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Exporting consumption: Lifestyle migration and energy use

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Abstract:
This paper examines how international population movements from highly developed to less developed countries spread environmentally-impactful consumption habits around the world. Lifestyle migration, a phenomenon whereby relatively privileged migrants move in search of a more fulfilling life, is increasingly common around the world and serves as an optimal example for studying the spread of unsustainable consumption. We wonder whether lifestyle migrants take high consumption lifestyles typical in their countries of origin to their destination places and whether their presence in destination communities increases consumption among natives as well. This study investigates these relationships based on the case of Costa Rica, a well-established recipient country for lifestyle migration. We analyze 100% sample microdata from the Costa Rican Census 2011 to test relationships between lifestyle migration and consumption of energy-intensive goods using multilevel models that nest consumption at the household level within communities. Our findings suggest that lifestyle migrants not only consume more energy-intensive goods than native Costa Ricans, but that their presence elevates consumption among native neighbors as well. Thus, lifestyle migration may increasingly serve as a mechanism through which unsustainable consumption patterns are transferred from the Global North to the Global South.

Keywords:
consumption; energy consumption; migration; lifestyle migration; Costa Rica; ecological footprint

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The authors have no competing interests to report.

Highlights:

- Migration from rich countries to the Global South is increasingly common.
- We model the effect of such migration on energy consumption in Costa Rica.
- Migrants from rich countries consume more energy-intensive goods than natives.
- The community presence of lifestyle migrants increases native consumption as well.
- Lifestyle migration is one mechanism driving increases in global energy consumption.

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1. Introduction

Human consumption drives global environmental change. If everyone in the world were to consume like the average North American, it would require the biocapacity of approximately 5 times the resources available on Earth to produce the goods and services and to absorb the associated waste (Global Footprint Network, 2018). While per capita consumption is much lower in most other parts of the world (e.g. 1.7 earths needed in Latin America and the Caribbean), globally we have been consuming more than the earth can sustainably support since 1971 (Global Footprint Network, 2018). The gap between consumption and the resources needed to support that demand continues to grow as consumption levels in middle and lower income countries increasingly mimic those in the Global North (Balatsky et al., 2015; Hansen, Nielsen & Wilhite 2016).

Most of the global footprint described above is attributable to carbon emissions associated with rising energy use (Global Footprint Network, 2018). Total primary energy consumption doubled between 1973 and 2015, and projections suggest that it will grow another 28% by 2040 (IEO 2017). Part of this growth is due to population growth, but *per capita* global energy use has been rising rapidly since 1995. Per capita energy consumption is highest (6,000 or more kilograms of oil equivalent (kgoe) per person) in rich, northern countries (i.e. Iceland, Luxembourg, Canada, United States, Norway, Finland, and Sweden) and in oil-rich countries (i.e. Qatar, Bahrain, Kuwait, and United Arab Emirates- World Development Indicators 2016). Consumption of energy in most middle and lower income countries amounts to only a fraction of the energy consumption in higher income countries (e.g. ~1,400 kgoe in Brazil, ~600 kgoe in India, and ~1,000 kgoe in Costa Rica); yet, it is rising rapidly as people in more places adopt more energy-intensive lifestyles (Motesharrei et al., 2016).

Adopting high consumption lifestyles around the world is not environmentally sustainable, but, current globalization patterns suggest that is the path we are on (Motesharrei et al., 2016). In this context, it is critical to better understand the mechanisms through which energy consumption patterns transfer between countries. In the present study, we set to do that by investigating the role that migration from highly developed countries with high consumption lifestyles to lower income regions plays in shifting the latter's adoption of energy-intensive residential goods. That is, we aim to understand what happens when people from high consuming countries move to lower consuming places. Do they bring their more extravagant lifestyles with them? If they do, do they also spread these lifestyles to their new neighbors such that natives also start to consume

more when they live in places with large numbers of lifestyle migrants? How might this vary across space?

Lifestyle migration (whereby migrants from rich countries move in search of a more fulfilling life) has become increasingly common around the world (Rainer 2019). Lifestyle migrants are difficult to count because we don't often know motivations behind peoples' moves in national surveys or administrative records. We can get a sense, however, by examining global north-to-south migrants. Worldwide, this migratory trend was estimated in 2017 to be 66 million people and projected to increase to 88 million by 2021 (Finaccord 2018). Record numbers of people are emigrating from the United States (McPhillips, 2017), and the presence of migrants from rich countries is palpable in many countries of the Global South (Finaccord 2018). We seek to discern how these migrants impact energy consumption in their destinations by either re-creating high consumption lifestyles with energy intensive technologies in their residences abroad or adjusting to local cultural practices. If lifestyle migration is influencing consumption in our study site of Costa Rica, then it may also be working more broadly as one of the mechanisms increasing global energy consumption.

This study is situated in IPAT logic, whereby energy footprint (impact) is the product of interactions between population, affluence, and technology (Stern et al. 1992; Chertow 2000). IPAT was developed to explicitly consider the importance of human consumption, in response to simplistic notions that ascribed environmental degradation to population growth (Commoner 1992; Ehrlich and Holdren 1971; Ehrlich and Ehrlich 1990). More recent critiques and conceptualizations further recognize how social organization and institutional arrangements (including political governance, market systems, and cultural norms) mediate these relationships (Dietz and Rosa 1994; Curran and De Sherbinin 2004) and that factors may have nonlinear or disproportionate influences (Rosa and Dietz 1998; York, Rosa, and Dietz 2003). Still, population-environment scholarship has been slow to fully bring "consumption into the population-environment equation" (Curran and De Sherbinin 2004). The consumption and environment literature has tended to focus on more developed countries, while the population and environment literature has focused on less developed ones (ibid). In the current study, we seek to extend the emerging body of population-consumption-environment scholarship (Dasgupta and Ehrlich 2013; de Sherbinin et al. 2007; Davis and Carr 2010; Liddle 2014) by integrating theory from lifestyle migration and migration and consumption while utilizing methodological approaches more commonly seen in demographic population-environment research and by focusing on north-south migration. In doing so, this study integrates scholarship on the Global North with scholarship on the Global South and extends IPAT to consider population-affluence-technology interactions across borders.

Drawing on the underlying IPAT logic, we assume that energy impact is determined at both the individual and the community-level by interactions between population, affluence, and

technological adoption of energy-intensive goods. Focusing on the technology component, we implement regression models that estimate the impact of lifestyle migration on adoption of energy-intensive technologies, while also considering the roles of population and affluence. Our models do not measure energy consumption directly, but following IPAT logic, technology use would drive the energy footprint beyond population and affluence.

2. Material and Methods

2.1 The Case: Costa Rica & Lifestyle Migration

Costa Rica was chosen for this study given its status as a middle income country with relatively low per capita energy consumption coupled with its large and growing number of lifestyle migrants. Costa Rica consistently ranks high on surveys of migrants from the global north moving abroad for lifestyle reasons (InterNations 2018). The exact number of lifestyle migrants living in Costa Rica is difficult to identify for several reasons. Immigrants are undercounted in national surveys and in administrative records (especially when legal status is in question) and these do not include questions about what motivated the move (lifestyle vs job/family/etc.). Based on reports from the United States Department of State, there are about 120,000 United States citizens living in Costa Rica (USDS, 2019). Data from Costa Rican immigration records indicate that about 50% of immigrants from rich countries to Costa Rica are from the United States (Dirección General de Migración y Extranjería, 2018). Other common rich countries of origin include Western Europe (especially Spain, Germany, and Italy), Canada, and Argentina. Together, these data points suggest that about 240,000 immigrants from rich countries are currently living in Costa Rica, which amounts to over 4% of the country's total population. In specific communities (popular destinations) within Costa Rica, the proportion of lifestyle migrants is much higher. For instance, the number of lifestyle migrants in the province of Guanacaste ranges between 7 and 14% of the total population (van Noorloos, 2013). Matarrita-Cascante and Stocks (2013) reported this range to be between 7 and 10% of the population of the town of Nuevo Arenal.

