

Understanding Utility Awareness and Engagement among Low Income Customers

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ABSTRACT

Utilities strive to position themselves as trusted messengers to help customers manage their bills and reduce their energy use. Low-income customers are unique in terms of their barriers and needs as well as the types of programs that utilities offer to them. As such, it is vital to understand the unique experience of low-income customers in order to improve service and engagement. This paper presents insights into customer awareness and use of utility energy programs based on results of a representative survey of 1,000 residential utility customers in the U.S. We first present descriptive results on the financial burden of energy bills and utility communication behaviors surrounding them. While 32% of lower-income customers reported struggling to pay electric bills (3x the rate of higher-income customers), fewer reported going on the utility website for resources to reduce their bill, and only 17% contacted their utility for assistance. We next explore customer awareness and use of a variety of utility programs and services to reduce energy bills. We identify an important gap in awareness of energy-saving programs: lower income participants were significantly less likely to have heard about rebates, demand response programs, and time of use rates. We explore a variety of causes of this gap – such as utility engagement, trust, and satisfaction – and complement descriptives with exploratory analyses to identify behavioral and demographic moderators of these trends.

Introduction

Despite decades of effort and many new approaches to deliver utility-funded energy efficiency programs, it's increasingly clear that customers with the highest energy burden, and therefore strongest need for energy efficiency, may not be effectively served by existing utility programs (e.g., Frank and Nowak 2016). This paper takes a customer-centric approach to better understand the income gap in customer awareness of, engagement with, and use of utility-provided bill reduction and energy management programs.

Low-income Customers and Energy Burden

Research has extensively documented the energy burden on low- to moderate-income (LMI) customers, in comparison to those with higher incomes (referred to as HI customers). On average, the percentage of income that LMI households spend on energy is 3 times higher than that of HI households; consequently, many LMI households are considered either energy burdened, spending 6% or more of their income on energy, or highly energy burdened, spending 10% or more of their income on energy (Drehobl, Ross, and Ayala 2020). Higher energy burdens have demonstrated negative associations with health and income (Bohr and McCreery 2020).

While this paper focuses on household income, it's important to note that a number of other household characteristics are associated with energy burden, including household location, physical characteristics (e.g., the age of the home), and the demographics of the household. Both rural and urban households, older housing stock with outdated weatherization or appliances, and diverse households, are particularly likely to have higher energy burdens (Brown et al. 2020; Rotmann et al. 2020). These household factors often covary: for example, notably, income is associated with lower housing stock energy efficiency (see Rotmann et al. 2020 for a review).

Low-income Customers and Energy Efficiency Programs

Research increasingly suggests that lower income customers are under-served by utility-sponsored energy efficiency programs. Historically, utilities have offered a suite of income-qualified programs to increase energy efficiency of LMI households, thus reducing energy costs and energy burden. These programs commonly target lighting, air sealing, and insulation measures. Like nearly all utility programs, these programs are typically opt-in, requiring customers to learn of the program and apply to it to receive services. These low-income support programs often struggle to reach a large percentage of the target population; recent research found that low-income targeted program participation averaged only 1% of eligible customers (Drehobl and Alvarez 2017).

While LMI customers are also eligible to participate in unrestricted energy efficiency programs, participation in such programs biases towards those with higher income and education, exacerbating the gap in utility support across income groups (Frank and Nowak 2016; Pigman, Deason, and Murphy 2021). Under-participation further extends to other disadvantaged groups (Rotmann et al. 2020; Navigant, Illume, and Cadeo 2020). Although engagement in energy efficiency programs is lower, LMI customers are more likely to engage in energy conservation behaviors (Umit et al. 2019), which have no upfront cost but tend to have a smaller impact on overall energy use (Dietz et al. 2009).

The Current Research

Taken together, the past research presented above suggests that households with the highest energy burden are least well served by utility programs to reduce bill costs and increase efficiency, despite ongoing efforts to overcome this gap. But does this gap extend to overall engagement with utilities? For which types of programs and services is this gap highest? Why does this gap exist? Is this gap simply a matter of reducing participant upfront cost, or are there other factors at play in reaching and engaging low-income customers?

To address these questions, this paper takes a customer-centric approach towards understanding utility awareness and engagement among lower income customers. We document customer experiences of energy burden and program participation. We further explore customers' broader utility experience, including bill monitoring and engagement behavior, and awareness of and interest in utility bill management and energy efficiency programs. Through this broader lens, we can better understand utility customer experience across income levels and identify potential deeper explanations of this gap in program adoption.

The rest of this paper presents research methods and findings on energy affordability and utility engagement, followed by preliminary insights into utility program design and marketing changes to mitigate this gap.

Methods

This study reports results from an online survey of 1,000 energy customers conducted in April, 2021. A panel provider (ROI Rocket) was contracted to field the survey to a nationally representative sample of U.S. residents. These results were collected as part of an annual survey taking 10-12 minutes. As a quality control measure, participants were excluded from the dataset if they completed the survey in less than 2 minutes, or if they failed a basic attention check that asked them to indicate a specific response to one of the items. Data collection was terminated when 1,000 participant records were collected that met these two criteria.

