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Disbursing Emergency Relief through Utilities: Evidence from Ghana

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Abstract

We provide descriptive evidence on the challenges in efficiently, effectively, and fairly distributing in-kind electricity transfers to households. We collect panel data from 1,200 households eligible for Ghana's COVID-19 electricity relief program. Distributing relief through electricity transfers enabled an immediate response to the crisis. Theoretical efficiency concerns are mitigated because transfers were inframarginal and storable for most households. Transfer receipt may have increased support for the governing party, possibly due to obfuscation of the program's financial burden. However, the program was regressive in design, and implementation challenges—delays, technological hurdles, information constraints, and the targeting of meters rather than households—add to inefficiency and regressivity. Households receiving the least average relief are those who use less electricity, pay a landlord or other intermediary for electricity, or share an electricity meter—characteristics of low-income households. Program implementation challenges were just as important as design features in determining program costs and benefits.

JEL: D04, O12, O13, H23, L94, Q48

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1 Introduction

Governments often take steps to provide for a society's most vulnerable members, particularly during economic downturns or other unanticipated crises. As the COVID-19 public health crisis spread, often closely followed by deep economic downturns that disproportionately affected the poor, many governments responded by expanding or introducing transfer programs. These were often in the form of energy subsidies: the Gentilini, Almenfi, and Dale global database reports that 112 countries—including Ghana—increased financial support for utility payments or other financial obligations in response to the COVID-19 pandemic. Support in the energy sector included payment deferrals, electricity transfers, and price reductions and freezes. Energy subsidies were already common before 2020 (Coady et al.), and in Ghana their structures were often regressive,[1] but the design and on-the-ground implementation of these programs can also meaningfully affect their impacts.

In this paper, we study the results of expanding energy subsidies for the specific purpose of providing social support during unanticipated crises. We surveyed households before, during, and after the electricity relief program announced by the government of Ghana in April 2020. Our detailed household-level panel data allow us to assess the program's efficiency, distributional, and political implications as directly experienced by intended recipients, factoring in not only design decisions but also on-the-ground logistical challenges that affect the program's impact. While the program was largely implemented as designed, we find that some of the most needy households—such as renters and low consumers—received the lowest benefits. And, the program may have served as clientelism prior to a presidential election.

Ghana's electricity subsidy program promised monthly transfers of 50kWh (worth 3.50 USD) for April-June 2020 to 'lifeline' customers (those who used less than 50kWh per month at baseline), and monthly transfers worth 50% of baseline usage for all other residential customers (ECG). The government eventually extended the 50kWh transfers for lifeline customers through March 2021. We use survey data related to energy consumption and political perspectives collected during a baseline round in 2018-2019 and across three rounds of surveys between May and October 2020, each with more than 1,200 respondents connected to electricity in Accra.

First, we consider how program design and implementation affect the efficiency and expediency of transfers. Theoretically, in-kind transfers may constrain consumption away from the welfare maximizing bundle. But this concern may not hold in practice (Bruce and Waldman; Currie and Gahvari; Gadenne et al.; Hirvonen and Hoddinott), especially when transfers are inframarginal (Southworth; Cunha). This was largely the case in Ghana, since transfers were based on March electricity usage and could be saved indefinitely. We find that 45% of households valued electricity more than an equivalent amount of cash, many noting that they would have used the money for electricity anyway. This is encouraging because by leveraging the existing electricity payments

[1] Keener and Banerjee provide a detailed account of tariff reforms, including household impacts of tariff increases and the national targeting of Ghana's lifeline tariff. Younger simulates policy changes to Ghana's electricity tariffs and subsidies to approximate their distributional impacts on household income.

infrastructure, the government avoided the cost and time of establishing or expanding an alternative distribution system (Allotey; IPA 2020). Still, this did not preclude delays or exclusion of designated recipients. Only 46% of households had received a transfer after the first month of the program, and one-third of households still reported never having received any transfers after the third month.

Second, building on a large literature studying the distributional impacts of energy transfers (Komives et al.; Basurto, Dupas, and Robinson; Borenstein; Younger), we identify numerous channels of regressivity, not only in the program's design but also in its implementation. A transfer proportional to baseline usage implies larger transfers to bigger users, who are likely wealthier. Households without electricity, who are generally poorer, did not receive a cash substitute. Importantly, even among connected households, lower-income households are less likely to have ever received any relief. Lifeline customers are 19 percentage points less likely to have ever received the transfer even though they were eligible the longest. Households that pay for electricity through an intermediary such as a landlord do not receive the transfer if it is not passed through: they are 13 percentage points less likely to have ever received relief.

Finally, building on existing evidence on the political economy of energy support programs (Briggs; Kojima, Bacon, and Trimble; Strand; Wolfram et al.), we consider the program's clientelistic government objectives prior to Ghana's closely contested December 2020 Presidential election. Satisfaction with the program was 94% among respondents who had received the transfer, and 72% even among those who had not. Support for the incumbent party is 7% higher among those who had received the transfer. Ex ante political affiliation does not predict receipt, and the results persist even when including respondent fixed effects. While we cannot directly establish causality, these results suggest that the subsidies increased support for the government.

Financial sustainability is a widespread concern among electric utilities in Africa—companies in only two out of 39 countries are recovering their operational and capital costs (Kojima and Trimble)—yet little attention was paid to the program's significant cost. The government may have gained political support by emphasizing the benefits without discussing the costs. To quantify this, we prompted respondents to consider that the cost may need to be recovered through higher electricity tariffs in future years. Satisfaction with the transfers fell by nearly 50%. In fact, 52% of respondents would prefer not to receive any relief even if their electricity costs next year increase by only a *quarter* as much as the transfers they receive this year. Government decisions and household beliefs about cost recovery therefore have important implications for relief program support.

2 Context and data

The first cases of COVID-19 were confirmed in Ghana on March 12, 2020. On April 9th, the government announced electricity and water relief programs in response to associated economic challenges, with the goal of *"mitigating the effects of the pandemic on the social and economic life of the country"* (Akufo-Addo). During the strictest lockdown period, the government provided free food and other essentials to some households in Accra and Kumasi. But Ghana's Deputy Minister

of Finance noted that the government lacked "*a formalized means that allows [it] to deploy cash or intangible benefits to the needy in society,*" and that electricity was among the only channels available (Allotey).[2] If the government's goal was to rapidly transfer resources to all Ghanaians, with the strongest support for the poorest and those worst affected by Covid, then these logistical and technological constraints may have forced the government to make trade-offs between these goals.

Electricity transfers would reach most households in Ghana: 82% are connected to electricity, including 94% in Accra. The Electricity Company of Ghana (ECG) distributes electricity to 4 million customers in Southern Ghana (ECG). Customers are defined at the meter level: one individual might have two meters, one at their home and one at their business, and conversely, a single meter may serve multiple households.

ECG registers post-paid and pre-paid meters, but most meters in Accra are pre-paid. Customers with a post-paid meter may use any amount of electricity, and are billed ex-post. Customers with a pre-paid meter may only use electricity paid for in advance by purchasing electricity credit from ECG branches or local shops that act as vendors. A minority of pre-paid meters—7% in our sample—are 'smart' meters: these customers can buy credit online. Once customers use up their pre-paid electricity, their electricity is shut off until they buy credit; most customers avoid this by preemptively 'topping up'.

2.1 The COVID electricity relief program

The transfer amount for each customer was based on their March 2020 electricity usage (ECG). 'Lifeline' customers, who used less than 50 kWh in March, would receive a transfer of 50 kWh in free electricity monthly (worth 3.50 USD) for April through June.[3] All other customers would receive a transfer worth 50% of their March usage. For example, a customer who used 30 kWh of electricity in March would be eligible to receive transfers worth 50 kWh of electricity each month, while a customer who used 120 kWh of electricity in March would be eligible for 60 kWh each month.[4] In July, the government extended electricity relief for lifeline customers through December 2020, later extended through March 2021. Around 28% of ECG customers are lifeline households (Amoh), compared to 13% in our sample, due to our focus on urban Accra.

Post-paid customers would see the transfer applied automatically to their bill. Since bills often arrive with a delay of two or three months, the transfers were also frequently delayed. While ECG did not implement a formal moratorium on disconnections, it is common for post-paid customers to carry over a negative balance on their accounts—even for multiple months—without being disconnected.

For pre-paid customers, the transfer would be applied as credit each month. Accounts for

[2] Ghana's Livelihood Empowerment Against Poverty (LEAP) Program, introduced in 2008, provides bimonthly cash transfers to over 330,000 households, targeting the extreme poor and mostly focused on northern Ghana. LEAP provided an additional one-off round of transfers to beneficiaries in May (Dadzie and Raju). It is not clear if any expansion of this program during the pandemic would have been feasible.

[3] For comparison, monthly household energy spending in Ghana averages 10 USD (Ghana Statistical Service).

[4] Figure A3 shows the distribution of monthly transfer amounts among recipients.

customers on 'smart' pre-paid meters would be automatically credited. Customers on 'non-smart' pre-paid meters would receive the transfer the first time they purchased credit at a shop or branch office each month. For these customers, transfer eligibility was determined by having them swipe a card on their meter and present that card at the time of purchase for the vendor to read their usage (ECG). This is a standard requirement for topping up that customers were already familiar with. For both types of customers, if any credited transfer amount remained unused at the end of the month, it would be carried over to the next month. Electricity credit cannot be refunded for cash.

2.2 Sample and data

We survey 1,245 ECG customers in Accra who had participated in a related study in 2018-2019 (Klugman et al.).[5] Each respondent was surveyed two or three times across three rounds of data collection between May-October 2020.[6] The survey collected data on demographics, electricity usage and spending, consumption, credit, government relief, and government perceptions (see Appendix C for more detail).

We compare our sample to households in Accra surveyed by the Ghana Statistical Service (GSS) across three surveys designed to be representative. Our respondents are somewhat younger, as the GSS surveys household heads; otherwise our sample is roughly representative of Accra (see Table A1).

91% of households in our sample have a pre-paid meter, and 13% would be considered lifeline customers using reported electricity expenditures in March to proxy usage. 26% pay an intermediary (often a landlordwe use these terms interchangeably) for electricity—the remainder pays ECG directly. 46% of households share a meter, with around 3-4 other users (Table A2 contains sample summary statistics). Lifeline customers are significantly more likely to pay an intermediary for electricity and to share a meter (Table A3).

In each round, we ask respondents whether they have ever received an electricity transfer, and the amount they received in the last 30 days. While these self-reports could be inaccurate if households receive the transfer without knowing it, this is unlikely for several reasons. First, awareness of the program is high (97% in round 1). Second, respondents have a good sense of their electricity spending, so they should notice a sizeable reduction in electricity costs. Finally, customers' itemized receipts or bills would clearly show additional credit.

3 Efficiency

In-kind transfers can be inefficient if they constrain the consumer away from the optimal consumption bundle, but this can be avoided if the transfer is inframarginal. And, absent a direct financial relationship between government and households, in-kind transfers can leverage existing distribu-

[5] Figure A2 shows approximate respondent locations.

[6] 87% of respondents are surveyed in all three rounds; 13% in two rounds. Figure A1 displays a timeline.

tion infrastructure. In-kind transfers may also offer protection against price volatility, though that is less important for goods whose prices do not typically fluctuate, such as electricity. The efficiency of in-kind transfers is thus an empirical question.

3.1 Inframarginal transfers

Ghana's electricity transfers are unlikely to be inframarginal for most lifeline customers, who used less than 50 kWh in March but received 50 kWh each month. While they should be inframarginal for non-lifeline customers, who received 50% of baseline electricity usage in relief each month, they may not be inframarginal if usage falls significantly, which may happen during an economic crisis.

That said, the sum of electricity purchases and transfers received does not change relative to March 2020, and if anything increases slightly, suggesting limited reductions in electricity use. Furthermore, 98% of households that report receiving electricity transfers in the last 30 days still purchased electricity in that period. Though some of these purchases may have preceded transfer receipt, spending on top of the transfer amount indicates that transfers were inframarginal for most customers.