Costa Rica's natural characteristics including its beaches, rainforests, mountains, volcanoes, and its rich biodiversity (containing 5% of the world's diversity- UNDP, 2018), are among the top reasons why lifestyle migrants are attracted to the country (van Noorloos, 2013; Matarrita-Cascante, Sene-Harper, Stocks, 2015). The country has protected over a quarter of its land area (UNDP, 2018) in an effort to support ecological integrity. Sociocultural conditions are also attractive. Costa Rica is a pacifist country which disbanded its armed forces in 1948 after its last civil war, directing military funds to investing in health and education (Matarrita-Cascante, 2010). Coupled with the social reforms that followed the last civil war, the country experienced sustained socioeconomic development that distinguished it from other Central American

119 countries. Today, Costa Rican literacy and life expectancy indicators parallel those of the
120 world's most developed nations (Rosero-Bixby and Dow 2016; CIA, 2018).
121
122 *2.2 Specific Questions, Data & Measures*
123
124 This study intends to respond to the following specific research questions:
125 1. Do households with lifestyle migrants consume more energy-intensive goods than
126 native Costa Ricans?
127 2. Are communities (districts) with higher proportions of lifestyle migrants associated
128 with higher levels of consumption, net of household migrant status?
129 3. Does the relationship between lifestyle migrant households and energy-intensive
130 consumption vary across space?
131
132 Data on both migration status and energy consumption come from the Costan Rican Census 2011
133 (Censos 2011), which includes a 100% sample, with microdata for 1.2 million households. The
134 census includes common demographic and economic questions, as well as specific questions on
135 country of birth, housing, and consumption of goods which are important to this study.
136 Geographic identifiers are included so that individuals can be nested within households, which
137 can be located within districts. Districts are political units that are similar in size and function to
138 counties in the United States, but are based on population size so that they are geographically
139 much smaller in higher population areas and larger in more rural areas. Districts are both
140 culturally and politically meaningful, and can be thought of as extended neighborhoods.
141
142 We use the question on country of birth to classify individuals as "lifestyle migrants", based on
143 their country of origin. We recognize that people sometimes move from richer countries to the
144 global south for employment, family, or other reasons (Benson and O'Reilly 2016), and that
145 measuring "lifestyle migration" based on country of birth will inadvertently include some of
146 those migrants, as well as those who move for lifestyle reasons. This trade-off is warranted in
147 that we are able a near complete population count via the census data. We count migrants who
148 were born in countries that score higher than Costa Rica on the United Nations Development
149 Program's Human Development Index (HDI) as "lifestyle migrants." In 2018, Costa Rica ranked
150 fifty-seventh among all countries in the HDI, so that migrants from the 56 countries with higher
151 levels of "human development" are the places of birth for our lifestyle migrants. We then
152 consider any household with at least one adult resident who was born in a high HDI country to
153 be a lifestyle migrant household (n= 18,876 households, 1.6% of all households, as counted in
154 the census). Of the lifestyle migrants in our sample, 52% were born in the United States, which is
155 by far the greatest proportion. Other common countries of origin include: Spain (6%), Argentina
156 (6%), Canada (6%), Italy (5%), Germany (5%), Chile (5%), and France (3%).
157

Questions about whether households have a personal vehicle, a flat screen television, or a hot water heater are used to proxy energy use. Personal vehicle ownership is particularly important to the Costa Rican energy context because the number of vehicles has risen exponentially over the last several years. In 1990 there were about nine registered cars for every 100 Costa Ricans. By 2016, this had increased to more than 30 cars for every 100 Costa Ricans (Ojo al Clima, 2018). At the time of Census 2011, 34% of Costa Rican households had at least one personal vehicle. This dramatic increase poses critical challenges to air quality, infrastructure, and traffic congestion and commuting times (Cruz, 2015; Gonzalez, 2017; Rodríguez, 2017; Lara, 2018). Traffic and vehicle congestion is now a key social problem in the San José metropolitan area (Rodríguez, 2017; Ugarte and Loaiza, 2018). Moreover, transportation is the energy sector that poses the greatest challenges for Costa Rica to meet its climate neutrality goals, accounting for almost two-thirds of all carbon emissions (Arguedas, 2015; Marin, 2017; Salazar, 2018).

We use presence of a flat screen television in the household as an indicator of electricity use from electronic gadgets. In 2011, 21% of households owned one. Hot water heaters are rare in Costa Rica (12% of households had one in 2011). When they are present, they are almost always electric. They use, on average, about four times the electricity than the more common "termoducha", which heats water on demand via electricity at the shower head. This means that hot water heaters usually constitute the second largest electricity demand in Costa Rican households that have one, using on average 4,380 kilowatt hours (kWh) of electricity annually, at a cost of about $810 (USD) a year. Most Costa Rican households don't use hot water, except for in the shower, via the "termoducha." Air conditioning would be another energy-intensive technology that is important to explore in this context, but data on air conditioners is not available in the Costa Rican census. Together, these measures (owning a personal vehicle, flat screen television, or hot water heater) approximate multiple dimensions of household energy use. We consider each separately as key dependent variables in the analysis, described below.

2.3 Modelling Strategy

Because we anticipate that both household characteristics and community-level factors will impact technology adoption, we employ multilevel mixed effects logistic regression (Long and Freese, 2014; Leckie, 2010) to estimate relationships between lifestyle migrant households and consumption of energy-intensive goods. We estimate three different models, each with a different indicator of energy use (A= personal vehicle ownership; B= flat screen tv ownership; C= water heater ownership). For each, the dependent variables of interest are dichotomous (1 or 0). The models then estimate the odds of households consuming each of these items. The models include two levels of analysis with households (n=1.2 million) nested within districts (n=472 districts, with an average of 617 households per district). All models are estimated using robust standard errors, but sensitivity tests show little difference between robust and classical standard errors, and no differences in interpretation.

At the household level, the predictor variable of interest is whether the household includes any adult lifestyle migrants or not, measured as a dichotomous variable. This measure addresses the question of whether lifestyle migrant households consume more. At the district level, we are interested in how the presence of lifestyle migrants in the community influences all households to consume. The predictor of interest at the district-level is then the proportion of households within each district that include lifestyle migrants, measured by decile. In the highest decile, at least 3.6% of households include a lifestyle migrant (range 3.6%-15.1%). In the lowest five deciles (the lower half), not more than 1% of households had lifestyle migrants.

Mediating variables at the household level include measures of household socioeconomic status (affluence), household demographics, and urbanity (population). At the district level, we include an index of average household-level well-being/socioeconomic status (affluence) and a measure of urbanity (population), as well as a district-level fixed effect. Each of these variables is described in more detail in Table 1. All data come from the Costa Rican Census 2011.

Insert Table 1 about here.

To fully investigate these relationships, we estimate three models for each dependent variable. The first model set is a logistic regression at the household level (using Stata command "logistic") that estimates the odds of consuming energy-intensive goods by lifestyle migrant status (informing RQ1). However, we recognize that household consumption is likely impacted by community-level factors and therefore households are not independent from one another, violating the assumptions of a simple logistic model. Model Set 2 addresses this issue by adding district-level fixed and random effects, making it the preferred model for addressing RQ1. Still, we include the results from Model Set 1 here to demonstrate how robust our conclusions are to different modeling strategies and the improvement to model fit we see by introducing the multilevel approach.

We fit model sets 2 and 3 in Stata statistical software using the meqrlogit command for multilevel mixed-effects logistic regression, allowing for random intercepts, random slope of the predictor variable (LifeMig), and for correlated random effects between slope and intercept. The primary purpose of Model Set 2 is to confirm that the relationships found in Model Set 1 hold, after considering district-level differences. District effects include urbanity (%Urban) and community socioeconomic status (distNBI), as well as allowing for district-level random effects (random intercepts), and for the slope of lifestyle migration to vary (random slope).

Model Set 3 examines how the presence of lifestyle migrants in a community impacts household consumption by adding a district-level measure of lifestyle migrant households. Thus, we are able to get at the question of whether living in a community with a high proportion of lifestyle

migrants has an effect on households' likelihood of consuming energy-intensive goods (RQ2). This is measured by adding a district-level variable for lifestyle migration (d_lifestyle) as a fixed effect to the same multilevel mixed-effects logistic regression model from Model Set 2. The proportion of lifestyle migrant households in each district is measured in deciles, in order to consider the possibility of threshold effects and nonlinearity. Again, the model fits district-level fixed effects (urbanization and socioeconomic status), and allows for random effects (random intercepts) and for the slope of lifestyle migration to vary (random slope).

Finally, we are also interested in spatial variation (spatial heterogeneity/structural instability) in the relationship between lifestyle migration and consumption of energy-intensive goods (RQ3). Costa Rica is geographically diverse with social and ecological systems that vary widely across a small area (Biesanz, Biezans and Biezans, 1999). Temperatures in lowland/beach areas are typically 20°F warmer than they are in the mountainous highlands only a few miles away. This means that energy demands, environmental contexts, and culture differs considerably from district to district. The kind of lifestyle migrant who is attracted to hot beach areas may be significantly different (and have different consumption habits) than lifestyle migrants who settled in the mild San José Metropolitan area or those who settle in the cooler mountains.

Moreover, finding significant random slopes and slope/intercept covariance in Model Sets 2 and 3 indicates that relationships between lifestyle migration and consuming energy-intensive goods are not spatially homogeneous. To explore spatial patterns in these relationships (and answer RQ 3), we run the basic logistic regressions for each response variable (from Model Set 1) separately for each of the 472 districts and map the resulting lifestyle migrant coefficients in ArcGIS software. This constitutes a spatial regime model (with 472 regimes/districts) whereby all coefficients (intercept, slope, variance) vary by district (Anselin 2017). This practice allows for the possibility that relationships between lifestyle migration and consumption are stronger or weaker in some districts than others.

