Science Museum Group Journal

Refrigerating India

Journal ISSN number: 2054-5770
This article was written by Harold Wilhite
01-10-2018 Cite as 10.15180; 180903 Research
Refrigerating India
Published in Spring 2018, Issue 09
Article DOI: http://dx.doi.org/10.15180/180903

Abstract

This article examines the powerful change potential embedded in the innocuous looking cold storage box nestled into virtually every kitchen in the rich countries of the world: the refrigerator. For people in these countries, the refrigerator is a taken-for-granted component of food practices. The refrigeration technology and its potentials for affecting home practices are spreading to kitchens in the Global South through increasingly liberal transnational markets. The article explores the meeting of this food storage technology with locally anchored ideas in South India that are at odds with the refrigerator's purpose. Based on ethnographic research centred in Kerala, India, conducted over a four-year period, the research unearthed how the refrigerator's powerful time saving and food preserving potentials are eroding deeply anchored ideas about diet and health in India. The infrastructural tentacles of refrigeration are taking root and bringing with them the same dramatic changes in food production, delivery and consumption that we have seen in the rich countries of the world. The energy and environmental consequences of these refrigerator-driven changes are briefly examined.

Component DOI: http://dx.doi.org/10.15180/180903/001

Keywords

consumption change, technology scripts, ethnography, social practice theory, energy consumption, food consumption, climate change

Introduction

In this article, I examine the powerful change potential embedded in the innocuous looking cold storage box nestled into virtually every kitchen in the rich countries of the world: the refrigerator. For people in these countries, the refrigerator is a

taken-for-granted component of food practices. The refrigeration technology and its potentials for affecting home practices are spreading to kitchens in the Global South through increasingly liberal transnational markets. I explore the meeting of this food storage technology with locally anchored ideas in South India that are at odds with the refrigerator's purpose. In South India, both the imbibing of cold foods and of foods that have been prepared and set aside for more than a few hours is regarded as unhealthy. This was behind an initial indifference to the refrigerator when it became widely available in the 1970s, to the consternation of marketing experts and refrigerator manufacturers; however, over a period of two generations the refrigerator has made its way into a majority of South Indian homes and begun to take its place as a normalised component of household food practices. This history illustrates the power of this and other household energy appliances in a world in which women are gradually moving into the work force yet retain full responsibility for taking care of family and household chores.

The analysis would not have been possible without a research method capable of capturing textured information on the cultural contexts into which the refrigerator was introduced. I will begin the article with brief discussions of the theoretical perspectives that informed the research and the methods used in the India study. I will follow this with a synopsis of the history of refrigeration in the USA, where the concept of refrigeration was born and the cold technologies were developed and manufactured on a large scale. I then explore the halting but persistent diffusion of the refrigerator in India over the past thirty years, giving emphasis to the interaction between a technology designed for food preservation and consumption in the USA and its effects on practices in a place with very different ideas about good food and its relation to good health. I discuss the importance of India's radical turn in its relationship to global markets in the 1990s, the socio-cultural issues at play in both inhibiting and accelerating change, and the health, energy and environmental implications of the spread of refrigeration to India and other parts of the 'emerging' South. As I will elaborate, the refrigerator story from India yields important insights on the ways that household consumption practices are affected by the relative power of technology agency on the one hand and culturally embodied knowledge on the other.

Researching the impacts of refrigeration

As I have argued in a number of publications over the past few years, much of the theoretical focus on household consumption from an energy and environmental sustainability perspective has omitted the importance of the socio-cultural context in which both technologies and individuals participate (Wilhite, 2008b). Social practice theory is a theoretical approach that corrects for these reductions, directing attention to interaction between people and technologies and acknowledging the importance of social relations and culturally-embedded knowledge in the formation of household practices. Over the past couple of decades, social practice theory has begun to get a foothold in consumption studies and policies aimed at reducing the environmental impacts of consumption (Warde, 2005; Shove et al, 2012). Social practice theory has its roots in the work of Bourdieu (1977; 1998) and his concept of *habitus*, defined as a domain of dispositions for action, created and perpetuated through performance of a practice in a given social-cultural space. These dispositions constitute a form of knowledge which influences or disposes subsequent practices. The *habitus* engages with the 'presence of the past' (Bourdieu, 1998, p 304) in forming and embodying knowledge. In other words, social practice theory takes account of the fact that many consumption actions have histories, both at the societal and individual levels, and that these histories make themselves present in current actions (Ortner, 2006).

In the recent surge in interest in social practice theory, the definition of a practice by Reckwitz has been widely accepted. He defines a practice in the following way (2002, p 249, cited in Warde, 2005): 'A "practice" (*Praktik*) is a routinized type of behaviour which consists of several elements, interconnected to one another: forms of bodily activities, forms of mental activities, "things" and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge.' Practices involve the exercise of reflexivity and intentionality, but also bring to bear embodied and tacit knowledge, the latter mainly absent from the theorising of consumption in mainstream research (Wallenborn and Wilhite, 2014). Social practice theory acknowledges the importance of the material (things and technologies) in shaping practices. This material perspective is particularly relevant for understanding practices that take place within the four walls of the home, such as cleaning clothes, preparing food, and attending to thermal comfort levels in the house (heating and cooling) (Wilhite, 2012; Wilhite, 2015). An important grouping of materialities that have saturated homes in places like the USA, Europe and Japan is the household energy appliances such as televisions, refrigerators, washing machines, microwaves and air conditioners. These are now central to home entertainment, food, cleanliness and comfort in the rich countries of the world and are rapidly making their way into households everywhere. These technologies are situated in the home, but are anchored in an interlinked regime of infrastructural technologies that bear energy, food and water through systems of provision and into homes, industries and both

public and commercial buildings.