Defining Low to Moderate Income Households

For visualization purposes, we define those with household incomes less than 80% of U.S. median income (approximately \$60,000), as Low and Moderate Income, or LMI, and those with household incomes greater than 80% of U.S. median income as Higher Income, or HI. Statistical differences noted in the paper treat income as a continuous variable, however.

Data Analysis

We report two types of analyses: simple differences by income and regression analyses. Although we bin income into LMI and HI groups for visualization and reporting purposes, statistical significance for income differences are calculated with regression models treating income as a continuous, linear variable. Similarly, the results of exploratory regression analyses on the predictors of utility program awareness and use report the results of multiple linear regression models that model the outcome variable as a function of various independent variables, and report the statistical significance of the coefficients of these independent variables. With a sample size of 1,000, statistically significant differences may be too small to be meaningful from a policy perspective. Therefore, rather than report and base our interpretation solely on statistical significance, we focus on differences that are statistically significant and meaningful.

Sample Characteristics

Figure 1 summarizes the demographic and household characteristics of the sample. Results are presented overall and separately for LMI and HI respondents. As noted in the introduction, differences in income are associated with differences in other demographic characteristics in our sample. LMI respondents have, on average, attained lower levels of education and are slightly more likely to identify as non-White. Compared to HI respondents, LMI respondents in the sample are more likely to: live in rural locations, rent their homes, and live in homes other than single family detached homes. LMI respondents were also less likely to be able to identify their utility as either investor-owned or municipal than HI respondents, suggesting less utility engagement overall.