Together, the methods allow us to estimate: (A) How much having a lifestyle migrant in the household increases households' odds of consuming energy-intensive goods, above and beyond the usual factors (RQ1); (B) How much living in a district heavily influenced by lifestyle migration increases everyone's odds of consumption, above and beyond the usual factors (RQ2); and whether relationships between lifestyle migration and energy consumption vary across space (RQ3). In addition, mapping relationships between lifestyle migration and consumption of energy-intensive goods allows for an exploration of *how* these associations vary across space and for hypothesis-building about additional community-level factors that might mediate the impact of lifestyle migration on energy consumption. This final factor is important for considering how the results of this Costa Rican case could (in future research) be expanded to theorize and investigate how lifestyle migration impacts energy use more broadly across developing

277 countries. It is also important for considering how policies and programs might best address
278 elevated energy consumption among lifestyle migrants.
279
280 **3. Theory**
281
282 *3.1 Lifestyle Migration*
283
284 International migration has been practiced throughout history in response to political unrest,
285 natural disasters, or economic necessity (Greenwood, 1975; Riad and Norris, 1996; Castles,
286 2003). In this paper, we are concerned instead with migration by relatively affluent people who
287 live safe and secure lives but who decide to migrate in a quest to make life more fulfilling or
288 meaningful (Benson and O'Reilly, 2009). As a result of contemporary macro level social
289 changes, increasing numbers of people are moving both within and between countries in pursuit
290 of lifestyle changes that are expected to improve quality of life socially, culturally, and/or
291 environmentally (ibid).
292
293 Lifestyle migration is based on choices motivated by desire and ability to relocate temporarily,
294 seasonally, or permanently to another location. Also known as amenity migration, retirement
295 migration, leisure migration, counterurbanization, migration of the privileged, or lifestyle
296 migration (used hereafter), this type of migration is driven by the desire of people to start a new
297 life elsewhere, particularly as they seek to redefine their lives (Croucher, 2009; Benson and
298 O'Reilly, 2009; Benson and O'Reilly, 2016). Lifestyle migrants seek to escape the burdens of
299 their previous life, often associated with living in urban areas of more developed nations under
300 conditions of high stress, high cost of living, and a rapid pace of life (Gosnell and Abrams,
301 2009). Many settle in less developed nations, commonly seeking rural communities because of
302 their proximity to nature and associated experiences (e.g., outdoor recreation, leisure), perceived
303 lower health risks, slower pace of life in comparison to their places of origin, and perceived
304 lower costs of living (Johnson and Beale, 1994; McGranahan, 1999; Beyers and Nelson, 2000;
305 Moss, 2006; Moss and Glorioso, 2014; Torkington, David and Sardinha, 2015). However, it is
306 important to note that there is great variability among lifestyle migrants' characteristics (e.g.,
307 stage of life, financial situation, personality types) which ultimately determine their expectations,
308 aspirations, needs, and wants. Lifestyle migrants vary in their choice of destination community
309 (e.g., rural, urban, coastal, mountainous, bohemian/artistic) and the way they experience such
310 communities (e.g., physically and/or socially segregated, integrated, reflexively; Benson, 2010;
311 Winkler, 2013; Ooi, Laing and Mair, 2015; Eimermann, Tillberg Mattsson and Carson, 2019;
312 MacAdoo et al., 2019). For instance, MacAdoo et al. (2019) refer to two distinct types of
313 lifestyle migrants- *dominants* and *reflexives*. Whereas *dominants* are more interested in personal
314 goals at the expense of nature, *reflexives* are more sensitive to the cultural and environmental
315 realities of host communities. *Dominants* appreciate the socio-cultural and physical landscape

transformations fostered by their presence, while *reflexives* integrate more into pre-existing social networks.

Lifestyle migration works to reshape social, economic, political and physical landscapes in receiving communities (Moss and Glorioso, 2014; Eimermann et al., 2019). Particularly in cases with large numbers or high proportions of lifestyle migrants, lifestyle migration becomes a force that goes beyond population growth, turning into a development process affecting multiple dimensions of receiving communities as in-migrants "appropriate place(s)" (Torkington et al., 2015). Lifestyle migration places increased and modified demand on services, commercial and economic activities, and natural environments and built infrastructure (Gosnell and Abrams, 2011; Abrams et al., 2012; David, Eimermann and Akerlund, 2015). Many of the receiving nations have capitalized on such expectations, aspirations, wants, and needs, developing and marketing specialized products for the lifestyle migrants, as in the case of real estate development and health care facilities (Hayes, 2015; van Noorloos and Steel, 2016; Pallares and Rollins-Castillo, 2019; Rainer, 2019). This is, to a large extent, a reflection of how culturally, lifestyle migrants often have different values and behaviors in comparison to those established in the local population (Winkler et al., 2007; Krannich, Luloff and Field, 2011; Schewe et al., 2012; Winkler, 2013; Moss and Glorioso, 2014; Ulrich-Schad, 2018; Eimermann et al., 2019).

Lifestyle migration has been shown to result in mixed environmental outcomes (Gosnell and Abrams, 2011). On one hand, the population and housing growth that typically accompanies lifestyle migration coupled with migrants' higher consumption lifestyles as compared to that of locals results in negative environmental consequences (Chaverri, 2006; Gosnell and Abrams, 2011; Matarrita-Cascante et al., 2015). On the other hand, lifestyle migrants often espouse strong environmental values and advocate for environmental protection measures in their destination communities (Jobes, 2000; Lynch, 2006; Kondo, Rivera and Rullman, 2012; Matarrita-Cascante, Stocks, and Sene-Harper, 2015). For instance, Lynch (2006) and Matarrita-Cascante et al. (2015) reported how lifestyle migrants were strong advocates for environmental education programs in their receiving community. Similarly, Marsh and Griffiths (2006) show how lifestyle migrants formed associations to advocate for the protection of aquatic and terrestrial ecosystems in receiving communities.

Of particular interest for this study is the consumption habits of the migrants and their influences on local residents. Two case studies based in Costa Rica suggest that migrants' consumption may have negative environmental impacts in host communities. Chaverri (2006) reported an increase in the number and size of homes built in Escazú with the arrival of lifestyle migrants. In a case study of Nuevo Arenal, Costa Rica, Matarrita-Cascante et al. (2015) noted that lifestyle migrants' "construction of large houses with heavily manicured lawns and gardens, the purchase of large inefficient vehicles, frequent travel, and higher purchasing power were also environmentally damaging" (p. 9).

3.2 Theories of Migrant Acculturation and Consumption

Following theories of practice, consumption is based in our collective daily practices and routines, but it is also "internally differentiated and dynamic" as different groups consume differently and individuals' practices may change over time (Warde 2005). Cultural differences are important determinants of energy consumption at the household level (Lutzenhiser, 1993; Stephenson et al., 2010; Warde, 2015). Cultural understandings of what kind, how many, when, and how often we use a variety of energy-intensive devices (cars, electronic devices, hot water, appliances, air conditioning, etc.) shape consumption patterns beyond differences due to income, market, or policy (Wallendorf and Reilly, 1983; Stephenson et al., 2010; Hansen, 2016; Hansen, 2018). In other words, what we want/need is shaped by cultural norms and prior experiences and daily practices or "doings" (Warde 2005, Warde 2014). Globalized economic and cultural systems increasingly promote exporting high-consumption lifestyles around the world such that our consumptive practices are becoming globalized (Maller and Strengers 2018). Migration between countries is a critical component of such globalization-- it is one of the pathways through which economic and cultural systems hybridize (Berry, 2008; Pieterse, 2015).

Demographers and sociologists have long studied migrant integration and acculturation, but existing research almost exclusively examines migrants from the Global South moving to the Global North. Moreover, most research focuses on immigrant assimilation in terms of socioeconomic status, spatial concentration, language assimilation, and intermarriage (e.g. Waters and Jiménez, 2005), with little attention to consumption patterns outside of marketing and consumer research. The limited work that does focus on consumption generally follows the dominant assumption that immigrants (wanting to become a part of the new culture) adopt the habits of the majority norm (Wallendorf and Reilly, 1983). For instance, Lee and Tse (1994) find that immigrants from Hong Kong to Canada changed their consumption habits dramatically to fit into the new environment, reprioritizing the items they consume to fit Canadian culture. However, critical scholarship demonstrates that the process is often more complicated (Lee and Tse, 1994; Peñaloza, 1994; Askegaard and Toulouse, 2011; Luedicke, 2011; Luedicke, 2015). Immigrants may behave in hyper-native fashion (overshoot) in an effort to be accepted in their new home or to disassociate from their original culture (Triandis et al., 1986). Other times, migrants continue to behave as they did prior to migration, ignoring or rejecting the new culture, in a process of ethnic affirmation (ibid).

