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IMPACT EVALUATION OF MULTI-PURPOSE CASH ASSISTANCE ON UNMET NEED FOR PRIMARY HEALTH CARE ACCESS AMONG SYRIAN REFUGEES IN LEBANON: THE ROLE OF PROXIMITY TO HEALTH CARE

by
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Abstract

Syrian refugees displaced to Lebanon face severe economic vulnerability that prevents them from meeting their basic needs, including primary health care. A multipurpose cash (MPC) program was implemented beginning in October 2017, distributing $175 per household per month. The program targets vulnerable Syrian refugee households in Lebanon with the intent of helping households cover their basic needs and improve overall well-being. A cross-sectional survey of 4421 households, some of whom received MPC and some of whom did not, was conducted in July and August 2018 as part of the larger CAMEALEON consortium project.

Using a quasi-experimental regression discontinuity design, this study compares unmet need for primary health care between MPC recipients and non-recipients, while accounting for the effect of distance to primary health care (PHC) facilities using geospatial analysis. MPC significantly reduced unmet need for PHC among individuals in households receiving the grants, while individuals living further from facilities were significantly more likely to have unmet need for PHC. Distance to facilities had a minor moderating effect on the relationship between MPC and unmet need for PHC. MPC has the greatest impact on young males aged 18-44 and individuals living in non-permanent shelters and did not have an impact on refugees with chronic illnesses. Further research is needed on the relationship between health care access, MPC programming, and proximity to health care. Efforts to improve health outcomes visa MPC should explicitly address chronic illness.

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1. INTRODUCTION

1.1 Background

Since the beginning of the Syrian crisis in 2011, an estimated 1.5 million Syrians have been displaced to Lebanon (Government of Lebanon, 2019). Syrian refugees in Lebanon face multi-dimensional vulnerabilities that span all of the key humanitarian sectors, including shelter, protection, food security, employment, education, sanitation, and health care (Government of Lebanon, 2019, VASyR, 2018). Half of displaced Syrian households live on less than $2.90 per person per day.[1] One-third of displaced Syrian households in Lebanon face moderate to severe food insecurity, and 97% of households engage in negative livelihood coping strategies such as reducing expenditure on health and education (Government of Lebanon, 2019).

Approximately 200,000 Syrian households in Lebanon (VASyR, 2018) depend on financial assistance, in the form of cash and vouchers delivered via a common e-card, to cover their household expenditures and to meet their basic needs (Government of Lebanon, 2019, VASyR, 2018). Mechanisms for cash distribution to Syrians in Lebanon have improved drastically since 2014, when 30 organizations were providing cash assistance across 14 sector-specific objectives, through diffuse and often poorly-coordinated responses and mechanisms (Harvey & Pavanello, 2018). Beginning in October 2017, WFP, in

[1] Less than $2.90 per person per day indicates that the household falls below the threshold of the Survival Minimum Expenditure Basket, "SMEB".

partnership with UNHCR and DFID, began distributing unconditional multipurpose cash grants (MPC) of $175 per household per month to the most vulnerable Syrian refugees in Lebanon (Chaaban et al., n.d.). MPC had been distributed in Lebanon prior to October 2017, but under different targeting criteria. MPC is most often provided in order to meet basic needs such as food, health care, education, or household items (CaLP, 2018). MPC is unrestricted, however, so the recipient can use the cash as they wish (CaLP, 2018). It is also typically unconditional, meaning that there are "no prerequisite activities or obligations that a recipient must fulfil in order to receive assistance" (CaLP, 2018).

Cash transfer programming (CTP) as a mechanism for social protection and aid delivery within the humanitarian sector has achieved broad acceptance since 2004, when it was first used at scale in response to the Indian Ocean tsunami (Doocy & Tappis, 2017, Harvey & Bailey, 2015). The critical advantages of cash transfer programming are that it has a lower cost per beneficiary than vouchers and in-kind food distributions (Doocy & Tappis, 2017), while simultaneously providing greater choice and flexibility to recipients than more traditional aid modalities. In 2016, an estimated $2.8 billion in humanitarian assistance was spent on CTP, up by 40% from $2 billion in 2015, and up 100% from 2014 (Smith et al., 2018).

To ensure that CTP in Lebanon is delivered efficiently and transparently, the Cash Monitoring Evaluation Accountability and Learning Organisation (CAMEALEON) consortium formed to research the impact of MPC on money-metric well-being, and access to and utilization of essential services, including health care (Chaaban et al., n.d.). This

study is part of the larger CAMALEON research project, and specifically addresses the role of proximity to primary health care (PHC) facilities in the relationship between MPC and unmet need for PHC.

2. LITERATURE REVIEW

2.1 Conceptualizing primary health care access

Primary health care (PHC) was affirmed by the WHO in 1978 as a tool to reduce health care inequities (WHO, 1978). PHC is intended to be the first point of contact with the health system for those seeking care, and encompasses both preventive care – such as screening, wellness visits, and immunizations – and curative care, examples of which are treatment of acute illnesses or management of chronic illness. PHC was reaffirmed in 2008 (WHO, 2008) as a mechanism of prioritizing comprehensive care and addressing inequities in social determinants of health (Rasanathan, 2011). Issues of health inequity and its social determinants are paramount in the context of Syrian refugees' access to PHC services in Lebanon. Increasing access to PHC can be conceptualized as a tool to reach health equity, although access and its measures can be operationalized in numerous ways. The enduring displacement of Syrian refugees in Lebanon and the ensuing humanitarian response has generated an abundance of annual assessments (Government of Lebanon, 2019, VASyR, 2018, UNHCR, 2018a) measuring, among other indicators, inequities of need for and access to health care.

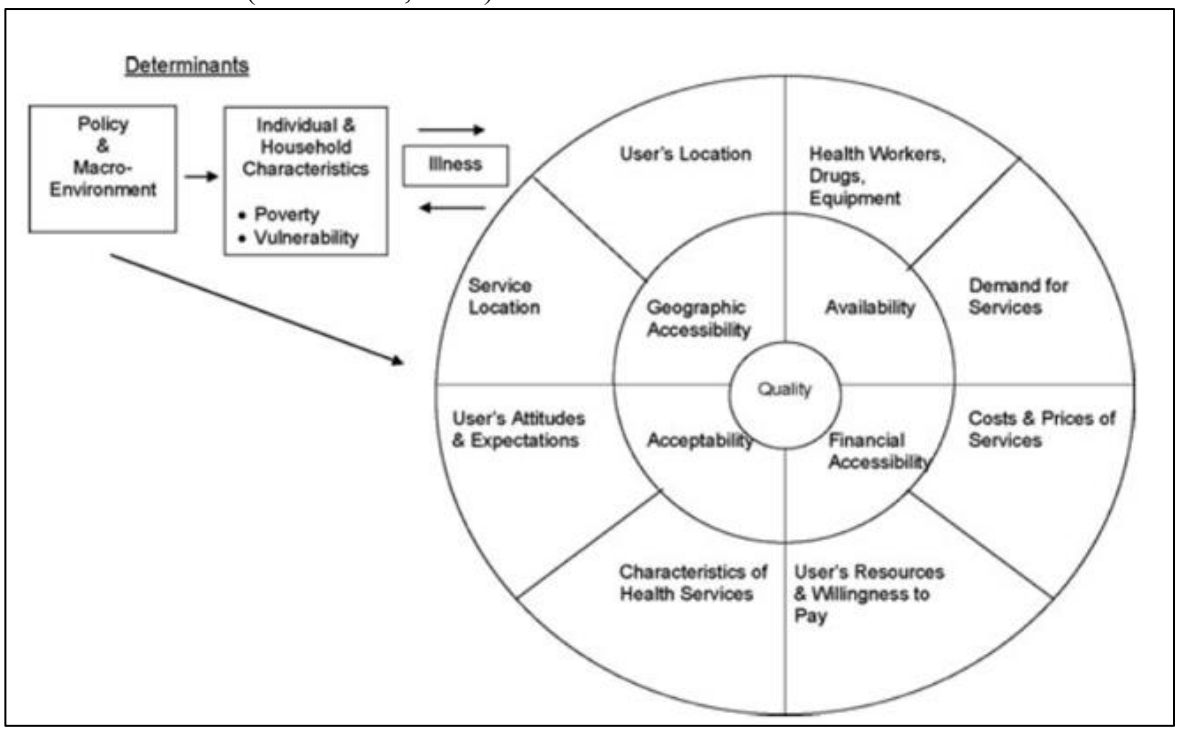
Measures of service utilization and expenditure alone may not account for the multi-dimensionality of health care access, although utilization is often the proxy of choice (Oliver & Mossialos, 2004). Without accounting for the role of social determinants of health and access - from the individual to the societal level - discussions of utilization or analyses of health outcomes fall flat. Determinants of access can arise from supply or demand-side effects or a combination thereof – supply and demand-side determinants are not mutually exclusive (Jacobs et al., 2008, Ensor & Cooper, 2004, O'Donnell 2007).[2]

To better understand factors influencing PHC access, Peters et al. (2008) offers a framework for "assessing access to health services", identifying determinants and dimensions of access to care (Figure 1) (Peters et al., 2008). Determinants of access to health care identified in the framework include the role of individual and household characteristics (such as poverty and vulnerability), the policy and macro-environment, and illness (Peters et al., 2008). The five dimensions of access are: 1*) geographic accessibility*, including physical distance and travel times to the service location from the user's location; 2) *availability*, including equipment, human resources, appropriate type of care, and opening hours; 3) *financial accessibility*, which is based on both the cost services and the user's ability and willingness to pay, as well as society cash flow (Jacobs et al., 2008); 4*) accessibility of services*, including the characteristics of services and user attitudes toward them; and 5) *quality*, which is integral to the former four components (Peters et al., 2008).

[2] Supply-side determinants may be defined as, "aspects inherent to the health system that hinder service uptake by individuals, households, or the community", while demand-side determinants as, "factors influencing the ability to use health services at individual, household or community level" (Jacobs et al., 2008).

This study, in its conceptualization of access, does not address to any great extent availability or quality of PHC services in Lebanon, rather it focuses on the financial and geographical accessibility of PHC services for Syrian refuges in Lebanon and the determinants of that accessibility.

Figure 1: Framework from Peters et al., 2008, "Conceptual framework for assessing access to health services" (Peters et al., 2008)



2.2 Syrian refugees in Lebanon

2.2.1. The state of primary health care

Health care for Syrian refugees in Lebanon is linked to the public and private system, with UNHCR covering a proportion of health care costs at subsidized facilities

throughout the country for the approximately 1.5 million registered or recorded Syrian refugees.[3] Refugees are charged 3,000 – 5,000 LBP for a consultation at supported facilities, while Lebanese citizens would pay 15,000 LBP for the same service (Blanchet et al., 2016, Refugees-Lebanon, 2019). For refugees, free services include vaccines, medications for acute illnesses, family planning services, up to two ultrasounds for pregnant women, and mental health services (Refugees-Lebanon, 2019). Chronic medications cost 1,000 LBP per visit (Refugees-Lebanon, 2019). UNHCR covers up to 85% of laboratory and diagnostic tests only for 'vulnerable' groups, which includes children under 5 years of age, those over 60 years of age, those with disabilities, and pregnant and lactating women (Blanchet et al., 2016).

UNHCR-subsidized PHCs and dispensaries may offer medical consultations, prescriptions, laboratory tests, immunization, antenatal care, reproductive health services, management of chronic diseases, and psychological support services (Refugees-Lebanon, 2019), although not every center provides all services. There are approximately 776 PHCCs in Lebanon, according to an inter-agency master list, with 99 facilities subsidized by UNHCR as of June 2018 (UNHCR, 2018b).[4] These facilities include dispensaries, Social Development Centers supported by the Ministry of Social Affairs (MoSA SDC), Primary Health Care Centers run by the Ministry of Population and Health (MoPH), and

[3] The Government of Lebanon ordered UNHCR to stop registering Syrian refugees in 2015 (Refugees-Lebanon, 2015).

[4] This list includes private and public facilities, as well as facilities run by religious organizations, dispensaries, and social development centers.

combination MoPH PHCC – MoSA SDCs. Many of these centers are operated by NGOs contracted through the MoPH (Blanchet et al., 2016). MoPH centers provide the largest range of services, while dispensaries and MoSA SDCs are more likely to have limited capacity and offer limited services (CRI, 2012). While public PHC services are generally available, the Lebanese health care system is fragmented, uncoordinated, and highly privatized (Blanchet et al., 2016, Lebanon Support, 2016).

