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Research paper

In the hearth, on the mind: Cultural consensus on fuelwood and cookstoves in the middle Himalayas of India

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ABSTRACT

While studies show that biomass-based 'traditional' cookstoves adversely impact health and environment, governments and nonprofits have struggled to achieve sustained adoption of cleaner cookstoves. Most cookstove diffusion programs focus on cookstove design, process of technology introduction, or market mechanisms. While such mechanisms are important, we postulate that a socio-cultural approach will go farther in informing programs that aim to diffuse cleaner cookstoves in developing countries. With our study, we step back from problems surrounding diffusion and deconstruct cultural beliefs that drive fuelwood and cookstove use in Lug Valley of Himachal Pradesh, India. The goal of this research is to understand the degree of consensus in shared beliefs regarding fuelwood use and cookstoves. Using cultural consensus analysis, we found an agreement amongst people for using fuelwood from forests and preferences for various cookstoves. We found that fuelwood use is driven by availability, lack of alternatives, and lack of infrastructure. Household factors like seasonality, cleanliness, smoke emitted, costs, taste of food influence choice of cookstoves at a household level. Cultural domains for fuelwood and cookstoves were independent from each other, therefore a holistic diffusion program focusing on cookstoves and fuel types is needed for diffusion of sustainable energy alternatives.

1. Introduction

1.1. Study context

About 2.7 billion people, or roughly 40% of the world's population, rely on biomass as the primary fuel for cooking by direct combustion on 'traditional' cookstoves [1]. These cookstoves are considered time and energy inefficient, unsafe, unhealthy, and emit fine particulates that lead to approximately 4.3 million deaths a year [2]. They also contribute to global climate change through greenhouse gas and black carbon emissions [3]. Cleaner cookstoves provide a potential solution by addressing environmental and individual health concerns through increased heat efficiency and effective management of smoke. However, efforts to promote cleaner cookstoves by both governmental and non-governmental organizations have struggled, especially in India, where over 30 years of targeted programs have not led to a sustained use and adoption of cleaner cookstoves [4–6]. The limited impact of these programs can be attributed to their lack of local context, inadequate infrastructure to support a switch in technologies, and misalignment between needs of the users and cookstove designers [7,8].

Socio-economic models that prioritize demographic variables currently dominate research in household cooking energy (e.g. [9,10]), leaving explorations of people's decisions to adopt new cooking and/or heating fuels and technologies understudied [11]. When considered, researchers assume that household fuel choices are largely a function of cost, rather than willingness to adopt a new technology. This assumption frames the issue as one of access, rather than choice, reflecting the pro-innovation bias of existing studies. To overcome the biases related with this assumption, this study builds on recent calls for more nuanced socio-cultural investigations on cookstove diffusion by exploring the complexities of people's decisions regarding household energy choices and technologies [12,13].

While there are numerous risks associated with the continued use of wood-based cookstoves, these risks are tied to social, geographical, economic, political, cultural, and technological issues, which are integrated into the regional social system through years of social and environmental learning. Assumptions about choices people make, especially women, in rural parts of developing countries, as driven by economic 'needs' colors discourses surrounding household energy use [14]. Cultural models provide a description of why people choose to do certain things, in this case collect wood from forests to burn in cookstoves that could be smoky and require more work. Such a descriptive, yet empirically bound, approach allows us to understand diffusion as a complex web of social, economic, ecological, and cultural factors. This

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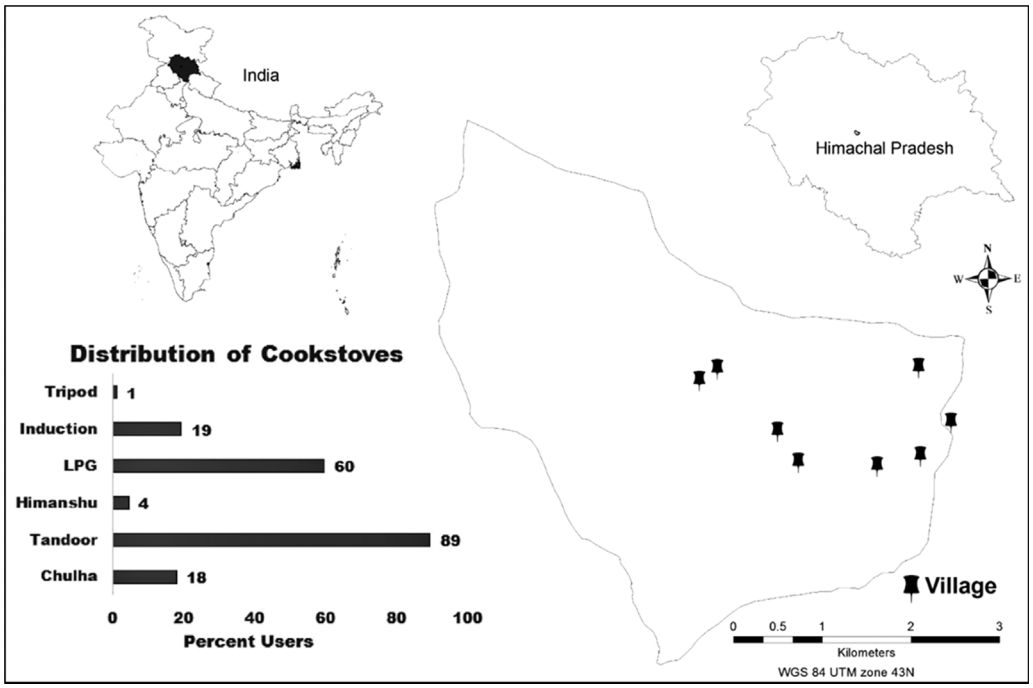