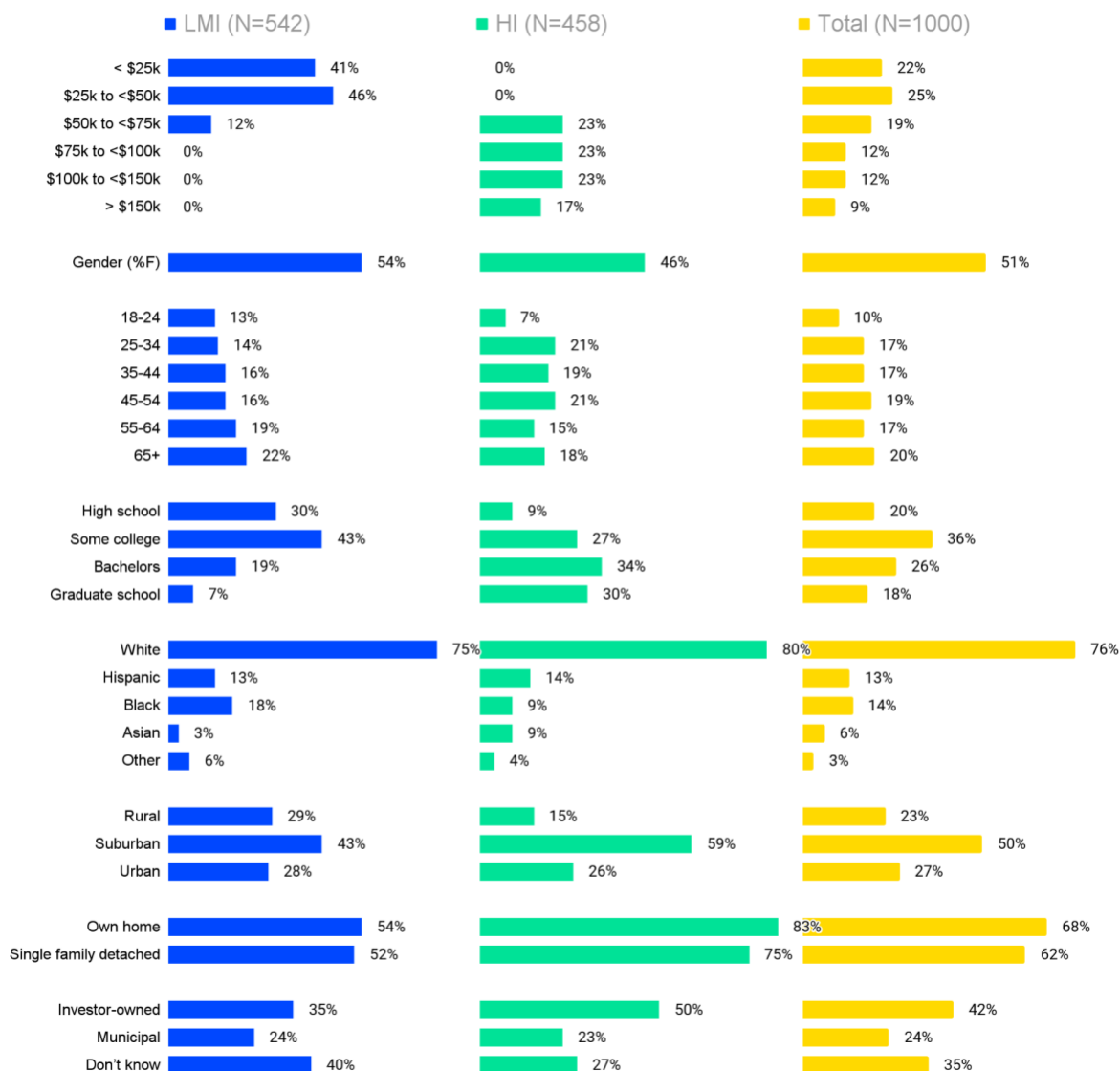


Figure 1. Sample characteristics

Results

We report customers' responses to a series of questions on energy affordability, utility bill monitoring behavior, and utility program engagement.

Energy Affordability

Customers answered a series of questions about their bill payment behavior, the extent to which their electric bills strain their finances, and the extent to which they save energy for financial reasons. Unsurprisingly, results show that LMI customers have, on average, higher financial strain and higher frequency of issues in paying electric bills specifically, but we observed no differences in the extent to which customers save energy for financial reasons.

Figure 2 presents bill payment behavior over the past year. Roughly three times as many LMI customers as HI customers reported payment issues in the past year, including being unable to pay, paying late, or struggling to pay. Over a third of LMI customers (37%) and over one quarter of the sample overall (27%) reported postponing purchases to afford to pay utility bills.

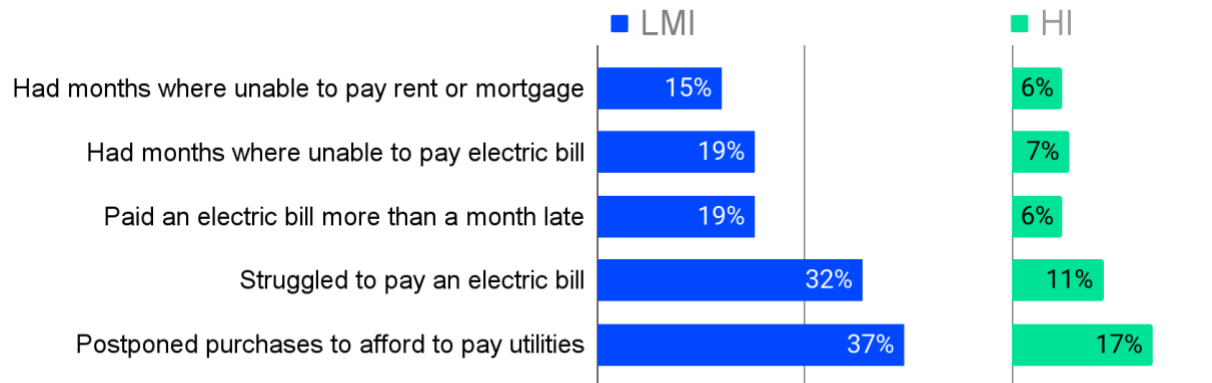


Figure 2. Bill payment in the past year. All differences are statistically significant at $p < .001$

Figure 3 presents additional measures of energy affordability and customer attitudes about the role that saving energy plays in their finances. Two thirds of LMI customers (65%) and over one-third (41%) of HI customers agreed (rated a 5 - 7 on a 7-point scale) that an unexpectedly high bill strains their finances. A notably higher proportion of LMI customers than HI customers also reported being unable to afford thermal comfort in either winter or summer.

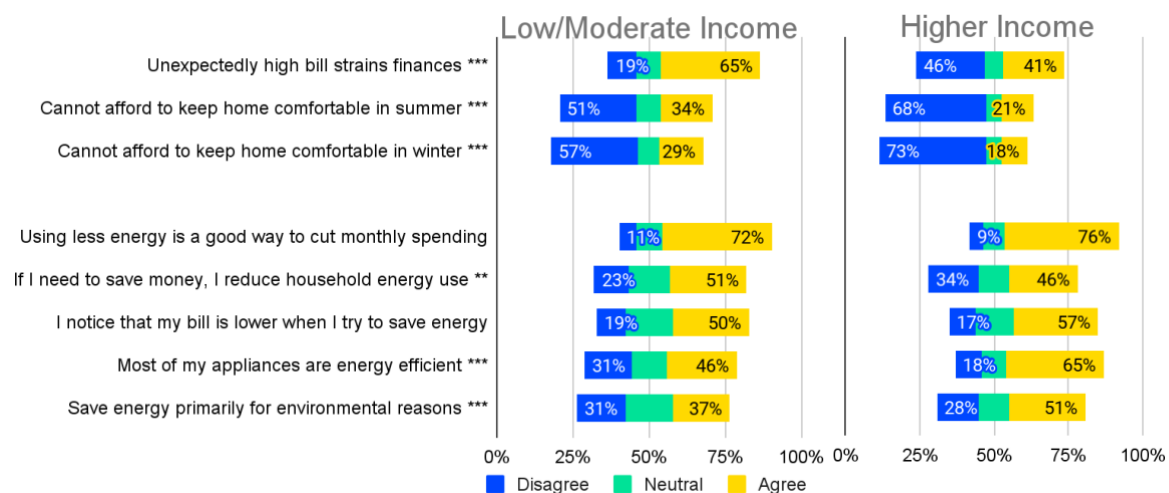


Figure 3. Energy affordability and financial role of saving energy by income level. * $p < .05$, ** $p < .01$, *** $p < .001$