2.2.2. Social determinants of access to primary health care

Social determinants of access to primary health care for Syrians in Lebanon range from the macro-level, policy environment to individual and household characteristics. Issues of legal status, economic vulnerability, household composition, pre-existing health conditions, and geographic disparities all may disadvantage refugees in their access to health care.

The Vulnerability Assessment of Syrian Refugees in Lebanon (VASyR-2018), with most recent data collected in April and May 2018, has surveyed representative samples of Syrian refugees annually since 2013. The 2018 report highlights differentials according to categories that may be considered individual and household-level social determinants of health and access to health care - and may be influenced by the macro environment in Lebanon. These include residency status, housing, characteristics of the head of household,

household member employment, household dependency ratio, arrival year to Lebanon, and illness and disabilities of household members (VASyR, 2018).

Gender also likely plays a role in determining access to care, with socio-economic vulnerabilities most pronounced among female-headed households. Less than one-fifth of households are headed by females, and female-headed households reside in non-permanent and non-residential structures more often than male-headed households (VASyR, 2018). Likewise, more than half of female-headed households did not have a working member, compared to 27% of male-headed households (VASyR, 2018). Overall, female-headed households were less food secure, with worse dietary diversity, and resorted to more severe food insecurity coping strategies (VASyR, 2018). Among those who were severely food insecure, less than half of households had a working member, compared to 86% of households who were food secure (VASyR, 2018). Further, VASyR-2018 found that unemployment was almost double among women versus men (VASyR, 2018).

Housing structures for Syrians in Lebanon may be categorized as residential, non-residential, or non-permanent. The Government of Lebanon's refusal to allow formation of formal refugee camps (Yahya et al., 2018) has resulted in dispersed, make-shift refugee settlements, or "non-permanent structures" throughout the country. The largest proportion of households in non-permanent structures (i.e., tents in informal refugee camps - "informal settlements") are concentrated in the north and east of the country. Non-residential structures may include but are not limited to garages, warehouses, and active construction sites. Both non-residential and non-permanent structures are often substandard and

overcrowded (VASyR, 2018). More than one-third of displaced Syrians live in substandard structures (Government of Lebanon, 2019). Those in non-permanent and non-residential structures may face additional difficulties related to being disconnected from road networks, utilities, and other essential services.

Although vulnerabilities differ by cross-sections of determinants, those living in nonresidential structures, households headed by females, households with members with illnesses and disabilities, and households without employed members tend to face greater levels of food insecurity. These groups also report resorting to negative food security coping strategies at a higher rate than those in less deprived situations (VASyR, 2018). Food insecurity and documented, subsequent negative coping strategies, such as reducing health care expenditure (VASyR, 2018), in turn reduces the financial feasibility of accessing health care.

2.2.3. Barriers to access to primary health care

2.2.3.1 Financial barriers to care

Barriers to accessing PHC services for Syrian refugees in Lebanon include cost of services, treatments and medications, and transportation (UNHCR &WFP, 2018, UNHCR, 2018a, Akik et al., 2019). Other barriers include distance to health centers and lack of knowledge of health center locations (VASyR, 2018). Telephone surveys conducted in 2017 and 2018 found that cost was the most frequently cited barrier to accessing care, including difficulties in arranging and paying for transport for non-camp Syrians in

Lebanon (UNHCR, 2018a, UNHCR, 2017). While it is reported that 87% of Syrian households with individuals requiring PHC in 2018 were able to access it (Government of Lebanon, 2019), a 2018 survey of non-camp Syrian households found that less than two-thirds of respondents knew that refugees had access to subsidized PHC services (UNHCR, 2018a). This suggests that some Syrian refugees may be paying more out-of-pocket costs than necessary. While some theorize that Syrians using care outside of the subsidized MoPH network, and therefore bearing greater out-of-pocket costs, are doing so out of preference and ability to pay the associated fees (Correspondence, El Jardali et al., with Doocy & Lyles, 2017), it is possible that some households are doing so because they are unaware that seeking care from within the MoPH network is less costly. Supporting this possibility, a 2016 study inadvertently found during survey administration that Syrian refugees were not able to consistently differentiate between PHC within the MoPH network and private, for-profit providers where health care costs will be higher than the UNHCR-subsidized fees (Correspondence, El Jardali et al., with Doocy & Lyles, 2017).

According to VASyR-2018, one-fifth of households paid in full for PHC costs (VASyR, 2018). Out-of-pocket costs for care are burdensome, as the largest average expenditures for Syrian refugee households in Lebanon are food and rent, followed by health, with an average per capita monthly expenditure of only $111 (UNHCR &WFP, 2018). In those households categorized between Survival Minimum Expenditure Basket (SMEB) and 125% SMEB, over one-third of households reported borrowing money to cover health expenses, and more than half reduced health expenditure to cope with a lack of food (VASyR, 2018). While two-thirds of households reported having at least one

household member with a chronic illness, disability, serious condition, or temporary illness (UNHCR & WFP, 2018), households below the SMEB and Minimum Expenditure Basket (MEB) were more likely to have individuals with disabilities or chronic illnesses (VASyR, 2018).

2.2.3.2. Geographic barriers to care

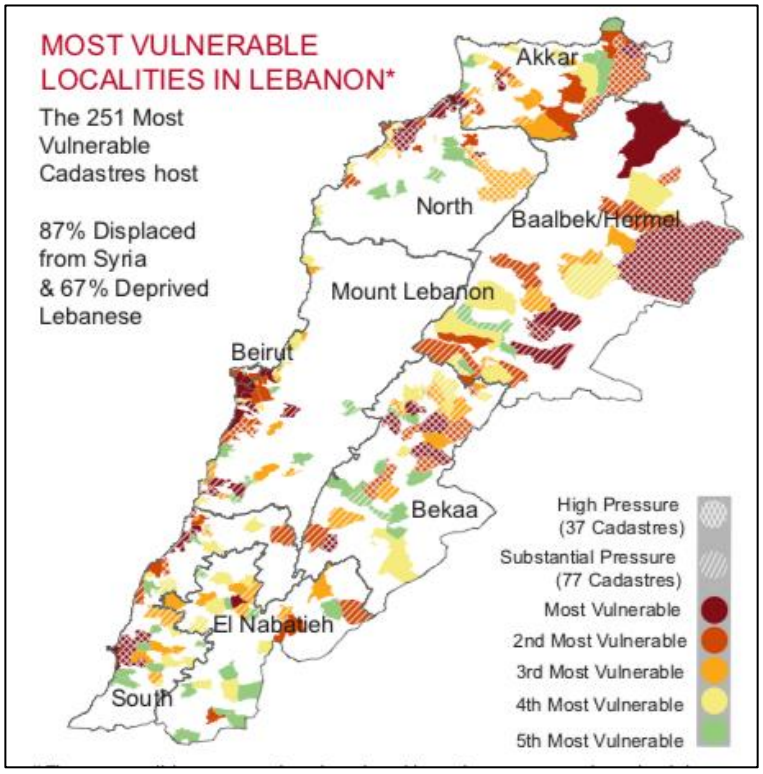
Distance from health serves as a barrier to accessing health care for Syrian refugees in Lebanon. There are clear geographic disparities not only in health status, but also in its determinants, including types of shelter, legal residency status, and overall deprivation. Nearly half of households in VASyR-2018 reported at least one member with chronic illness, but this figure varied by governorate and was highest in Baalbek (56%) and lowest (36%) in Beirut (VASyR, 2018). Out-of-pocket health expenditure also varies by governorate, from 9% in Bekaa to 37 in Mount Lebanon, indicating wide geographic disparities (VASyR, 2018).

Nearly three-quarters of adult (15+) Syrian refugees in Lebanon did not have legal residency in the country (VASyR, 2018), and well-documented bureaucratic and financial obstacles prevent them from establishing legal residency (HRW, 2016). According to VASyR-2018, the fraction of households with no members aged 15 and older with legal residency varied by governorate, with 64% in Mount Lebanon, 65% in the North, and 73% in Bekaa (VASyR, 2018). Moreover, the majority of households living in non-permanent

shelters are in Baalbek, Bekaa, and Akkar, while seven in ten households living in non-permanent shelters had no adult members with legal residency (VASyR, 2018). Syrians without residency report facing greater difficulties in securing employment, while their lack of legal status also impacts their mobility due to the fear of coming across regular and ad hoc checkpoints that may attempt to verify their legal status. In turn, these restrictions put them at increased risk of detention and exploitation (HRW, 2016), and reduce their access to essential services, including health care.

The majority of the most 'deprived' displaced Syrians, according the Multi-Deprivation Index (MDI), are geographically concentrated in cadasters that are also home to the most vulnerable Lebanese (Government of Lebanon, 2019). The MDI is indexed to cadaster and scores households according to access to health services, income levels, access to education, access to water and sanitation, and housing conditions. 'Deprivation' as assigned by the MDI is probably self-reinforcing. The most deprived cadasters lack many essential services, and therefore households in these cadasters must pay for transportation to reach areas that offer these services. These households likely live in the most deprived cadasters because they cannot afford to live elsewhere. Therefore, in terms of access to services, the lack of geographic accessibility is compounded by the lack of financial accessibility.

Figure 2: Multi-Deprivation Index by Cadaster (Government of Lebanon, 2019)



Transportation costs were cited as a barrier to PHC access by nearly one-third of displaced Syrian households (UNCHR & WFP, 2018). This is unsurprising, given the reliance on the Lebanese road network to reach essential services. Lebanon has a mountainous topography, with about 21,705 km of roads, the majority (15,325 km) of which are winding, municipal (village) roads, in mostly fair or poor condition (World Bank, 2017). During extreme winter weather, some areas, including primary highways and mountain villages, are cut off entirely from the road network (World Bank, 2017). Syrian refugees in Lebanon, like Lebanese citizens, use the road network as their primary mechanism of transport – the World Bank reports an estimated 15-20% increase in traffic in

Lebanon since the refugee influx - although refugees may take fewer trips than Lebanese citizens due to limited financial access to transport and greater use of shared transportation (World Bank, 2017).

2.3 Proximity to services as a barrier to access: The global evidence

2.3.1. Distance decay in LMICs

Globally, physical distance from health facilities is a well-established barrier to health care access. Proximity to health care services as a determinant of health outcomes and health service utilization has been researched most extensively in global health research on reproductive, newborn, maternal, child, and adolescent health and nutrition (RMNCAH&N) in LMICs. Increased household distance from facilities (also called "distance decay") is a clear determinant of in-facility delivery and skilled birth attendance in low- and middle-income countries (LMICs) (Nesbitt et al., 2016, Karra et al., 2017, Lohela et al., 2017, Hounton et al., 2008, Masters et al., 2013, De Allegri et al., 2011). Three studies on neonatal or childhood mortality found that distance decay is associated with an increased risk of mortality (Karra et al., 2017, Kashima et al., 2012, Malqvist et al., 2010), while two found marginal or no association (Sarrassat et al., 2018, Lohela et al., 2017). Studies using various proxies of access to PHC in LMICs, including use of health consultations (McLaren et al., 2014), immunization uptake (Al-Taiar et al., 2010) and coverage (Sasaki et al., 2011), PHC utilization (Tanser et al., 2006), and facility attendance

for treatment of fever (Alegana et al., 2012) also found significant evidence of distance decay.

2.3.2. Geospatial methodologies for measuring proximity to services

Research in LMICs assessing the relationship between proximity to services and proxies for health care access often uses Euclidean (straight-line) distance from household or village coordinates to facilities, especially in rural, primarily African contexts (Nesbitt et al., 2016, Lohela et al., 2017, Kashima et al., 2012, McLaren et al., 2014, Sarrassat et al., 2018, Malqvist et al., 2010, Gabrysch et al., 2011, Palafox et al., 2019). Other studies assessing proximity and utilization of health services use cost-surface rasters, (Gething et al., 2012, Noor et al., 2006, Masters et al., 2013, Alegana et al., 2012, Tanser et al., 2006) which can account for elevation and land-use barriers such as bodies of water while finding the shortest path from one location to another. Network analysis is also used (Murad, 2018, Ferguson et al., 2016, Sasaki et al., 2011, Gibson et al., 2011, Owen et al., 2010). Network analysis utilizes a road network dataset to account for distance using length of the network and/or travel time. Studies that compare two or more geospatial methodologies for measuring proximity to health services have found that while Euclidean distance may be an appropriate proxy in settings where clients walk to facilities (Nesbitt et al., 2014), Euclidean distance overestimates proximity as it does not account for topographical barriers or travel networks. More complex methodologies like cost-surface rasters and network analysis paths may provide more precise estimates (Gibson et al., 2011, Owen et al., 2010,

Noor et al., 2006, Delamater et al., 2012), especially in countries like Lebanon, where the topography is mountainous and individuals are likely to use defined transport networks.