Importantly, electricity credit can be stored indefinitely. For recipients with access to liquidity, even transfers that exceed monthly usage may thus be inframarginal. However, for recipients with liquidity constraints, stored electricity credit cannot fund non-electricity consumption in the short term.

To investigate whether households' optimal consumption is constrained by offering electricity rather than cash transfers, we use contingent valuation to elicit respondent willingness to pay (WTP) for electricity.[7] Figure 1 shows the results. 45% of respondents prefer the electricity transfer to an equivalent or larger amount of cash. The median household values 50 GHS of electricity at 35-50 GHS in cash,[8] and the mean value across households is 50.1 GHS.

[Figure 1]

Respondents who prefer the electricity transfer provide several reasons. 62% "*would use the money for electricity anyway*", indicating that an electricity transfer covers inframarginal expenditures. Second, some see it as a commitment device: 37% stated "*I worry that I will spend the money on something else*". Third, transaction costs are high: 21% state that "*it takes too much time/effort to top up electricity*". Further discussion of reported preferences for electricity over cash is included in Appendix C.

On the other hand, 20% of respondents would prefer even just 25 GHS in cash to 50 GHS in electricity. These may be liquidity-constrained or low users of electricity. Lifeline customers appear more likely to prefer cash to an electricity transfer, but the difference is not large or significant. Those who had never received the electricity relief have a greater preference for cash—they may not

[7] Appendix C provides more information on the elicitation method.

[8] In other words, the respondent prefers 50 GHS in cash to 50 GHS in electricity, but prefers 50 GHS in electricity to 35 GHS in cash. We did not offer choices between 35-50 GHS.

trust that they will receive the transfer. Respondents who pay a landlord or other intermediary for electricity strongly prefer cash over electricity, which we explore more in Section 4.2.

We discuss how transaction costs may drive preferences between cash and electricity transfers in more detail in Berkouwer et al. For the purpose of studying efficiency, in aggregate households do not clearly prefer cash over electricity, suggesting limited efficiency losses from providing relief through an electricity transfer.

3.2 Implementation efficiencies

After implementing strong restrictions on movement and business when the pandemic hit Ghana, the government sought to distribute relief as quickly and broadly as possible. By working through existing transfer systems, governments without existing cash transfer structures circumvent the need to set up novel transfer systems, which could hasten relief. Ghana does not have existing systems to easily and broadly provide cash transfers to households (Allotey; IPA 2020), meaning cash transfers would have been costly and slow.[9] ECG has a direct financial relationship with about 4 million customers (ECG), which allowed some households to begin receiving relief on May 1, only 1.5 months after the first confirmed COVID-19 case in Ghana.[10]. By the end of May, 46% of respondents had received a transfer.

Still, most households experienced delays and many never received relief. By the final survey round in September-October, 31% of respondents reported still having never received any relief (Figure 2). This contradicts ECG reports, which by late May claimed "99.98%" of pre-paid customers had received their benefits (ECG). While 50% of households who had not received any transfers in May stated they thought their transfer was likely delayed, by September fewer than 20% attributed their non-receipt to delays. Instead, almost half of respondents thought it was due to government incompetence, and 8.5% of respondents who never received a transfer attributed this to government corruption.

[Figure 2]

In July the program was extended for lifeline customers, but the sharp drop in transfer receipt starting in August includes lifeline customers, raising questions about the implementation of this rule (Figure 2).[11]

It is unclear whether attempts to provide relief through a different channel would have been more effective. The lack of existing alternatives suggests any other mechanism would also have suffered from delays and limited receipt. Indeed, according to the GSS, 78% of communities did not receive free water despite this being the government's other main relief program (Ammah).

[9] Livelihood Empowerment Against Poverty (LEAP) provides monthly cash transfers to over 330,000 poor households (primarily in northern Ghana), but reaching this population required many years of outreach. The costs of expanding this program during the pandemic may have been high.

[10] For comparison, CARES relief checks were distributed 1.5 months after the first COVID-19 case in the U.S.

[11] We proxy lifeline status with March electricity expenditures for households, while actual lifeline status was determined at the meter level based on March usage.

Technical hurdles in the distribution process may have contributed moderately to non-universal receipt. First, ECG notes that some pre-paid customers failed to swipe their cards on their meters to verify their transfer eligibility (ECG). But this was already a requirement for pre-paid topups before the pandemic, and an experiment where we provide this information to a random subset of participants did not increase receipt. Second, slow billing may have delayed transfers initially, but only half of post-paid customers had received any transfers by October, even though by then nearly all post-paid customers had received bills for April, and surveyors encouraged respondents to review their bills to check if they had received it. Third, ECG indicated that customers who had tampered with their meters did not receive transfers (ECG), however there is no indication that meter tampering is widespread. Finally, relief for pre-paid customers was conditional on purchasing credit, but pre-paid respondents report topping up electricity twice monthly, and fewer than 6% indicated that it had been more than a month since their last purchase, with no difference in the mean number of days since the last electricity purchase between those that did and did not receive the transfer. While these technical difficulties were specific to ECG's infrastructure, utilities elsewhere may face similar difficulties that could meaningfully affect implementation. That said, it appears unlikely that they can account for the large share of households yet to receive any transfers after 5 months in Accra.

In addition to these technical aspects, the targeting of transfers to electricity meters rather than households may also account for incomplete receipt, as intermediaries may have skimmed part of the transfer. We discuss this further in Section 4.2.

Despite these shortcomings in implementation, the program successfully transferred aid to many households in Accra in a reasonable timeframe. A cash transfer program to disburse aid in response to the pandemic rapidly and to such a large population might not have been feasible.

4 Distributional implications

Next we consider the program's distributional implications. An obvious concern with providing relief through electricity is that unconnected households are excluded. 18% of Ghanaian households, and 25% of rural communities, are unconnected, and they did not receive a substitute for the electricity transfer (Ammah; The World Bank). According to Afrobarometer (2017) Round 7 data for Ghana, unconnected households are more likely to be located in rural areas, go without food, water, or cash income more frequently, and have received no or limited formal schooling. Thus, eligibility for this form of transfer is regressive.

4.1 Regressivity in transfer amount and receipt

As with any proportional subsidy, the program design was regressive: those with baseline usage above 100 kWh per month—who are likely also wealthier—were to receive the largest transfers. This is particularly inefficient if the utility of electricity use is concave. In this respect, the extension of the relief program after the first three months for lifeline customers only is less regressive, but

as discussed in Section 3.2, the gap in transfer receipt by lifeline status narrowed only slightly in practice. Table 1 shows that lifeline customers are 18 percentage points less likely to have ever received the electricity transfer. Ownership of electric appliance types—a proxy for household wealth—is also positively associated with transfer receipt.[12]

[Table 1]

By the third survey round, lifeline households had been eligible for five months of transfers while non-lifeline households had been eligible for only three months. Despite this, expected non-lifeline transfers exceed lifeline transfers, and actual transfers are increasing in baseline electricity spending (Figure A4).

4.2 Distribution via an intermediary

When transfers are distributed via an intermediary (e.g., food transported by distributors, water flowing via utilities and landlords, or agricultural inputs distributed by community leaders), the risk exists that they skim part or all of the transfer value. Households that do not directly pay ECG for electricity will not receive the transfer unless it is passed through. In our sample, 46% of respondents share a meter and 26% pay an intermediary for electricity, meaning another party may capture the transfer for the meter used by these households. In this case, while the transfer may reach the meter as intended, it does not reach all households using the meter. By August-October 74% of households that pay for electricity directly had received relief, compared to 53% of households that pay an intermediary (Figure 2).

Table 1 shows that respondents who pay a landlord or another household for electricity are 12.5 percentage points less likely to have ever received the transfer controlling for indicators of wealth, including appliance ownership and lifeline status. Figure 2 shows that this gap persists over time, suggesting intermediaries do not merely delay the transfer. This exacerbates regressivity since households that pay a landlord have less wealth on average than landlords or households that manage meters: they own fewer appliance types and generators, a reasonable proxy for wealth in the absence of wealth measurements, and are more likely to be lifeline customers. This negative correlation between renter status and socioeconomic well-being holds in our sample (Table A3) and across Ghana more broadly: according to the GSS (2019), households that rent their dwelling have fewer rooms, lower likelihood of having their own bathroom, lower likelihood of having a cement wall, lower monthly electricity spending per capita, fewer mobile phones, and lower likelihood of having a computer (all with $p<0.05$), relative to households that own their dwelling.

Imperfect pass-through may occur for several reasons. Households depend on their intermediary to accurately report transfer receipt: only the intermediary observes this. And, 53% of households that pay an intermediary for electricity report paying a fixed periodic amount. Even if some households know to ask for a lower payment, the terms of their rental or meter use agreement may rule out a rebate, such that the benefit will accrue entirely to the landlord.

[12] Because all surveys were conducted over the phone, direct questions on household wealth were excluded.

This result also applies to the government's water relief program. Respondents who pay a landlord for electricity—assumed more likely to also pay the landlord for water—are 10 percentage points less likely to have ever received the water transfer (Table A4). Capture of government relief by intermediaries will particularly exacerbate regressivity in urban areas: 39% of urban households in Ghana rent their dwelling compared to 14% of rural households (GSS 2019).

4.3 Shared electricity connections

Additional regressivity may arise through local housing structures. It is common in Accra for multiple families to share a meter. 29% of respondents who pay ECG for electricity share a meter with at least one other user (5% share with five or more other users), while 98% of households who pay an intermediary share their meter with other users (32% share with 5 or more other users). 72% of lifeline households share a meter with at least one other user, compared to 42% of non-lifeline customers. These households might individually be considered lifeline and therefore be eligible for the full transfer if they had their own meter. However, their combined monthly usage at the meter level may exceed the lifeline threshold, warranting only 50% relief rather than the 50 kWh transfer that their individual household usage would warrant.

5 Political Implications

The provision of public goods prior to an election has frequently been found to serve clientelistic goals by increasing support for the incumbent (Ferraz and Finan; Golden and Min; Min; Casey; MacLean et al.; Wolfram et al.). There was widespread support for Ghana's relief program, and our surveys suggest there was partial obfuscation of its significant costs. By implementing a large multi-month electricity relief program, the government of Ghana may have gained significant political support in the months before the December 2020 presidential election.

5.1 Program support

Support for the program is high: 94% of respondents who had received transfers, and 72% of those who hadn't, indicated satisfaction with the program (Figure A5). While we find no evidence that transfer receipt significantly increases household consumption or improves food security (Table A5), it does appear to decrease electricity spending, the amount of times customers need to top up their meter, and instances of households losing power due to lack of electricity credit (Table A6).

Columns 1-3 of Table 2 show that support for the incumbent—the New Patriotic Party (NPP)—is 7-8% higher among households who had received a transfer relative to households that never received one. The association among those receiving the transfer in the last 30 days on government support is slightly larger than the effect of receiving it earlier. These correlations appear to be driven by neutral respondents shifting towards favoring NPP, with a smaller reduction in pro-opposition attitudes, rather than increased support among existing supporters (Table A7). Data from a short follow-up survey indicates that measures of government support are correlated with

whether respondents voted in the November 2020 election (Table A10). Given that the NPP won the election by about 4 percentage points nationally, the political gains from the relief program are substantial.

[Table 2]

Three additional results help interpret the correlation between government support and transfer receipt. First, to account for the potential bias introduced by household characteristics that are correlated with political perspectives—Table 1 shows that these are associated with transfer receipt—the regressions in Table 2 control for all of these variables. Second, fixed effects regressions take advantage of variation in when households received relief. Even within households, transfer receipt increases government support, though the magnitudes are smaller (column 4 of Table 2), alleviating concerns about omitted variables that vary across recipients. Fixed effects estimates are also unchanged after including the same controls as in columns 1-3. Third, Table A11 replicates column 4 of Table 1 adding controls for political perspectives collected during 2018-2019 surveys.[13] Baseline political support does not predict transfer receipt, ruling out reverse causality, and estimated impacts are similar with and without controlling for prior support for NPP. While our empirical design does not let us establish causality, the results suggest transfer receipt affected political support.