We also assessed the extent to which customers view saving energy as a good way to save money. Although more HI than LMI customers agreed that they save energy primarily for environmental reasons (51% versus 37% respectively), there was strong agreement across income levels that using less energy is a good way to cut monthly spending (72% of LMI vs 76%

of HI customers), and only a small difference in the number of customers that reported reducing their household energy use if they need to save money. Furthermore, similar numbers of customers agreed that they noticed a difference when they try to save energy. Thus, although LMI customers have a higher energy burden, we find few differences in households identifying energy savings as a useful or effective way to save money across income levels.

Bill Monitoring and Engagement

We also explored customers' bill monitoring and management behaviors, and how customers engaged with their utility around bills. Customers reported on several different bill monitoring and management behaviors (Figure 4). LMI customers reported similar rates of contacting their utility about energy use or a high bill, and were more likely to contact their utility for assistance in paying. However, HI customers were somewhat more likely to look into changing their rate, check their usage between bills, or look on their utility website for resources to save energy or reduce their bills. Customers reported similar levels of monitoring bill amounts monthly (71% LMI vs 64% HI, $p > .05$). LMI customers further reported somewhat lower levels of awareness of their ability to check usage online between bills (10% LMI versus 5% HI)

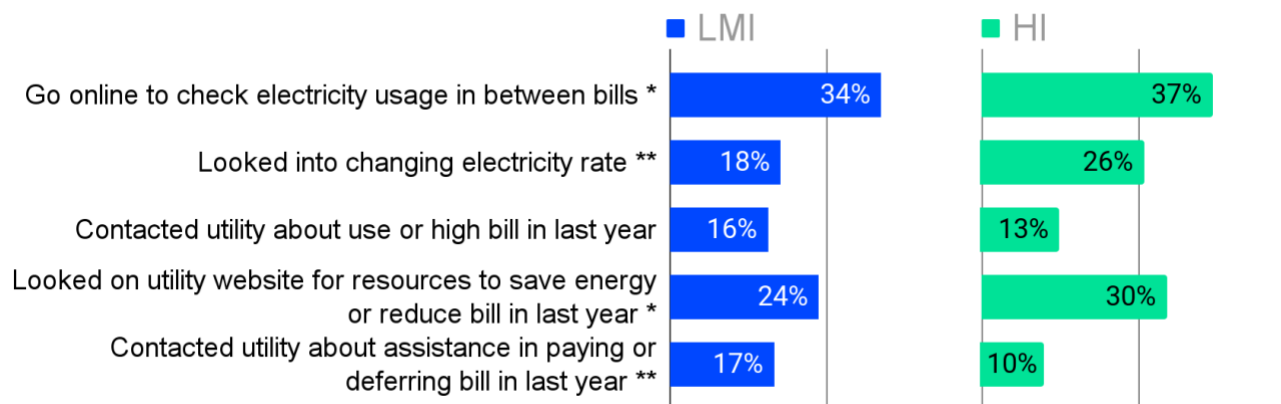


Figure 4. Bill monitoring and management behavior. * $p < .05$, ** $p < .01$, *** $p < .001$

Awareness and Use of Utility Services

Customers were asked about their awareness of, participation in, and interest in a variety of different utility-sponsored programs around bill management, energy efficiency (EE), and rates. Participants were given brief descriptions of each program and asked to indicate whether they had heard of it and/or used it in the past. Figure 5 summarizes rates of lack of awareness and participation across LMI (left) and HI (right) customers. Note that not all programs listed were available to all customers in this nationally-representative sample, and thus absolute rates of awareness and participation include customers for whom the service is not available.

We find similar proportions of unawareness of billing-related programs (first five rows) including budget (or levelized) billing, digital wallet payments, pre-pay, and mid-cycle bill projections. Awareness of high bill alerts was marginally lower among LMI customers. Reported rates of participation in billing-related programs were similar, with the exception of high-bill alerts, which was marginally higher among HI customers.

Importantly, we find somewhat lower rates of awareness across most other EE and rate programs (rows six onward), including awareness of tips, rebates, audits, home energy reports (HERs), marketplace, on-bill financing, and electric vehicle (EV) support. Notably, lag in awareness among LMI customers is particularly pronounced for rates and demand programs such as time of use and demand response (14% to 16% lower awareness), despite the fact that time of use and demand response typically have no upfront cost.