2.4. Humanitarian cash transfer programming

2.4.1. Cash-based interventions in humanitarian contexts: Existing evidence

Cash transfers have become an increasingly widespread mechanism of humanitarian assistance and have the capacity to fundamentally change provision of assistance and humanitarian architecture. In many contexts, cash transfers have been proven to be more effective in improving food security and dietary diversity (Hidrobo et al., 2014, Sandström & Tchatchua, 2010) and more cost-effective than in-kind assistance (ODI, 2015, Cabot Venton et al., 2015, Hidrobo et al., 2014). Although the body of evidence is greater in development contexts, a 2016 rigorous review found that the majority of the evidence for cash transfer programming (CTP) addresses education outcomes and health and nutrition through conditional cash transfer programs (CCT) (Bastagli et al., 2016). In terms of particular outcomes, much of the evidence addresses monetary poverty (e.g., household expenditure), dietary diversity, child health, and anthropometric outcomes (Bassani et al., 2013, Bastagli et al., 2016, Manley et al., 2012).

CTP is a demand-side intervention (Jacobs et al., 2008, Schmidt et al., 2010), intended to help households meet their basic needs. Basic needs, by the definition of the Cash Learning Partnership (CaLP), "refers to the essential goods, utilities, services or

resources required on a regular or seasonal basis by households for ensuring long term survival AND minimum living standards, without resorting to negative coping mechanisms or compromising their health, dignity, and essential livelihoods assets" (CaLP, 2018). Basic needs vary by context, and are quantified by the Minimum Expenditure Basket, which is the average cost of items and services that households are expected to prioritize in that context (CaLP, 2018).

About 200,000 Syrian households in Lebanon received some form of cash assistance between 2017 and 2018, with 46% of households reportedly having access to cash using a common e-card that can be used to withdraw cash from ATMs (VASyR, 2018). While Syrians in Lebanon may receive cash transfers from several sources (Table 1) with several targeting mechanisms, MPC is unrestricted and unconditional. It therefore has the capability to alleviate some of the burden of essential expenditure such as food, which could then be channeled to other household expenses including health care. Cash transfer programming has the potential to improve the financial accessibility of services for Syrians in Lebanon via demand-side strategy, or "the direct channeling of resources to a population group to obtain [services]" (Jacobs et al., 2008, Schmidt et al., 2010). CTP is not, however, a substitute for supply-side interventions, such as those addressing quality of health care systems or the integration of refugees into those systems. Further, even if financial barriers to health care access are reduced through the introduction of cash transfers, geographic disparities and other dimensions of accessibility may still play a role.

Table 1: Modalities of cash and voucher assistance for Syrian refugees in Lebanon

Assistance	Amount	Frequency	Lead agency	Restricted	Conditional
Cash-for-food	$27 per person	Monthly	WFP	No (labelled)	No
E-vouchers (Cash-for-food)	$27 per person	Monthly	WFP	No (labelled)	No
Multipurpose cash grants (MPC)	$175 per household	Monthly	UNHCR & WFP	No	No
UNICEF "Mil Ila" Child-Focused Grants	$13.5 to $65 per 5-14 year old child attending second shift schooling	Monthly	UNICEF	No (labelled)	No
Winter cash assistance	$75 - $147 per household	Monthly	UNHCR & ICRC	No	No

2.4.2 Cash transfer programming for health

2.4.2.1. Conditional and unconditional cash transfers

Research on the impact of cash transfers on health care access and utilization outcomes is limited (Doocy & Tappis, 2017) and mixed, although the evidence suggests that *conditional* CTP in development contexts can increase the use of health care facilities. A 2016 review of CTP found that conditional cash transfers (CCT) may increase the use of health facilities, with 9 out of 15 relevant studies reporting a significant increase (Bastagli

et al., 2016).[5] Of these 9 nine studies, all focused on CCT, with one study in Burkina Faso (Akresh et al., 2012) having an unconditional component but with no significant effect (Bastagli et al., 2016). A second study in Burkina Faso by the same authors found that while CCT increased the number of preventative routine health clinic visits among children under 5, UCT had no impact (Akresh et al., 2016). A study comparing UCT and CCT in Zimbabwe found that among households with children under the age of 5, those receiving UCT had a higher percentage of children with complete vaccination records versus the CCT and control groups (Robertson et al., 2013). Another UCT – CCT comparison study in Honduras, however, provided the UCT group with double the transfer of the CCT group and saw no significant impact on health outcomes (Benedetti et al., 2015). A 2007 study in Ecuador found that children of households receiving UCT were not more likely to visit health clinics (Schady & Paxon, 2007), but studies in the Democratic Republic of Congo (Grellety et al., 2017) and Kenya (Haushofer & Shapiro, 2016) found that when households received UCT, children with malnutrition had significantly better nutritional outcomes, and households increased medical expenditure, respectively.

2.4.2.2. Multipurpose cash transfers

The impact of unconditional, multipurpose cash (MPC) transfers on health in humanitarian contexts is less clear (Harvey & Pavanello, 2018, Pega et al., 2015). MPC is

[5] 16 of the 25 studies reviewed for their impact on health and nutrition used CCT as opposed to UCT (Bastagli et al., 2016).

valuable in humanitarian contexts as it provides recipients with greater choice. It also takes a multi-sectoral approach in that it is not restricted or labelled for specific use (such as food or shelter). A 2015 evaluation of an unconditional MPC program for Syrian refugees in Lebanon found that MPC-recipient households were more consistently seeking care from doctors as opposed to traditional healers (Foster, 2015). A 2016 impact evaluation of the same program did not find a significant increase in health expenditure, nor self-reported health status (Battistin, 2016). While UN agencies and NGOs produce internal reports documenting purported positive health outcomes as a result of unconditional MPC programs, these reports often rely on descriptive analysis of monitoring data or non-rigorously applied survey design and are usually intended for reporting to donors. Literature on unconditional MPC for health would benefit from rigorous application of survey principles and evaluation. Additional research on outcomes and modalities is warranted.

2.5. Hypothesis and rationale

This study frames unmet need for PHC services as a measure of access. Recognizing that access is multi-dimensional, this study specifically addresses the dimensions of geographic and financial accessibility of PHC services for Syrian refugees in Lebanon. We attempt to account for many of the socio-demographic determinants of access, and conceptualize multipurpose cash as strategy for demand-side barrier reduction to improve access to health services (Bornemisza et al., 2010, Jacobs et al., 2008). Increased purchasing power and the ability to cover basic household expenditure may

increase the financial accessibility of health care thereby reducing unmet need. Using a quasi-experimental regression discontinuity design (RDD), we examine levels of unmet need for PHC among Syrian refugees in Lebanon who are receiving MPC versus those who are not.

This study uses geospatial analysis to measure the proximity of MPC-recipient and non-recipient households to PHC facilities. It was hypothesized MPC would reduce unmet need for PHC, and that as proximity to PHC facilities decreases, the magnitude of the relationship between receiving MPC and unmet need weakens. In other words, while MPC will significantly decrease unmet need, MPC will have greater impact for MPC-recipient households that are, on average, closer to facilities than those households that are further. This hypothesis is based on the assumption that while MPC may increase the financial accessibility of PHC by reducing demand-side financial barriers to access, geographic barriers to access – distance to PHCs – would remain.

2.6. Study significance

Previous impact evaluations of CTP for Syrian refugees in Lebanon (Battistin, 2016, Lehmann & Masterson, 2014) have addressed neither the impact of CTP on health beyond health expenditure and number of sick days, respectively, nor the role of proximity to services. This study contributes to critical evidence gaps on cash programming for health in humanitarian settings (Woodward et al., 2018), and in particular informs the use of

unrestricted and unconditional cash transfer programming for health in Lebanon and in other similar refugee contexts. It also contributes to the literature on the relationship between proximity to health services and health care access.

3. METHODS

3.1. The CAMEALEON Project

This thesis is part of a larger research study to evaluate the impact of multi-purpose cash assistance on the welfare of Syrian refugees in Lebanon (Chaaban et al., n.d.). The larger study is funded, via the Department for International Development (DFID), by the Cash Monitoring Evaluation Accountability and Learning Organizational Network (CAMEALEON), a consortium including the Norwegian Refugee Council, Oxfam, Solidarités International (Chaaban et al., n.d.). Implementing partners include the American University of Beirut (AUB), Economic Development Solutions (EDS), Overseas Development Institute (ODI), and the Cash Learning Partnership (Chaaban et al., n.d.). The larger research study will collect cross-sectional data in three waves over a period of a year and a half. This thesis analyzes only a subset of the data collected by the study team in the first wave of collection in July and August 2018. This thesis henceforth refers to those who are part of the research team of the larger study and designed methodology or conducted analyses that were incorporated into this thesis as "the study team."

3.2. Study Design

The study design follows a quasi-experimental fuzzy regression discontinuity design (RDD) approach. RDDs in impact evaluations are comparable in robustness to randomized control trials and support causal inference (Chaaban et al., n.d.). Quasi-experimental designs are appropriate for impact evaluations as they use pre-assigned comparison and intervention groups, thereby preventing ethical issues associated with randomly assigning subjects to control and intervention groups in the real world (White & Sabarwal, 2014). RDDs function as an approximation of random assignment to control and intervention groups by identifying a cutoff point along a continuously distributed variable (the forcing variable), then comparing those below the cutoff point to those above the cutoff point (Chaaban et al., n.d., Jacob et al., 2012).

3.3. Sampling and data collection

Syrian refugee households (2800 on each side of the RDD forcing variable or 'cutoff point') in the North, Bekaa, and Mount Lebanon governorates were sampled by the study team for the first wave of the survey. Probability proportional to size sampling was used, by the proportional population size of selected cadasters. Households were sampled in clusters of 10. The target was 4000 household interviews, assuming a 30% non-response rate (Table 2). The survey collected data on household and individual socio-demographics, including those accounted for in the proxy means test (PMT) (*see*: 3.5.2 Proxy means testing and multipurpose cash allocation), as well as sections reflecting a multi-dimensional

concept of welfare, including education, employment, health status, primary health care access and utilization, secondary health care access and utilization, food security, shelter, household assets, safety and security, aid receipt, and income and expenditure. One respondent per household answered all household-level questions, as well as individual questions about themselves and on behalf of all other household members. No incentives were provided to respondents to participate in or to complete the interview.

Data collectors contacted or attempted to contact 4421 households in July and August 2018, of whom 3802 (86.00%) completed the interview. Only households that completed the full interview were included in the analysis. Households receiving MPC from agencies other than WFP and UNHCR were also removed from the analysis (n=92), as other agencies use different modalities of household targeting (Table 2). One further household was also removed from the analysis because data regarding whether they received MPC during the period of study (period 2, "p2" – after November 2017) was not available.

3.4. Data sources

Data from the CAMEALEON wave 1 surveys was used for this analysis. The primary dataset in this study consisted of the cleaned and weighted data collected from households in the first wave of data collection in July and August 2018. Geospatial data, including Lebanese administrative boundaries (HDX, 2018b) and the Lebanese road

network (HDX, 2018a), was downloaded from Humanitarian Data Exchange. The PHC master list with corresponding locations was downloaded from the UNHCR Operational Portal (UNHCR, 2018b).

3.5. Concepts and measures

3.5.1. Unmet need for primary health care

The outcome in this study is unmet need for primary health care. The outcome is dichotomous, with individuals who did not report requiring PHC and individuals who reported requiring PHC and received it considered to have "met need." Those who reported requiring primary health care and did not receive it were considered to have "unmet need". Respondents were asked about whether they or household members required care for acute illnesses, preventive reasons, injuries or accidents, diagnostic tests, chronic illnesses, or mental health. Although respondents were asked about routine women's health check-ups (for breast screening, family planning, etc.) and antenatal and postnatal care, these were excluded from the measure of the outcome due to gender specificity. The unit of analysis was individuals, clustered by household.