More nuanced arguments suggest that immigrants neither adopt prevalent consumer culture in their destination communities nor hang on to prior consumption patterns but rather create their own unique cultural style (Wallendorf and Reilly, 1983; Ustuner and Holt, 2007). Transnationalism, whereby immigrants maintain active lives in more than one country, further complicates the acculturation process (Portes and DeWind, 2004). Acculturation is dynamic such

that immigrants reevaluate their consumption needs, behaviors, and practices once they are in a new environment. Focusing on how the practice of consumption is dynamic and embedded in local contexts, Strengers and Maller (2017) show how migrants' memories of past practice interact with new experiences and geographic contexts to shape adaptive practices in the destination environment. Adaptation is further mediated by income and by the cultural and physical environment (Lee and Tse, 1994; Luedicke, 2015). Because lifestyle migrants tend to be relatively wealthy, we might expect them to consume at higher levels than the typical household in either the sending or receiving nation. When specific consumption behaviors uniquely belong to one culture but not to the other (e.g. common in the origin but rare in destination or vice versa), acculturation is less likely and potentially more difficult (Lee and Tse, 1994).

In the case of lifestyle migrant consumption in Costa Rica, personal vehicles and flat screen televisions are generally valued and culturally accepted in both the local Costa Rican context and in the more affluent countries from which lifestyle migrants originate. Water heaters, on the other hand, are almost universal in rich northern countries, but are rare and not culturally expected or accepted in the tropical Costa Rican environment. Thus, with regards to our first research question, we expect that **(H1): lifestyle migrants would consume personal vehicles and televisions at a similar rate as native Costa Ricans, but that they would be more likely to have a water heater.**

Given that the literature on migrant acculturation is dominated by stories of migration to the Global North, it assumes that social influence runs from the host culture down to the immigrant and leaves little room for the prospect that immigrant consumption habits shift natives' patterns. The research presented here extends existing work on immigrant acculturation and consumption to examine relatively high status migrants moving to communities with generally lower incomes. Which direction does social influence run in this context? Because social influence stems from power (Raven, 2008), the direction of acculturation might be quite different when migrants are coming from relatively rich and powerful places. Rather than gradually adapting to lifestyles in their host countries, lifestyle migrants may influence their new neighbors to emulate them. Exploratory evidence suggests that immigrants from rich countries influence environmental behaviors among native Costa Ricans more than vice versa (Matarrita-Cascante et al., 2015). For example, a recent case study of Nuevo Arenal, Costa Rica found that lifestyle migrants have both a direct and an indirect influence on the environmental attitudes and behaviors of locals as a result of the environmentally beneficial programs that they establish as well as their actions, which are mimicked by the locals (ibid).

Given the relatively high status of immigrants from the Global North, we expect that **(H2) the presence of lifestyle migrants increases consumption of energy-intensive technologies, net of household migration status. In other words, Costa Ricans who live in neighborhoods**

with more lifestyle migrants will consume more energy-intensive goods than Costa Ricans who are less exposed to lifestyle migrants.

Finally, acculturation is influenced by the cultural environment within which immigrants are embedded (Lee and Tse 1994; Ustuner and Holt, 2007; Luedicke, 2015). This cultural environment can vary across geographies within a country. For instance, in Costa Rica the cultural and natural environment varies tremendously across space in temperature, physical landscape, cultural influences, civil infrastructure, and level of urbanity and development. Moreover, the process of lifestyle migration itself transforms sociocultural and environmental landscapes. Different types of lifestyle migrants (e.g. *dominants* and *reflexives*- MacAdoo et al. 2019) may choose different types of destinations and have different consumption impacts. We expect that **(H3) the relationship between lifestyle migration and energy consumption will vary across space, such that being a lifestyle migrant elevates consumption more in some communities than in others.**

4. Results

4.1 Do lifestyle migrant households consume more energy-intensive goods than native Costa Ricans?

Descriptive statistics show that the proportion of households consuming energy-intensive goods is considerably higher among lifestyle migrant households in comparison to native Costa Rican households and to immigrant households from countries with a lower HDI score than Costa Rica (see Table 2). Lifestyle migrant households, on average, consume about twice as many vehicles and televisions, and about five times as many hot water heaters than native Costa Ricans.

Insert Table 2 about here.

Odds ratios resulting from univariate logistic regression models (not shown), indicate that households with lifestyle migrants have 4.6, 3.6, and 9.2 times increased odds of consuming personal vehicles, flat screen televisions, and hot water heaters than other Costa Rican households, respectively. Much of these elevated consumption levels can be explained by household demographic, socioeconomic, and housing-related factors. Still, after we consider the effects of these controls, the observed relationship between lifestyle migration and consumption remains highly significant and substantial.

Insert Table 3 about here

Table 3 shows the multivariate regression results from Model Sets 1 and 2. We see that after considering the mediating factors and district-level effects, lifestyle migrant households still have

a 1.6 times increased odds of owning a personal vehicle, a 1.5 times increased odds of having a flat screen tv, and a 3.5 times increased odds of owning a hot water heater. Household demographic, socioeconomic, and housing-related factors also remain important in explaining consumption of energy-intensive goods. Notably, district-level socioeconomic status (distNBI) shows a strong positive association with consumption of energy-intensive goods, indicating that the community context within which households consume is highly relevant. A stepwise regression process (not shown here) indicates adding the predictor variable for lifestyle migrant, beyond demographic and economic controls, improves the fit of the models on all three consumption measures. Sensitivity tests with various model configurations show consistent and robust results.

The logistic models do a reasonable job predicting variance in the dependent variables (pseudo R-squared), and fit (Wald chi-squared, AIC, and LR test) is improved by adding the multilevel dimensions. Still, we expect that heteroskedasticity is an issue in these models, hence the attention paid below to spatial models in addressing research question 3. The random effects parameters on Model Set 2 indicate that intercepts (consumption levels) and slopes (relationships between LifeMig and consumption) vary significantly between districts. This is less true for owning flat screen televisions and more true for owning water heaters. The statistics indicate that the degree to which lifestyle migrant households exhibit elevated consumption varies from district to district. We also see evidence of negative covariance between slopes and intercepts for water heaters, suggesting there is less difference between lifestyle migrant households and native Costa Ricans in districts with more lifestyle migrants. This could mean that the presence of lifestyle migrants in a community impacts consumption among native Costa Ricans and leads us to the second research question.

4.2 Are districts with higher proportions of lifestyle migrants associated with higher levels of consumption, net of household migrant status?

Model Set 3 (shown in Table 4) introduces decile variables to measure the impact of the presence of lifestyle migrants within the community (district) on households' consumption of energy-intensive goods. Adding these variables improved the fit of the model (measured using Wald chi-squared and AIC) over the simpler Model Set 2. Like Model Set 2, this set estimates consumption for households as they are nested within communities (districts), considering district-level factors (now urbanity, socioeconomic status, *and presence of lifestyle migrants*), as well as district-level random effects and allowing for random slope. Now, we are most interested in the measure of how the presence of lifestyle migrants in the district impacts households' consumption among both lifestyle migrants and native Costa Ricans.

Insert Table 4 about here

Consistent with Model Sets 1 and 2, results show that lifestyle migrant households have an increased odds of consuming energy-intensive goods. Moreover, we see that beyond that household-level relationship, the presence of lifestyle migrants in the community also impacts consumption of energy-intensive goods. Regardless of immigrant status, households living in districts in the top 30% of lifestyle migrants (>1.35% of households have lifestyle migrants) had a significantly increased odds (1.4-1.5) of consuming personal vehicles. Those living in the top 20% (>2.1% of households have lifestyle migrants) had significantly increased odds of consuming flat screen televisions (1.3-1.4) and water heaters (1.6-2.5).

Reviewing the random effects parameters (shown in Table 4) suggests that there is spatial variation in the relationship between lifestyle migration and consumption of all three energy-intensive goods, especially water heaters. Random slope measures are significantly different than zero, and we see evidence of negative covariance suggesting that in districts with more lifestyle migrants, consumption could be increased for native Costa Ricans. These findings lead us to explore spatial patterns further in the next subsection. They also suggest that we should explore cross-level interactions in the relationship between lifestyle migration and consumption.

Figures 1A-1C illustrate interactions between the impacts of household-level lifestyle migration and the presence of lifestyle migrants in the community on energy consumption. They offer a sense of how living in a community that is a common destination for lifestyle migrants impacts consumption among native Costa Ricans. First, we set the value of all control variables to their mean. Then, we predict and compare the probability of consumption of each of the three dependent variables for four different groups: (i) native Costa Ricans who live in a district where 3% or more households are lifestyle migrants (top LifeMig destinations); (ii) native Costa Ricans living in districts with less lifestyle migration presence; (iii) lifestyle migrant households living in top LifeMig destinations; and (iv) lifestyle migrant households living in other districts.