The refrigerator is the most widely diffused of the household appliances. One might assume from its appearance and controls that it is innocuous. Once in place in the home and plugged in, the refrigerator requires little control or adjustment by its owner. It performs its task of producing chilled air in an insulated cabinet with virtually no need for intervention or management. This design simplicity and mundaneness, along with the use of bland colours (hence the designation 'white good') have been part of a strategy by manufacturers to emphasise its normal place in home food practices (Shove and Southerton, 2000). Compared with the 'conspicuous' technologies such as the car, smart phones and the various home entertainment systems, the refrigerator and freezer have quietly and un-dramatically made themselves essential and normal to food preparation in the rich OECD countries. This normalising process played out over the course of a half century from the early to mid-twentieth century. As I will discuss below, the bland appearance is deceiving. The refrigerator has played an important role in comprehensive changes in food practices in OECD countries and is rapidly spreading to the so-called emerging economies where household practices are changing rapidly (Hansen and Wethal, 2015). India began a period of rapid change in both political economy and household practices with a significant shift in its openness to global markets in the 1990s. Below, I will discuss the 'opening' of the Indian economy to global markets and transnational capital in the early 1990s and how many of the household technologies that were normal in the households of USA and Europe became available and affordable in India. The aftermath of this 'opening' provided an excellent setting for researching the relative strengths of technology scripts, local knowledge and social relations in retarding and/or enabling changes in practices.

Based on a generous research grant from the Norwegian Research Council I was able to fully deploy ethnographic methods to the study of changing household consumption in the state of Kerala in South India over a period of several years in the early 2000s (Wilhite, 2008a). Kerala was one of the highest consuming States in India in the 1990s and 2000s, despite its history of social democratic governance and strong redistributive economic policies. During this period, Kerala led all other states in the consumption of many 'durable goods', including cars and household appliances. Another unique aspect of Kerala society is the high proportion of Christians relative to other states – about thirty per cent of the population is Christian. The Christian church was established early in Kerala, with evidence of a Christian ministry as early as the first century AD. The long coexistence between Hindu and Christian (Muslims constitute only about ten per cent of the population) has led to a cross-fertilisation of cultural rituals and practices, including practices involving food.

My research was centred in urban, middle class neighbourhoods in Thiruvananthapuram (Trivandrum), Kerala and surrounding villages, which are made up of a mix of socio-economic groups from poor to middle class. The methods deployed included:

- Deep participation. My wife, two children and I rented a house in a middle-class neighbourhood in Trivandrum and developed close relationships with neighbours and their extended families.
- Semi-structured interviews with over one hundred households representing differing castes, household types and age groups. Repeat interviews were conducted with about twenty households.
- The use of diaries by selected female head of households in which they recorded time used in daily practices on various activities like cooking, washing clothes, shopping and watching television.
- A survey questionnaire with four hundred households, conducted by female research assistants. The survey contributed data on issues such as the size of the house, technologies owned, family income, family size, ages of family members, educational levels and type of work.
- Interviews in retail appliance stores with customers, managers and sales personnel.

Another important source of information was discussions with local scholars at the Centre for Development Studies in Trivandrum and an extensive review of local literature and policy documents. These various methods together provided an excellent platform for the analysis of changing household practices as new technologies became widely available in the 1990s and early 2000s.

Component DOI: http://dx.doi.org/10.15180/180903/002

A brief history of the refrigeration of food practices

The first mass production of refrigerators began in the USA in 1918. By mid-twentieth century in the USA and the 1990s in Europe, the refrigerator/freezer had come to be regarded as an indispensable appliance. This energy-driven cold storage unit was to drastically transform food practices and diets in these places. Prior to the advent of the refrigerator, food shopping and preparation had to rely on the short storage time of food items once they were purchased. The life of raw, canned and prepared foods was extended by storing them in basements, darkened closets or in kitchen cabinets that were ventilated to allow the entry of cool outside air. Many homes built in the 1920s and 30s in the USA, including the home built in 1925 that I have rented in Berkeley, CA, over the past few years, still have these vented cabinets in the kitchens. In many rural settings in the USA, 'storm cellars' dug into back yards served a double purpose: cool storage for food and shelter against tornados.

The first cold food storage technology was the 'ice box', invented in the 1800s in England and widely used in the USA well into the mid-twentieth century. My great-grandmother's ice box from her home in Cross Plains, Texas, has been passed down to me. It consists of two cabinets. Food was placed in the top cabinet, providing only enough cooled space for a bottle of milk, a few eggs and fresh vegetables. The refrigerant, 'dry ice' (a solid form of carbon dioxide) was placed in the bottom cabinet, which was insulated with zinc or tin. There was an entire industry devoted to producing and distributing dry ice daily to homes and businesses. My father's first job as a teenager in Coleman, Texas, in the late 1930s was in a dry ice factory, where he cut and delivered ice to homes with ice boxes.