Fig. 1. The location of the selected micro-watershed in Lug Valley, India.

study provides an argument in favor of regional, cognitive, and culturally sensitive approaches to decision-making in diffusion studies, which have historically relied on economic cost-benefit analyses and individual choices and preferences, while ignoring regional diversity [15].

1.2. Theoretical underpinning: situating cultural models within rural household energy

Humans acquire most of their behavioral traits through social learning or cultural transmission. Individuals belonging to the same social group generally behave in similar ways, hold similar values, and share a common belief system imparted to individuals within that group through social learning processes [16]. This shared cultural knowledge, commonly understood by all people belonging to one cultural group, is different from individual knowledge which results in intra-cultural variation and influences the behavior and actions of people [17].

For our study, culture represents "ideas, beliefs, behaviors, and values that are transmitted from one individual to another via some form of direct social learning" ([18]: 254). Though culture is often cited by researchers, it is done more as an excuse for deviations from the norm, to explain 'irrational' behavior, than to provide an explanation for a certain behavior [19]. There are many ways to analyze the shared knowledge that comprises culture. Quinn and Holland [20] and D'Andrade [21] suggest that culture cannot be a complete whole and that people reason using cultural models, defined as cognitive domains/schemas that are intersubjectively shared by a social group. These domains are topic-specific and comprised of knowledge that is widely known and understood by a group of people. Cultural domains, therefore, include lists of items that people think are related to a specific topic. For instance, we defined a cookstove domain which comprised of a list of all cookstoves as understood by people of a certain group. Cultural models allow us to analyze these domains. The degree to which individuals absorb these shared cultural models in their own beliefs and behaviors is referred to as cultural consensus [22]. Therefore, cultural consensus represents commonality in a social group of peoples' beliefs regarding a certain domain.

Analysis of cultural consensus begins by establishing what these beliefs are, and then proceeds to correlate an individual's beliefs with beliefs shared by others in the larger group to derive a model that is prototypical of that group for that domain of knowledge [23,24]. Because these models are topic-specific, they allow analysis of the decision-making processes and shared knowledge under that domain. These measurements do not view shared knowledge as homogenous across the community but elucidates overlapping beliefs and diversity of viewpoints [25]. Cultural models can motivate behavior, both by the authority and expertise with which they are invested and by their persuasive power [20]. Quinn and Holland ([20]: 11) believe that there is an "intrinsic cultural motivation i.e. socialized-in motivation," a need to follow cultural norms or values. But this does not imply that culture is a bounded entity that can be absorbed and passed on to others; instead, these norms and values are learned and modified by individuals based on personal experiences [25].

Cultural consensus has found application in ethno-sciences, studies on intra- and inter-cultural variations [26–29], and theoretical models of cognition and knowledge sharing [30,31]. Cultural consensus is also becoming popular in management of natural resources where studies use cultural models to understand multiple stakeholder perspectives and facilitate negotiations for collective action in natural resources management decisions ([32,33]). But it has yet to find a stronghold in diffusion of innovation studies. According to Rogers [34], though a technology is evaluated based on its merits and de-merits, people rely on more subjective evaluations that are learned and shared amongst people. We would like to extend this theory and methodology to diffusion of innovation studies that rely on knowledge sharing and learning.

2. Methods

2.1. Study area

We conducted our research in Lug Valley located in Kullu District of the Himalayan State of Himachal Pradesh. About 26.4% of Himachal Pradesh's total geographical area is under forest cover. The rural population of the state accounts for 89% of the total population and generally uses wood, agricultural and forest by-products, kerosene, or LPG (Liquid Petroleum Gas) for cooking and heating ([35]).