Insert Figure 1 about here.

The figures show a clear difference in consumption levels between lifestyle migrant households and Costa Rican natives (RQ1). They also show varying influences of community-level lifestyle migration on both native Costa Ricans and lifestyle migrants themselves. Relationships are particularly clear for water heaters (Fig 1C) where, holding mediating variables to their averages, about 35% of lifestyle migrant households who live in top destination districts own a water heater in comparison to only 19% of lifestyle migrants living outside these hot spot communities. Moreover, about 15% of native Costa Rican households living in top lifestyle migrant destinations have a water heater in comparison to only 9% of Costa Ricans living elsewhere.

4.3 Does the relationship between lifestyle migrant households and consumption of energy-intensive technologies vary across space?

Reviewing the random effects parameters in Model Sets 2 and 3 indicate that there are differences between districts in the relationship between a household's immigration status and their consumption of energy-intensive goods, and that only part of this variation can be explained by fixed effects such as community-level socioeconomic status, urbanity, and the presence of lifestyle migrants in the community. Here, we explore this spatial heterogeneity in more detail with the goal of describing the patterns and facilitating hypothesizing about which other geographic and community-level factors might explain these differences. To do so, we run a logistic spatial regime model (where the regime is the district) for each dependent variable. In other words, we run the same model from Model Set 1, but we run it separately for each district.

Figures 2A-C map the district-specific odds ratios for the effects of household-level lifestyle migration on consumption. Odds ratios compare lifestyle migrant households to native Costa Rican households. Values less than 0.9 (shown in shades of yellow) indicate that native Costa Rican households have a greater probability of consumption than lifestyle migrant households, all else equal. Districts shown in white either show little difference between lifestyle migrant and native households consumption or are home to fewer than ten lifestyle migrant households. Those districts where lifestyle migrants have a substantially higher consumption probability than native Costa Ricans are shown in shades of blue, with the darkest blues showing the greatest differentials.

Insert Figure 2 (A-C) about here

There is statistically significant spatial variation between districts for all three consumption variables ($p<0.001$, following Wald tests for equality of coefficients), but geographic differences are clearest for water heaters (2C). Generally speaking, the results indicate that districts with the greatest consumption differentials tend to be located in coastal Pacific areas, especially along the northwestern Pacific coast which is known as the Guanacaste "Gold Coast" region (Blanco Obando 2017). Across most of the Pacific coast, in communities like Tamarindo, lifestyle migrants are 8-11 times more likely to have a water heater than native Costa Ricans (see Table 5). On the other hand, in districts like Carmen in San José (located at higher elevation, far from the coast) native Costa Ricans are just as likely to consume energy-intensive goods as lifestyle migrants.

Beyond demonstrating that there are place-based environmental, socioeconomic, and/or cultural differences in the impact of lifestyle migration on consumption, the maps allow for hypothesis building about additional community-level factors (not included in our models) that might mediate the relationship. For example, differences between coastal districts (like Tamarindo) and highland districts (like Carmen) could be based on differences in temperature and tourism. Costa Rica's lowland coastal areas experience hot temperatures year round; thus native Costa Ricans

see little need for heating water in these areas (cool water is more valued). Lifestyle migrants, however, may hold on to their cultural understanding that homes should have hot water in all faucets for washing hands, dishes, and clothes. If so, we might expect greater differentials in the lowlands than the mountains. Also, places with a heavier tourist influence are generally more global, and may look and feel more like "home" to lifestyle migrants. Such a context might mean that lifestyle migrants have less pressure to adjust consumption practices to their new surroundings and thus, continue consuming following standards of their country of origin. Lifestyle migrants in Costa Rica also commonly host tourists in their homes using services like Airbnb (Monteverde Institute 2018). This might increase lifestyle migrant consumption if tourists demand items like personal vehicles, televisions, and water heaters.

Insert Table 5 about here

To illustrate the potential roles of temperature and tourism, we compare four carefully chosen districts in Table 5. Each of the communities is a top destination for lifestyle migrants, but they differ in regards to temperature and tourism influence. We chose communities in which we have some personal and research experience in order to better contextually situate the types of lifestyle migrants attracted to each. In *Carmen,* an urban district in temperate San José, 12% of households include a lifestyle migrant, but there is little tourism presence. Here, lifestyle migrants consume similarly to native Costa Ricans. *Monteverde* is a rural ecotourism-based, mountain community with mild (cool) weather. Lifestyle migrants are twice as likely to have a water heater, but similarly likely to own a personal vehicle or a flat screen television. *Cahuita* is an Atlantic coastal tourism community, featuring ecotourism, beaches, and hot and humid weather. Lifestyle migrants to Cahuita are twice as likely to have a personal vehicle, 50% more likely to have a TV, and 4.5 times as likely to have a water heater. *Tamarindo* is a Pacific coastal tourism and lifestyle migrant destination featuring hot and dry weather. Lifestyle migrant households in Tamarindo are several times more likely to consume energy intensive technologies than native Costa Ricans in that district. Following these examples, and based on what we see more broadly in the maps, it appears that high temperatures and tourism may increase differences in consumption between lifestyle migrants and local households, though we didn't test this pattern and more research would be needed to make this claim. Moreover, the more extreme differences in Tamarindo compared to Cahuita (both with hot weather and much tourism) might be explained by different types of lifestyle migrants choosing different communities, following MacAdoo et al.'s (2019) characterization of some lifestyle migrants as *dominants*. Monteverde, Carmen, and Cahuita are places that, from our experiences, seem to attract more *reflexive* lifestyle migrants. Tamarindo is colloquially recognized as the "California of Costa Rica" and seems to attract more *dominant* lifestyle migrants.

5. Conclusions & Discussion

This paper investigates the impact of migration from highly developed countries to the Global South on energy-intensive technology adoption in the destination country. Findings show that, in Costa Rica, lifestyle migrants consume more energy-intensive goods than native Costa Ricans. We can't say exactly how lifestyle migrants use these items or measure direct energy consumption; but, if we assume that lifestyle migrants use the technologies similar to the average person, we can estimate a rough energy consumption impact. We calculate the difference between the predicted probability of lifestyle migrant households and native Costa Rican households (holding all other predictor variables constant) and multiply this by the number of lifestyle migrant households observed in the 2011 Costa Rican census (n=18,876). Making some assumptions about average use and energy required based on industry averages, this would mean that the excess consumption that lifestyle migrants demonstrated over similarly situated native Costa Rican households, in 2011, would translate to approximately 9,345 additional personal vehicles on the streets (emitting approximately 47,658 additional metric tons of carbon dioxide each year); 3,628 more televisions (each consuming about 368 kWh of electricity per year or 1.3 million kWh in aggregate) and about 6,746 more water heaters (each consuming about 6,570 kWh of electricity per year or 44 million kWh in aggregate).

Findings also suggest that the presence of lifestyle migrants in communities increases native Costa Rican consumption as well. Costa Ricans who live in neighborhoods with many lifestyle migrants consume more energy-intensive goods than Costa Ricans who live in districts with fewer lifestyle migrants. Looking just at those native Costa Rican households that live in top lifestyle migration destination districts (n= 13,349 households), they added (in aggregate) 254 personal vehicles (amounting to 1,294 extra metric tons of carbon emissions a year), 387 televisions (142,461 extra kWh of electricity/year), and 641 water heaters (4.2 million extra kWh of electricity/year) more than what similar native Costa Rican households living in communities with less lifestyle migrants consumed.

Costa Rica is internationally known for its commitment to environmental protection and climate change mitigation. In recent decades, it has significantly reduced natural resource exploitation, switching over from a net reduction in biocapacity each year to a net annual increase in biocapacity since 2000 (Global Footprint Network, 2018). But these improvements have been offset by a simultaneously growing environmental footprint (per capita consumption), due primarily to growth in carbon emissions, such that the net balance between biocapacity and consumption of resources went negative in about 1990 (Global Footprint Network, 2018). Similar patterns are common across middle and lower income countries, as footprints continue to increase even while environmental protection is increasingly common (ibid). Increasing consumption in this manner creates myriad social and environmental challenges, chief among which is complicating efforts to reduce global carbon emissions.

This paper focuses on the impacts that lifestyle migration has on energy consumption in one destination country, but the potential for global impacts are what is most important. We know that lifestyle migration is increasingly common around the world. Costa Rica is a key destination, but other countries host even more migrants from rich countries (i.e. Singapore, Bahrain, Indonesia, Mexico, Malaysia, and Vietnam are a few of the countries with tens of thousands more American expats than Costa Rica- Migration Policy Institute 2017). If the pattern of findings shown here for Costa Rica is common among lifestyle migrants in other destinations, it would suggest that lifestyle migration is an important mechanism driving increases in residential energy consumption in the Global South and around the world. In fact, the impact might be much greater in other countries that have less political and cultural commitment to environmental sustainability and carbon neutrality than Costa Rica.