The first mechanically cooled refrigerator was produced in 1913. The Frigidaire Company began mass production for the US market in 1918. By 1929, one million refrigerators had been produced and sold in the US. The refrigerator's cold storage temperatures were achieved through a combination of electricity, a compressor, coolants and a well-insulated container. The refrigerator revolutionised food shopping, food preparation, food storage and diets. Among other things, it allowed for shopping in bulk for vegetables and other perishables; the increased consumption of meat, milk products and bottled drinks; the consumption of foods pre-prepared by food retailers that could be stored and then reheated; and the storage of leftover foods for reheating and consuming at later meals. It also brought with it extensive changes in infrastructure and systems of provision of food, including the construction of refrigerated warehouses for wholesale storage, refrigerated transport to bring foods to retail stores, and refrigerated sections of the retail food stores where the products were displayed and sold.

Another cold-producing food technology, the freezer, joined the refrigerator in the mid-twentieth century as a stand-alone appliance and then was later incorporated into a single unit called the fridge/freezer. Shove and Southerton (2000) relate how the freezer became indispensable to food production and consumption in the United Kingdom over the course of a thirty-year period. In 1965, only three per cent of UK households owned a freezer. By 1995, ownership had increased to 97 per cent. They attribute this rapid diffusion to time pressures related to women entering the workforce in great numbers from the 1970s. Manufacturers marketed the freezer as a 'time machine' that would help women save time in all of their food-related tasks from shopping to cooking. The freezer was conjoined with the refrigerator in the 1980s and provided a 'mini-supermarket' within the home containing 'freezer-dependent foods such as burgers, pizzas and iced cream…' (Shove and Southerton, 2000, p 308). Today, the presence of one or more fridge/freezers in virtually every home in Europe and the USA has fostered a burgeoning industry of fast foods, frozen foods and convenience foods. Large sections of supermarkets are dedicated to cold storage dependent products such as dairy and milk, as well as to frozen foods. As Shove and Southerton write, 'The freezers of today promise to help people cope with the compression and fragmentation of time. But in so doing they lock their users into certain practices and habits, at the same time requiring an extensive if routinely invisible supporting infrastructure' (2000, p 315). Over the course of three generations in Europe and the USA, the refrigerator-freezer became an integral part of virtually every home and engendered a significant transformation of eating and food shopping habits.

Component DOI: http://dx.doi.org/10.15180/180903/003

Refrigerating India

When refrigerators became widely available in India in the 1970s, refrigerator manufacturers expected that Indian elite and middle class households would rush to buy them with the same zeal as Japanese households of a decade earlier (Mazzarella, 2003; Wilhite et al, 1996). Marketing experts were soon scratching their heads over Indian consumers' lack of enthusiasm for the refrigerator. Through my interviews and interactions with Indian households, I was able to identify that this lukewarm reception was mainly due to a deeply anchored food ideology – with its roots in the Ayurvedic health principles popular with

Hindus of South India – which regards two of the main practices enabled by the refrigerator as unhealthy: the imbibing of cold foods and drinks, and the storing and then reheating of cooked foods. Food should be 'alive' in order to give life to the eater, meaning that it should be prepared from fresh ingredients and eaten right away. Cooked foods that are set aside or stored lose their vitality and eating them is said to cause laziness and stupidity.

Figure 1

© Harold Wilhite

Freshly cooked rice, the staple of the South Indian diet

DOI: http://dx.doi.org/10.15180/180903/010

I found that in Kerala's middle-aged and elderly generation, the practice of preparing food in bulk and reheating it at later meals was rare in the early 2000s, even among those families who owned a refrigerator. The aversion to imbibing cold food and drinks was widespread. To quote from a classic Ayurvedic text, 'Processes like digestion and sexual intercourse require heat to separate, to distil and to mix different (bodily) substances'. Imbibing cold foods and cold drinks is thought to disturb these processes. Our housemates and neighbours, who did not usually intervene concerning my family's food habits, would invariably get agitated when we gave cold water from the refrigerator or chilled bottled drinks to our children. We were admonished time and again about the health risks of drinking cold beverages. We were told that ingesting cold foods or drinks was not only a source of throat and stomach problems, it would lead to sluggish and lazy children.

I found that many of those households who did not have a refrigerator set aside a cool, dark place in the house where vegetables, eggs and dairy products such as milk and ghee (clarified butter) were placed. This is still the case in many of Kerala's rural and low income households, where a closet or a small, dark room is set aside for cool storage of raw foods. I found that freeing up space was a stronger motive for many families who purchased refrigerators than an interest in cold-food practices. This is consistent with Garnett's (2007) findings in her research on the motivations behind the spread of the refrigerator in England in the 1960s, where food was mainly stored in cool basements. A refrigerator liberated food storage space for other uses.

In the early 2000s in India, sales of refrigerators began to pick up and ideas about healthy food began to change, especially

among younger households. In the next section I discuss what I found to be the three main reasons for this: the abrupt change in the political economy of durable goods after the opening of India in 1991; time pressures on women who were entering the workforce and yet still maintained responsibility for all household chores, including shopping for food and cooking; and the flow of ideas and goods through Kerala's extensive work migration.

