns (Joseph et al., 2019) have utilised such technology. Yet, compared to researchers from other social science disciplines, human geographers have been slow to incorporate GPS methods within their research, which Shoval et al. (2014) suggest is partly to do with concerns regarding ethics, the expense of GPS data collection until recently, and critiques in geography that people's subjectivity was being neglected due to an over-focus on physical movements.

To date, few studies have utilised GPS tracking applications to map mobility patterns within Majority World contexts (Joseph et al., 2019). Innovative mobile methods have been used in Africa to understand young people's movements (Langevang, 2007; Porter et al., 2010). However, there is now scope to advance these by incorporating GPS technologies to further understand the complex, varied, and embodied nature of young people's itinerant vending mobilities across

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urban spaces. Youth mobilities and livelihoods are highly interconnected, and this paper will argue that such analyses can be developed in combination through innovatively using mobile-based GPS technology.

This paper reflects on the use of mobile GPS to map the everyday routes of young informal street vendors in urban Tanzania. It illustrates how GPS mapping and participant annotations of their own tracks can provide richer understandings of informal vendors' livelihood strategies and their embodied encounters with urban spaces. This knowledge can advance theoretical and practical interpretations of young vendors' urban lives and informal livelihoods. Generating such insights is important to know how youth negotiate contemporary challenges, including rapid socio-economic changes. Moreover, the ways in which mobile GPS was utilised within a Majority World context is detailed, and the complementary nature of GPS in combination with mobile methods including participant observations and "go-along" conversations is evaluated. Ethical considerations when employing GPS technology with young vendors in an African context are also discussed. The predominant focus of this paper is on the practical and ethical issues of using mobile GPS methods, rather than on discussing epistemological issues in any depth.

2 | YOUNG PEOPLE'S URBAN INFORMAL LIVELIHOODS AND MOBILITIES

Since Keith Hart's seminal work on informality in Ghana (1973), an abundance of academic work has sought to disentangle the heterogeneity of the informal sector. Scholarship has highlighted a range of issues pertinent to understanding the complexities of informality which includes, but is not limited to, the characteristically unregulated and unpredictable nature of the informal economy (Lloyd-Evans, 2008); gender-based disparities prevalent within informality (Chant & Pedwell, 2008); and the intersections between youth and informal work (Gough & Langevang, 2016). Yet, as Gough et al. (2013) note, little is known about how youth create and sustain informal livelihoods in contexts of impoverishment and sparse employment opportunities. Developing understandings of young people's livelihoods is crucial because in sub-Saharan Africa youth are expected to become "job creators" rather than "job seekers" (Langevang & Gough, 2012). An estimated 96% of young people aged 15–24 in this region are engaged in informal work (ILO, 2018). Young urbanites are particularly visible and engage in numerous activities, including informal street vending (Gough & Langevang, 2016). In Tanzania, 62.2% of employment within urban contexts is situated within the informal economy (ILO, 2018), and one of the largest and most observable forms of informal work in this environment is street trading.

For young itinerant street vendors, daily mobilities, the "movements with meanings" that they perform (Langevang & Gough, 2009), are vital in shaping both the opportunities and challenges of their work. However, this area of study has only recently begun to receive more attention (Porter et al., 2017). Previous research has highlighted that walking is the main form of mobility for young people in African contexts (Porter et al., 2010), and other work not specific to youth has emphasised the strategic importance of movements in establishing, maintaining, and in some instances bettering people's livelihoods (Bryceson et al., 2003). Yet these areas of study have seldom been developed in combination, partly because of a lack of knowledge on young people's daily mobility patterns in Africa (Porter et al., 2017). Although urban youth are widely regarded as spatial agents whose lives shape, and are shaped by, the spaces they inhabit and traverse (Skelton & Gough, 2013), further research is required into young vendors' spatial mobilities and the meanings they ascribe to the movements they undertake in relation to their livelihoods (Langevang & Gough, 2009). This is necessary to develop understandings of young people's experiences of navigating urban spaces while they endeavour to sustain their livelihoods. The following section details how mobile GPS was employed with young vendors in Tanzania to address the gaps in research identified above.