5.2 The aversion to cost recovery

The government expected to spend 510 million USD between April and December on the relief program (ECG; GhanaWeb; ECG), representing 1% of Ghana's 2019 GDP, 3.4% of 2019 government expenditures and 44% of ECG annual revenues (Ofori-Atta; ECG).[14] The government has not publicly discussed how it will finance this. Does public attention to the program's costs affect its broad support? To test this, we present households with a hypothetical scenario in which ECG increases future electricity tariffs to recover costs. We use an incremental guided search to elicit WTP for electricity transfers in terms of increased electricity costs next year. The approach is described in detail in Appendix C. Respondents choose whether they prefer to receive an electricity transfer today and repay some proportion in one year through temporary increases in electricity costs, or to not receive anything. The highest proportion of the transfer the respondent is willing to pay through increased electricity costs is taken as their WTP for the transfer.

When prompted with the possibility of future tariff increases, program satisfaction falls by nearly 50% (Figure A5), 79% of respondents would not want any electricity relief if the amount received this year is exactly offset by an increase in electricity costs next year (Table A12). In fact, most respondents (52%) would not even accept paying a *quarter* of the transfer amount in

[13]The sample size is lower because only a randomly selected half of respondents completed these surveys. Mean transfer receipt and correlations between household characteristics and transfer receipt are similar for this subset compared to the rest of the sample.

[14]The US Government spent over 2 trillion USD on the CARES Act COVID-19 relief program, 45% of total government spending in the fiscal year ending September 2019 Berger.

extra electricity costs next year to receive relief (Figure 3). Respondents exhibit strong negative reactions to reminders that the government will somehow need to recover the program's costs, and display greater aversion to future electricity cost increases than on decreasing their current electricity spending. The initial widespread satisfaction with the relief program indicates inattention to potential future costs, or the hope that those costs would be borne by others.

[Figure 3]

The aversion to increased future costs could reflect generic intertemporal preferences or be specific to electricity. To test this, we offer respondents numerically equivalent options for a cash loan. WTP for a cash loan is substantially higher than for an electricity "loan". Fewer households reject a cash loan if they have to repay the same amount next year (41%) than reject electricity relief under the same conditions (79%). 50% of respondents are willing to take a loan even if repayment includes interest: 12% of respondents are willing to take a loan even with 75% annual interest. Aversion to debt or uncertainty about future liquidity therefore cannot fully explain the rejection of electricity transfers under repayment.

Those who reject electricity transfers if the same amount must be repaid are much more likely to cite uncertainty about their financial situation next year than those who reject the loan (51% to 6%; Table A12). The flexibility of cash may be preferred under uncertainty as it preserves more consumption choices. The result may also reflect mental accounting—respondents may budget for fixed monthly electricity spending (Thaler)—or higher disutility from unpaid bills than delays in loan repayment. Finally, this reaction also reflects dislike for unfairness (Kahneman, Knetsch, and Thaler): 47% report objections to having to repay something presented to them as free.

It is unlikely that this result is due to differential expectations about delivery of the transfer. Very few respondents (6%) reject the electricity transfer because they do not believe they would receive the full amount, and the distribution of responses does not vary with transfer receipt or by whether the respondent pays for electricity directly or via an intermediary.[15] Furthermore, while bill arrears represent utility debt for post-paid customers, which could lower demand for intertemporal borrowing of electricity, only 9% of respondents in our sample are connected through a post-paid meter and this is not correlated with the decision to reject electricity transfer that must be repaid.

The greater WTP for cash than electricity when there is repayment involved contrasts with the finding that 45% of households prefer electricity to cash when there is no repayment. This suggests households are reacting to something particular to electricity. Customers may believe that an increase in electricity charges by ECG would become permanent, or that their future electricity use will be greater than at present.

This result has important governance and political implications. Government decisions and public beliefs about cost recovery will have significant implications for political support for relief programs. The Africa Centre for Energy Policy feared the transfers would exacerbate ECG's existing

[15] Transfer receipt and amount have no significant relationship with transfer tradeoff decisions, but respondents that are more satisfied with the relief program are less likely to reject the transfer (Table A13).

financial challenges (GhanaWeb). Critics argued that it was a populist move by the government ahead of elections, made with little regard for its impact on government expenditures (Allotey).

6 Conclusion

We evaluate the efficiency, distributional, and political implications of an electricity relief program in Ghana that was implemented in response to the economic distress caused by the COVID-19 health crisis. Our unique data on transfer receipt allow us to study these dimensions of the program in a manner that incorporates not only the statutory design but also the on-the-ground implementation. The implementation complexities strike us as fairly fundamental in their nature and may be present in many of the countries that use energy subsidies to provide relief to vulnerable members of society.

We find that electricity transfers are largely inframarginal to counterfactual electricity use, and leveraging the utility's existing customer relationships circumvented the need to establish a novel cash transfer infrastructure. Despite this expediency advantage, we identify several logistical, technological, and informational challenges that affected on-the-ground implementation. As a result, a large proportion of households report never receiving any electricity transfer, and transfer receipt is regressive. Households using more electricity receive larger transfers, and the poorest households are less likely to have ever received electricity transfers. Households paying an intermediary for electricity, sharing a meter, spending below the lifeline amount for electricity in March, and having fewer different appliance types—all correlated with lower household wealth—are less likely to have ever received any transfers. Incomplete pass-through of transfer to households who pay an intermediary for electricity may account for part of the gap in transfer receipt, and may apply to other government relief programs that do not target households directly.

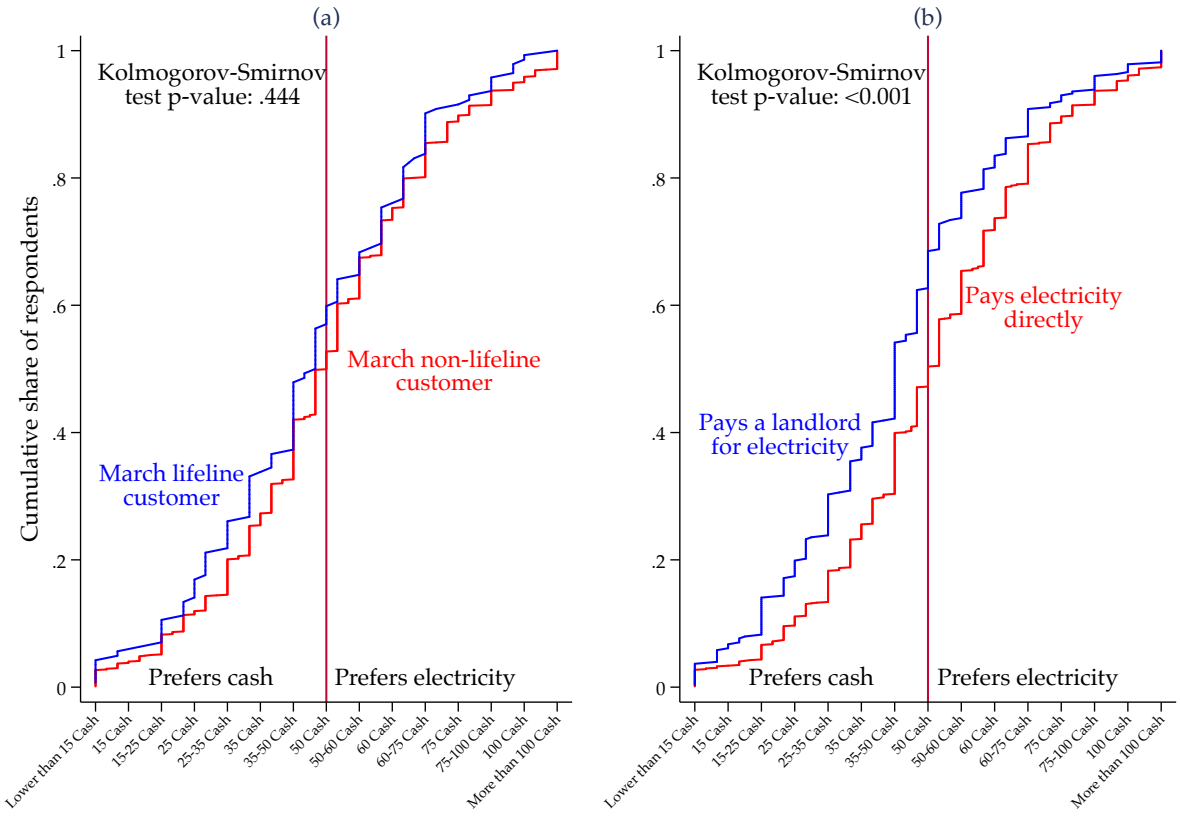
Finally, the program increased support for the incumbent party in an election year. This support wanes when respondents are prompted with the possibility that future electricity tariffs may increase to fund program costs. Most respondents would prefer to not receive any electricity transfers this year if they have to repay even a fraction of it next year. This is important given the severe financial constraints faced by many African utilities.

This analysis generates several tangible policy findings. First, a uniform rather than a proportional electricity transfer would be more progressive, and possibly easier and less costly to implement. Households would know the amount they were entitled to, which might provide accountability and increase pass-through by intermediaries. Inframarginal transfers are less likely to be distortionary, which is an advantage of goods that can be stored. Second, programs where transfers are disbursed to units other than households should attend to the possible exclusion of certain categories of households. Mechanisms incentivizing intermediaries to pass on aid to households would improve the reach of such programs. Third, relief programs' political support and welfare impacts depend on how the costs are eventually distributed. If energy subsidies worsen the financial situation of utilities, leading to issues with energy supply to customers or to price increases passed on to consumers, some households may be worse off. Further research is needed to determine how design features

and implementation constraints affect the costs and benefits of a government electricity transfer program during an economic crisis, particularly when the need for immediate, well-targeted relief is high but government options for providing support are limited.