On average, LMI customers reported awareness of 4.6 EE and rate programs, versus 5.6 average for HI customers. Self-reported program participation is similarly lower across many of these programs: LMI customers reported participating in an average of 1.3 programs listed, versus 1.9 programs for HI customers.

These findings suggest a notable and meaningful gap, as customers who are potentially more adversely affected by high bills tend to have lower awareness and use of utility energy saving programs and rate options.

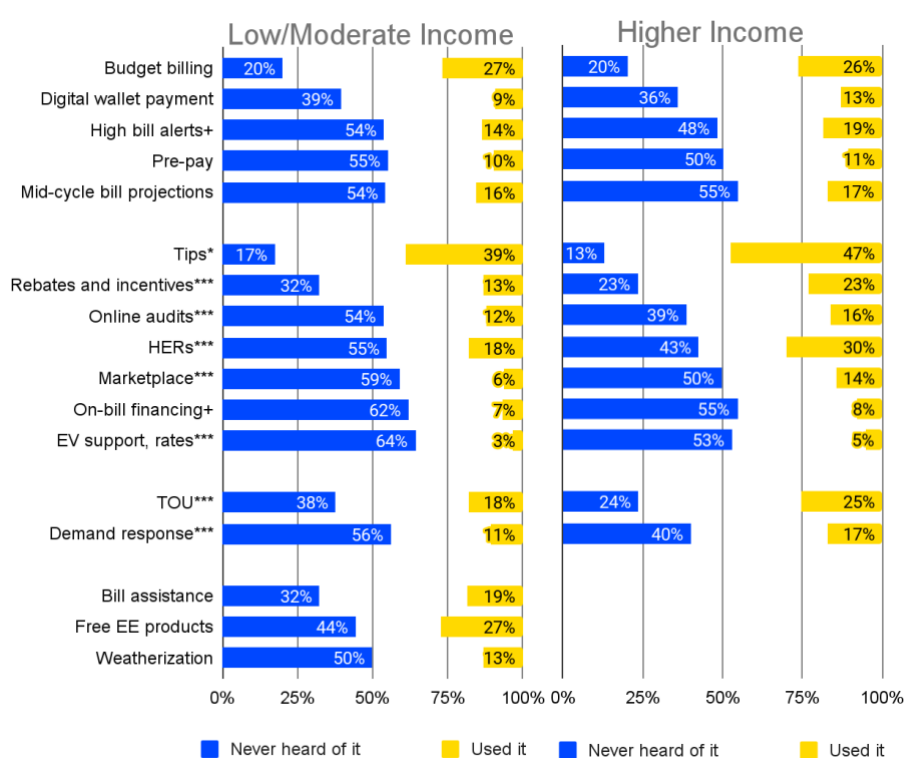


Figure 5: Program awareness and participation by income level. The bottom three programs were only shown to lower-income respondents, as they are most commonly offered as income-restricted programs. * $p < .05$, ** $p < .01$, *** $p < .001$

Interest in Utility Services

Customers who had not participated in the programs identified above also indicated their interest in each. Program interest shows slight differences across income levels, but HI customers report higher levels of interest in rebate, high bill alerts, and EV support and rates (Figure 6).

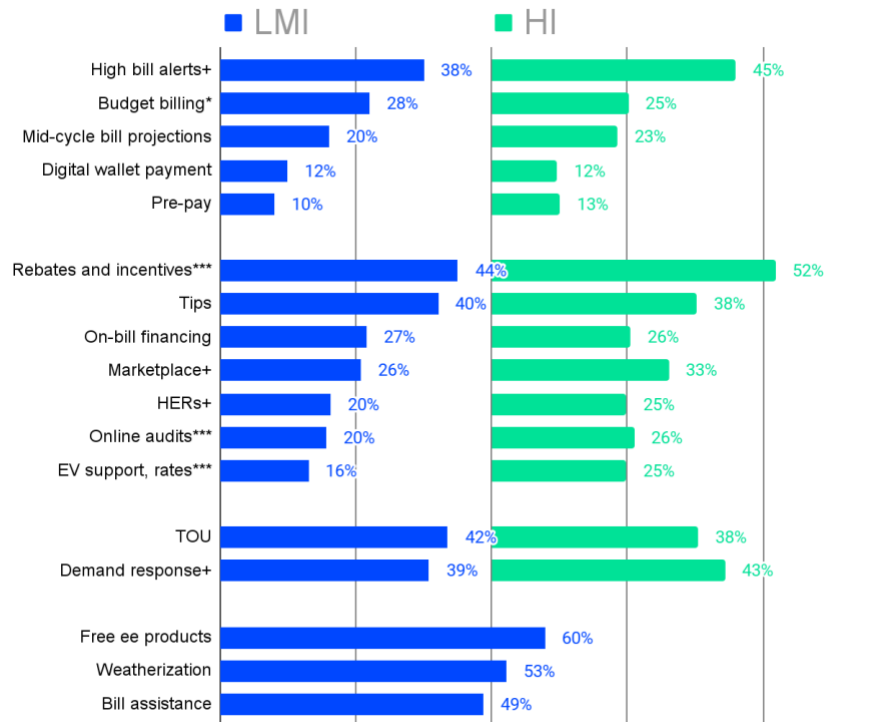


Figure 6. Percent of customers interested in bill management, EE, rate, and LMI utility programs by income level. Percentages indicate interest ratings of a 4 or 5 on a 5-point scale.
 + $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