Component DOI: http://dx.doi.org/10.15180/180903/004

The changing political economy of refrigeration

The changes in India's political economy after 1991 dramatically affected the price, availability and marketing of the refrigerator and other household appliances. The refrigerator was removed from the category of luxury goods, and the luxury tax on their purchase was eliminated. The more favourable conditions for transnational appliance manufacturers after 1991 led to increased competition in Indian domestic markets and lowered retail prices. These corporations and their retail subsidiaries offered payment plans that included small or no down payments and long payback times at very low interest rates. The transnational manufacturers and international advertising agencies brought their long experience with promoting household appliances to India. Nonetheless, studies of early marketing such as those of Mazzarella (2003) related limpid interest and weak sales to advertising images that were not appropriate or interesting for Indian consumers. These were essentially re-treads of successful marketing strategies and images from the US and Europe, emphasising cold food properties that were counter to local ideas about good food. According to Mazzarella, marketers learned from these failures and by the late 1990s began to successfully adapt advertising to Indian cultural themes, for example how the refrigerator would contribute to satisfying the ideal Indian woman as a good (and efficient) mother and housewife. The most successful strategies emphasised that this 'modern' technology would seamlessly fit into traditional Indian practices. Mazzarella called this marketing image 'close-distance', very similar to successful post-Second World War marketing of household appliances in Japan (Wilhite et al, 1996). In advertising in both Japan in the 1960s and in India from the late 1990s, the emphasis was on how appliances could help women balance the modern demands of efficiency with the cultural expectations on caring for family. Usher (2004) did an extensive analysis of the way women were portrayed in Indian television advertisements of the early 2000s and found that housewives were portrayed as 'smart in apparel and appearance, and shrewd and efficient with regard to disposition of time and management of finances' (2004, p 22). Concerning men, Usher writes that in Kerala 'In the world of advertisement, women provide the humble services while man provides the useful advice' (2004, p 20). Usher underlines the point that the advertisements of the period contributed to the construction of the meanings of 'modern' and 'traditional' in explicitly gendered terms.

Component DOI: http://dx.doi.org/10.15180/180903/005

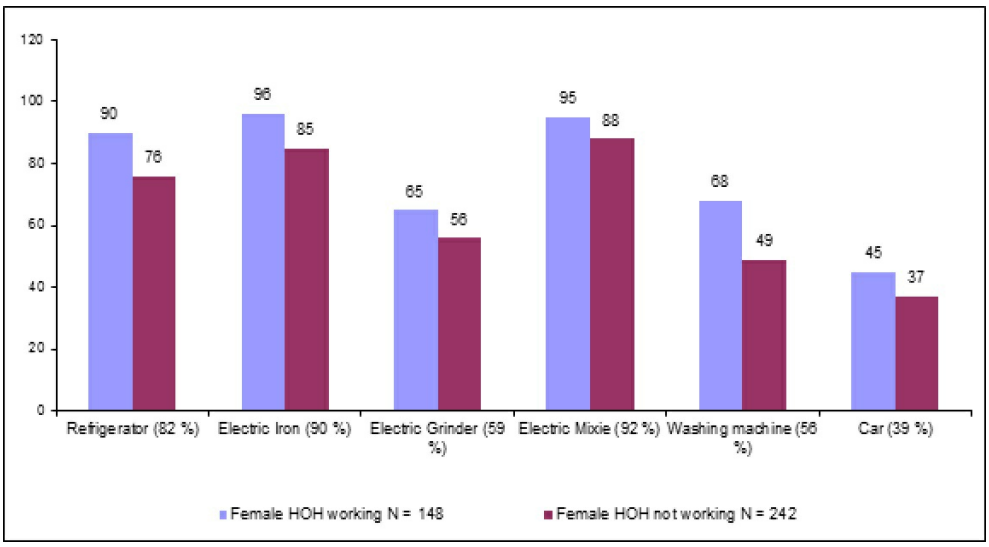
Gendered household practices and time pressures on women

The changing expectations surrounding the appearance and practices of the 'traditional' woman has a unique legacy in Kerala. A large proportion of the Hindu population of Kerala (the Nair caste and portions of the Ezhava caste) practiced matrilineality (*marumakkathayam*) well into the twentieth century (Gough, 1962). Inheritance followed the woman's matriarchal kinship. Men, women and children in the matrilineal lineage lived together in joint family households. The husbands, or conjugal partners, were regarded as visitors and shared a separate room in the house. Senior men in these matrilineal households exercised influence in family decision making, but the undisputed leader of the household was the senior male (*karnivar*), usually either the senior female's brother or uncle. Younger women had full responsibility for housework and family care. From the pre-teen years, young women were put under the supervision of senior women and were assigned household tasks. Young women were expected to perform all domestic services and to give the male head of household 'obedience and devotion' (Gough, 1962).