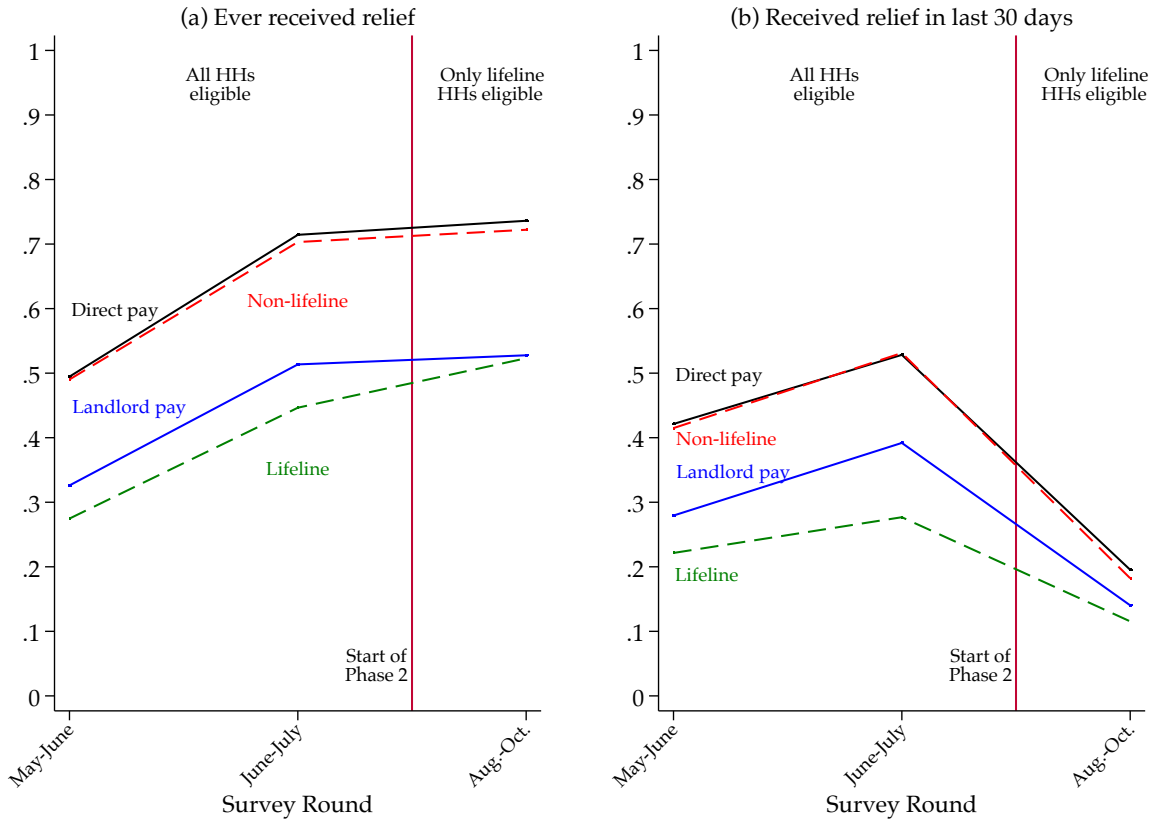
Figures

Figure 1: Distribution of willingness to pay for a 50 GHS electricity transfer



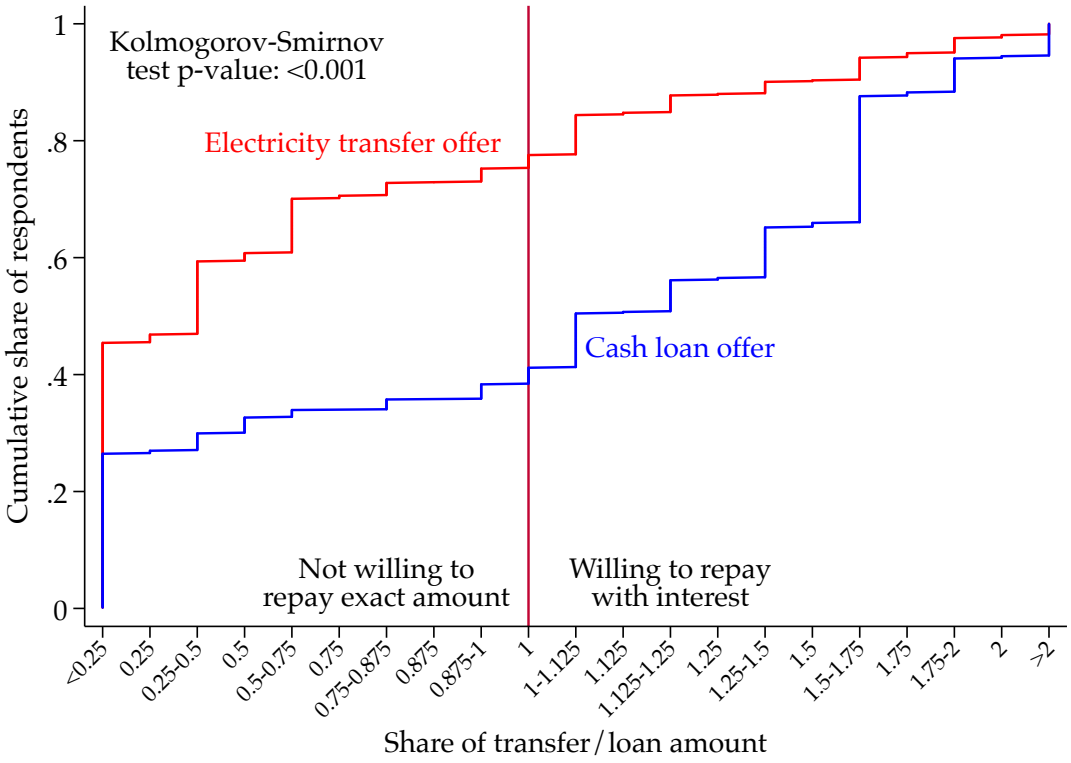
The figures show the distribution of the highest offered cash transfer amount which respondents would **reject** in favor of a 50 GHS electricity transfer, during an elicitation exercise where respondents are prompted with a series of hypothetical choices between receiving a 50 GHS electricity cash transfer or receiving a specific cash transfer amount. The red bar indicates valuing cash and an electricity transfer equally. Households to the right of the red bar rejected cash transfers larger than 50 GHS, preferring a 50 GHS electricity transfer. Values are mean willingness to pay within households across rounds. Panel (a) compares the distribution by whether households are considered 'lifeline' based on their March 2020 electricity spending. Panel (b) compares the distribution by whether households pay for their electricity directly to ECG or via an intermediary such as a landlord. The p-values in the top left are the results of Kolmogorov-Smirnov test of equality of distribution functions.

Figure 2: Share of respondents receiving electricity relief, by payment method and lifeline status



The relief program was announced April 9, 2020 and the first transfers were made on May 1. The red bar indicates the transition from phase 1 to phase 2 of the program. Lifeline status is proxied by reported March electricity expenditures being below the cost of 50 kWh, the lifeline threshold. 'Landlord pay' indicates payment to any intermediary for electricity, while 'Direct pay' indicates paying for electricity directly to the utility or their agent.

Figure 3: Distribution of highest amount willing to repay in one year's time for a cash loan or electricity transfer today



Respondents are presented an iterated sequence of dichotomous choices between either receiving a cash loan or electricity transfer today and repaying some share in one year's time, or receiving nothing. The red bar indicates being willing to repay the exact amount of the transfer or loan in one year. Households to the right of the red bar are willing to repay the loan or transfer today with interest in next year while households to the left of the red bar are only willing to accept the loan or transfer today if they repay less than the principal. The offered transfer amount in the electricity repayment scenario varied by respondent to reflect their actual or expected relief under the government pandemic relief program. The median amount offered was 240 GHS and the mean was 300 GHS. In the generic loan scenario, respondents were randomly offered a loan of either 120, 240, or 360 GHS. The p-value in the top left is the result of a Kolmogorov-Smirnov test of equality of distribution functions.

Tables

Table 1: Correlates of electricity transfer receipt

	(1)	(2)	(3)	(4)	(5)	(6)
Pays landlord/other household for electricity	-0.190***	-0.160***	-0.145***	-0.145***	-0.125***	
	(0.029)	(0.033)	(0.032)	(0.033)	(0.034)	
Prepaid meter		0.203***	0.198***	0.195***	0.214***	0.248***
		(0.049)	(0.049)	(0.049)	(0.052)	(0.066)
Electricity spending in March (USD)		0.001	0.000	0.000	-0.001	-0.001
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Sum of appliance types held			0.016***	0.016***	0.015***	0.018***
			(0.004)	(0.004)	(0.004)	(0.004)
Lifeline customer according to March spending					-0.186***	-0.198***
					(0.043)	(0.045)
Shares meter with other users						-0.062**
						(0.028)
Observations	3339	3098	3098	3092	3055	2898
Dep. Var. Mean	0.594	0.603	0.603	0.603	0.604	0.604
Additional Controls	No	No	No	Yes	Yes	Yes

The dependent variable is a dummy for ever having received an electricity transfer at the time of the survey. SEs clustered at household level. Week and day of week fixed effects included but not shown. Additional controls included in columns 4-6 include respondent gender and age, counts of adults and children in the household, whether the household also operated a business at the same location when the household was originally surveyed in 2018-19, and whether the household has a generator.

Table 2: Respondent support for governing party and transfer receipt

	(1)	(2)	(3)	(4)
Received electricity relief in last 30 days	0.271***	0.293***	0.308***	0.111**
	(0.046)	(0.076)	(0.074)	(0.052)
Received electricity relief but not in last 30 days	0.230***	0.242***	0.240***	0.058
	(0.050)	(0.074)	(0.072)	(0.057)
Baseline - Overall Govt/NPP support (1-5)			0.215***	
			(0.036)	
Observations	3065	1406	1406	3311
No Transfer Mean	3.486	3.412	3.412	3.506
Household Controls	Yes	Yes	Yes	No
Household Fixed Effects	No	No	No	Yes
Sample	All Households	Households with Baseline	Households with Baseline	All Households

SEs clustered at household level. Week and day of week fixed effects included but not shown. The dependent variable is the enumerator's overall assessment of the respondent's support for the governing political party NPP, based on their responses to questions on the government's performance on specific issues. The assessment is on a scale from 1 to 5 where 1 reflects very unfavorable views of NPP (or alternatively very favorable views of the opposition) and 5 reflects very favorable views of NPP. The control variable for the respondent's baseline political perspective during 2018-2019 surveys is defined similarly. A description of the political variables included in our analysis is included in Appendix C. The magnitudes are similar when considering other measures of respondent political perspectives (Table A8). Considering impacts of transfer amount received instead of dummies for receiving a transfer also gives similar results (Table A9).

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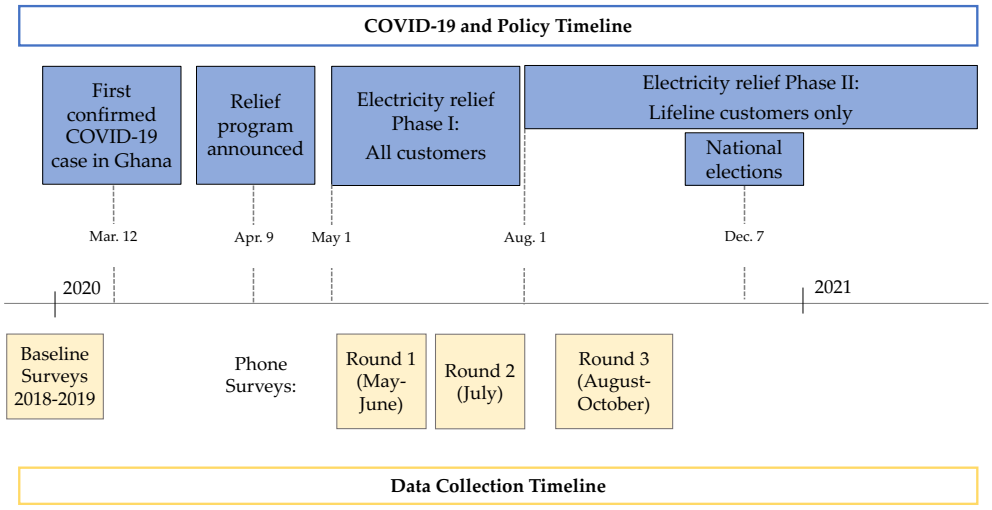
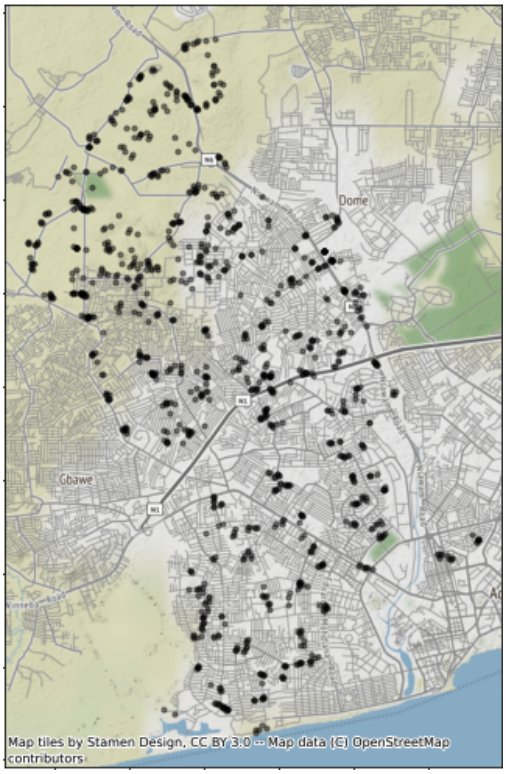
Appendix A: Additional Figures