3 | THE PRACTICALITIES OF USING MOBILE GPS WITH YOUNG ITINERANT VENDORS

GPS tracking was one of the methods employed during my doctoral research, undertaken in two urban locations – Dar es Salaam and Arusha, Tanzania – over a period of one year from August 2018. This method was one of several used within an ethnographic study which focused on developing an understanding of the diverse and complex livelihood strategies and experiences of young men and women who work within the informal sector in urban Tanzania. This paper draws on my experiences of using mobile GPS mapping methods with eight small-scale itinerant vendors (one in Dar

es Salaam, seven in Arusha) out of a total sample of 37 young people aged 15–35 years.[1] A purposive sample was used to select participants, and I initially approached vendors through drawing on contacts with gender and youth organisations. Assistants were employed to translate between English and Kiswahili. Communicating through assistants made establishing rapport with participants more difficult, but I sought to mitigate this by accompanying participants on their journeys through the city.

In total, 15 maps were created using Strava – a free to download fitness application. The application was chosen due to its accessibility and final presentation of mapped routes. Prior to entering the field, I had not considered using mobile GPS methods. Yet, once the research had begun, it became apparent that GPS tracking could complement other methods in the study such as participant observations. Initially I purchased an inexpensive smartphone which I trialled in Dar es Salaam. I had planned to buy several devices to give to participants to map their own routes. However, it transpired that this smartphone could not run GPS applications and due to budgetary constraints it was not feasible to buy a more advanced model. None of the participants whose routes were being tracked owned a smartphone, so it was not possible to download a tracking app onto their devices either.

I tested Strava on my own personal mobile device and found it worked in most areas across Dar es Salaam and Arusha. Due to these circumstances and because of personal safety concerns, it was decided that the device would stay in my rucksack, which unfortunately meant that I had sole control over the tracking application. This contrasts with participatory methodologies which aim to enable participants to have greater control over research processes (Pain, 2004). Yet, because of financial constraints (Evans, 2016), this approach was the most suitable given the resources and options available to me at that time.

3.1 | GPS map annotations

To address the limited involvement during the GPS mapping process, a collaborative approach was adopted with youth participants, who annotated and discussed their own maps after they had been created (see Figures 1 and 2). This enabled subjective insights to be developed, which would have been overlooked if I had relied solely on my own analysis and interpretations (Bell et al., 2015). The clear and appealing visualisation of young people's routes offered through GPS maps (Christensen et al., 2011) provided an aid through which participants could reflect on, and ascribe meanings to, their journeys. Jarvis et al. (2017) used a similar approach when using GPS methods with youth and noted that through this they were able to develop enriched understandings into young people's everyday mobilities and activities.

Participants normally annotated their maps within a week of their creation, during follow-up interviews. Although discussing participants' lived experiences "after the fact" has been criticised because details can be lost through recollection (Spinney, 2015), a more immediate approach was not suited to this research because itinerant vendors seldom had time to converse while working on the move, and occasionally arranging follow-up meetings with participants took extended periods of time. During annotation sessions, I invited participants to highlight areas of their maps they considered significant to their businesses. Through prompts, I asked young people where the better/worse places were for their work, why they undertook the routes they did, whether there was a strategy behind their movements, and the parts of their routes they found easiest/hardest.

As Nasser's annotations (Figure 1) reveal, his movements, and the overall route he took, were undertaken in relation to where customers could be found. During an observation at the time, Nasser explained to me that "moving is a way for me to reach for my customers." The work of informal vendors is often centred around convenience, as products and services can be brought to the customer rather than the customer having to travel to buy what they need (Adama, 2020). Nasser employed a strategy of walking the same route each day, as through this repetition he was able to build a regular customer base which afforded some stability and predictability to his business. Similarly, Doreen's map interpretations (Figure 2) drew attention to areas of the city she would frequent, as these were places where regular, reliable, and trustworthy customers could be found. For both Nasser and Doreen, the location of customers gave meaning to their movements (Langevang & Gough, 2009). The number of customers that could be found along sections of their routes also determined the value that both participants assigned to the spaces they passed through. GPS annotations can help to understand the livelihood mobilities and strategies that young people undertake, by uncovering the knowledge(s) and experiences that young people draw on (Freeman et al., 2016).