Matriliny came under pressure from Hindu patrilineal traditionalists, colonial policies and Kerala modernists in the early twentieth century (Wilhite, 2008a). By mid-century, matriliny was waning and a patrilineal family structure was firmly in place. A practice was established in which brides, accompanied by dowry, took up residence with husbands and their extended families. New brides became apprentices to their mother-in-law, where they learned the family's traditions for things like child rearing and food preparation. Until the mid-twentieth century, it was fairly common that one or more siblings and their families would become permanent fixtures in the paternal household. In recent decades, the more common practice is that newly

married young couples take up residence in their parent's household soon after the marriage and remain there until the birth of the first child, when they move out and establish their own home.

In the more stable joint family households of the matrilineal past, while younger women did the bulk of the work, there was nonetheless sharing of housework and child care among all the women of the household. In today's nuclear family, chores that were previously shared by the women of the joint household now fall on the shoulders of the wife alone. A clear finding from my research in the early 2000s was that only a very few husbands participated in household chores or child care. Increasing educational opportunities and more openness to women working outside the home had led to a steady increase in women in the workforce, yet women still had full responsibility for housework. This resulted in increased time pressures on wives who had to compress all of their household chores into early mornings and late evenings. Time stress made an important contribution to an increased interest in the refrigerator and other 'convenience' appliances such as washing machines, mixmasters and microwave ovens. Graph 1 shows the ownership of the refrigerator and other convenience appliances, contrasting differences in ownership according to whether the female head of household works or not. Families with wives working full time outside the home were more likely to have all of the convenience appliances, including the refrigerator.



Graph 1: Differences in ownership of convenience appliances between households with female heads of household working outside the home and households with female heads of household not working outside the home, based on a survey of 408 households in four neighbourhoods in Trivandrum, Kerala, in 2002 (Wilhite, 2008a)

Of all the convenience appliances, the refrigerator has the greatest time-saving potential. This time-saving 'script' (Akrich, 2000) was beginning to exert influence on household food practices in Kerala the early 2000s. The refrigerator's potential to store cooked foods and thus save time in subsequent meal preparation was beginning to erode culturally-embedded ideas about healthy food. Chavita, a 25-year-old housewife with two kids said this about refrigeration and reheating of food: "These ideas are changing. Now people are working and going to school in the morning. There is no time to prepare every meal" (Wilhite, 2008b, p 102). In the early 2000s many young married women were routinely making food in bulk and reheating portions for forthcoming meals. There was a growing interest in frozen and other ready-made foods. Our Hindu Nair neighbour Anil would wring his hands in consternation every time I stopped at a bakery and bought a *somosa* (vegetable roll), or other prepared food. This aversion was not shared by his wife Deeba, who was a teacher at a local elementary school. She did all of the cooking for their two children as well as for Anil's parents and grandmother, who were members of the household. In order to save time in cooking for this large family, Deeba would occasionally buy ready-cooked foods from the local bakery, store them in the refrigerator and then serve them with dinner or place them in the kids' lunch boxes for the next day. This led to constant bickering by Anil and the older members of the family and was one of a series of conflicts which eventually led Deeba and the children to move out and take up residence in a separate house.

Figure 2

© Harold Wilhite

Preparations for an elaborate meal with members of the joint family

DOI: http://dx.doi.org/10.15180/180903/011

Interviews with families whose head of households were in their twenties and early thirties confirmed that ideas about healthy food were changing and that the full potential of the refrigerator for saving time in meal preparation was beginning to be exploited. Many of the younger families interviewed regularly prepared food in bulk and served it up after it had been stored for up to several days in the refrigerator or freezer.

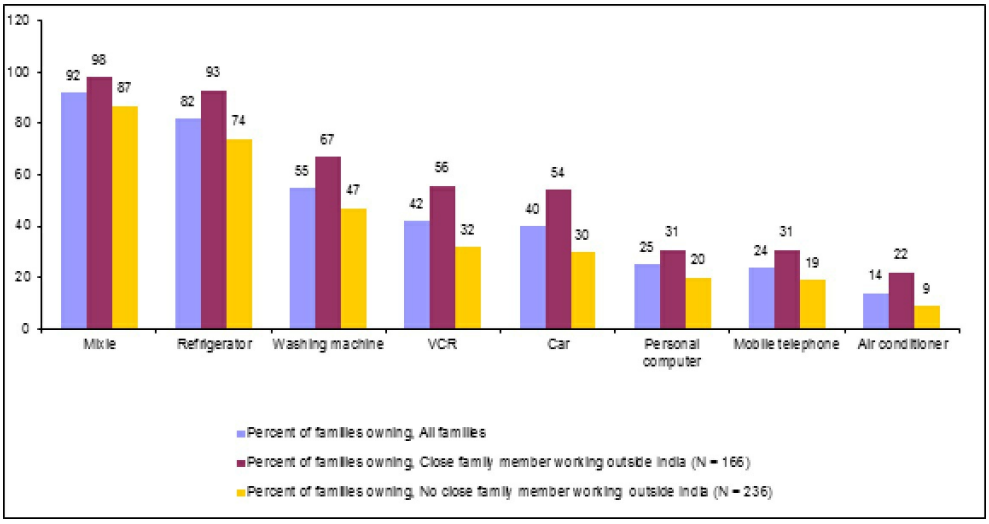
Component DOI: http://dx.doi.org/10.15180/180903/006