Access to energy and its benefits for community and economic development as well as personal and household well-being is critical for developing countries, particularly in those places with relatively little access and ability to meet basic needs. We should expect (and encourage) energy consumption in such places to rise as increasing numbers of people gain access and related opportunities. However, in middle income countries where access to electricity is almost universal (like Costa Rica), increasing energy consumption toward habits more typical of those in rich countries such as the United States, is unsustainable and not critical for meeting general development goals. Rather, in order to meet global emissions targets, higher consuming countries need to be shifting consumption levels downward.

One key limitation of this study is that we don't know what lifestyle migrants' energy consumption patterns were in their country of origin, prior to migration into Costa Rica. It may be that, while they consume more than the average Costa Rican, they consume less than they would have if they had remained in their home country. This factor complicates our ability to extrapolate the results of this study to understand global impact. Future research should address this complication, as well as extend investigations of how migrants from rich countries consume energy in destinations around the globe. Nonetheless, if as our findings suggest, the presence of lifestyle migrants increases consumption in the native population, then lifestyle migration could generally (and globally) spread high consumption lifestyles around the world and ultimately drive increases in global energy consumption.

While acculturation theories suggest that lifestyle migrants would downwardly adjust their consumption habits as they acculturate to a new environment, it could also be true that relatively high socioeconomic status immigrants from rich countries are substantively different than the more typically studied immigrants from poorer countries, and consume similarly (or even more) as they did in their home country due to lower costs of living in the destination. Theories on migration and acculturation suggest that migrants generally adopt the habits and practices of the majority, but our findings show that lifestyle migrants moving to Costa Rica display higher

energy consumption levels than native Costa Rican households and that influence appears to run from the migrant toward the native, such that lifestyle migrants appear to influence local populations to consume more. This could be explained by postcolonial power differentials that affect the acculturation process (Fetcher and Walsh, 2010; Benson, 2013; Croucher, 2015). Migrants may experience "postcolonial continuity in relation to people, practices, and imaginations" (Benson, 2013 citing Fetcher and Walsh 2010, p. 1197), which puts them in a position of 'ascribed power' in relation to the locals. In other words, given a process of continual postcolonial relation, locals posit lifestyle migrants as "better" and try to mimic their attitudes and behaviors, including their consumption behaviors.

It is important to note, however, that not all lifestyle migrants are the same. Our findings show that the relationship between lifestyle migration and energy consumption varies across space, such that being a lifestyle migrant elevates consumption more in some communities than in others. This could be because acculturation is influenced by the social and cultural environment within which immigrants are embedded, and/or because the type of lifestyle migrants who choose to settle in certain types of places tend to hold different values and behaviors than those who settle in others. Recent work conducted on lifestyle migrants in Chile (Matarrita-Cascante, Zunino and Sagner-Tapia, 2017), shows that they can be diverse in terms of their attitudes and behaviors towards the environment and toward local people, carrying a more *dominant* or *reflexive* approach to life in the destination country (MacAdoo et al., 2019). Given these differences, we might expect that different types of lifestyle migrants may also have different consumption patterns and choose different types of destinations. In our fieldwork throughout Costa Rica, we've noticed that *dominants* seem to choose coastal areas, whereas *reflexive* lifestyle migrants seem to be clustered in mountainous or other quieter places where they integrate more with local populations. We know from prior research that lifestyle migration transforms sociocultural and environmental landscapes (Moss and Glorioso, 2014; Eimermann et al., 2019). There could be a feedback loop whereby more dominant lifestyle migrants choose coastal and touristic communities and primarily interact with one another in those communities, collectively transforming local landscapes toward higher consumption, and thus attracting more *dominant* migrants who further continue the cycle.

These kinds of differences among Costa Rican lifestyle migrants might explain why we found that those living in coastal districts tend to have higher levels of consumption in comparison to lifestyle migrants living in other communities. For instance, when the first author presented preliminary results of this study in Monteverde, Costa Rica, the audience made clear that they perceived key differences between the migrants in Monteverde and those who live "en la playa." This study's quantitative findings support this thinking, finding significant differences between Monteverde and coastal districts (like Tamarindo). There is a general colloquial understanding in Costa Rica that lifestyle migrants have different consumption patterns than native Costa Ricans, but also that lifestyle migrants differ from one another as well. Take this quote from a 2015

CostaRica.com webpage, which seeks to provide information to an international audience about travel, relocation, and real estate in Costa Rica.

> *"In Costa Rica, the key to the household budget is whether a home operates under American or Costa Rican standards – American luxuries come at a considerable premium. Generally, a traditional Costa Rican-style home does not have a central water heater (most have hot water in the shower only), has no clothes dryer, dishwashing machine, and is not air-conditioned. On the other hand, many of the newly-constructed American-style homes may offer the ultimate in luxury, including hot water in all faucets, top-of-the-line appliances, air conditioning in warmer climates, and may also subscribe to premium cable television and high-speed Internet service."*

There is a general understanding that American-style living is different than Costa-Rican style living, even within Costa Rica, and that some lifestyle migrants will adopt a more or less "American-style" version of Costa Rican life. As a growing number of lifestyle migrants spread around the world, they may similarly increase environmentally-impactful consumption across destination countries, ultimately serving as one avenue through which high-consumption norms and values are globalized and perpetuated.