GPS map annotations also helped to develop understandings of young people's embodied interactions with/in urban environments (Jarvis et al., 2017). Nasser, who pushed a heavy metal cart, filled with 1,000 oranges at the start of each day, identified a steep hill he had to walk up as the hardest part of his route (see Figure 1). This area of the city was

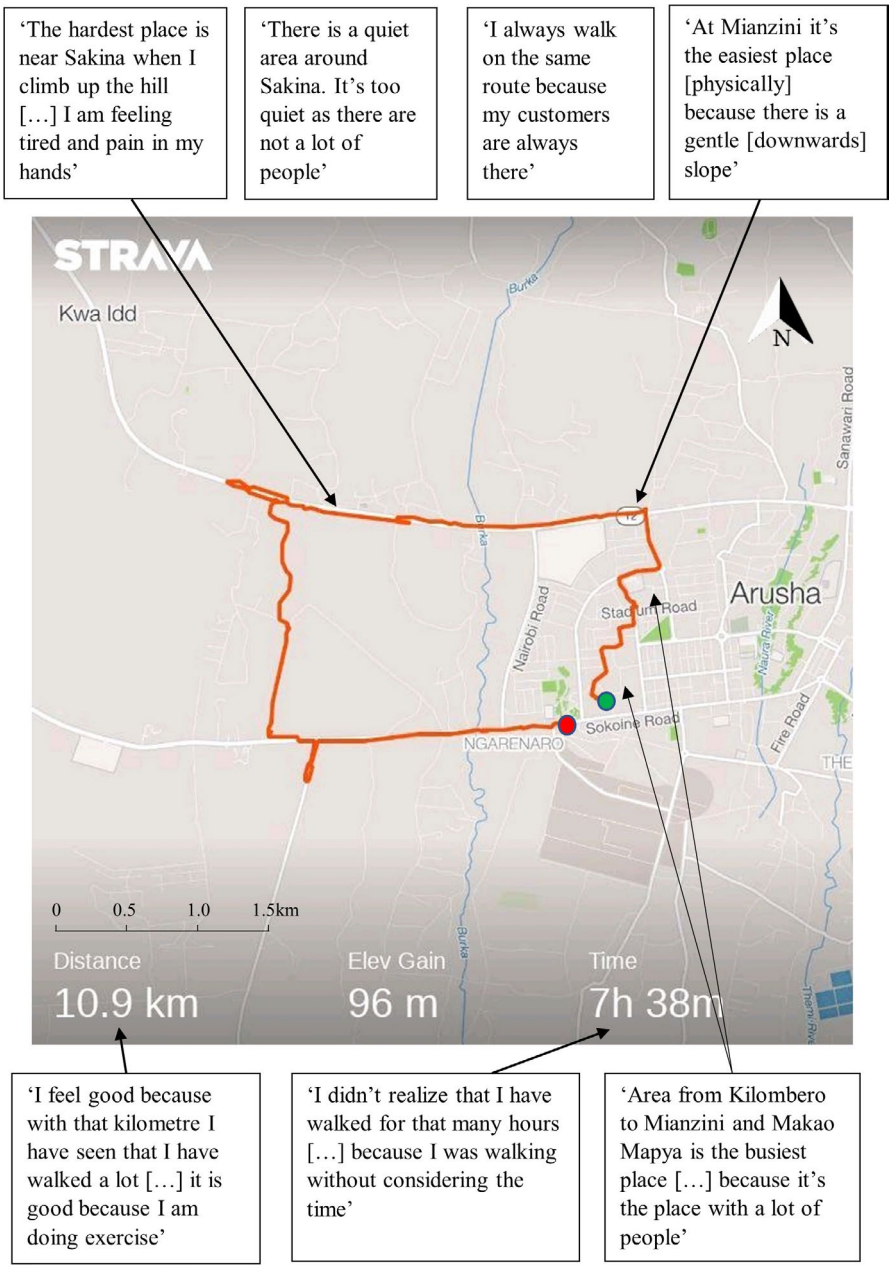

FIGURE 1 A GPS map annotated by Nasser, a male street vendor in Arusha

identified as the "most difficult" part he passed through while attempting to generate income, because it caused him to feel tired and to feel pain in his hands as he pushed his orange cart uphill. Conversely, he identified the least physically demanding area of the city which had a gentle downhill slope as the "easiest" place he encountered. Feelings of embodiment defined Nasser's experience of street vending along certain parts of the route he took. His interpretations also highlight that embodiment can change over the course of a journey, depending on factors such as urban terrain. Nasser's "mundane" mobilities included notable embodied encounters with place (Porter et al., 2010), and through interrogating these, more detailed and nuanced insights were gained into his livelihood mobilities as he navigated through, and interacted with, different city spaces.

In Doreen's annotations, she highlighted overall feelings of pain that she encountered while working (Figure 2). She remarked on being previously unaware as to why she experienced levels of tiredness that caused her to feel pain over her entire body, and why she suffered from chronic chest problems and aches. However, on reflecting on her GPS map, which included the distance she walked and the time she spent undertaking her business, she became aware of just how physically demanding her work was, which she saw as the reason why she suffered multiple forms of pain while undertaking her business. Although it has been recognised that walking long distances can be challenging for informal workers