Work migration

Another source of changing ideas about the appropriateness and uses of household appliances is Kerala's extensive work migration. Anthropologist Arjun Appadurai (1996) coined the term 'workscape' to capture the expanding geographical space which encompasses home and work for many people in the Global South. The practice of finding work outside Kerala yet maintaining a house and household in Kerala has a long history, partly due to the state's high priority on education. Many of Kerala's doctors, nurses, engineers, teachers and administrators have found work in the Oman Gulf countries (such as Kuwait and Saudi Arabia), and more recently in places further afield such as Singapore, Europe, Australia and North America. In Trivandrum in 2002, forty per cent of all families had at least one close family member (spouse, sibling, aunt or uncle, cousin) working abroad. Migrants typically maintain strong ties with their family in Kerala, travel back to Kerala often and in many cases split the nuclear family between geographically separated households, with the male head of household working abroad while his wife and children remain in Kerala.

In their places of work abroad, migrants encounter new household practices involving the routine use of appliances such as refrigerators and washing machines. I found that these work migrants often bring both the appliances and the associated practices with them back to their Kerala households. They are distributed through the migrant's extended family through dowry

and other forms for gifting expected of work migrants. The following graph shows ownership of selected household appliances in families with or without a close family member working outside India.



Graph 2: Ownership of selected appliances comparing families with a family member working outside India (overseas) versus families with no family member working outside India (no overseas), based on a survey of 408 households in four neighbourhoods in Trivandrum, Kerala, in 2002 (Wilhite, 2008a)

The graph shows that families with a close member working abroad are 19 per cent more likely to own a refrigerator. Interviews revealed that the families of work migrants were much less concerned about potential health problems associated with storing cooked foods or imbibing of cold drinks. They were more likely to purchase ready-made and frozen foods. Gopal, a Hindu Ezhava who had spent much of his life in Kuwait with his work migrant parents, found it puzzling that there was still reticence in Kerala households towards exploiting the full convenience potential of the refrigerator. He said this in an interview (Wilhite, 2008a, p 101):

> The refrigerator, the tradition over here is that you prepare for the day and you try to finish it or you throw it out. So there is a lot of wastage. We in the Gulf, we preserve. Both my parents were working and they made the food for a week and we utilised it each day. They used to cook on a Friday which was a holiday for them. She [his mother] would take a part for the daily use and then warm it up. So there it was a necessity, so we continued that necessity back here. But my wife finds it difficult to eat this. Even if they [the typical Malayalee] have a refrigerator in their house it is not put to much use. They don't think it is a great necessity. So it is a luxury for them and for us it is a great necessity.

The differences in attitude to refrigeration were brought home to me in the tension that the use of the refrigerator created between Gopal and his mother Cavita on the one side and his wife Kahina on the other. Cavita had worked in Kuwait much of her adult life. The apartment furnished by her employer had a refrigerator and several other modern appliances. She had a full-time job working as a nurse. She used the refrigerator to help her save time on meal preparation by preparing large portions of food and storing the rest for later meals. Shortly after their retirement and return to Kerala, Cavita and her husband arranged a marriage for Gopal with Kahina, a young woman from a small village in central Kerala. Kahina had never had a refrigerator in her home and believed fully in the negative health consequences of storing and reheating food. Cavita, as mother-in-law and head of the household insisted that Kahina follow the practice that she had established in Kuwait: preparing large amounts of food for several days of meals, keeping the food refrigerated and reheating small portions for subsequent meals. In a conversation I had with all of the family members present, Kahina told me that she found this practice 'disgusting'. Differences over food and refrigeration practices became a source of serious conflict that continued throughout my first year of contact with the family. It became so acute that Kahina was on the verge of moving back to her parent's home. When I visited the family a year later they had reached a compromise. Kahina prepared some dishes from scratch, mainly for her own consumption, but she had gone along with Cavita's wish to cook food for the rest of the family in large quantities, store it in the refrigerator and reheat it for weekday meals. Thus despite conflict and resistance, a new consumption practice had gotten a foothold in this

transnational household.

These new practices associated with the refrigerator picked up momentum in the two decades after the economic liberalisation. Sales in refrigerators in India tripled over the ten-year period from 2007 to 2016. The decline in reticence to buy and use the refrigerator paved the way for an increase in fast foods and frozen foods. The sale of ready-to-eat and packaged food increased at an average annual rate of 32.5 per cent between 2010 and 2015 (Mathews, 2016). A new refrigeration-based cooking regime (refrigerator, freezer, mixmaster, and microwave) is rapidly taking hold in Indian middle-class households. As has been the case elsewhere, this is increasing the use of refrigeration throughout the chain of food provision. The number of food retail stores that have refrigerated sections is increasing as is the total amount of space dedicated to refrigerated foods (Sood and Mishra, 2015). Sood and Mishra report that soft drink sales are also booming. In 2013, India's population of 1.25 billion people consumed 11,755 million litres of soft drinks, an increase of 170 per cent from 2008.