Figure A1: Timeline of policy programs and surveying activities



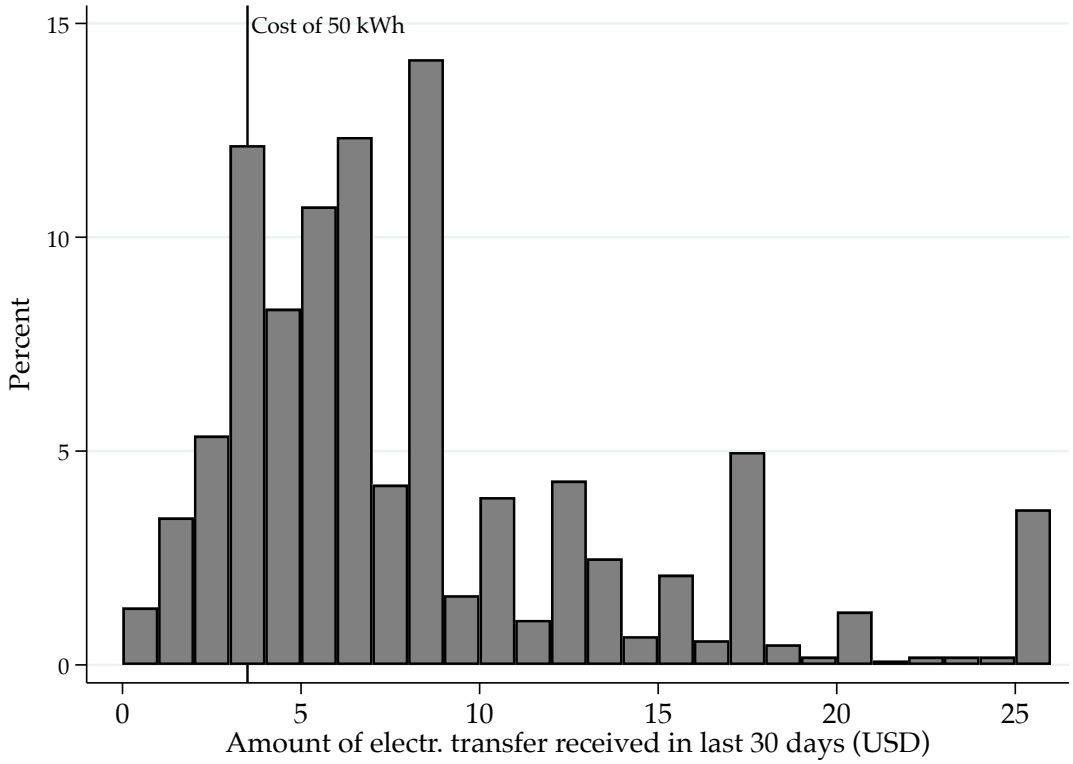
Timeline of the starts and endings of electricity relief program phases and the rounds of survey data collection.

Figure A2: Distribution of respondents across Accra, Ghana



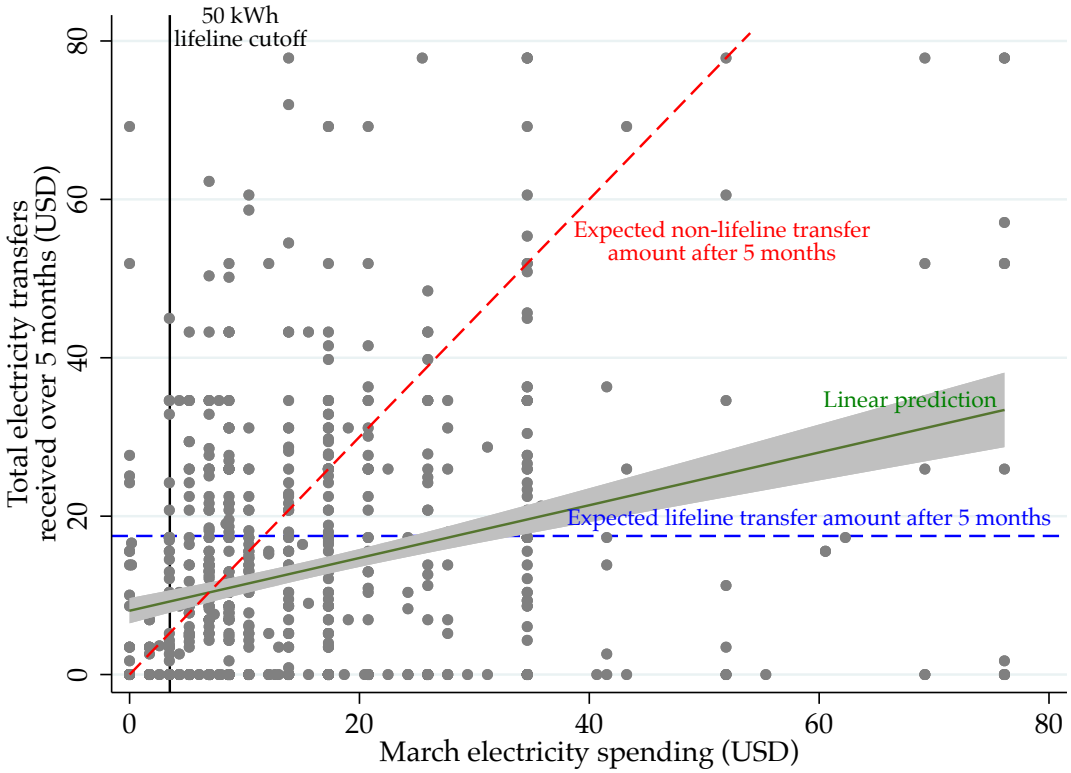
The location of respondents at the time of initial enrollment (June 2018 - March 2019).

Figure A3: Histogram of monthly electricity transfer amounts, excluding non-recipients



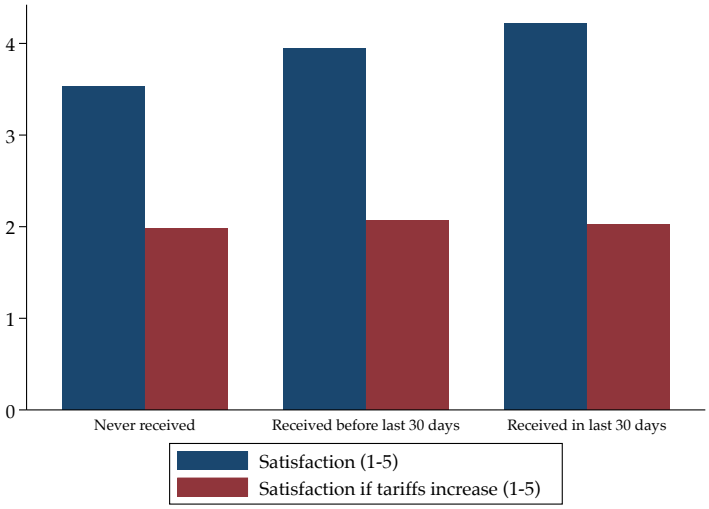
Data are pooled across all rounds. Though 31.4% of respondents had not received any transfers by the third round of surveys in September-October, across all rounds 66.1% of respondents report not receiving any transfer in the last 30 days. These 0 values are omitted from the figure to better observe the rest of the distribution. The last bin aggregates all observations above 26 USD. The vertical bar indicates the cost of 50 kWh, which is the intended monthly transfer amount for all lifeline households.

Figure A4: Actual and expected total electricity transfers received over 5 months of relief program, by baseline electricity spending



Data show the distribution of respondent reports of total transfers received as of the last survey, 5 months from the first disbursements. The black line indicates the cutoff for lifeline status. Expected transfer for lifeline households is five times the cost of 50 kWh, the lifeline monthly transfer amount. Expected transfer amount for non-lifeline households is three times half of March electricity spending, reflecting their 50% transfer. The green line and shading represents a linear prediction of total electricity transfers by baseline spending (95% CI).

Figure A5: Electricity relief program satisfaction, by transfer receipt



Satisfaction is rated from 1 (very unsatisfied) to 5 (very satisfied). Respondents are first asked their satisfaction with the current program, and then their satisfaction if the utility has to increase electricity future tariffs to fund it.

Appendix B: Additional Tables

Table A1: Comparison of 2020 Covid Survey households to Greater Accra Area households

	2020 Covid Survey	2010 Census	2015 Labor Force Survey	2017 GLSS	2017 GLSS
Respondent* is male	0.70	-	0.63	0.67	0.67
	(0.46)	-	(0.48)	(0.47)	(0.47)
Respondent* age	29.14	-	40.46	45.39	45.17
	(9.00)	-	(14.63)	(14.43)	(15.54
Household size	4.05	3.69	2.58	3.46	3.88
	(2.68)	-	(1.74)	(2.11)	(2.69)
Of which adults	2.78	-	1.69	2.11	2.14
	(1.75)	-	(0.95)	(1.20)	(1.30)
Of which children (<18)	1.26	-	0.89	1.34	1.75
	(1.60)	-	(1.22)	(1.48)	(1.89)
Phones in household	2.47	2.83	-	3.02	2.45
	(1.47)	-		(1.88)	(1.89)
Grid connection? (=1)	1.00	0.94	0.97	0.94	0.81
	-	-	(0.17)	(0.23)	(0.39)
Has a generator (=1)	0.04	0.01	0.07	0.02	0.01
	(0.19)	-	(0.25)	(0.15)	(0.08)
Has a TV (=1)	0.94	-	0.85	-	-
	(0.24)	-	(0.36)	-	-
Households	1,245	450,749	728	1,271	14,009
Sample	Accra West utility customers	Accra Metro Area households	Greater Accra urban households	Greater Accra urban households	All Ghana households

The 2020 Covid Survey survey is drawn entirely from urban households in three Accra West electricity districts in Accra Metropolitan Area. Summary statistics for the 2010 Census are for all households in the Accra Metropolitan Area. Summary statistics for the 2015 Labor Force Survey and 2017 GLSS are for urban households in the Greater Accra Region, which includes the Accra Metropolitan Area and surrounding districts. Both of these surveys are designed to be representative at the region level and by urban/rural location. For comparison, we also include summary statistics for all households in Ghana from the 2017 GLSS. Survey weights are applied to generate representative estimates. Data from the Census, LFS, GLSS, are provided by the Ghana Statistical Service.

*The respondent for the 2020 Covid survey may be an adult other than the head of household, as long as they are able to answer questions about the household's electricity use and expenditure and about household consumption. The survey does not separately ask about the characteristics of the head of household, or other adults in these households. For the Labor Force Survey and GLSS, we present data on the head of household for comparison.