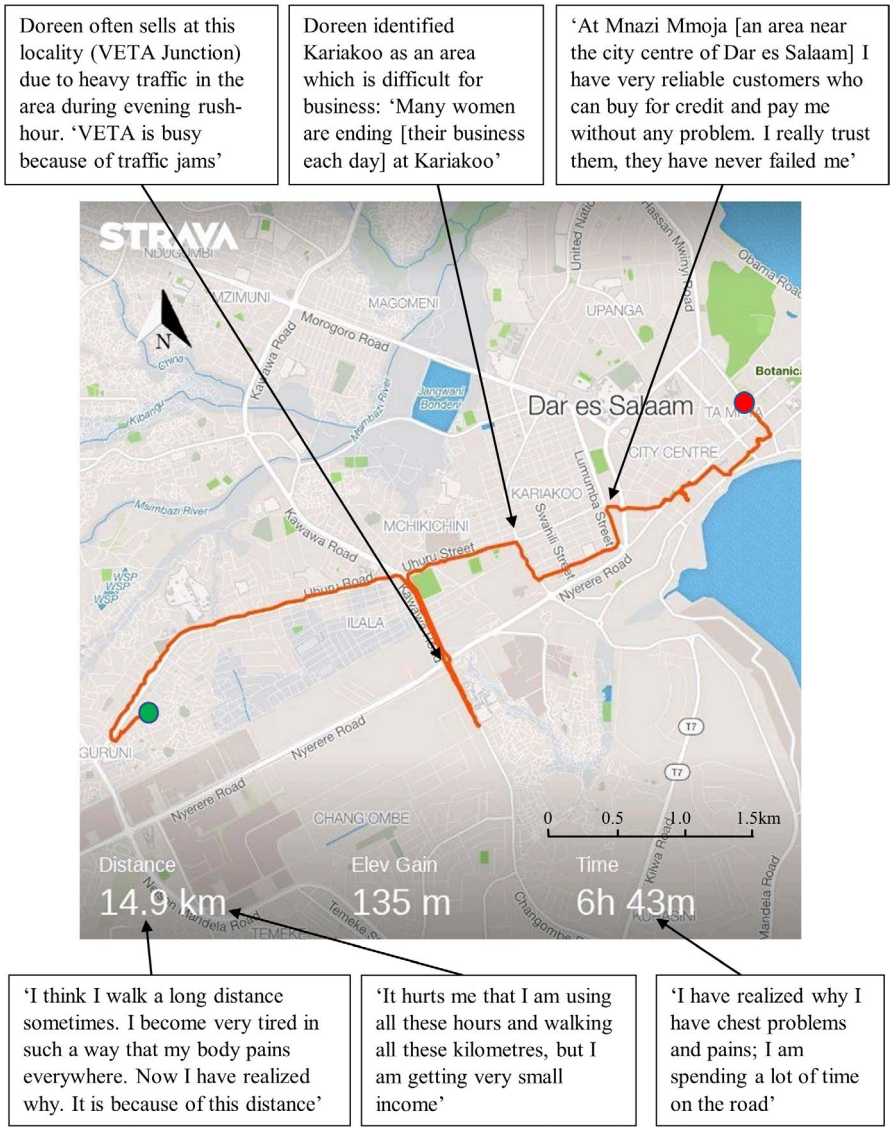

FIGURE 2 A GPS map annotated by Doreen, a female street vendor in Dar es Salaam

(Bryceson et al., 2003), simply acknowledging this without developing deeper understandings overlooks the personal embodied experiences and health impacts that these journeys can have on informal workers. On realising the amount of labour she put into her work, often for little remuneration, Doreen also felt emotional hurt (see. Figure 2). Through visualising and measuring Doreen's route through using GPS tracking, insights could be gained into both the physical and the emotional responses that her work elicited. Again, these are important to understand as they allow for more holistic insights into young people's practices and experiences of livelihood mobility to be developed.

The accounts given above are not generalisable because different vendors will interpret and react to spaces in different ways (Porter et al., 2010). As demonstrated throughout this section, innovative GPS techniques benefited this study through their ability to capture the heterogeneity of young vendors' itinerant street-vending activities and encounters.

3.2 | Combining GPS methods with mobile methods

Mobile GPS in this research was used in combination with two mobile methods: participant observations and informal go-along conversations. Combining these methods was an important part of the research process and complemented the ethnographic approach taken within this study. This allowed additional context on young people's livelihood mobilities to be gained. Used alone, GPS methods could produce geographical patterns of routes, yet they could not reveal why

participants chose the routes they did, nor could they reveal their experiences as they walked along these (Christensen et al., 2011). The inclusion of mobile methods enabled insights into the lived experiences of participants as they performed certain types of mobility (Jones & Evans, 2012). I could observe and ask questions in relation to young people's actions, interactions, practices, and strategies as they walked through city spaces in search of income – insights which could not easily be expressed by participants through using other methods such as interviews (Langevang, 2007).