General Utility Trust and Satisfaction

Given that LMI customers reported lower level of awareness and use of utility services, we also explored whether customers' reported trust in, and satisfaction with their utility differed across income levels. We failed to find evidence of significant differences in either utility trust or satisfaction. Out of five stars, LMI customers gave an average rating of 4.05 stars, while HI customers gave 4.10 stars ($t(986) = -0.83$, $p = 0.40$). Customers also gave similar ratings of trust in different utility services (Figure 7). Although LMI customers' level of trust in their utility as a source of information about saving energy was slightly lower than HI customers' rating, this difference was small in magnitude, and overall ratings of trust in utility services didn't differ meaningfully across income levels. We thus find that despite lower awareness and participation in utility services, levels of satisfaction and trust are similar, overall. We explore this relationship further below.

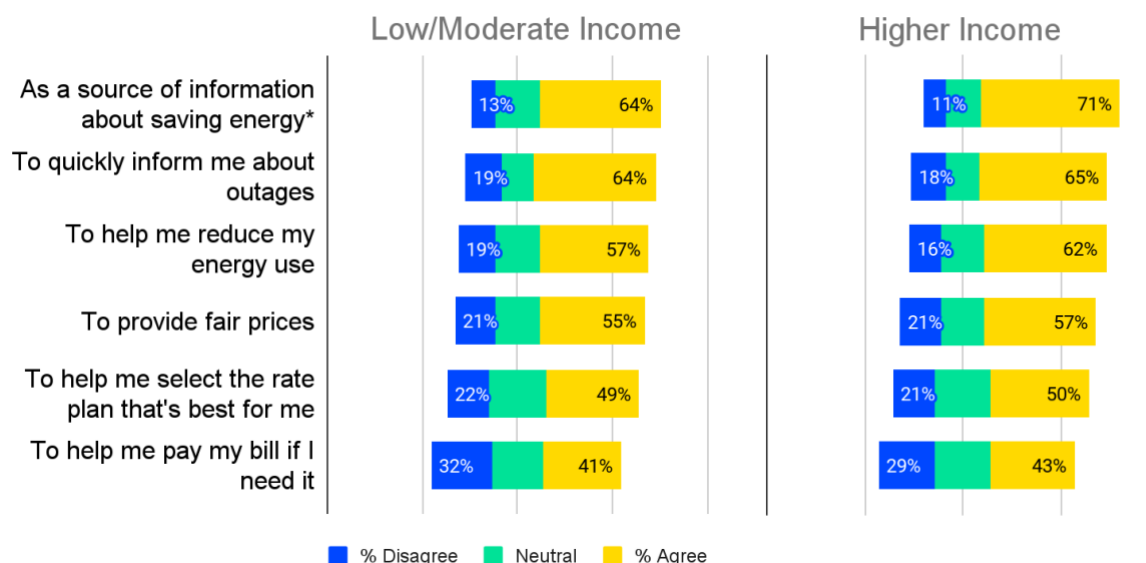


Figure 7: Trust in utility services by income level. Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Exploring Potential Causes of Awareness and Participation Gap

These results show that income is associated with differences in program awareness and use, but they do not tell us the cause of this association. While these correlational data can't demonstrate causality, we conducted exploratory analyses to suggest potential intervening variables in the observed income differences that warrant further research. We examined a few potential contributors to this observed gap. As income covaries with a number of other household and individual characteristics, such as education and home ownership (Rotmann et al. 2020), we examined whether this income gap persists controlling for other demographic characteristics. It's also possible that the participation gap is a symptom of different levels of overall utility engagement, trust, or satisfaction, or perceived energy burden across income levels, which in turn lead to differences in utility program participation. We examined which of these variables predicts awareness and participation, and whether this income gap persists when controlling for these factors. For all analyses, we examined the composite of utility program and service awareness and use: the total number of programs and services from Figure 5 that customers reported awareness or use of. Table 1 below presents the results of four linear regression models addressing these questions. We modeled the total number of programs of which customers were aware of (Model 1, 3) or had used (Models 2, 4) as a function of demographic and household factors (Model 1, 2) as well as attitudinal and behavioral factors (Models 3, 4). Key results are summarized below the table.