3.5.2. Proxy means testing and multipurpose cash allocation

MPC served as the exposure, or intervention, in this study. Households were assigned to the comparison and intervention groups according to MPC receipt after

November 2017, or "period 2 (p2)." Some households had received MPC prior to November 2017 "period 1 (p1)", but MPC receipt in p1 did not have direct effect on assignment to comparison or intervention groups in this study.

To determine an eligibility threshold for MPC receipt, a desk formula was developed by UNHCR, WFP, and AUB, using a quantitative economic vulnerability-based scoring approach to calculate estimated household expenditure per capita. The approach is meant to identify households unable to meet needs for food, health, shelter, and education (VASyR, 2018). Households were scored according to this desk formula, and assigned a "Proxy Means Test" (PMT) score, based on predicted monthly per capita expenditure, which serves as the forcing variable in this study.[6] WFP and UNHCR assigned MPC benefits to households by governorate, beginning with those with the lowest PMT score and continued until all funds were allocated, resulting in an eligibility cutoff point (henceforth, "cutpoint") of approximately 70 USD per capita per month. Cutpoints differed by governorate, with corresponding score being 66.9 in Bekaa, 68.7 in Mount Lebanon, and 73.5 in the North. In practice, however, some households whose scores were above the cutpoint did not receive MPC, while some households with scores below the cutpoint did; some households were assigned MPC benefits on a qualitative basis despite not qualifying quantitatively, i.e., case referral by a field officer. Given that in this study, some households received MPC, but scored above the cutpoint, and some did not receive MPC, but scored

[6] A RDD is structured in a way that the treatment effect is presumed to have a different effect on those above and below a cutoff point. That cutoff point is a defined point along a continuous variable, known as the "forcing variable."

below the cutpoint, this study takes on a "fuzzy" (as opposed to "sharp") RDD (Jacob et al., 2012).

Although MPC was allocated in five governorates, only Bekaa, Mount Lebanon, and North governorates were included in this study due to the higher concentration of MPC recipients in these locations compared to other governorates. Household scores eligible for inclusion in this study ranged from 60.01 to 79.99, within a threshold of a cutpoint, 70, and a bandwidth of ± 10. The cutpoint and bandwidth for the RDD was chosen by the study team because it is where the largest discontinuity is observed in terms of probability of receiving the intervention (Chaaban et al., n.d.). Under the RDD, a weak assumption is required that households scoring within this threshold are identical to other households within the threshold (Chaaban et al., n.d.), based on the household demographics accounted for in the PMT formula.

MPC-eligible PMT scores differed by governorate. Following the methodology of the study team, governorate-standardized scores were generated by subtracting the governorate-specific cutpoint from the household PMT score, resulting in scores ranging from – 13.453 to 13.091, with a cutpoint of 0. The final analysis included 3707 households, 1496 (40.36%) of which were MPC recipients in period 2 and 2211 (59.64%) which were not. Of the 3707 households, 2113 (57.00%) had scores falling above the cutpoint, whereas 1594 (43.00%) fell below (Table 2).

Table 2: Household and individual non-response and MPC receipt

	Households N (%)	**Individuals N (%)**
Response	(n = 4421)	-
Completed interview	3802 (86.00)	-
Non-response	619 (14.00)	-
MPC after Nov 2017	(n = 3707)	(n = 22301)
Received	1496 (40.36)	9733 (43.64)
Did not receive	2211 (59.64)	12568 (56.36)
Cutpoint	(n = 3707)	(n = 22301)
Above cutpoint	2113 (57.00)	11861 (53.19)
Below cutpoint	1594 (43.00)	10440 (46.81)
MPC recipients vs. cutpoint	(n = 1496)	(n = 9733)
Recipients above cutpoint	21 (1.40)	99 (1.02)
Recipients below cutpoint	1475 (98.60)	9634 (98.98)
MPC non-recipients vs. cutpoint	(n = 2211)	(n = 12568)
Non-recipients above cutpoint	2092 (94.62)	11762 (93.59)
Non-recipients below cutpoint	119 (5.38)	806 (6.41)

3.5.3. Distance from household clusters to PHC facilities

Distance from household clusters to primary health care facilities (i.e., proximity to primary health care) was included in this study for its potential moderating role in the relationship between exposure and outcome. A moderator changes the strength and direction of correlation between the exposure, in this case, MPC receipt, and the outcome (unmet need for PHC). The mean-log distance from household clusters to the first and second closest primary health care centers was measured according to road distance in meters and used as the measure of proximity in this study. The first and second closest PHCs were included in the study, as opposed to just the single closest PHC, to account for

the reality that individuals may not use the absolute closest facility to their places of residence (Alford-Teaster et al., 2016, Escamilla et al., 2018, Yao & Agadjanian, 2018).

Inclusion criteria for PHCs were 1) the facility is included in the 2019 UNHCR health brochure (Refugees-Lebanon, 2019) listing facilities offering subsidized care for Syrian refugees and/or 2) any core services are provided (consultations, dental, drugs, family planning, mental health, and vaccinations). Both public and private facilities were included, as the evidence shows that Syrians use both the public and private sector for health care (VASyR, 2019, Lyles et al., 2016). Facilities providing only social services were excluded.

3.5.4. Covariates

Several covariates were included in the full regression models. Categories of covariates included 1) individual-level variables such as gender, age, chronic illness, and disability, 2) household receipt of other forms of cash assistance (such as cash-for-food or winter supplementary assistance), and 3) household characteristics assigned to every individual in the household, such as household size, arrival year to Lebanon, and living in a female-headed household, among others.[7]

[7] See Appendix 1 for full list of variables

3.6. Geospatial analysis methods

3.6.1. Geospatial cleaning and extrapolation

Household GPS coordinates were recorded during data collection. No GPS data was recorded, however, for a substantial proportion of households due to connectivity issues, primarily in Bekaa governorate. After removing GPS accuracy measures of greater than or equal to 2.5km (>=99p), the mean was taken of existing household coordinates by cluster to create a single set of coordinates for each cluster, extrapolating the mean set of coordinates to all households within each cluster to fill missing data. Following this step, 78.53% of households had assigned cluster coordinates based on the mean household location of households with existing GPS data (Table 3). 90.2% of households without GPS coordinates were located in Bekaa governorate.

Table 3: Availability of household GPS coordinates by clusters, households, and individuals

	Clusters N (%)	**Households N (%)**	**Individuals N (%)**
Household GPS coordinates	(n=628)	(n=3707)	(n=22314)
Available	**478 (76.11)**	**2911 (78.53)**	**18185 (81.50)**
Bekaa	174 (36.40)	1044 (35.86)	5154 (28.34)
Mount Lebanon	83 (17.36)	481 (16.52)	3450 (18.97)
North	221 (46.23)	1386 (47.61)	9581 (52.69)
Unavailable	**150 (23.89)**	**796 (21.47)**	**4129 (18.50)**
Bekaa	133 (88.67)	718 (90.20)	3643 (88.23)
Mount Lebanon	6 (4.00)	26 (3.27)	184 (4.46)
North	11 (7.33)	52 (6.53)	302 (7.31)

Coordinates for the assigned mean cluster locations ("mean clusters") for all clusters with coordinates were input into ArcGIS 10.6.1 ("ArcGIS"). ArcGIS was also used to calculate cadaster centroids, i.e., the point center of each cadaster polygon, with the intent to input cadaster centroids as proxies for each of the remaining 23.89% (n = 150) of cluster locations.

3.6.2. Network analysis

ArcGIS Network Analysis was used to measure the distance in meters via the Lebanon road network from the mean clusters and cadaster centroids to the closest and second closest primary health care facilities. Road network data based on OpenStreetMap and downloaded from the Humanitarian Data Exchange (HDX, 2018a) was used for the analysis. The network was clipped to the borders of Lebanon and analyzed with an XY tolerance of 10 meters to reduce the likelihood of slivers in the road network.[8] Length in meters was the only assigned impedance for the analysis.

PHC locations, mean clusters, and cadaster centroids were snapped to the closest point along the road network, then the snapped locations were integrated with the road

[8] An XY tolerance of 10 meters means that the software will read any point within 10 meters as the same point. "Slivers" in a road network file refer to small disconnections (gaps) or overlaps between the lines that make up the file and do not actually exist in the road network. Slivers prevent the software from reading a line as a continuous route.

network.[9] Network analysis was run using the Closest Facility tool, which finds the closest route, via a road network, from "incidents" to "facilities". In this case, PHC locations were set as facilities and cluster locations as incidents. The distance from the mean clusters to the closest facilities (1st PHC, 2nd PHC) was calculated with no additional snapping and no restrictions set on the network. Two mean clusters and two cadaster centroids were excluded because they did not locate PHCs (these points did not link with the main road network due to road network data quality). Final route distances included both the snapped distance of the cluster locations and health facilities to the road network.

All route distances and snapped distances were consolidated in Stata 13. Due to the non-normality of the distance data, we utilized the natural logs of the snapped distance measures. The mean of the log snapped distances between the distance to the first closest PHC and the second closest PHC was taken as the distance measure in order to account for the element of choice in PHC options. Using the mean of the log distances as opposed to the log of the mean distances is preferable in this case as the mean, as a statistical measure, assumes that x is normally distributed.

[9] "Snapping" causes map features, such as a household point location that has road access only via an undocumented footpath, to jump to the closest point of another feature, such as an arterial road, thereby connecting the features. The "integrate" tool ensures that the ArcGIS software reads the point location and the road feature as two connected features.

3.6.3. Geospatial proxy coordinate bias test

To confirm that cadaster centroids were an adequate proxy measure for the missing mean clusters, a bias test was conducted. Existing mean-log cluster distance data was paired with its corresponding mean-log distance cadaster centroid data, e.g., the distance measure from a cluster in Bqaa Safrin to the PHC facilities would be paired with the equivalent cadaster data for Bqaa Safrin. A paired t-test was used to compare the mean-log cluster distance data to the mean-log distance cadaster centroid data to ensure that there were no significant differences between the distance outputs. There were twelve mean cluster locations located in the two cadasters without centroid data. These were excluded from the analysis as there was no corresponding data, resulting in n=464 and a p-value of 0.2073 from the t-test, indicating that the cadaster centroid data can be used as a proxy measure for the clusters without mean cluster data. In the final dataset, the mean-log cadaster centroid distances were input as a proxy distance for each cluster without mean cluster data. Only clusters with distance data (n=623) (either mean cluster or centroid distances) were included in the final analysis.

3.7. Statistical analysis methods

3.7.1. Summary statistics and bivariate analysis

The distribution of household and individual characteristics describing household socio-demographics and receipt of assistance other than MPC after November 2017 were tabulated by intervention status (MPC receipt yes/no – “Intervention” versus

"Comparison") with sampling weights (Table 4). The mean log-distances to health centers, at the cluster level, were tabulated by governorate (Table 5). Means and standard deviations of the log-distances were reported, as were antilog means, the antilog 95% confidence intervals, p-values, and the true minimum and maximum distances. Finally, the distribution of chronic illness and disability across individual characteristics (gender, age group, governorate) were tabulated by intervention status (Table 6) as was the outcome, "Unmet need for PHC", as well as the variables used to calculate the outcome – "Required PHC" and "Accessed required PHC."

Unweighted counts and weighted percentages were generated for categorical and dichotomous variables, and p-values were generated using Pearson's chi-squared test. Weighted means and standard deviations were generated for all continuous variables and p-values were generated using oneway ANOVA.

3.7.2. Balance checks

Analyses using RDD require internal validity checks to ensure that there is no significant discontinuity between those with scores above and below the cutpoint in terms of the forcing variable – PMT score in this study. Those with scores above and below the cutpoint could have significant discontinuity if the comparison and intervention groups are significantly different by chance, or if there was manipulation in the assignment of the

forcing variable, thereby violating the weak assumption of homogeneity of household characteristics (with the exception of intervention status) above and below the cutpoint.