Table A2: Summary statistics, pooled across rounds

	Mean	SD	Min	25^{th}	50^{th}	75^{th}	Max	N
Household characteristics								
Number of adults (>=18)	2.79	1.76	1.0	2.0	2.0	4.0	11.0	1245
Number of children (<18)	1.27	1.61	0.0	0.0	1.0	2.0	9.0	1245
Respondent age	29.13	9.00	18.0	22.0	27.0	34.0	65.0	1245
Respondent is male (=1)	0.71	0.46	0.0	0.0	1.0	1.0	1.0	1245
Household-Firm during GW deployment	0.02	0.15	0.0	0.0	0.0	0.0	1.0	1243
Do you have a generator in working condition?	0.04	0.19	0.0	0.0	0.0	0.0	1.0	1245
Sum of appliance types held	7.37	2.93	0.0	5.0	7.0	9.0	24.0	1245
Household in same location in round 3 as in round 1	0.96	0.20	0.0	1.0	1.0	1.0	1.0	1131
HH total spending per capita in past 7 days (USD)	159.30	585.43	0.2	16.7	27.7	59.7	8857.6	3339
HH food spending per capita in past 7 days (USD)	8.97	8.47	0.0	4.2	6.9	11.5	121.1	3323
Any loans last 12 months (=1)	0.51	0.50	0.0	0.0	1.0	1.0	1.0	768
Any formal loans last 12 months (=1)	0.09	0.28	0.0	0.0	0.0	0.0	1.0	768
Electricity connection and use								
Shares meter with other users	0.46	0.50	0.0	0.0	0.0	1.0	1.0	1130
Count of meter users, including respondent	2.19	1.79	0.0	1.0	1.0	3.0	15.0	1130
Pays landlord/other household for electricity	0.26	0.44	0.0	0.0	0.0	1.0	1.0	1245
Days since last paid landlord for electricity	16.36	19.87	0.0	6.0	12.0	21.0	210.0	808
Amount of last landlord payment for electricity (USD)	5.07	3.88	0.0	3.5	3.5	6.9	34.6	816
Prepaid meter	0.91	0.28	0.0	1.0	1.0	1.0	1.0	1245
Current balance on prepaid meter (USD)	5.74	8.17	0.0	1.0	3.3	6.9	51.9	1116
Number of prepaid meter topups in last 30 days	1.85	1.34	0.0	1.0	2.0	2.0	9.0	2305
Average topup amount in last 30 days (USD)	10.31	15.16	0.0	4.3	8.6	10.4	519.0	2307
Number of days between prepaid meter topups in February	20.92	21.80	0.0	14.0	15.0	30.0	300.0	2126
Electricity spending in past month (USD)	12.72	12.28	0.0	5.2	8.6	17.3	69.2	3247
Electricity spending in March (USD)	15.80	15.64	0.0	6.9	10.4	17.3	207.6	1125
Lifeline customer according to March spending	0.13	0.33	0.0	0.0	0.0	0.0	1.0	1112
Government perceptions								
Overall Govt/NPP support (1-5)	3.64	0.93	1.0	3.0	4.0	4.0	5.0	3339
Trust govt to care for citizens (1-5)	3.60	1.12	1.0	3.0	4.0	4.0	5.0	3339
NPP addressing Dumsor (1-5)	4.12	0.82	1.0	4.0	4.0	5.0	5.0	3285
Relative party Dumsor performance (1-5)	4.05	0.94	1.0	4.0	4.0	5.0	5.0	3049
NPP addressing Covid (1-5)	4.06	0.87	1.0	4.0	4.0	5.0	5.0	3285
Electricity relief experience								
Aware of electricity relief program (=1)	0.97	0.16	0.0	1.0	1.0	1.0	1.0	1244
Satisfied with electricity relief program (=1)	0.91	0.29	0.0	1.0	1.0	1.0	1.0	2174
Received electricity relief by time of round 1 interview	0.47	0.50	0.0	0.0	0.0	1.0	1.0	3152
Received electricity relief by time of round 3 interview	0.69	0.46	0.0	0.0	1.0	1.0	1.0	3152
Ever received electricity relief	0.59	0.49	0.0	0.0	1.0	1.0	1.0	3339
Received electricity relief in last 30 days	0.35	0.48	0.0	0.0	0.0	1.0	1.0	3323
Amount of electr. transfer received in last 30 days (USD)	3.03	7.10	0.0	0.0	0.0	4.3	173.2	3081
Amount of electr. transfer expecting to get monthly (USD)	8.66	11.50	0.0	3.5	6.9	8.6	259.5	2383
Amount of electr. relief received in total (USD)	12.79	19.13	0.0	0.0	6.9	20.5	259.5	940

Table A3: Correlates of electricity connection characteristics

	Prepaid meter	Pays intermediary	Shared meter	March lifeline household
Number of adults (>=18)	0.003	-0.031***	-0.012	-0.002
	(0.005)	(0.007)	(0.008)	(0.006)
Number of children (<18)	-0.004	-0.010	-0.000	-0.013**
	(0.005)	(0.008)	(0.009)	(0.006)
Respondent age	0.001	-0.002	-0.004**	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Respondent is male (=1)	-0.011	0.000	-0.000	0.024
	(0.017)	(0.027)	(0.029)	(0.020)
Household-Firm during GW deployment	0.075	0.015	-0.084	-0.000
	(0.055)	(0.085)	(0.086)	(0.065)
Do you have a generator in working condition?	0.063	-0.060	-0.012	0.012
	(0.043)	(0.067)	(0.069)	(0.051)
Sum of appliance types held	0.002	-0.018***	-0.007	-0.006*
	(0.003)	(0.005)	(0.005)	(0.003)
Electricity spending in March (USD)	0.001*	-0.003***	-0.001	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
Lifeline customer according to March spending	-0.022	0.249***	0.036	
	(0.025)	(0.039)	(0.043)	
Pays landlord/other household for electricity			0.637***	0.147***
			(0.033)	(0.023)
Prepaid meter			0.088	0.025
			(0.064)	(0.036)
Observations	1110	1110	1015	1110
Dependent Variable Mean	0.915	0.256	0.458	0.128

Data are from the first time households are observed, in survey round 1. Data on March lifeline status are missing for 132 households. "Pays intermediary" indicates that the household pays someone else for their electricity (often a landlord) rather than paying the utility directly.

Table A4: Correlates of transfer receipt: electricity and water

	Electricity	Electricity	Water
Pays landlord/other household for electricity	-0.092***	-0.142***	-0.104**
	(0.031)	(0.039)	(0.042)
Prepaid meter	0.248***	0.250***	0.206***
	(0.041)	(0.069)	(0.076)
Sum of appliance types held	0.015***	0.009	0.024***
	(0.004)	(0.006)	(0.006)
Electricity spending in March (USD)	-0.001*	-0.001	0.000
	(0.001)	(0.001)	(0.001)
Lifeline customer according to March spending	-0.181***	-0.167***	0.038
	(0.039)	(0.048)	(0.053)
Observations	3029	912	912
Dep. Var. Mean	0.574	0.697	0.443
Sample	All	Wave 3	Wave 3

SEs clustered at household level. Week and day of week fixed effects and household controls included but not shown. The dependent variable is a dummy for whether the respondent ever received a particular type of transfer. Columns 1 and 2 report on the electricity transfer and column (3) reports on the water transfer. Only households in wave 3 were asked about receiving the water transfer, so the sample in columns 2 and 3 include only households in wave 3 that were aware of the water relief program.

Table A5: Transfer receipt and household consumption and food security

	Expenditure per capita	Food exp. per capita	Worry about having enough food	Days adults skipped meals
Received electricity relief	-1.295	0.078	-0.028	-0.099
in last 30 days	(2.251)	(0.485)	(0.026)	(0.102)
Received electricity relief	1.942	0.196	-0.039	0.059
but not in last 30 days	(2.781)	(0.521)	(0.029)	(0.111)
Observations	3270	3246	3271	3269
Control Mean	34.659	9.060	0.214	0.849

SEs clustered at household level. Household, week, and day of week fixed effects included but not shown. Identification of impacts comes from variation in the timing of transfer receipt, and impacts should be interpreted as suggestive. Dependent variables are measured over the last 7 days. Expenditures in columns 1 and 2 are in USD.).

Table A6: Transfer receipt and household electricity purchasing behavior

	Electricity spending	Pre-paid meter balance	Number of top-ups	Average top-up amount	Outages due to non-payment
Received electricity relief in last 30 days	-1.232*	0.761	-0.181	-0.994	-0.124*
	(0.692)	(0.968)	(0.113)	(3.322)	(0.070)
Received electricity relief but not in last 30 days	-1.530**	0.027	-0.070	-2.325	-0.079
	(0.766)	(1.235)	(0.135)	(4.122)	(0.078)
Observations	3130	780	2039	2043	2177
Control Mean	12.798	4.638	1.930	59.404	0.456

SEs clustered at household level. Household, week, and day of week fixed effects included but not shown. Identification of impacts comes from variation in the timing of transfer receipt, and impacts should be interpreted as suggestive. Dependent variables are measured over the last 30 days. Amounts in columns 1, 2, and 4 are in USD. Column 1 includes all households; remaining columns include only households with pre-paid meters.).

Table A7: Transfer receipt and level of support for current government

	Govt Support =1	Govt Support =2	Govt Support =3	Govt Support =4	Govt Support =5	Govt Support >3
Received electricity relief in last 30 days	-0.028*	-0.024	-0.060*	-0.005	0.116***	0.112***
	(0.014)	(0.019)	(0.034)	(0.035)	(0.026)	(0.037)
Received electricity relief but not in last 30 days	-0.016	-0.020	-0.070*	0.025	0.082***	0.106***
	(0.014)	(0.020)	(0.039)	(0.041)	(0.026)	(0.040)
Baseline - Overall Govt/ NPP support (1-5)	-0.028***	-0.036***	-0.022	0.049***	0.037***	0.086***
	(0.008)	(0.009)	(0.016)	(0.016)	(0.011)	(0.017)
Observations	1406	1406	1406	1406	1406	1406
No Subsidy Mean	0.047	0.088	0.353	0.398	0.115	0.513

SEs clustered at household level. Week and day of week fixed effects and household controls included but not shown. All outcome dummies are based on the respondent's support for the current government/NPP, on a scale from 1 to 5, where 3 indicates political neutrality.

Table A8: Transfer receipt and specific respondent political perspectives

	Trust NPP to Care for Citizens	NPP Addressing Covid	NPP Adressing Dumsor	NPP vs NDC Dumsor
Received electricity relief in last 30 days	0.307***	0.296***	0.217***	0.149*
	(0.080)	(0.066)	(0.061)	(0.085)
Received electricity relief but not in last 30 days	0.149*	0.191***	0.092	0.116
	(0.084)	(0.071)	(0.066)	(0.084)
Baseline - Overall Govt/NPP support (1-5)	0.206***	0.110***		
	(0.036)	(0.029)		
Baseline - NPP addressing Dumsor (1-5)			0.075***	
			(0.027)	
Baseline - Relative party Dumsor performance (1-5)				0.162***
				(0.039)
Observations	1406	1380	1360	1092
No Subsidy Mean	3.426	3.870	4.000	3.952

SEs clustered at household level. Week and day of week fixed effects and household controls included but not shown. All outcome variables are on a scale from 1 to 5 where 1 reflects very unfavorable views of NPP (or alternatively very favorable views of NDC) and 5 reflects very favorable views of NPP. Columns 1, 2, and 3 are the respondent's assessment of NPP's performance in different areas. Column 4 is the respondent's assessment of the relative performance of NDC and NPP in addressing Dumsor (when each party was in power). The controls for the respondent's political responses during GW deployment surveys are defined similarly.

Table A9: Respondent support for governing party and transfer amount

	(1)	(2)	(3)	(4)	(5)
Amount of electr. transfer received in last 30 days (USD)	0.017***	0.020***	0.021***	0.009**	
	(0.004)	(0.006)	(0.006)	(0.004)	
Baseline - Overall Govt/NPP support (1-5)			0.219***		
			(0.037)		
Amount of electr. relief received in total (USD)					0.005***
					(0.001)
Observations	2847	1305	1305	2954	838
Mean Transfer Amount Among Recipients	8.372	8.528	8.528	8.378	22.228
Household Controls	Yes	Yes	Yes	No	Yes
Household Fixed Effects	No	No	No	Yes	No
Sample	All Households	Households with Baseline	Households with Baseline	All Households	Round 3 Households

SEs clustered at household level. Week and day of week fixed effects included but not shown. The dependent variable is the enumerator's overall assessment of the respondent's support for the governing political party NPP, based on their responses to questions on the government's performance on specific issues. The assessment is on a scale from 1 to 5 where 1 reflects very unfavorable views of NPP (or alternatively very favorable views of the opposition) and 5 reflects very favorable views of NPP. The control variable for the respondent's baseline political perspective during 2018-2019 surveys is defined similarly.