Table 1. Association between program awareness, use, and other factors

Model Term	Demographic and Household Predictors		Behavioral and Attitudinal Predictors ¹	
	Model 1	Model 2	Model 3	Model 4
DV	Awareness	Use	Awareness	Use
Income (binned)	0.17* (0.07)	0.02 (0.04)	0.15** (0.07)	0.02 (0.04)
Age	-0.01 (0.06)	0.01 (0.04)	-0.02 (0.05)	0.01 (0.04)
Home Owner	0.36+ (0.20)	0.30* (0.14)	0.25 (0.19)	0.26** (0.13)
Education	0.11+ (0.06)	0.12*** (0.04)	0.12* (0.06)	0.20*** (0.04)
Ethnicity (ref = Non-Hispanic)	-0.23 (0.28)	-0.31+ (0.19)	-0.20 (0.27)	-0.32+ (0.18)
Multilingual (ref = no)	0.61* (0.25)	0.25 (0.17)	0.54* (0.24)	0.17 (0.16)
Suburban (ref = Rural)	0.62** (0.22)	0.18 (0.15)	0.25 (0.22)	-0.03 (0.14)
Urban (ref = Rural)	0.95*** (0.25)	0.38* (0.17)	0.50* (0.24)	0.11 (0.16)
Household size	0.10+ (0.06)	0.17*** (0.04)	0.11+ (0.06)	0.14*** (0.04)
Contacted utility about bill assistance (ref = no)			0.50+ (0.28)	0.99*** (0.19)
Struggled to pay a utility bill (ref = no)			-0.64** (0.24)	-0.26+ (0.16)
Agree using less energy is a good way to cut spending			0.12* (0.06)	0.10* (0.04)
Satisfaction			-0.06 (0.11)	0.03 (0.07)
Trust to help pay bill			0.20** (0.06)	0.08+ (0.04)
Trust to help reduce use			0.17+ (0.10)	0.19** (0.07)
Constant	2.54*** (0.61)	-0.95* (0.40)	-0.08 (0.71)	-2.71*** (0.47)
Adjusted R ²	0.06	0.07	0.16	0.18
F Statistic	7.11*** (df =10; 989)	8.79*** (df =10; 989)	9.81*** (df =21; 978)	11.12*** (df =21; 978)

¹ The behavior and attitudinal models also included coefficients for trust utility as a source of information on saving energy, trust to inform on outages, and trust to help select best rate, trust fair prices, and contacted utility about a high bill, all $p > .05$, which have been omitted for space reasons. + $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Role of other demographic and household characteristics. We find that controlling for other demographic variables, income is significantly associated with program awareness, but we fail to find evidence that income is significantly associated with program use. Other demographic and household characteristics are significant predictors of overall level of program awareness and use, including location (rural customers have lower awareness and use), as well as education and home ownership (higher educated customer and home owners have higher levels of use). These models explained modest amounts of variance in both awareness and use ($R^2 = 0.06$ and 0.07), indicating that demographic and household factors explain some differences in awareness and use, but that much of the variance remains unexplained by these predictors.

Role of attitudinal and behavioral factors. Even controlling for other behavioral and attitudinal factors, income remains a significant predictor of program awareness, but not use (Model 3, 4). Several attitudinal and behavioral predictors are also associated with program awareness and use, however. Customers who had struggled to pay a bill had lower program awareness and marginally participation, but customers who had contacted their utility about help paying had somewhat higher awareness and participation. Unsurprisingly, customers who reported higher agreement that saving energy is a good way to save money also reported higher program awareness and use. We don't find evidence that overall utility satisfaction was statistically predictive of awareness or use, but trust in utility to pay bill and help reduce use were somewhat predictive. These models explain a moderate amount of variance in both awareness and use ($R^2 = 0.16$ and 0.18), suggesting that these variables are associated with meaningful differences in utility service awareness and use.

Note that these relationships are not causal: we can't conclude whether program awareness causes higher trust, or whether trust causes higher awareness, or whether some other variable causes both higher trust and awareness. These analyses are also dependent on which variables are included in our models: it's possible that factors we didn't measure are more important than those listed. Yet, while speculative, these analyses suggest that controlling for other variables, program awareness, more so than use, is associated with income over and above other demographic and behavioral factors, based on the set of predictors we included.

Conclusion

Although utilities provide a variety of bill and energy management programs, especially to LMI customers, research continues to document a persistent gap in uptake. This research contributes several key findings around household income and utility and program engagement.

Key Findings

Although LMI customers report more bill-related financial stress, they are similarly satisfied with their utilities, engage at similar levels with bill management services, and have lower awareness of most energy programs and services compared to HI customers. Specifically:

- LMI customers' higher levels of financial stress around utility bills does not correspond with greater utility engagement. In the last year, 32% of LMI customers report struggling to pay an electric bill, 3x the rate of higher-income customers, yet fewer report going on a

utility website for resources to reduce their bill or to change their rate, and only 17% have contacted their utility about a high bill or to ask for assistance in paying.