Component DOI: http://dx.doi.org/10.15180/180903/007

Energy and climate impacts

Refrigerators run on electricity and as outlined above are connected into refrigerated processes and spaces that run throughout the food delivery chain, so that the energy demands of refrigeration are considerable. McNary and Berry (2012) have estimated that in the European Union, about 15 per cent of household energy use goes to cold appliances (refrigerators and freezers) and in European supermarkets, refrigeration accounts for up to fifty per cent of the building's energy consumption. The energy efficiency of the refrigerator's compressor has increased over the past three decades, but the total amount of the electricity used by refrigerators has only declined slightly over the same period because of the increase in the size and number of refrigerators per household. In 2008, 99 per cent of homes in the United States had one refrigerator and about 26 per cent had two or more (34 per cent of California homes had two or more refrigerators) (U S Department of Energy, 2009). In the UK, where only about one in three houses had a refrigerator in 1960, today over 95 per cent of households own one. In addition to the saturation of refrigeration in the OECD countries and the rapid uptake of refrigeration in India, it is also spreading rapidly in other emerging economies such as Brazil, Indonesia and China. In China, household refrigerator ownership rose from seven per cent in 1995 to 95 per cent. The IEA has estimated that refrigeration and the other rapidly spreading refrigerating technology, the air conditioner, accounted for approximately sixteen per cent of the global electricity consumption in 2012 (GCI/IEA, 2014). If current global trends continue, Munzinger and Gessner (2015) estimate that refrigeration of food and air will contribute thirty per cent of all climate emissions in 2030.

In the USA and Europe, cold chain technology is totally embedded in the production and consumption of food. New food products and technologies are constantly emerging that are predicated on refrigeration and as such exacerbate and increase refrigeration dependence. In other words, the presence of refrigeration is shaping the sorts of foods we choose to eat, the way we shop and the way we cook. Ready-made foods and frozen foods are enabled by the cold technologies and these demand energy throughout the chain from production to consumption. Meat consumption increases in step with refrigeration. In India around forty per cent of the population is vegetarian, but for the remaining 500 million non-vegetarians, meat consumption has gradually increased over the past two decades and this can be related to increasing refrigeration. Larsen (2012) examined the relationship between meat consumption and refrigeration in the USA. His study showed that as refrigerators became standard home appliances in the 1950s, meat consumption began to increase. From 1950 to 2010 annual meat consumption increased by five times in the USA to an estimated fifty billion pounds of meat, corresponding to an annual beef consumption of 42 kg per person. The consequences of meat consumption for land use and the consumption of energy and water are dramatic. Kapper (2014) estimates that to prepare one 'quarter pound' hamburger requires 6.7 pounds of grain and forage for the cattle, 52.8 gallons of water, 74.5 square feet of land and 1,000 BTUs of energy. The global climate emissions attributable to meat production and consumption are 25 times that of rice (Weber and Mathews, 2008). In the UK, Oosterveer and Sonnenfeld (2012) estimate that meat and dairy consumption contribute 66 per cent of carbon emissions from food-related activities.

Component DOI: http://dx.doi.org/10.15180/180903/008

Conclusion

The refrigerator's powerful time-saving and food preserving potentials are eroding deeply anchored ideas about diet and health in India. The infrastructural tentacles of refrigeration are taking root and bringing with them the same dramatic changes in food production, delivery and consumption that we have seen in the rich countries of the world. In these places where refrigeration has taken hold, people find it hard to imagine a daily life without them. The refrigerator does save time, reduce the drudgery of constant trips to the market and has a positive set of health consequences due to the safe preservation of foods. Nonetheless, the urgency of reducing energy and climate emissions from daily practices provides a rationale for examining how this deeply anchored dependence on refrigeration can be reduced in the Global North and moderated elsewhere.

There are a few new initiatives in the realm of food production and consumption that have the effect of reducing the need for refrigeration. One example is the growth in the promotion of local food production and local markets; another is direct contracts between producers and groups of consumers enabling frequent delivery of food, reducing the need for cold-storage and eliminating the middle step of retail refrigeration. Vegetarianism and veganism are growing around the world, bringing with them a reduction in the consumption of meat and dairy products, thus reducing the need for refrigeration throughout the food chain. Interestingly, these 'alternative' food practices springing up in Europe and the USA resemble practices that have been normal in India for centuries. Will refrigeration and refrigerator-based practices lock-in in India or is there a potential for an engagement with these alternative food practices and a moderation of refrigeration-dependence? These are important questions for future research agendas on the nexus between refrigeration, food, energy and climate.