Furthermore, through accompanying participants while they undertook their itinerant informal activities, I was able to develop understandings of the embodied meanings of place (Ponto, 2016). If a participant walked 16 km over an 8-hour period while undertaking their business, I would walk with them for the entire journey. Through this, I was able to improve my knowledge of the conditions participants worked in while also experiencing feelings of achiness and tiredness that regularly occurred after walking long distances over many hours. This is not to claim that my experiences were aligned with those of the participants (Merriman, 2014), but through these encounters I was able to better understand the nature of their businesses and the physicality of their work.

Walking with participants also helped to build rapport (Anderson, 2004). Prior to commencing research with a new participant, it was common for them to ask my assistants "Are you sure he [researcher] is going to be able to walk the distances I walk? It is very far!" Yet, once I had completed a journey with a vendor, they often seemed more open to having discussions with me. This can perhaps be attributed to the time and effort I put into attempting to understand their experiences, through placing myself in the environments they worked. I would observe and have informal conversations with participants at least once prior to GPS tracking participants' routes. This enabled me to gain an awareness of the routes participants took, which allowed me to ask more specific questions during map annotations.

3.3 | The unpredictability of research environments while on the move

The mobile nature of street vending investigated within this study meant that the environment in which "we" were situated (participants, researcher, and research assistant) was continuously changing. The research setting was flexible and unpredictable, and often not controllable (Ponto, 2016). Sometimes, "we" found ourselves in situations that had evolved in rapid and unexpected ways, which put our safety at risk. In Dar es Salaam, traffic jams are common throughout the city. We were observing and tracking the movements of Idi, a male vendor who walked through traffic selling crisps to people in their vehicles. When the traffic was stationary, we would follow Idi out into the road and walk behind him in between cars, lorries, and other vehicles. But at times, this resulted in some tricky situations.