In order to check for significant discontinuity between comparison and intervention groups, per the methodology of the study team, balance checks were conducted using the McCrary Density Test (McCrary, 2008), with a standardized PMT-score bandwidth of ± 12. Two-way local polynomial regression was used to regress scores above and below the cutpoint, respectively, on each of the socio-demographic and assistance-related variables that factored into the PMT score. P-values of greater than 0.05 indicated no significant discontinuity at the cutpoint.

3.7.3. Instrumental variable regressions

3.7.3.1. Two-stage least squares (2SLS)

Instrumental variable regression (IV regression), using the two-stage least squares (2SLS) method, was used for the analysis of all multivariable models, per the methodology of the study team. While logistic regression is often used in the analysis of RCTs (Knol et al., 2011) with dichotomous outcomes, it is prone to endogeneity bias (White & Sabarwal, 2014). Endogeneity bias is when there are endogenous, unmeasured or non-observable variables influencing the relationship between the dependent variable and the outcome (Bascle, 2008). As such, 2SLS is more appropriate in quasi-experimental studies based on observational data when there is a risk of endogeneity bias. More simply, 2SLS can

estimate causal effects in the presence of unmeasured confounding (Lousdal, 2018). 2SLS also accounts for selection bias introduced through slight differences between those with scores above and below the cutpoint to a greater extent than ordinary least squares or logistic regression in the case of RDD (White & Sabarwal, 2014).

2SLS is a suitable choice for use with this RDD because it can examine the effect of independent variables and potential moderating variables on the outcome around the cutpoint, can adjust for clustering around the primary sampling unit (households), and is robust to heteroscedasticity. In order to use 2SLS, the instrumented variable (cutpoint) should be correlated with the intervention (MPC receipt), therefore indirectly influencing the outcome (unmet need for PHC). The instrument influences the outcome via the intervention, but not directly - in other words, if a household falls within the set threshold, having a PMT score above or below the cutpoint should not have an effect on whether an individual in that household has unmet need for PHC, except by way of the fact that the household might be receiving MPC. 2SLS measures the local average treatment effect (LATE); when the outcome (unmet need for PHC), intervention (MPC receipt), and instrumented variable (cutpoint) are dichotomous, as in our study, 2SLS provides consistent, unbiased estimates of the LATE (Basu et al., 2017), making it suitable for our analysis.

The first stage of 2SLS isolates the variation in the forcing variable that is not correlated with the equation error term by regressing the endogenous explanatory variable (MPC receipt) on the instrumented variable (cutpoint) (Bascle, 2008, Söderbom, 2009). The

second stage regresses the predicted values of the endogenous variables on the outcome variable (unmet need for PHC), along with any covariates (Bascle, 2008, Söderbom, 2009).

3.7.3.2. Base and full multivariable models

The basic 2SLS models for this analysis, or the "base" models (Model 1a, 1b, 1c) upon which the subsequent models were built, included the dependent variable: "unmet need for PHC" (*Y)*, the instrumental variable: "cutpoint" (governorate-specific), standardized household PMT score, and adjusted for sampling weights and household clustering. The base models also included an interaction term for standardized household PMT score and cutpoint, in order to account for the slope on both sides of the cutpoint. The "full" models (2a, 2b, 2c) also included a list of socio-demographic and assistance covariates, which were used consistently in both the full and disaggregated models (Appendix 1). Models 1b and 2b accounted for the mean of the natural logarithms of the distance from clusters to the first and second closest PHCs in kilometers, called "distance" or "D1", while Models 1c and 2c tested for the moderating effect of distance on the relationship between unmet need for PHC and MPC using an interaction term. Instrument validity was confirmed by assessing the base and reduced model outputs for underidentification of instruments (i.e., whether the instruments are relevant) (Kleibergen & Paap, 2006) and weak identification of instruments (Stock-Yogo, 2005).

3.7.3.3. Disaggregated models

Based on the results of the base and full models, the full model including distance (Model 2b), but without the interaction term for MPC and distance, was used for stratification in order to understand the effect of distance on subpopulations of the dataset. The full models were initially disaggregated by age groups (child <5, 6-14, 15-64, 65+) (Model 3a), chronic illness by age group (Model 4a – age 18-44; Model 4b – age 45+), residency status (Model 5a), and house structure (Model 6a).[10] After reviewing the results of the disaggregated models, the 18-44 age group was disaggregated by gender (Model 7a). Model 3a, 5a, and 6a were also disaggregated by distance - distances above and below the median – to examine the effect of distance at two levels (Model 3b, 5b, and 6b). The number of observations, number of clusters, coefficients, 95% confidence intervals, and p-values were reported for all models.

Data was analyzed using Stata 13 and ArcGIS 10.6.1 software. The sampling weights used in both summary statistics, bivariate, and multivariable analyses were generated by the study team.

[10] We had intended to disaggregate chronic illness for multiple age groups, particularly those over the age of 64. We had also intended to disaggregate by disability. Both elderly individuals and disabled individuals formed small population subgroups with a limited number of households and therefore limited power prevented us from doing so.

4. RESULTS

The final sample used for the analysis was comprised of 12483 individuals in the comparison group and 9709 individuals in the intervention group. These individuals belonged to 2188 and 1490 households, respectively.

4.1. Summary statistics and bivariate analysis

4.1.1. Socio-demographic characteristics and assistance at the individual and household level

Overall, individuals and households in the comparison and intervention group were similar according to personal and household composition characteristics (Table 4). In both the comparison group and the intervention group, the proportion of females was larger than the proportion of males (about 51% to 49%). The average age of the comparison group was slightly and significantly higher, at about 20 years old versus 19 years old in the intervention group. Household sizes were, on average, larger in the intervention group (6.26) than in the comparison group (5.75), as was the age dependency ratio (ADR), indicating that a larger proportion of the household is comprised of dependents (under age 15 or over age 60) in the intervention group.

Households in the comparison group did not have a significantly higher proportion of working age (15+) members employed for at least one hour in the previous month; about 70% of households had, by this definition, at least one employed member. The majority of

households in both groups lived in residential structures, followed by non-permanent structures, then non-residential structures. Compared to the comparison group, a greater proportion of households in the intervention group lived in non-permanent versus residential or non-residential structures. In some cases, one "household" included multiple families, in which case those families would have distinct UNHCR case numbers but count as a single household. The comparison group had a higher proportion of households with multiple case numbers, although the proportion was low, at 11.5%.

There was no significant difference in age of the head of household between comparison and intervention groups; the average head of household was about 40 years old. The majority of heads of household were male, but there was a significantly larger proportion of female heads of household in the intervention group, at 17.1% versus 15.8% in the comparison group. This is to be expected, as female-headed households were considered part of the PMT scoring criteria.

644 households in the comparison group and 645 households in the intervention group had received MPC prior to November 2017 (p1), although the proportion was significantly higher in the comparison group. A higher proportion of households in the intervention group received Cash-for-Food (CFF) in p2, which aligns with the targeting criteria for both MPC and CFF, which deliberately target households with greater levels of food insecurity.

Table 4: Summary statistics and bivariate analysis of socio-demographic and assistance variables					
	Comparison		Intervention		P-value
Variables	**N**	**Weighted % or mean ± SD**	**N**	**Weighted % or mean ± SD**	
Individual socio-demographics	12483	58.25%	9709	41.75%	-
Gender †					0.8759*
Male	6079	48.81%	4704	48.70%	-
Female	6404	51.19%	5005	51.30%	
Age §	12470	20.09 ± 16.62	9698	18.93 ± 15.86	**0.0000***
Household socio-demographics	2188	60.29%	1490	39.71%	-
Governorate †					**0.0000***
Bekaa	1063	45.76%	670	50.63%	-
Mount Lebanon	194	12.17%	313	13.97%	-
North	931	42.08%	507	35.40%	-
Household size §	2188	5.75 ± 2.23	1490	6.26 ± 2.17	**0.0000***
PMT score §	2188	5.32 ± 3.74	1490	-4.20 ± 2.60	**0.0000***
HoH age §	2183	40.16 ± 10.64	1487	40.06 ± 9.65	0.7714
Gender of HoH †					**0.0136***
Male	1834	84.18%	1199	82.92%	
Female	354	15.82%	291	17.08%	
Age dependency ratio §	2188	1.31 ± 0.99	1490	1.51 ± 1.0	**0.0000***
Adults (15+) with legal residency †					0.2322
None	1141	52.51%	837	54.25%	-
At least one	458	21.22%	301	18.85%	-
All	589	26.26%	352	26.90%	
Housing structure †					**0.0001***
Residential	1331	62.24%	962	60.80%	-
Non-residential	221	10.08%	107	6.55%	-
Non-permanent	636	27.68%	421	32.65%	
At least one HH member has worked in the last 30 days †	1569	72.77%	1057	70.55%	0.1512
Multiple UNHCR cases in the same household †	255	11.50%	149	8.90%	**0.0109***
Household assistance					
HH received MPC prior to Nov 2017 (p1) †	644	57.36%	645	45.99%	**0.0000***
HH received CFF after Nov 2017 (p2) †	937	43.71%	902	68.26%	**0.0000***
HH received vouchers after Nov 2017 (p2) †	1221	54.94%	586	31.60%	**0.0000***
HH received UNICEF cash assistance after Nov 2017 (p2) †	638	30.17%	565	33.00%	0.0727
HH received winter cash assistance after Nov 2017 (p2) †	2099	96.00%	1457	97.25%	0.0608

*P-values indicate statistical significance of testing comparison versus intervention group at α = 0.05

† Pearson's chi-squared test used to calculate weighted % and p-value

§ One-way ANOVA used to calculate weighted mean and standard deviation

4.1.2. Proximity to health services

Of the 623 clusters with distance data, 301 were located in Bekaa, 89 in Mount Lebanon, and 233 in North governorates. In the Bekaa, clusters range from 157 meters in mean distance to the first and second closest facility, to 19.55 kilometers, in Mount Lebanon, about 127 meters to 6.54 kilometers, and in the North, 201 meters to the first and second closest facility, with a maximum distance of over 20 kilometers. Clusters in Mount Lebanon, although less numerous, were, on average, closer to facilities, with a mean distance of less than 1 kilometers, while mean distance to facilities in Bekaa and the North were less than 3 kilometers.[11]

4.1.3. Chronic illness

2461 (19.48%) individuals in the comparison group and 1663 (17.12%) individuals in the intervention group were reported to have a chronic illness. 61.74% of households in the comparison group and 60.82% of households in the intervention group had at least one member with a chronic illness. Chronic illnesses specifically asked about in the survey were diabetes, cancer, hypertension, hyperlipidemia, cardiovascular diseases, chronic pulmonary diseases, chronic renal failure, endocrine diseases, neurological diseases, mental health disorders, anemia, strokes, and slipped discs, while an option was included for 'other' conditions such as arthritis or intestinal diseases.

[11] All distance-related results are reported in true distance as opposed to the logarithmic scale that was used for the analysis.

The prevalence of chronic illness in the sample was higher among females than males, however, this difference was only significant in the intervention group. As expected due to the etiology of chronic illness, the proportion of individuals reporting chronic illness increased by age group (<5 years, 5-17 years, 18-44 years, 45+); less than 10% of children under 5 were reported to have chronic illness in both the comparison and intervention groups, while over 60% of individuals age 45+ reported chronic illness. Higher prevalence of chronic illness is reported in the North and Bekaa, respectively, than in Mount Lebanon, in both the comparison and intervention groups.

4.1.4. Disability

Disabilities were relatively rare. Only 5.09% of individuals in the comparison group and 4.25% in the intervention group reported disabilities. By household, 22.53% had at least one disabled individual versus 21.90% in the intervention group. A larger proportion of males were disabled compared to females, and the proportion of those with disabilities was highest in the 65+ age group. This is contrary to global burden of disability, in which working age people and females are more likely to be disabled than other population subgroups (IMHE, 2018). The age group with the lowest disability prevalence is children under 5, at 3.39% in the comparison group and 2.30% in the intervention group. In all age groups, the prevalence of disability was less than 10%, with the exception of those aged 45+, for whom disability prevalence was over 10%. Higher prevalence of disability was reported in the North than in the Bekaa, followed by Mount Lebanon.