- Many demographic, behavioral, and attitudinal factors play a role in program awareness: the variance in program awareness explained by income alone is modest.
- Compared with HI customers, LMI customers have similar levels of awareness of bill management tools, and notably lower levels of awareness of energy saving programs and alternate rates. Although fewer LMI customers were aware of high bill alerts, LMI customers had similar levels of awareness of levelized billing, pre-pay, and bill projections. Yet LMI customer awareness was lower for all energy efficiency and rate programs listed, including those with potentially no upfront cost, such as tips, home energy reports, TOU rates, and demand response programs. The association between income and program and service awareness, although modest in magnitude, persists even controlling for other demographic, attitudinal, and engagement variables that we assessed. That is, income is associated with service awareness over and above utility engagement and other demographic and household factors.
- Income is associated with systematic differences in program use that mirror the differences in awareness summarized above: LMI customers have similar levels of use of bill management tools, and lower levels of use of a variety of energy saving programs. However, we find that this association is explained by other demographic and household characteristics. These findings align with those of Pigman, Deason, and Murphy (2021).
- With the exception of levelized billing, LMI customers' interest in programs is similar to or somewhat lower than interest among HI customers. This finding suggests that more changes are needed than simply increasing program awareness among LMI customers.

Recommendations

Findings suggest that income is just one variable that impacts utility engagement; there are a range of customer characteristics and behaviors that influence awareness and engagement with utility services. These include both demographic and household characteristics, but also past utility engagement behaviors (such as past program participation or use of bill management services), which this research shows strongly influence program participation. These findings have several implications for both the design and delivery of utility programs, many of which are beyond the scope of this paper. We highlight two related strategies for addressing the awareness and participation gaps identified: continuing to innovate message delivery channels and messengers to increase reach, and fundamentally rethinking the customer journey to increase engagement.

Utilities have long sought to position themselves as trusted messengers: if customers think of their utility as a resource for bill and energy management, they will be more likely to attend to targeted messages they receive and use their utility as a resource during critical energy-relevant decisions. Other delivery channels may be critical partners for the utility to reach and engage underserved audiences. Utilities should seek to innovate with communication channels and messengers, using channels and messengers that are trusted by the audiences they seek to reach. Partnering with messengers (such as community organizations, retailers, or other service providers) can be an effective strategy to reach and build trust with a wider audience (McKenzie-Mohr 2011) while reducing the information search costs associated with consulting an additional source of information during household decisions.

These findings further suggest the need to overhaul utility communications to better engage customers and reduce participation friction. One potential strategy, which some utilities are beginning to adopt, is to fundamentally reconceptualize disparate utility customer interactions with separately marketed programs into a more personalized, unified customer journey that acknowledges and maximizes the linkages between different customer interactions with the utility. Customer journeys help customers access the most relevant programs at the right times to reduce information search costs and participation barriers and improve customer experience and service uptake, improving the ability to:

- Identify and pre-qualify customers to reduce information search and signup barriers
- Provide more targeted customer education to motivate and reduce information overload
- Link programs together, including bill management with energy efficiency programs
- Maintain ongoing engagement with customers
- Market services through trusted partners

Personalized customer journeys must consider not just income but a range of customer characteristics and past utility engagement behaviors to successfully engage customers. For example, an LMI renter may receive a Home Energy Report optimized for LMI renters, linked to a product giveaway hub that offers free energy efficient products such as LED light bulbs. From there, a customer can receive High Usage Alerts to help them take action to reduce a high bill. A fixed income homeowner may receive a Home Energy Report that can help them plan in advance for emergency replacements, and links to an online utility marketplace with targeted offers that include a free or discounted smart thermostat with demand response program enrollment.

Another example of a personalized customer journey applies to increasing awareness and reducing barriers to participation in income-qualified LMI programs. Many current LMI-focused programs, such as the Low Income Home Energy Assistance Program (LIHEAP), require participants to demonstrate eligibility and periodically reapply specifically for that program, creating friction that reduces participation. In the absence of automatic enrollment, program administrators can work together to combine program renewals with other targeted program offerings (integrated into an overall customer journey) to make it easier for customers to find and enroll in all relevant programs and services. For example, one LIHEAP application asks applicants if they are also interested in home weatherization and community solar programs (DOEE, 2022). The relevant program administrator can then establish eligibility and follow up with interested applicants about these other energy-saving programs. These types of bundled offerings and enrollments can reduce friction and barriers, and increase program engagement.

These are just a few examples of potential innovations in customer communication strategies to increase awareness and engagement. A variety of larger, systematic changes to program designs are likely needed to fully address this gap in the long-term. These changes may require regulatory changes to increase the flexibility of programs and further concentrate financial and program resources on underserved customers. As utilities adopt new communication strategies and innovate service designs, it is critical for utilities to collect data to monitor participation across customer characteristics, and conduct analyses that facilitate tracking progress to ensure that customers who can most benefit from utility-provided energy and bill management services are receiving them.

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