> I was focusing on observing Idi, who was focused on selling crisps to a customer in a car. Without realising, the traffic lights behind us had turned green. The cars had started to move past us on both sides which resulted in us being in the middle of moving traffic. Fortunately, we were able to dart to the side of the road, through a gap in the traffic caused by a slow-moving lorry. (Research diary, 17 July 2019)

Not all research contexts while on the move evolved in unpredictable ways. Degrees of risk sometimes changed over the course of accompanying participants while they undertook their businesses. This required me to evaluate situations as they unfolded. I often consulted with both my research assistant and with participants, to understand whether my approaches would be suitable to certain research contexts or whether they needed to be adapted to minimise the degree of risk to us all.

4 | ETHICAL CONSIDERATONS AND POSITIONALITY

Before employing mobile GPS with participants, verbal consent was negotiated. The rationale for using this method, and how created maps would be used in an anonymised form for publications and presentations after I left the field, was explained to participants, who all agreed for their routes to be tracked. Yet, the data could pose a risk for participants and has the potential for misuse, unless there are clear ethical protocols about anonymity and how the data will be stored and disseminated. Geospatial technology makes mobility data more legible and could be used by the state/local authorities to predict and constrain the movements of vendors in and across urban spaces, which could impact their livelihoods and/or well-being.

Spending long periods of time with participants "on the move" can also be problematic. As Ponto (2016) identifies, participants may feel obliged to stay with a researcher if they are walking together even if they no longer want to. In Dar

es Salaam, I was walking with David, a vendor who sold hard-boiled eggs. My presence had made David concerned about how people were perceiving him.

> David has mentioned that he is attracting more attention from people because of my presence. He has explained that people think he is going to be rich because he is with a white person. I asked David if he was happy for us to continue to walk with him or if he would like us to stop. He has told us that it is not a problem for us to stay with him, but I am mindful of this. (Research diary, 2 February 2019)

Beyond explicitly asking David if he wanted us to continue accompanying him, I was also monitoring any verbal and non-verbal signs which would indicate otherwise (Ponto, 2016). However, in practice this can be difficult, especially in a cross-cultural and cross-language setting. I had arranged to meet David again to undertake another observation and to utilise GPS mapping. However, when this day came, David told us that he was sick and that he would not be working. This happened again on two separate occasions thereafter. As Langevang (2007) highlights, a researcher working with youth in Africa must carefully consider the power relations between themselves and a participant. Participants will seldom say "no" to a researcher given their position of authority, yet they may display other signs of unwillingness to continue participating in a research process (Langevang, 2007). On reflection, it was evident after the first time that David told me he was sick that he no longer wanted to be included in the research; however, this was not necessarily clear to me at the time.

My positionality as a white researcher in a post-colonial African context characterised by significant wealth differentials and global inequalities often meant that participants were asked by people on the street why I was with them, and in what ways they were benefiting from my presence. Due to perceptions of affluence, people assumed that I was financially supporting the participants involved in this research. The impact these assumptions had on the lives of participants after I left the field cannot be fully known, and often this impact is not recognised in published work.

5 | CONCLUSION

The new and existing challenges informal vendors face within complex and ever-changing urban environments throughout Majority World contexts require ongoing attention. This paper has provided a timely contribution detailing how innovative GPS approaches can be used with mobile methods to generate meaningful insights into young itinerant vendors' experiences and perspectives of traversing various urban landscapes to sustain their informal livelihoods. It showed that mapping data and participant narratives alone can only partially capture the intricate aspects of vendors' livelihoods, including their embodied experiences, the factors influencing the routes they took beyond the "rational," and whether they felt safe in, or excluded from, particular spaces. Using mobile GPS techniques alongside qualitative and ethnographic methods helped to further contextualise young vendors' livelihood mobilities and develop an awareness of the varied spatial knowledge(s) and strategies they draw on daily. Creating maps through using GPS methods complemented and enhanced participant observation of young vendors' mobilities, encouraging young people to talk in greater detail about specific parts of their complex and diverse journeys. This enabled additional insights into the variability of young vendors' routes to be gained, which would have been harder to obtain if only participant observation and follow-up interviews, which lack visual attributes that can enrich participants' interpretations, were used.

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DATA AVAILABILITY STATEMENT

Research data are not shared.

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ENDNOTE

[1] The African Union, along with many African nations, define youth as those aged 15–35 (African Union, 2006).

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