4.1.5. Unmet need for primary health care

As discussed in the methodology, unmet need for PHC is a dichotomous variable, with those who did not require PHC or did require PHC and accessed it considered to have "met need". Those who required PHC but did not access it were considered to have "unmet need." 46.37% of the comparison group and 44.30% of the intervention group reported requiring PHC, and of those, 85.09% and 87.23% respectively were able to access it. Females reported requiring PHC at higher proportions than men, which is notable given that reproductive and women's health-specific PHC was excluded from this analysis. Had these components of PHC been included in the analysis, we can expect that the difference between females and males in terms reported requirement for PHC would be even greater. Females and males reported accessing required PHC at similar levels, and calculated unmet need was similar as well.

Reported requirement of PHC peaked in the youngest (children under 5) and oldest (65+) age groups. Less than half of those aged 18-64 required care, and an even lower proportion required care among those aged 15-17. Among those who required PHC however, children under 5 had the highest proportions of access, at over 90%, followed by age 65+, then those 5-17 and 18-64. Unmet need for PHC was highest among those aged 65+ and lowest among those 18-64. By governorate, the lowest proportions of individuals reported both requiring and accessing PHC in Mount Lebanon, while in Bekaa and the North, proportions of those requiring and accessing PHC were higher. In terms of unmet need, the lowest proportion was reported among the intervention group in Bekaa (6.89%), and less than 10% individuals in Mount Lebanon in both the comparison and intervention group reported unmet need. The

highest proportion of unmet need was among the comparison group in the North, at 11.26%.

Table 5: Summary statistics and bivariate of mean distance from household clusters to first and second closest PHC facilities							
	N (clusters)	**Mean log KM ± SD †**	**Mean KM §***	**95% CI**	**P-value ****	**Min.**	**Max.**
All	623	0.0077 ± 1.004	2.1409	(1.973, 2.324)	-	0.1270	20.8489
Governorate					0.096		
Bekaa	301	0.0079 ± 0.896	2.6694	(2.409, 2.958)		0.1573	19.5456
Mount Lebanon	89	0.0065 ± 1.015	0.8133	(0.647, 1.022)		0.1270	6.4532
North	233	0.0076 ± 0.914	2.2994	(2.038, 2.595)		0.2013	20.8489

† Mean of the logarithmic distances to the first and second closest PHCs in km

§ Mean of the true distances to the first and second closest PHCs (ln back-transformed) in km

*Logarithmic standard deviations cannot be back-transformed to the original scale

Table 6: Bivariate analysis of socio-demographic variables by health status and intervention status								
	Chronic				Disability			
	Comparison		Intervention		Comparison		Intervention	
Variables	**N**	**Weighted %**	**N**	**Weighted %**	**N**	**Weighted %**	**N**	**Weighted %**
Household	2187		1490		2188		1490	
At least one member	1345	61.47	923	60.82	494	22.53	346	21.90
P-value				0.7880				0.6547
Individual	12482		9709		12482		9707	
All	2461	19.48	1663	17.12	641	5.09	427	4.25
P-value				**0.0000***				**0.0041***
Gender								
Male	1156	18.81	773	16.24	388	6.27	263	5.36
Female	1305	20.13	890	17.95	253	3.97	164	3.2
P-value				0.0573				0.6955
Age group								
<5 years	181	8.27	104	6.99	72	3.39	34	2.3
5-17 years	504	10.59	395	8.7	214	4.56	172	3.79
18-44 years	1057	23.83	734	23.46	208	4.46	144	4.46
>45 years	713	60.42	426	60.37	145	12.25	77	10.18
P-value				0.3607				0.1297
Governorate								
Bekaa	987	19.55	629	17.25	211	4.22	142	3.9
Mount Lebanon	184	14.3	307	13.26	45	3.48	74	3.13
North	1290	20.98	727	19.46	385	6.26	211	5.6
P-value				**0.0000***				**0.0000***

*P-values indicate statistical significance of Pearson's chi-squared test at $\alpha = 0.05$

Table 7: Bivariate analysis of socio-demographic variables by intervention status and PHC requirement, access, and unmet need												
	Required PHC				Accessed required PHC				Unmet need for PHC			
	Comparison		Intervention		Comparison		Intervention		Comparison		Intervention	
	N	Weighted %	N	Weighted %	N	Weighted %	N	Weighted %	N	Weighted %	N	Weighted %
Individual	12460		9704		5506		4107		12460		9704	
All	5812	46.37	4314	44.3	4687	85.09	3559	87.23	1311	10.51	850	8.34
P-value				**0.0028***				**0.0035***				**0.0000***
Gender												
Male	2675	43.77	1958	41.13	2265	84.73	1697	87.39	639	10.46	400	8.02
Female	3137	48.86	2356	47.30	2422	85.43	1862	87.08	672	10.56	450	8.65
P-value				0.4195				0.5692				0.4402
Age group												
<5 years	1246	58.45	834	56.59	1136	91.19	770	92.52	189	8.81	96	6.25
5-17 years	1708	36.25	1658	36.36	1437	84.66	1432	87.39	370	7.82	307	6.48
18-64 years	2700	49.66	1737	47.75	1976	82.03	1280	83.95	719	13.43	430	11.25
>65 years	151	72.92	82	72.25	131	87.55	74	90.5	31	14.79	17	13.55
P-value				**0.0000***				**0.0000***				**0.0210***
Governorate												
Bekaa	2508	49.95	1613	44.11	2003	85.96	1352	89.3	514	10.3	252	6.89
Mount Lebanon	529	40.29	1016	43.59	424	83.74	815	84.6	111	8.58	207	8.8
North	2775	45.38	1685	45.08	2260	84.72	1392	85.54	686	11.26	391	10.5
P-value				**0.0000***				**0.0000***				**0.0000***

*P-values indicate statistical significance of Pearson's chi-squared test at $\alpha = 0.05$

4.2. Balance checks

The McCrary Density Test (2008) (Appendix 2), per the methodology of the study team, was used to test for discontinuity between those above and below the cutpoint across several variables that were used as an approximation for the calculation of the household PMT score (McCrary, 2008). P-values of greater than or equal to 0.05 indicate that there is no significant discontinuity at the cutpoint, therefore indicating that there was no significant manipulation in the assignment of the PMT score. The p-value for the overall density test was 0.18, while the only variables that had significant discontinuity were "female head of household" (p-value = 0.02) and "At least 1 dependent with a disability" (p-value = 0.02).

4.3 Instrumental variable regression models

4.3.1. Base models

All IV regression models contained the outcome and the variables MPC, household PMT score, and an interaction term for household PMT score and the cutoff point, which formed the "base" model. MPC was significant at $p<0.01$ in the model containing only the base (Model 1a); holding household PMT and the interaction term constant, there was a decrease of 3.94 percentage points, from 11.25% (95% CI: 7.31, 12.71) unmet need for PHC among individuals in households receiving MPC versus those not. When distance ($p=0.001$) was added to the model (Model 1b), there was a slightly larger, 4.13-point decrease in unmet need, with a difference of 0.18 percentage points from Model 1a.

As shown in Model 1b, distance was significant at p=0.001 with a coefficient of 10.6887 (95% CI: 4.284, 17.093). Therefore, holding MPC receipt, household PMT score, and the interaction term constant, a 10% increase in mean distance in km to the two closest PHC facilities is associated with unmet need higher by 1.019 percentage points.[12] Putting that in simpler terms, households in clusters located a mean distance of 5 km from the two closest PHC facilities will have, on average, 1.019 percentage points less unmet need for PHC than those a mean distance of 5.5 km from the two closest facilities.

There is a crude decrease in unmet need when distance is added to the model that does not adjust for socio-demographic or assistance covariates, indicating the possibility of a minor moderating effect. When tested, however, distance did not have significant moderating effect on the relationship between MPC and unmet need for PHC (Model 1c).

[12] A 10% increase in X will increase Y by B_1*ln(1.10)

Table 8: Multivariable analysis of unmet need for primary health care (base models)						
Base models	**Model 1a (base)**		**Model 1b (base + D1)**		**Model 1c (base + D1 + interaction term)**	
Observations	22164		22164		22164	
Clusters	3680		3680		3680	
Variables	**Coefficient (95% CI)**	**P-value**	**Coefficient (95% CI)**	**P-value**	**Coefficient (95% CI)**	**P-value**
MPC (P2)	-0.0394 (-0.069, -0.010)	**0.008***	-0.0412 (-0.071, -0.012)	**0.006***	-0.1969 (-0.596, 0.203)	0.334
PMT score	-0.0014 (-0.005, 0.002)	0.483	-0.0020 (-0.006, 0.002)	0.307	-0.0025 (-0.007, 0.002)	0.275
Mean of the distances to first and second closest PHCs (D1)†			10.6887 (4.284, 17.093)	**0.001***	2.0079 (-20.666, 24.682)	0.862
MPC (P2) * D1					20.067 (-28.984, 69.119)	0.423
Margins						
Unmet need for those receiving MPC	7.31% (5.33, 9.07)		7.20% (5.45, 8.96)		-	
Unmet need for those not receiving MPC	11.25% (9.79, 12.71)		11.33% (9.86, 12.79)		-	

Note: Model was adjusted for the interaction of household score and the cutpoint

† Distance is reported in KM in a logarithmic scale

4.3.1. Full models

When socio-demographic and assistance variables were added to the base model (Model 1a), MPC was significant at $p<0.05$ (Model 2a). Holding all other variables constant, there was a 3.54-percentage point decrease in unmet need for PHC in households receiving MPC versus those not, from 11.09% (95% CI: 9.65, 12.52) to 7.55%. When distance ($p<0.01$) was added to the model (Model 2b), there was a small, 0.08 percentage-point decrease to 3.62 percentage points, although distance had no significant moderating effect (Model 2c), consistent with the findings of the base models. Once adjusted for distance, socio-demographic, and assistance variables (Model 2b), unmet need for those not receiving MPC was estimated to be 11.12% (95% CI: 9.69, 12.55), while for those receiving MPC, it was 7.50% (95% CI: 5.76, 9.25).

Holding MPC receipt, the variables of the base model, plus socio-demographic and assistance variables constant (Model 2b), a 10% increase in mean distance in km to the two closest PHC facilities is associated with unmet need higher by 0.904 percentage points. Put in the same terms as those in the base model, households in clusters located a mean distance of 5 km from the two closest PHC facilities will have 0.904 percentage points less unmet need than those a mean distance of 5.5km from facilities. In both the base and full models, adjusting for distance has a minor crude strengthening effect on the negative relationship between unmet need for PHC and MPC (Model 1b, 2b), however, this effect was not significant (Model 1c, 2c).

In terms of the socio-demographic and assistance covariates, these remained relatively consistent whether or not distance was included in the model. In both Model

2a and 2b, holding all other variables constant, age was significant at $p<0.01$; for every 1 year increase in age, unmet need for PHC increases by 0.04 percentage points. Gender was not significant. Chronic conditions and disabilities had a strong and highly significant ($p=0.000$), positive relationship with unmet need. Unmet need for PHC for those with chronic conditions was estimated to be about 20.76%, while for those without, only 7.08%, indicating an approximate 13.68-point increase in unmet need for those with chronic conditions – a much greater impact than MPC. Only a small proportion of the sample reported disabilities (n=1068), however, among them, unmet need was estimated at about 20.22%, while for those without disabilities, it was only 9.08%.

In regard to household-level characteristics, household size, arrival year to Lebanon, households with multiple UNHCR case numbers, and whether or not a household member was currently employed had no significant impact on whether or not an individual had unmet need for PHC. Age and gender of head of household did, however, have significant impact on unmet need. While age of the individual had a positive association with unmet need (i.e., as age increases, unmet need increases), age of head of household had a negative association ($p=0.001$) with unmet need (i.e., as age of head of household decreases, unmet need increases). Individuals living in female-headed households had a 2.25-point, significant ($p<0.05$) higher probability of unmet need compared to individuals living in households headed by males.

Household residency status and house structure had an impact on unmet need for PHC, although not at all levels. Compared to those in residential structures, those in

non-residential structures were significantly (p=0.01) more likely to have unmet need for PHC, while those living in non-permanent structures were not. When distance was added to the model, the impact of living in a non-residential structure on unmet need decreased; when distance was not accounted for, unmet need was 0.29 percentage points higher than when it was. Therefore, living in a non-residential structure compared to a residential structure plays slightly less of a role when distance is accounted for, although this difference is negligible.