Table A10: Correlates of voting in 2020 election

	(1)	(2)	(3)	(4)
Baseline - Overall Govt/NPP support (1-5)	0.016			
	(0.052)			
Supports Government/NPP		0.123**		0.206**
		(0.050)		(0.087)
Ever received electricity relief			0.098*	0.166**
			(0.054)	(0.084)
Supports Government/NPP=1 × Received				-0.136
				(0.107)
Observations	91	213	213	213
Control Mean	0.824	0.779	0.794	0.679

The dependent variable is a dummy for voting in Ghana's 2020 election. Household controls based on round 3 survey data included but not shown. Results should be interpreted as correlations and not as causal effects. All survey households were contacted for a short follow-up automated phone survey about the 2020 election. Our response rate was 20%–respondents are younger, less likely to be male, and have fewer appliance types on average than non-respondents.

Table A11: Prior political affiliation and electricity transfer receipt

	(1)	(2)	(3)	(4)
Prepaid meter	0.255***	0.259***	0.255***	0.267***
	(0.057)	(0.057)	(0.058)	(0.064)
Pays landlord/other household for electricity	-0.136***	-0.138***	-0.142***	-0.137***
	(0.045)	(0.045)	(0.046)	(0.049)
Sum of appliance types held	0.017***	0.017***	0.017***	0.020***
	(0.005)	(0.005)	(0.006)	(0.006)
Electricity spending in March (USD)	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Baseline - Overall Govt/NPP support (1-5)	-0.010			
	(0.017)			
Baseline - Supported Government/NPP		0.031		
		(0.038)		
Baseline - Supported Opposition/NDC		0.060		
		(0.048)		
Baseline - NPP addressing Dumsor (1-5)			0.007	
			(0.018)	
Baseline - Relative party Dumsor performance (1-5)				-0.000
				(0.017)
Observations	1406	1406	1381	1191
Dep. Var. Mean	0.535	0.535	0.536	0.541

The dependent variable is a dummy for ever having received any electricity transfer at the time of the survey. SEs clustered at household level. Week and day of week fixed effects and household controls included but not shown. The omitted category in column (2) is Neutral/Supported neither party during GW deployment. Relative party Dumsor performance in column (4) asks respondents to compare the performance of the two parties when they were in power, with a higher score indicating better relative performance by NPP relative to NDC.

Table A12: Responses to electricity transfer and cash loan tradeoff scenarios

	Mean	SD	Min	25^{th}	50^{th}	75^{th}	Max	N
Willingness to accept transfer given next year increase in electricity costs								
Estimated monthly transfer amount (GHS)	49.94	69.22	0.0	20.0	40.0	50.0	1500.0	1131
Prefer no transfer if have to repay same amount next year (=1)	0.79	0.41	0.0	1.0	1.0	1.0	1.0	1131
Prefer no transfer if have to pay - unsure about next year financial situation	0.50	0.50	0.0	0.0	1.0	1.0	1.0	724
Prefer no transfer if have to pay - unsure about COVID next year	0.05	0.22	0.0	0.0	0.0	0.0	1.0	724
Prefer no transfer if have to pay - will have to pay more than received	0.15	0.36	0.0	0.0	0.0	0.0	1.0	724
Prefer no transfer if have to pay - electricity prices will stay high	0.09	0.28	0.0	0.0	0.0	0.0	1.0	724
Prefer no transfer if have to pay - not right to ask to pay for free electricity	0.48	0.50	0.0	0.0	0.0	1.0	1.0	724
Prefer no transfer if have to pay - wealthier households/businesses should pay	0.05	0.21	0.0	0.0	0.0	0.0	1.0	724
Prefer no transfer if have to pay - government should pay with other taxes	0.16	0.37	0.0	0.0	0.0	0.0	1.0	724
Prefer no transfer if have to pay - won't receive this much transfer	0.06	0.23	0.0	0.0	0.0	0.0	1.0	724
Willingness to accept loan given next year repayment amount								
Starting amount for loan and time transfer scenarios (GHS)	235.05	96.51	120.0	120.0	240.0	360.0	360.0	775
Ratio of amount willing to repay to amount of loan offered	1.03	0.66	0.1	0.1	1.1	1.6	2.0	775
Prefer no loan if have to repay same amount next year (=1)	0.41	0.49	0.0	0.0	0.0	1.0	1.0	775
Prefer no loan - uncertain about finances next year	0.06	0.25	0.0	0.0	0.0	0.0	1.0	297
Prefer no loan - uncertain about COVID next year	0.01	0.10	0.0	0.0	0.0	0.0	1.0	297
Prefer no loan - loan offer too small	0.54	0.50	0.0	0.0	1.0	1.0	1.0	297
Prefer no loan - want more time to repay	0.01	0.12	0.0	0.0	0.0	0.0	1.0	297
Prefer no loan - don't believe it would be given	0.09	0.28	0.0	0.0	0.0	0.0	1.0	297
Prefer no loan - have enough money for expenses	0.17	0.38	0.0	0.0	0.0	0.0	1.0	297
Prefer no loan - don't want to go into debt	0.31	0.46	0.0	0.0	0.0	1.0	1.0	297
Prefer no loan - don't want to add to my loans balance	0.00	0.06	0.0	0.0	0.0	0.0	1.0	297
Prefer no loan - afraid of misusing loan	0.20	0.40	0.0	0.0	0.0	0.0	1.0	297
Prefer no loan - concerned about payment flexibility	0.01	0.08	0.0	0.0	0.0	0.0	1.0	297

Table A13: Correlates of respondent decision to reject a transfer/loan that must be repaid in one year

	(1) Electr. Transfer	(2) Cash Loan
Received electricity relief in last 30 days	-0.067	-0.031
	(0.054)	(0.058)
Received electricity relief but not in last 30 days	0.019	0.015
	(0.034)	(0.042)
Satisfaction with relief program (1-5)	-0.054***	-0.040**
	(0.015)	(0.018)
Any loans last 12 months (=1)	-0.048	-0.240***
	(0.033)	(0.038)
Any formal loans last 12 months (=1)	-0.013	-0.031
	(0.065)	(0.064)
Prefer no loan if have to repay same amount next year (=1)	0.113***	
	(0.031)	
Observations	733	733
Mean - No Transfers Received	0.814	0.454

Round 3 respondents only. Week and day of week fixed effects and controls for household characteristics included but not shown. The outcome variable in column (1) is a dummy for whether the respondent would reject the electricity transfer now if they have to repay the same amount next year in the form of higher electricity tariffs. Column (2) is a dummy for whether the respondent would reject a loan offer now if they have to repay the same amount next year (i.e., rejecting an interest-free loan payable in one year).

Appendix C: Sample and Data Notes

Sample

We survey 1,245 respondents currently residing in Accra, Ghana. The sample consists entirely of ECG customers in Accra West who we had previously surveyed in 2018 and 2019 as part of Klugman et al. Original enrollment was done quasi-randomly, in the vicinity of a set of control and treatment sites based on an electricity construction program, and are likely to be roughly representative of lower- and middle-income residents of Accra. We refer to the surveys conducted during this original enrollment as the GridWatch (GW) deployment surveys. Participants enrolled in this study had been surveyed in June 2019 at the latest, before they were contacted for this survey in 2020.

Each respondent was surveyed either 2 or 3 times across three rounds of data collection. 86.5% of respondents are surveyed in all three rounds, 12.7% are surveyed in two rounds, and 0.9% are surveyed only in the first round. The first round of data collection was from May 7-June 22 during the first half of the initial 3 month universal relief program. Round 2 was from June 25-July 29 during the second half of the initial program. Round 3 was from August 24 through October 26 after the program was extended only for lifeline electricity customers. To limit any increased risk of our research on our study population, all surveys were conducted over the phone. The survey included modules on household composition, electricity connections and expenditures, electric appliances, expenditures in the last 7 days, food security, credit, government relief, and perceptions of the government.

Transfer receipt

The survey includes a section on the electricity relief program. Respondents are first asked about their awareness of the program, knowledge of its characteristics, and the transfer amount they expect to be eligible to receive. They are then asked about their experience with the program. In each survey observation, transfer receipt is coded as 1 if the respondent said they had ever received a transfer at the time of the survey, and 0 if they said they had not received a transfer or if they do not know. We further break down the timing of transfer receipt by distinguishing among observations in which the respondent has received a transfer and can name the amount they received in the last 30 days, and observations where the respondent has received a transfer but not in the last 30 days. In addition to asking about the transfer amount received in the last 30 days in each round, we also ask respondents in round 3 to report the total amount of electricity transfers received to date.

In addition to asking about transfer receipt in each round, we also ask respondents in round 3 to retrospectively confirm whether they had received a transfer by the time of their previous interviews, as many respondents were uncertain about transfer receipt during the first two survey rounds. Measures of transfer receipt based on responses during each round and round 3 recall differ for 8.9% of observations, primarily for respondents who said they did not know if they had received a transfer during the earlier survey rounds. Our measures of transfer receipt for our analyses of program efficiency and distributional implications are based on the recall responses from round 3. Analyses of willingness to pay and program satisfaction are based on transfer receipt responses in each round, as perspectives at the time of the survey should be affected by the respondent's understanding of their transfer receipt at the time of the survey.

Electricity meter and payment types

We distinguish among households based on their type of meter connection and how they pay for their electricity. Pre-paid meter customers must regularly pay to 'top up' their electricity credits ex ante. Post-paid meter customers receive monthly bills charging them for their electricity use ex post.

Customers labeled 'Direct' pay electricity bills to or purchase credit from ECG or associated vendors directly. Customers labeled 'Landlord' pay a landlord or other household for their electricity use. In rounds 1 and 2, respondents that paid a landlord or other household did not indicate a meter type. This information was collected in round 3. All electricity connection information is updated based on the responses given in round 3.

Difficulty using transfer size discontinuity for identification

The transfer size discontinuity around the 50 kWh cutoff is an ideal setting for a regression discontinuity to estimate the impact of transfer size on socioeconomic outcomes. Unfortunately, this is infeasible in this context. The cutoff applies to electricity *usage* rather than *expenditure*. For pre-paid customers—who comprise 91% of our sample—ECG's central billing system only logs credit purchases: usage is only recorded locally at the meter, and must be recovered manually (more detail on this below). Furthermore, since expenditure is more salient than usage, our survey measures electricity expenditure. Finally, due to global travel restrictions, we have been unable to meet with ECG to obtain updated usage data for post-paid customers.

Political perspectives

Respondents are asked four questions relating to their political perspectives: how much they trust the New Patriotic Party (NPP) - the current governing party in Ghana - to care for citizens, how well they think the NPP has performed in addressing the COVID-19 pandemic, how well they think the NPP has performed in addressing the 'Dumsor' power outages, and how well they think NPP has performed in addressing 'Dumsor' relative to the National Democratic Congress (NDC) - the previous governing party in Ghana. For all questions, the respondents give an answer from 1 to 5, where 5 reflects a very favorable view of NPP and 1 a very unfavorable view. Based on responses to these four questions, enumerators rate the respondent's overall support for NPP relative to NDC, again on a scale from 1 to 5 and without asking the respondent. These questions are asked at the end of survey to minimize risk of respondents refusing to continue.