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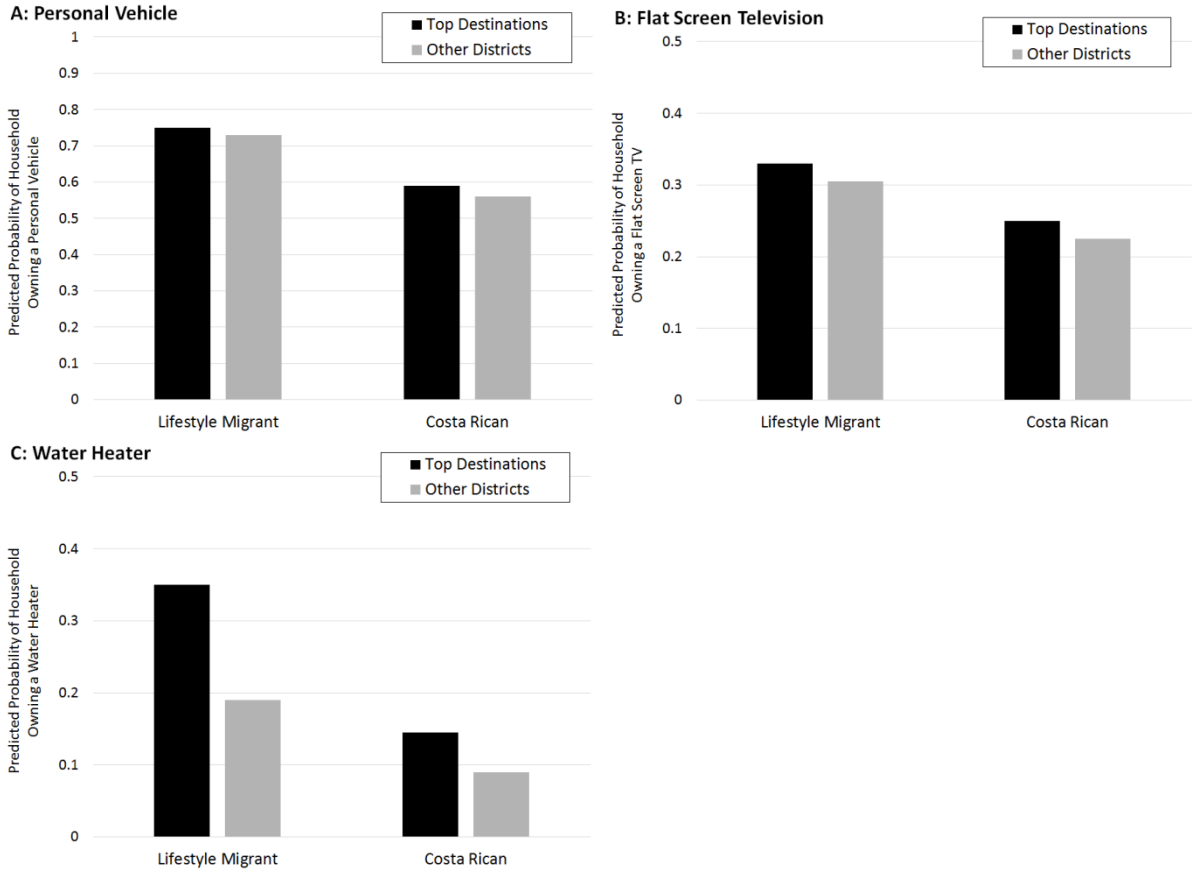
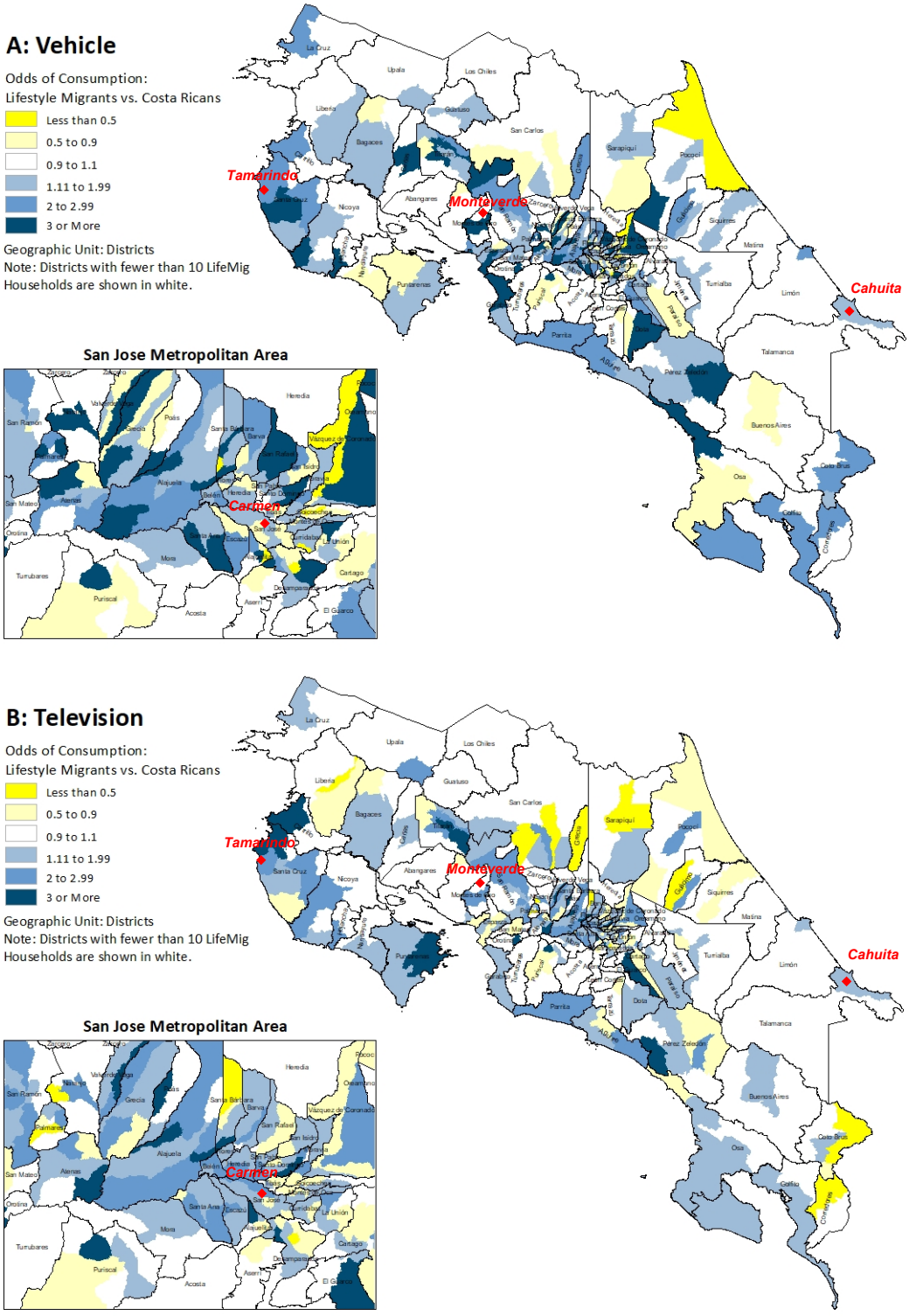
Figure 1: Consumption of Energy-Intensive Goods by Household Migrant Status and Community Presence of Lifestyle Migrants



Note: Top Lifestyle Migrant destinations are districts (communities) where at least 3% of households have a lifestyle migrant.

Figure 2: Maps of odds ratios comparing consumption of lifestyle migrant households to native Costa Rican households by districts.

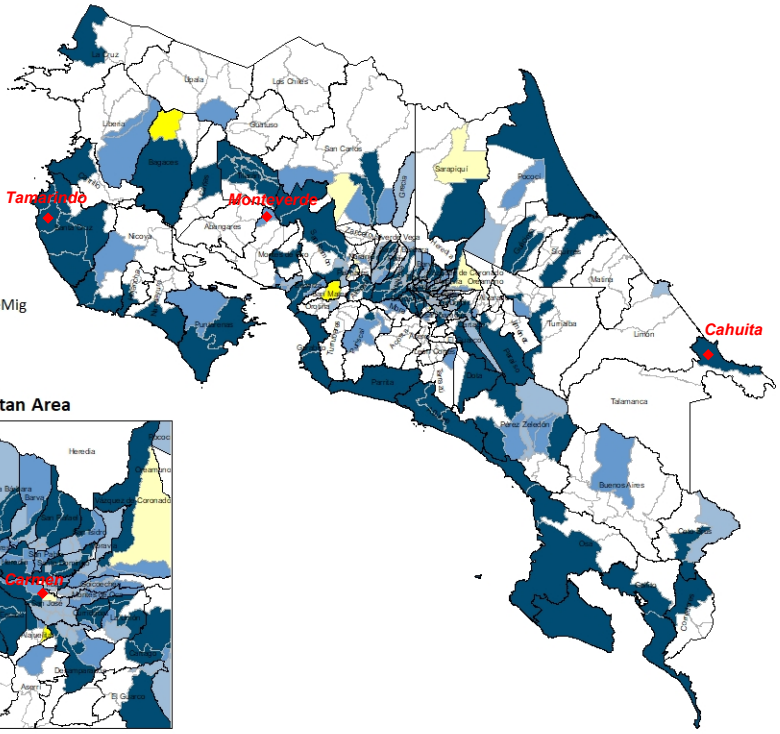


C: Water Heater

Odds of Consumption:
Lifestyle Migrants vs. Costa Ricans

- Less than 0.5
- 0.5 to 0.9
- 0.9 to 1.1
- 1.11 to 1.99
- 2 to 2.99
- 3 or More

Geographic Unit: Districts
Note: Districts with fewer than 10 LifeMig Households are shown in white.



San Jose Metropolitan Area

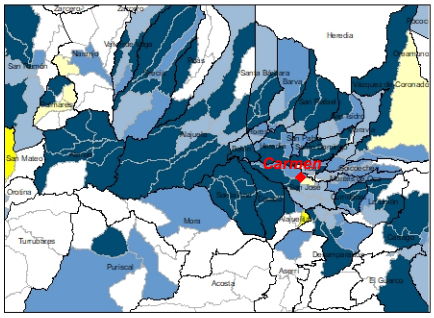


Table 1: Variable Descriptions

Variable Name	Function	Level	*m*	SE	Description
Vehicle	DV	HH	0.35	0.48	Dichotomous (0/1). Household owns at least one personal vehicle.
TV	DV	HH	0.19	0.39	Dichotomous (0/1). Household owns at least one flat screen television.
W_Heater	DV	HH	0.11	0.31	Dichotomous (0/1). Household owns a hot water heater.
LifeMig	Predictor	HH	0.02	0.14	Dichotomous (0/1). At least one adult in the household is a lifestyle migrant (born in a high HDI country and now living in Costa Rica).
d_lifestyle	Predictor	District	--	--	Categorical (by deciles). Proportion of households within the district who are lifestyle migrant households.
Immigrant	Control	HH	0.15	0.36	Dichotomous (0/1). Household includes at least one adult born in a country with a lower HDI score than Costa Rica.
HH_size	Control	HH	3.42	1.67	Continuous. Number of persons living in the household. Note- values > 10 recorded as "10" to alleviate impact of large extended family farm households.
Children	Control	HH	1.09	1.23	Continuous. Number of children living in the household.
FemHead	Control	HH	0.30	0.46	Dichotomous (0/1). Indicates whether the household is headed by a female.
Age	Control	HH	41.5	13.5	Continuous. Average age of adults living within the household.
Age2	Control	HH	1902	1322	Continuous. Age-squared, to consider nonlinear effects of age.
Education	Control	HH	8.46	4.05	Continuous. Average years of schooling among adults within the household.
Employed	Control	HH	1.07	0.74	Categorial. 0 if no adults in the HH are working. 1 if one adult in the HH is working. 2 if more than one adult in the HH is working.
Urban	Control	HH	0.67	0.47	Dichotomous (0/1). Indicates whether the household is located in an urban area.
Tenure	Control	HH	0.69	0.46	Dichotomous (0/1). Indicates whether the household is owned by the occupants (vs rented/loaned=0).
H-Quality	Control	HH	2.52	0.66	Categorical. Indicates overall housing quality as measured by responses to questions about status of walls, ceilings, and building materials and by census enumerators. 1= bad; 2= regular; 3= good.
%Urban	Control	District	0.67	0.30	Percent of households within each district that are located in urban area.
distNBI	Control	District	-0.27	0.12	District average of household-level index of access to basic standard of living measures: housing, education, and access to healthy life and other goods. Commonly used in Costa Rica to measure household well-being. Index is scaled so that positive values indicate higher average socioeconomic status in the district.