As expected, individuals living in households in which all members over the age of 15 were legal residents were significantly less likely (p<0.01) to have unmet need for PHC than those with no legal residents. Households in which at least one but not all members 15+ were legal residents was not associated with unmet need. Unmet need for legal residents was estimated to be 7.92% (95% CI: 6.80, 9.03), compared to 10.03% (95% CI: 9.18, 10.87) among households with no legal residency, a 2.11-point difference and a slight (0.18-point) decrease from Model 2a in which distance was not accounted for. Therefore, accounting for distance in considerations of the impact of residency on unmet need for PHC slightly increases the impact of legal residency.

Of the five types of household assistance beyond MPC p2 for which we accounted - MPC p1, CFF p2, vouchers p2, UNICEF p2, and winter assistance p2 - only MPC p1 and winter p2 were significant (p<0.05). Those who received MPC p1 had lower levels of unmet need than those who did not receive it (p<0.01), although the impact was smaller than MPC p2 (p<0.05) (a 1.79-point decrease and 3.62-point decrease in unmet need, respectively). Those who received winter assistance in p2 were

significantly *more* likely to have unmet need for PHC ($p<0.05$), however, given that nearly all households (96% in comparison group and 97.25% in intervention group) received winter cash assistance and the logical unlikelihood of additional assistance resulting in unmet need for PHC, this is likely related to the household characteristics of those who did and did not qualify for winter cash assistance and not due to specific vulnerabilities caused by receiving winter assistance.

Table 9: Multivariable analysis of unmet need for primary health care (full models)						
Full models	**Model 2a**		**Model 2b**		**Model 2c**	
	(base + socio-demographics & assistance status)		**(base + D1 + socio-demographics & assistance status)**		**(base + D1 + interaction term socio-demographics & assistance status)**	
Observations		22098		22098		22098
Clusters		3670		3670		3670
Variables	**Coefficient (95% CI)**	**P-value**	**Coefficient (95% CI)**	**P-value**	**Coefficient (95% CI)**	**P-value**
MPC (P2)	-0.0354 (-0.065, -0.006)	**0.018***	-0.0362 (-0.066, -0.007)	**0.016***	-0.1467 (-0.053, 0.234)	0.451
D1	-	-	9.4847 (3.175, 15.794)	**0.003***	3.410 (-18.160, 24.981)	0.757
MPC (P2) * D1					14.3057 (-8.457, 1.614)	0.183
Individual-level characteristics						
Gender						
Male	-	-	-	-		-
Female	0.0024 (-0.005, 0.010)	0.501	0.0025 (-0.005, 0.010)	0.496	0.0026 (-0.005, 0.010)	0.478
Age	0.0004 (0.0001, 0.0007)	**0.003***	0.0004 (0.0001, 0.0007)	**0.003***	0.0004 (0.0001, 0.001)	**0.004***
Chronic condition	0.1372 (0.121, 0.153)	**0.000***	0.1368 (0.121, 0.153)	**0.000***	0.1123 (0.083, 0.141)	**0.000***
Disability	0.1115 (0.083, 0.140)	**0.000***	0.1114 (0.082, 0.140)	**0.000***	0.1371 (0.121, 0.153)	
Household-level characteristics						
HH size	0.0004 (-0.003, 0.004)	0.838	0.0006 (-0.003, 0.004)	0.756	0.0007 (-0.003, 0.004)	0.706
Arrival year to Lebanon	0.0018 (-0.0007, 0.004)	0.150	0.0017 (-0.001, 0.004)	0.175	0.0019 (-0.001, 0.004)	0.143
HoH age	-0.0011 (-0.002, -0.0004)	**0.001***	-0.0011 (-0.002, -0.0004)	**0.001***	-0.0011 (-0.002, -0.000)	**0.001***
Female HoH	0.0228 (0.004, 0.041)	**0.016***	0.0225 (0.004, 0.409)	**0.017***	0.0027 (0.004, 0.041)	**0.016***
Multiple UNHCR cases in same HH	0.0217 (-0.009, 0.044)	0.061	0.0210 (-0.002, 0.044)	0.070	0.0204 (-0.002, 0.043)	0.078
HH member currently employed	-0.0025 (-0.017, 0.012)	0.742	-0.0018 (-0.017, 0.013)	0.807	-0.002 (-0.017, 0.124)	0.757
House structure						
Residential	-	-	-	-	-	-
Non-residential	0.0371 (0.011, 0.062)	**0.006***	0.0342 (0.008, 0.060)	**0.010***	0.0338 (0.008, 0.060)	**0.011***
Non-permanent	0.0064 (-0.008, 0.021)	0.379		0.834	0.0007 (-0.013, 0.015)	0.915
Residency status (age 15+)						
No legal residents	-	-	-	-		
At least one but not all	0.0048 (-0.012, 0.021)	0.569	0.0033 (-0.013, 0.020)	0.695	0.0034 (-0.013, 0.020)	0.687
All legal residents	-0.0194 (-0.033, -0.006)	**0.006***	-0.0212 (-0.035, -0.007)	**0.003***	-0.0213 (-0.035, -0.007)	**0.002***
Household assistance status						
MPC (P1)	-0.0169 (-0.030, -0.004)	**0.013***	-0.0179 (-0.031, -0.005)	**0.009***	-0.0184 (-0.032, -0.005)	**0.007***
CFF (P2)	0.0303 (-0.019, -0.080)	0.229	0.0330 (-0.015, 0.081)	0.181	0.0208 (-0.035, 0.077)	0.465
Vouchers (P2)	0.0296 -0.019, 0.079)	0.236	0.0321 (-0.016, 0.080)	0.189	0.0225 (-0.030, 0.752)	0.403
UNICEF (P2)	0.0042 (-0.009, 0.018)	0.537	0.0033 (-0.010, 0.017)	0.634	0.0039 (-0.010, 0.017)	0.578
Winter (P2)	0.0360 (0.007, 0.065)	**0.017***	0.0354 (0.007, 0.064)	**0.016***	0.0288 (-0.003, 0.061)	0.080
Margins						
Unmet need for those receiving MPC	7.55% (5.80, 9.30)		7.50% (5.76, 9.25)			-
Unmet need for those not receiving MPC	11.09% (9.65, 12.52)		11.12% (9.69, 12.55)			-

Note: Model was adjusted for PMT score and the interaction of household score and the cutpoint

† Distance is reported in KM in a logarithmic scale

4.3.3. Disaggregated models

The full model including distance (Model 2b) was used as the base for the disaggregated models. Given that the addition of the socio-demographic and assistance covariates to the base models caused a change of greater than 10% in the coefficient for MPC, we can conclude that the covariates are controlling for some confounding elements. Model 2b was disaggregated by selected variables of interest including age, chronic illness, residency, house structure, and cross-sections of age, gender, and chronic illness. Despite the fact that we did not find significant evidence for a moderating effect of distance on the relationship between unmet need for PHC and MPC, the disaggregated models serve to elucidate the relationship between MPC and unmet need for PHC, and distance and unmet need for PHC in different subpopulations of refugees.

4.3.3.1. Age disaggregation

Age was disaggregated into four groups, 0-59 months (children under 5), age 5-17, age 18-64, and age 65+ (Model 3a). Neither MPC receipt nor distance was significant for any age group with the exception of 18-64. For those in the 18-64 age group, MPC had a greater negative impact and distance a greater positive impact on unmet need for PHC than the impact on the full sample (Model 2b). Unmet need for individuals age 18-64 was estimated to be 14.55% (95% CI: 12.69, 16.42) for those who did not receive MPC and 9.51% (95% CI: 6.92, 12.10) among those who had. A 10% increase in mean distance in km to the two closest PHC facilities is associated with unmet need in this age group higher by 1.114 percentage points. For children under 5

and the 5-17 age group, unmet need for PHC in both groups was below 10% (Table 7) implying that individuals in these age groups are, by and large, having their needs met despite limited financial resources or distance to PHC facilities. The 65+ age group was small (n=588), so it is likely that there was not enough power to detect a significant effect, as this age group had the highest proportion of unmet need (Table 7) of any age group.

As both MPC and distance had a significant effect on the 18-64 age group, in order to better understand this relationship, we disaggregated the effect of distance according to those household clusters below or equal to the overall median distance to facilities (Model 3b). Fifty percent of clusters were a mean of less than 2.2 km from the first and second closest PHC facilities, while the remainder were further. Looking exclusively at individuals age 18-64 living in households at distances at or below the median of 2.2 km, both MPC and distance lose their significance. In those individuals of the same age group living more than an average of 2.2 km to facilities, the effect of MPC more than doubled compared to Model 3a, from -0.0504 to -0.1036 (95% CI: -0.165, -0.042) and the effect of distance more than tripled, from 11.689 to 39.164 (95% CI: 14.254, 64.074). Among this group, unmet need for PHC is estimated at 17.18% (95% CI: 14.40, 19.96), which is reduced to 6.83% (95% CI: 3.04, 10.62) for those receiving MPC - and distance plays a much larger role.

Table 10: Multivariable analysis of unmet need for primary health care by age group (disaggregated models)								
Disaggregated models	**Model 3a (null + D1 + socio-demographics & assistance status)**							
Age groups	**0-59 months**		**5-17**		**18-64**		**65+ §**	
Observations	3604		9257		8922		315	
Clusters	2186		3190		3648		273	
	Coefficient (95% CI)	**P-value**	**Coefficient (95% CI)**	**P-value**	**Coefficient (95% CI)**	**P-value**	**Coefficient (95% CI)**	**P-value**
MPC	-0.0429 (-0.094, 0.009)	0.103	-0.0249 (-0.058, 0.008)	0.137	-0.0504 (-0.092, -0.009)	**0.016***	0.0173 (-0.167, 0.201)	0.854
D1	6.1399 (-5.383, 17.663)	0.296	6.8741 (-0.046, 13.794)	0.052	11.689 (3.149, 20.230)	**0.007***	28.1325 (-13.021, 69.286)	0.180
Margins								
Receiving MPC	-		-		9.51% (6.92, 12.10)		-	
Not receiving MPC	-		-		14.55% (12.69, 16.42)		-	

Note: Model was adjusted for PMT score, the interaction of household score and the cutpoint, and socio-demographic and assistance covariates as in Model 2b
† Distance is reported in KM in a logarithmic scale
§The 65+ age group was too small a subset to adequately compute coefficients and p-values

Table 11: Multivariable analysis of unmet need for primary health care, age 18-64 by distance (above and below the median)				
Disaggregated models	**Model 3b (null + D1 + socio-demographics & assistance status)**			
Age 18-64	**D1 below 2.2 km**		**D1 above 2.2 km**	
Observations	4397		4525	
Clusters	1814		1834	
	Coefficient (95% CI)	**P-value**	**Coefficient (95% CI)**	**P-value**
MPC	0.0051 (-0.052, 0.062)	0.861	-0.1036 (-0.165, -0.042)	**0.001***
D1	3.4889 (-13.777, 20.754)	0.692	39.164 (14.254, 64.074)	**0.002***
Margins				
Receiving MPC		-		6.83% (3.04, 10.62)
Not receiving MPC		-		17.18% (14.40, 19.96)

Note: Model was adjusted for PMT score, the interaction of household score and the cutpoint, and socio-demographic and assistance covariates as in Model 2b
† Distance is reported in KM in a logarithmic scale

4.3.2.2. Chronic illness disaggregation

Model 2b was disaggregated by chronic illness in two age groups, 18-44 and age 45+. The highest proportion of those reporting chronic illness was among those age 65+ (more than 60%), compared to about 23% in the 18-44 age group. In both age groups, 18-44 and 45+, MPC receipt did not have a significant effect on unmet need for PHC for those with chronic illnesses (Model 4a, 4b). Distance had a significant effect ($p=0.01$) only for those with chronic illness over age 44 – a 10% increase in mean distance in km for this age group is associated with unmet need higher by 3.493 percentage points, although the 95% confidence interval was wide (0.823, 6.163 percentage points), indicating lack of sufficient power to make precise conclusions.