Component DOI: http://dx.doi.org/10.15180/180903/009

Tags

- History of technology
- Material culture
- Public engagement
- Energy

References

1. Akrich, M, 2000, 'The De-scription of Technical Objects', in Bijker, W and Law, J (eds), *Shaping Technology/Building Society* (Cambridge Massachusetts: The MIT Press), pp 205–224
2. Appadurai, A, 1996, *Modernity at Large: Cultural Dimensions of Globalization* (Minneapolis and London: University of Minnesota Press)
3. Bourdieu, P, 1977, *Outline of a Theory of Practice* (Cambridge: Cambridge University Press)
4. Bourdieu, P, 1998, *Practical Reason* (Cambridge: Polity Press)
5. Garnett, T, 2007, 'Food refrigeration: What is the contribution to greenhouse gas emissions and how might emissions be reduced?', a working paper produced as part of the Food Climate Research Network, Centre for Environmental Strategy, University of Surrey, England
6. Gough, K, 1962, 'Modern Disintegration of Matrilineal Decent Groups', in Schneider, D and Gough, K (eds)*, Matrilineal Kinship* (Berkeley and Los Angeles: University of California Press)
7. Hansen, A and Wethal, U (eds), 2015, *Emerging Economies and Challenges to Sustainability* (London: Routledge)
8. Kapper, J L, 2014, 'The U.S. Beef Industry's Environmental Impact', WWF webinar, September, available at https://www.academia.edu/8201264/The_U.S._Beef_Industry_s_Environmental_Impact (accessed 4 September 2015)
9. Larsen, J, 2012, 'Peak Meat: U.S. Meat Consumption Falling', Data Highlights, Earth Policy Institute, available at http://www.earth-policy.org/data_highlights/2012/highlights25 (accessed 8 July 2015)
10. Mathews, P R, 2016, 'Understanding the frozen food market in India', available at http://www.refrigeratedfrozenfood.com/articles/91711-understanding-the-frozen-food-market-in-india (accessed 7 April 2017)
11. Mazzarella, W, 2003, *Shoveling Smoke: Advertising and Globalization in Contemporary India* (Durham and London: Duke University Press)
12. McNary, B and Barry, C, 2012, 'How Americans are using energy in homes today', *Proceedings of the 2012 ACEEE Summer Study in Buildings* (Washington, DC: American Council for an Energy Efficient Economy)
13. Munzinger, P and Gessner, A, 2015, 'Climate-friendly refrigeration and air conditioning: A key mitigation option for INDCs', working paper, GIZ, September, available at http://www.giz.de/expertise/downloads/giz2015-en-rac-sector-indcs.pdf (accessed 6 April 2015)
14. Oosterveer, P and Sonnenfeld, D A, 2012, *Food, Globalization and Sustainability* (London and New York: Earthscan)
15. Ortner, S, 2006, 'Power and projects: reflections on agency', in Ortner, S (ed), *Anthropology and Cultural Theory: Culture, Power and the Acting Subject* (Durham and London: Duke University Press)
16. Reckwitz, A, 2002, 'Toward a theory of social practices: a development in culturalist theorizing', *European Journal of Social Theory* 5: 243–262
17. Shove, E and Southerton, D, 2000, 'Defrosting the freezer: from novelty to convenience: A narrative of normalization', *Journal of Material Culture* 5(3): 301–319
18. Shove, E, Pantzar, M and Watson, M, 2012, *The Dynamics of Social Practices: Everyday Life and How It Changes* (London: Sage)
19. Sood, D and Mishra, S, 2015, 'India: Retail foods', Report IN5164, USDA foreign agricultural service, available at https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Retail%20Foods_New%20Delhi_India_12-28-2015.pdf (accessed 6 April 2017)
20. U S Department of Energy, 2009, Refrigerator Market Profile: New Opportunities Multiply Savings, December (accessed 10 April 2015)
21. Usher, V T, 2004, 'Gender, Value, and Signification: Women and television in Kerala', discussion paper No. 67, Kerala Research Programme on Local Level Development. Trivandrum: Centre for Development Studies
22. Wallenborn, G and Wilhite, H, 2014, 'Rethinking embodied knowledge and household consumption', *Energy Research and Social Science* 1: 56–64
23. Warde, A, 2005, 'Consumption and theories of practice', *Journal of Consumer Culture* 5:131–153
24. Weber, C and Matthews, H S, 2007, 'Embodied environmental emissions in U. S. International Trade, 1997–2004', *Environmental Science and Technology* 42(10): 3508–3513
25. Wilhite, H, 2008a, *Consumption and the Transformation of Everyday Life: A View from South India* (Basingstoke and New York: Palgrave Macmillan)

26. Wilhite, H, 2008b, 'New thinking on the agentive relationship between end-use technologies and energy using practices', *Journal of Energy Efficiency* 1(2): 121–130
27. Wilhite, H, 2012, 'The energy dilemma', in Bjørkdahl, K and Nielsen, K B, *Development and the Environment: Practices, Theories, Policies* (Oslo: Universitetsforlaget)
28. Wilhite, H, 2016, *The Political Economy of Low Carbon Transformation: Breaking the Habits of Capitalism* (London: Routledge)
29. Wilhite, H, Nakagami, H, Masuda, T, Yamaga, Y and Haneda, H, 1996, 'A cross-cultural analysis of household energy-use behavior in Japan and Norway', *Energy Policy* 24(9): 795–803

Author information

Harold Wilhite

Professor Emeritus

Contact this author >

Harold Wilhite is a Professor Emeritus of Social Anthropology at the University of Oslo's Centre for Development and Environment. He has published widely on the theories, practices and policies of consumption, energy savings and sustainable development, drawing on ethnographic fieldwork in several parts of the world, including Central America, USA, Norway, Japan and India. He has worked closely with European and Norwegian policy development in the domains of energy conservation and sustainable development. He is one of the co-founders of the European Council for an Energy Efficient Economy (ECEEE) and its Director from 1993–2001. His books include the *Consumption and the Transformation of Everyday Life: A View from South India* (Palgrave Macmillan, 2008) and *Political Economy of Low Carbon Transformation: Breaking the Habits of Capitalism* (Routledge, 2016)