Table 2: Average Proportion of Households that Consume Energy-Intensive Goods

Consumption Variable	Native Costa Rican HHs	Lifestyle Migrant HHs	Other Immigrant HHs
Vehicle	39%	73%	25%
TV	21%	48%	18%
Water Heater	11%	54%	12%

Source: Estimated by authors using Costa Rican Census 2011 data.

Table 3: Results of Model Set 1 (Logistic) and Model Set 2 (Multilevel)

Variables	A- Personal Vehicle				B- Flat Screen TV				C- Water Heater			
	Set 1- Logistic		Set 2- MLM		Set 1- Logistic		Set 2- MLM		Set 1- Logistic		Set 2- MLM	
	Odds Ratio	*SE*	*Odds Ratio*	*SE*	*Odds Ratio*	*SE*	*Odds Ratio*	*SE*	*Odds Ratio*	*SE*	*Odds Ratio*	*SE*
Household Level Variables												
LifeMig	**1.701**	**0.033**	**1.629**	**0.063**	**1.604**	**0.027**	**1.539**	**0.052**	**4.372**	**0.073**	**3.519**	**0.168**
Immigrant	0.655	0.005	0.634	0.005	1.069	0.008	0.984	0.008	1.6	0.014	1.308	0.012
HH_size	1.091	0.002	1.088	0.002	1.05	0.003	1.036	0.003	0.981	0.003	0.956	0.003
Children	0.913	0.003	0.926	0.003	0.918	0.003	0.941	0.003	0.986	0.004	1.031	0.004
FemHead	0.373	0.002	0.367	0.002	0.729	0.004	0.703	0.004	0.94	0.006	0.899	0.006
Age	1.1	0.001	1.102	0.001	1.01	0.001	1.009	0.001	0.991	0.001	0.99	0.001
Age2	0.999	0	0.999	0	1	0	1	0	1	0	1	0
Education	1.254	0.001	1.245	0.001	1.199	0.001	1.177	0.001	1.204	0.001	1.172	0.001
Employed-1	1.456	0.01	1.419	0.01	1.17	0.009	1.153	0.009	0.96	0.009	0.941	0.009
Employed- 2	1.893	0.014	1.797	0.014	1.521	0.013	1.455	0.013	1.082	0.011	1.01	0.011
Urban	1.03	0.006	0.946	0.007	1.629	0.011	1.149	0.01	1.62	0.014	0.965	0.011
Tenure	1.858	0.01	1.928	0.011	1.297	0.008	1.37	0.009	1.234	0.01	1.322	0.011
H-Quality-2	1.741	0.022	1.689	0.021	1.57	0.027	1.545	0.026	1.663	0.04	1.601	0.039
H-Quality-3	3.474	0.041	3.16	0.038	3.302	0.054	3.141	0.051	3.819	0.089	3.475	0.081
constant	0.037	0.001	0.003	0	0.075	0.002	0.009	0	0.004	0	0.009	0.213
District Level Variables												
%Urban	--	--	0.822	0.057	--	--	1.675	0.084	--	--	1.895	0.213
distNBI	--	--	6.294	1.133	--	--	3.779	0.495	--	--	9.796	2.976
RE Parameters			*Estimate*	*SE*			*Estimate*	*SE*			*Estimate*	*SE*
Random Intercept	--	--	0.146	0.01	--	--	0.065	0.005	--	--	0.354	0.026
Random Slope	--	--	0.257	0.04	--	--	0.16	0.026	--	--	0.51	0.061
Covariance	--	--	0.001	0.016	--	--	-0.019	0.009	--	--	-0.0462	0.0326
Measures of Fit												
Level 1 n= households	1,201,898		1,201,898		1,201,898		1,201,898		1,201,898		1,201,898	
Level 2 n= districts	--		472		--		472		--		472	
Pseudo R2	0.235		--		0.161		--		0.158		--	
Wald chi2	246,963	p<0.001	208,296	p<0.001	8,237	p<0.001	106,000	p<0.001	105,656	p<0.001	58,493	p<0.001
LR test vs logistic	--	--	17,300	p<0.001	--	--	5,917	p<0.001	--	--	27,298	p<0.001
AIC	1,220,206		1,196,236		1,028,570		1,015,959		740,999		703,728	

Notes: Independent variables of interest shown in red. All coefficients are statistically significant at p<0.001, except for those highlighted gray. Standard Errors in Model Set 1 (logistic) are robust.

Table 4: Results of Model Set 3 (Multilevel with District Presence of Lifestyle Migrants)

	A- Vehicle		**B- TV**		**C- Water Heater**	
	Odds Ratio	*SE*	*Odds Ratio*	*SE*	*Odds Ratio*	*SE*
Household Level Variables						
LifeMig	**1.621**	**0.063**	**1.513**	**0.049**	**3.501**	**0.04**
Immigrant	0.634	0.005	0.984	0.008	1.308	0.094
HH_size	1.088	0.002	1.036	0.003	0.956	0.095
Children	0.927	0.003	0.941	0.003	1.031	0.095
FemHead	0.367	0.002	0.703	0.004	0.899	0.096
Age	1.102	0.001	1.009	0.001	0.99	0.094
Age2	0.999	0	1	0	1	0.094
Education	1.245	0.001	1.177	0.001	1.172	0.093
Employed-1	1.419	0.01	1.153	0.009	0.942	0.097
Employed- 2	1.796	0.014	1.455	0.013	1.01	0.098
Urban	0.946	0.007	1.15	0.01	0.965	0.098
Tenure	1.929	0.011	1.371	0.009	1.323	0.093
H-Quality-2	1.689	0.021	1.545	0.026	1.601	0.093
H-Quality-3	3.16	0.038	3.14	0.051	3.475	0.034
constant	0.002	0	0.008	0.001	0.006	0.002
District Level Variables						
%Urban	0.83	0.054	1.686	0.077	1.821	0.126
distNBI	4.043	0.734	2.767	0.357	4.123	0.168
d_lifestyle2	1	0.068	1.001	0.047	0.741	0.127
d_lifestyle3	1.049	0.079	0.98	0.051	1.036	0.145
d_lifestyle4	1.149	0.086	1.083	0.056	1.244	0.146
d_lifestyle5	1.19	0.08	0.979	0.046	0.966	0.137
d_lifestyle6	1.168	0.085	1.061	0.053	1.157	0.144
d_lifestyle7	1.232	0.097	1.143	0.061	1.135	0.148
d_lifestyle8	**1.362**	**0.099**	1.144	0.057	1.275	0.144
d_lifestyle9	**1.449**	**0.106**	**1.254**	**0.063**	**1.58**	**0.14**
d_lifestyle10	**1.522**	**0.111**	**1.415**	**0.07**	**2.46**	**0.108**
RE Parameters	*Estimate*	*SE*	Estimate	SE	*Estimate*	*SE*
Random Intercept	0.128	0.01	0.052	0.004	0.3	0.023
Random Slope	0.257	0.053	0.16	0.026	0.51	0.06
Covariance	-0.012	0.016	-0.021	0.009	-0.1682	0.032
Measures of Fit						
Level 1 n= households	1,201,898		1,201,898		1,201,898	
Level 2 n= districts	472		472		472	
Wald chi2	208,384	p= 0.000	106,715	p= 0.000	59,044	p= 0.000
LR test vs logistic	13969	p= 0.000	4152	p= 0.000	16,681	p= 0.000
AIC	1,196,197		1,015,892		703,637	

Notes: Independent variables of interest shown in red. All coefficients are statistically significant at p<0.001, except for those highlighted gray.

Table 5: District Variation in Relationship between Lifestyle Migration and Consumptive Technologies

	% LM	Odds-Vehicle	Odds-TV	Odds-WH
Carmen (city) low temp-low tourism	11.6	0.9	1.3	1.5
Monteverde (mountain) low temp-high tourism	6.3	0.8	0.9	2.1
Cahuita (Atlantic coast) high temp-high tourism	12.3	2.0	1.5	4.5
Tamarindo (Pacific coast) high temp-high tourism	14.9	2.4	2.1	9.3

Highlighted cells indicate coefficient for lifestyle migration (in comparison to native Costa Rican) is not statistically significant at $p<0.01$. Wald tests comparing coefficients across districts show significant differences on all variables at $p<0.0001$.