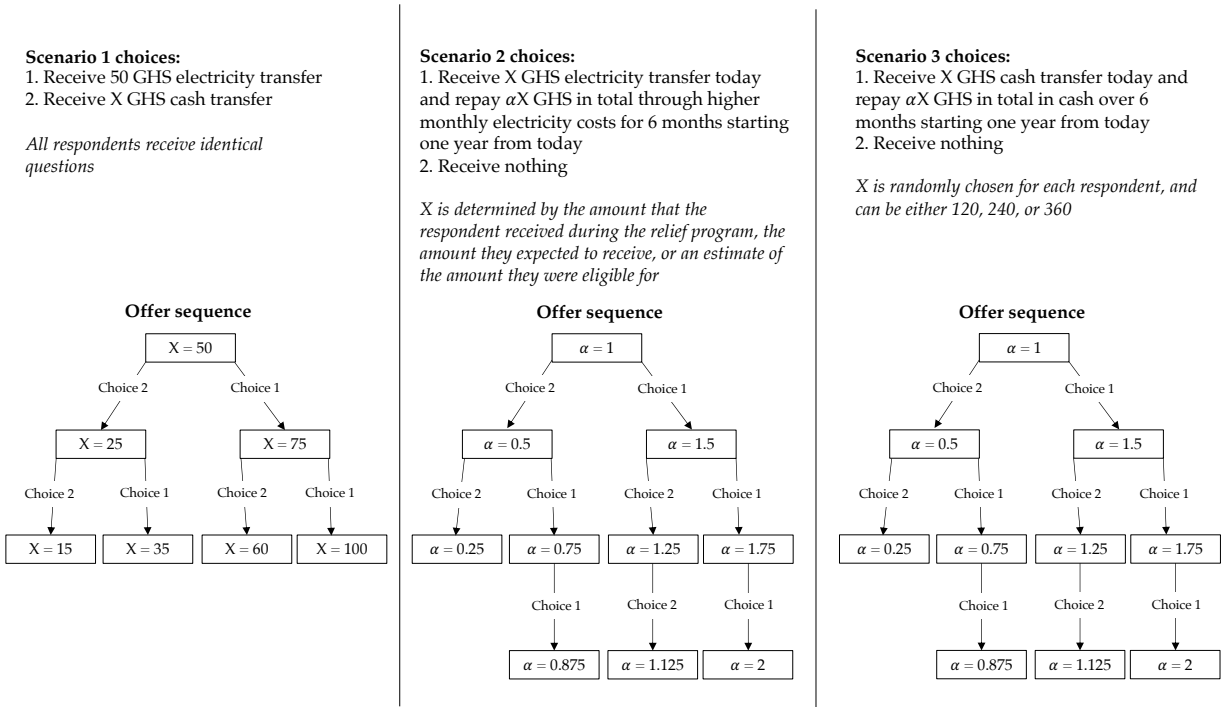
WTP Scenarios

The survey includes three willingness to pay (WTP) elicitation modules. In all three cases, WTP is elicited using a contingent valuation approach through an iterated sequence of dichotomous choice questions. These questions take the form of hypothetical tradeoffs, where the respondent is asked to choose one of two options, and subsequent options are varied depending on the prior response in an iterated manner to increase the precision of the WTP estimates. This stated preference approach is a common method for eliciting WTP for goods or services (Alberini and Cooper), including WTP for electricity in different African countries (Abdullah and Jeanty; Deutschmann, Postepska, and Sarr; Sievert and Steinbuks). The sequence of choices is similar in style to negotiating over a price, a process that is well understood in African countries (Whittington et al.). We reduce the risk of hypothetical bias by presenting the WTP scenarios in the context of the existing government electricity transfer program.

The three WTP modules are identical in structure, though the nature of the choices varies. In the first, respondents are asked to choose whether they would prefer to receive a 50 GHS electricity transfer or a cash transfer of a varying amount. In the other two, respondents are asked whether they would prefer to receive a specified transfer of electricity or cash that they would have to repay a varying multiple or fraction of next year, or to receive nothing. In all three cases, what varies across the iterated sequence of choices is the amount of cash respondents are willing to give up in order to receive the offered transfer. The first amount presented to respondents is always identical in value to the amount of the transfer. The sequence of choices is structured such that the amount of cash

respondents must give up increases in the next question if the respondent is willing to pay or give up the current amount, and decreases if the respondent is not willing to pay the current amount. Figure A6 illustrates the sequence of choices presented to respondents in each WTP scenario. We use the highest cash amount the respondent is willing to give up as the estimate of their WTP for the offered transfer.

Figure A6: Willingness to pay elicitation method



WTP scenario 1 follows a series of questions asking respondents about their knowledge of the government electricity relief program. The scenario aims to elicit households' willingness to pay (WTP) for a 50 GHS electricity transfer. This amount was chosen to match the median and mean monthly electricity transfer expected in our sample under the government COVID-19 relief program (determined during pilot surveys), and is intended to make the scenarios more realistic.

The first prompt is "*Suppose that the government allows you to choose between two options for its electricity relief program. If you choose Option 1 you will receive 50 GHS towards your electricity spending. If you choose Option 2 you will receive 50 GHS as a cash transfer to your mobile money account. The electricity transfer can only pay for electricity, but the cash transfer can be used to pay for anything you prefer. Would you prefer Option 1, 50 GHS towards your electricity spending, or Option 2, a 50 GHS cash transfer?*". Subsequent prompts keep Option 1 the same but vary the amount in Option 2, where the amount increases (decreases) if the respondent chose electricity (cash) in the previous question. Respondents who prefer 50 GHS in electricity to 50 GHS in cash are asked to give reasons why they prefer electricity.

WTP scenario 2 elicits WTP for electricity relief in terms of the increase in electricity costs next year that respondents are willing to pay to receive an electricity transfer today. These questions follow a module asking the respondent about their experience with the government electricity relief program so far. Respondents are reminded about their responses, and told "Let us suppose that you receive [amount] GHS on average for each of the 6 months of the electricity relief program this year." The offered transfer amount varies by respondent. Respondents who received a transfer in the last

30 days are offered the amount they received. Respondents who reported the monthly amount they expected to receive are offered that amount. Respondents with neither of these values are offered an estimate of their monthly transfer amount based on their March electricity consumption. The median total amount offered (over the proposed 6 months) was 240 GHS and the mean was 300 GHS.

The first prompt is "*It is possible that ECG will have to increase electricity prices next year to pay for the current electricity transfers. Suppose that under the relief program where you receive [amount] GHS on average for each of the 6 months of the relief program this year,*[16] *you would have to pay some amount more each month for your electricity for the same 6 months next year. Would you prefer Option 1, receiving [amount] GHS in electricity transfers on average for each of the 6 months of the program this year, but paying [amount] GHS more each month for your electricity for the same 6 months next year, or Option 2, not receiving any electricity transfers this year and having no increase in your electricity costs next year?*". In subsequent prompts Option 1 is revised to change the amount to be paid in increased electricity costs next year. This amount increases (decreases) if respondents said they would choose Option 1 (Option 2) in the prior question. Respondents who choose Option 2 in the initial prompt (where the transfer amount equals the increase in electricity costs) are asked to give reasons why.

WTP scenario 3 follows a series of questions where the respondent is asked about their borrowing and credit experiences. It is identical in structure to electricity transfer-cost increase tradeoff scenario, but elicits WTP for a cash transfer in terms of the amount the respondent is willing to repay next year to receive the transfer today. Respondents are randomly offered a hypothetical loan of either 120, 240, or 360 GHS. These amounts were chosen so that the middle value is equal to the median total amount respondents would be offered in the electricity relief repayment scenario.

The first prompt is "*Let us suppose that you are offered [amount] GHS from a trusted source, which you would pay back starting one year from today in monthly installments over 6 months. Would you prefer Option 1, receiving [amount] GHS today and paying back [amount] in total over 6 months starting one year from today, or Option 2, not accepting the loan?*". Subsequent questions vary the amount to repay based on responses to the prior question. Respondents who choose Option 2 in the initial prompt (where the loan amount equals the repayment amount) are asked to give reasons why.

Exploring WTP for electricity responses

The distribution of responses to the first WTP exercise indicates that a significant share of respondents are willing to give up some amount of cash in order to receive a 50 GHS electricity transfer. We tested the reliability of these data in several ways.

First, 2 weeks into our first survey round we asked 2 senior field officers to call back respondents who had indicated preferring 50 GHS of electricity to 100 GHS of cash, to re-explain the question and make sure that they had understood it correctly. The respondents all confirmed that they had understood the question, and confirmed that their answers were intentional. Second, we conducted an emergency training with field officers to ensure that all were understanding these questions and presenting them to respondents in an identical fashion, and to emphasize that they go through these questions very carefully to ensure respondents understood. We found instances of very strong respondent preferences for electricity over cash across all field officers, and the distribution of responses looked very similar before and after this emergency training. The distribution of responses also looks similar across all three survey rounds. These two tests suggest that respondents are in fact understanding the questions and responding accurately.

[16] Most respondents were only eligible for 3 months under the actual relief program, but were asked to imagine that the program operated as described.

Third, for all respondents that preferred 50 GHS of electricity to at least 50 GHS cash, we asked follow up questions asking why they prefer electricity. The shares are similar when considering respondents with the strongest preferences for electricity over cash. The responses indicate that respondents have legitimate reasons for preferring electricity to cash. Most commonly (61.5%), respondents stated "I would use the money for electricity anyway." While this does not address why respondents would be willing to give up cash in order to receive electricity, it emphasizes that transfers are inframarginal for most recipients.

37.4% of respondents stated "I worry that I will spend the money on something else", suggesting a strong desire for commitment to spending on electricity by respondents, which is supported by anecdotes from our field officers when discussing these questions reporting that many respondents are willing to pay to ensure that some amount of money is committed to electricity spending. For example, one respondent stated "taking the [electricity transfer] ensures that the household can all benefit from this gift equally" and another stated "It is very important for my business that we have electricity and taking the transfer instead of the cash will help my business be successful."

20.7% stated "It takes too much time/effort to top up [purchase electricity credit]", relating to our argument about transaction costs of buying electricity. Indeed, several respondents stated that it would cost them more than 50 GHS to go and purchase electricity credit. For example, one stated "It will cost me more than 50 GHS to get to the ECG office because of transport and time lost. Therefore, it is worth it to just take the voucher and not have to worry about the hassle of getting to the ECG office." Even though the transfers are inframarginal for most households, they may save them some transaction costs. The median household tops up their electricity meter twice each month rather than purchasing all their credit at once. Receiving the transfer can thus reduce the number of trips to top up in a given month, even if it does not fully eliminate the need to go purchase some electricity. Indeed, we find that receiving a transfer in the last 30 days is associated with a reduction in the number of times customers go to top up their electricity meter in that same period.

Finally, respondents stated that "I worry about mobile money charges/costs" (9.7%) and that "I don't trust that the government will give me the money" (4.9%). These indicate some concerns about the actual value of a hypothetical offer of a 50 GHS mobile money transfer.

Additional notes

The COVID survey data are merged with data from the same respondents during the 2018-2019 GridWatch (GW) deployment surveys. Not all respondents were asked the same questions during those surveys, so regressions controlling for this 'baseline' data have a reduced sample size.

The surveys do not include specific questions on household employment, income, or wealth.

All continuous variables are winsorized for our analysis, with values above the 99th percentile replaced with the value at the 99th percentile.

In most regression tables, household controls are included but not shown unless otherwise indicated. Household controls include the the count of household adults (age 18 or older), count of household children (under age 18), the age and gender of the respondent, whether the household also operated a business at the same location when the household was originally surveyed in 2018-19, whether the household is connected to a prepaid meter (as opposed to postpaid), whether the household pays a landlord or other household for their electricity (as opposed to paying for electricity directly), whether the household shares its meter with other users, whether the household has a generator, the count of different appliance types held by the household, and the households spending on electricity in March (in USD). The count of appliance types is a sum of dummy variables for whether the household owns the following types of electric appliances: air-conditioning system, TV receiver, fan, iron, lightbulb/lamp, radio, TV, refrigerator/freezer, blender, blow (hair) dryer,

security camera, computer, cooking stove, DVD/CD player, halogen oven, hair straightener, heater, kettle, maize/grain processing machine, microwave, photocopying machine, printer, other printing-related appliance, other large matching for income purposes, rechargeable torch, rice cooker, sewing or other clothing machine, shaving/hair trimming machine, stereo/music system, tablet, toaster, washing machine, water pump, and welding machine.