Table 12: Multivariable analysis of unmet need for primary health care, chronic illness by age group (18-44 and 45+)								
Disaggregated models	**Model 4a**				**Model 4b**			
	(null + D1 + socio-demographics & assistance status)				**(null + D1 + socio-demographics & assistance status)**			
	Chronic illness (age 18-44)				**Chronic illness (age 45+)**			
	Yes		**No**		**Yes**		**No**	
Observations	1787		5599		1134		717	
Clusters	1433		3117		887		611	
	Coefficient (95% CI)	**P-value**	**Coefficient (95% CI)**	**P-value**	**Coefficient (95% CI)**	**P-value**	**Coefficient (95% CI)**	**P-value**
MPC	-0.0307 (-0.142, 0.081)	0.591	-0.0580 (-0.097, -0.019)	**0.004***	-0.0698 (-0.197, 0.0570)	0.28	0.0127 (-0.083, 0.108)	0.794
D1	14.3491 (-8.882, 37.580)	0.226	7.3156 (-1.022, 15.623)	0.085	37.6488 (8.633, 64.665)	**0.010***	14.7683 (-5.565, 35.102)	0.155
Margins								
Receiving MPC	-		4.51 (2.10, 6.92)		-		-	
Not receiving MPC	-		10.31 (8.47, 12.16)		-		-	

Note: Model was adjusted for PMT score, the interaction of household score and the cutpoint, and socio-demographic and assistance covariates as in Model 2b
† Distance is reported in KM in a logarithmic scale

4.3.3.3. Residency disaggregation

MPC and distance were not significantly associated with unmet need for PHC for individuals in households where there were no legal residents or in which not all household members (age 15+) were legal residents (Model 5a). For individuals living in households in which all household members (age 15+) were legal residents, both MPC ($p<0.05$) and distance ($p<0.01$) were significantly associated with unmet need for PHC. Unmet need for PHC in this group was low compared to the full sample; for those not receiving MPC, an estimated 9.84% (95% CI: 7.33, 12.36) had unmet need, for those receiving MPC, this figure was only 3.83% (95% CI: 1.18, 6.48). Distance had a greater positive effect on unmet need for those in households with legal residency compared to the full sample; a 10% increase in mean distance in km from the two closest facilities for those households with legal residency is associated with higher likelihood of unmet need by 1.669 percentage points.

Like in Model 3b, in order to elucidate the effect of distance and MPC on unmet need for individuals in households with full legal residency (Model 5b), legal residency was disaggregated by distance, that is, individuals in households below and above the 2.2 km median. Once disaggregated, we see that those that are, on average, less than 2.2 km to facilities, no longer see a significant effect of MPC or distance, whereas for those above the median, only distance remains significant, at 31.2016 (95% CI: 0.568, 61.835). The power of this disaggregation was limited, however, as the confidence interval for distance was wide.

Table 13: Multivariable analysis of unmet need for primary health care by legal residency						
Disaggregated models	**Model 5a**					
	(null + D1 + socio-demographics & assistance status)					
Residency	**No legal residents in household**		**At least one but not all household members (age 15+) are residents**		**All household members (age 15+) are residents**	
Observations	11914		5189		4995	
Clusters	1976		753		941	
	Coefficient (95% CI)	**P-value**	**Coefficient (95% CI)**	**P-value**	**Coefficient (95% CI)**	**P-value**
MPC	-0.0283 (-0.070, 0.014)	0.185	-0.0269 (-0.094, 0.401)	0.434	-0.0602 (-0.108, -0.013)	**0.013***
D1	5.2179 (-3.884, 14.320)	0.261	10.2667 (-4.0292, 24.5625)	0.159	17.5082 (6.345, 28.672)	**0.002***
Margins						
Receiving MPC	-		-		3.83% (1.18, 6.48)	
Not receiving MPC	-		-		9.84 (7.33, 12.36)	

Note: Model was adjusted for PMT score, the interaction of household score and the cutpoint, and socio-demographic and assistance covariates as in Model 2b
† Distance is reported in KM in a logarithmic scale

Table 14: Multivariable analysis of unmet need for primary health care, legal residency by distance (above and below the median)				
Disaggregated models	**Model 5b**			
	(null + D1 + socio-demographics & assistance status)			
Legal residents	**Below 2.2 km**		**Above 2.2 km**	
Observations	2373		2262	
Clusters	443		498	
	Coefficient (95% CI)	**P-value**	**Coefficient (95% CI)**	**P-value**
MPC	-0.0693 (-0.148, 0.009)	0.084	-0.0596 (-0.121, 0.002)	0.057
D1	1.437 (-21.684, 24.558)	0.903	31.2016 (0.568, 61.835)	**0.046***
Margins				
Receiving MPC	-		-	
Not receiving MPC	-		-	

Note: Model was adjusted for PMT score, the interaction of household score and the cutpoint, and socio-demographic and assistance covariates as in Model 2b
† Distance is reported in KM in a logarithmic scale

4.3.3.4. Housing disaggregation

MPC and distance were not significantly associated with unmet need for PHC for individuals living in households in residential structures. For those in non-residential structures, distance was significant ($p<0.05$) but MPC was not, while for those in non-permanent structures, both distance ($p<0.01$) and MPC ($p<0.05$) were significantly associated with unmet need for PHC. Unmet need for those living in non-permanent structures and not receiving MPC was 12.10% (95% CI: 9.14, 15.06), and for those receiving MPC it was 6.02% (95% CI: 3.04, 9.01). Distance ostensibly has a greater effect for those in non-residential structures – 10% increase in mean distance in km is associated with unmet need higher by 3.129 percentage points, versus 2.047 percentage points for those in non-permanent structures.

When individuals living in non-permanent structures were disaggregated by those in households above and below the median mean distance of 2.2 km, like for households with legal residency and the 18-64 age group, both MPC and distance lose significance for those within a mean of 2.2 km to facilities (Model 6b). For those further than 2.2 km, both the effect of MPC and distance were significant ($p<0.05$). In this case, unmet need declined from 14.36% (95% CI: 10.36, 1.34) for those not receiving MPC to 5.92% (95% CI: 2.06, 9.78) among those who were. Holding all other variables constant, for those in non-permanent structures and further than a mean of 2.2 km from facilities, a 10% increase in mean distance in km is associated with unmet need higher by 3.079 percentage points, versus 2.047 when looking at all household distances (Model 6a). As with the previous findings, these figures should be taken cautiously due to the wide confidence intervals, particularly for the distance measure.

Table 15: Multivariable analysis of unmet need for primary healthcare by house structure						
Disaggregated models	**Model 6a**					
	(null + D1 + socio-demographics & assistance status)					
House structure	**Residential**		**Non-residential**		**Non-permanent**	
Observations	14270		2029		5799	
Clusters	2289		327		1054	
	Coefficient (95% CI)	**P-value**	**Coefficient (95% CI)**	**P-value**	**Coefficient (95% CI)**	**P-value**
MPC	-0.0227 (-0.059, 0.014)	0.223	-0.0374 (-0.149, 0.074)	0.512	-0.0608 (-0.116, -0.005)	**0.031***
D1	4.4841 (-2.753, 11.721)	0.225	32.8269 (2.584, 63.070)	**0.033***	21.4738 (7.420, 35.527)	**0.003***
Margins						
Receiving MPC	-		-		6.02% (3.04, 9.01)	
Not receiving MPC	-		-		12.10 (9.14, 15.06)	

Note: Model was adjusted for PMT score, the interaction of household score and the cutpoint, and socio-demographic and assistance covariates as in Model 2b
† Distance is reported in KM in a logarithmic scale

Table 16: Multivariable analysis of unmet need for primary health care, non-permanent structures by distance (above and below median)				
Disaggregated models	**Model 6b**			
	(null + D1 + socio-demographics & assistance status)			
Non-permanent structures	**Below 2.2 km**		**Above 2.2 km**	
Observations	2035		3764	
Clusters	390		664	
	Coefficient (95% CI)	**P-value**	**Coefficient (95% CI)**	**P-value**
MPC	-0.0004 (-0.079, 0.078)	0.990	-0.0844 (-0.157, 0.011)	**0.023***
D1	-17.2182 (-40.887, 6.451)	0.154	32.306 (1.357, 63.256)	**0.041***
Margins				
Receiving MPC	-		5.92% (2.06, 9.78)	
Not receiving MPC	-		14.36% (10.36, 18.34)	

4.3.3.5. Gender disaggregation

Gender was disaggregated only within the 18-44 age group, with the intent to examine the difference of effect of MPC and distance on young males and females (Model 7a). This decision to look explicitly at young males and females was based on the results of the age disaggregation, which indicated an effect of MPC and distance only on the 18-64 age group (Model 3a), and the results of the chronic illness disaggregation, which found that MPC only had a significant effect on those in the 18-44 age group without chronic illness (Model 2b).

MPC had a significant ($p<0.05$), negative association with unmet need among young men, age 18-44. Unmet need for PHC was estimated to be 14.71% (95% CI: 12.14, 17.28) among young men in households not receiving MPC, and 8.34% (95% CI: 4.71, 11.97) among those receiving MPC. MPC was not significantly associated with unmet need among young women, however, nearly all of the women of reproductive age (15-49) fall into 18-44 age group. Since unmet need for PHC related to reproductive health or routine women's health checks were not included in this analysis, the results related to young women should not be interpreted as conclusive. Distance to facilities was significant for neither young men nor young women.

Table 17: Multivariable analysis of unmet need for primary health care by gender, age 18-44				
Disaggregated models	**Model 7a**			
	(null + D1 + socio-demographics & assistance status)			
Gender (18-44)	**Male (age 18-44)**		**Female (age 18-44)**	
Observations	3269		4117	
Clusters	2805		3401	
	Coefficient (95% CI)	**P-value**	**Coefficient (95% CI)**	**P-value**
MPC	-0.0637 (-0.121, -0.006)	**0.030***	-0.0420 (-0.092, 0.008)	0.101
D1	9.3798 (-2.843, 21.602)	0.133	8.7105 (-1.493, 18.914)	0.094
Margins				
Receiving MPC	8.34% (4.71, 11.97)		-	
Not receiving MPC	14.71% (12.14, 17.28)		-	

Note: Model was adjusted for PMT score, the interaction of household score and the cutpoint, and socio-demographic and assistance covariates as in Model 2b
† Distance is reported in KM in a logarithmic scale

5. DISCUSSION

5.1. Summary of findings

This study hypothesized a negative relationship between MPC receipt and unmet need for PHC, that is, unmet need for PHC should decrease for individuals in MPC-recipient households. This study also posited that distance would moderate the relationship between MPC and unmet need for PHC, in that those individuals in MPC-recipient households living further, on average, from the two closest PHC facilities, will experience a smaller impact of MPC on unmet need for PHC. The hypotheses were based on the theory that, given the well-established financial and geographic barriers to health care access among Syrian refugees in Lebanon (Blanchet et al., 2016, VASyR, 2018, HRW, 2016, UNHCR, 2018a, Government of Lebanon, 2019) and in other

contexts (Nesbitt et al., 2016, Jacobs et al., 2011, Dator et al., 2018), increased financial accessibility of health care via a cash intervention should reduce unmet need for PHC, but more so among those for whom geographic accessibility is not a major barrier. In agreement with the first component of the hypothesis, the results show that MPC reduces unmet need for PHC overall. While there is a minor crude negative effect on the relationship between unmet need for PHC and MPC when distance is added to the model, because the interaction term (Model 1c, 2c) was not significant, we cannot conclusively say that MPC has the greatest impact on those who are geographically disadvantaged in terms of distance to facilities.

5.1.1. Does MPC affect unmet need for PHC?

Our results show that MPC significantly reduces unmet need for PHC in our general sample population. In both the base (Model 1a) and full models (Model 2a), MPC is significantly associated with reduced unmet need for PHC. When Model 1a and 2a are adjusted for socio-demographic and assistance covariates, the magnitude of the association between MPC and unmet need weakens – from a coefficient of -0.0394 (Model 1a, 95% CI: -0.069, -0.010) to -0.0354 (Model 2a, 95% CI: -0.065, -0.006). Therefore, the base model alone does not explain the relationship between MPC and unmet need. In plainer terms, Model 2a, which is adjusted for socio-demographic and assistance covariates, but not distance, reveals that MPC receipt reduces unmet need for PHC by 3.54 percentage points in the sample population. This is an important finding – previous studies that examined the effect of MPC on health care access (Battistin, 2016, Lehmann & Masterson, 2014, Haushofer & Shapiro, 2013) did not find significant

effect on health outcomes, although these studies used proxy measures for health care access that differed from those used in this study and therefore comparability is limited.

5.1.2. Does distance play a role?

Distance has a minor, if negligible, crude effect on the relationship between unmet need for PHC and the general sample population. It does not, however, have a significant moderating effect (Model 1c, 2c). When distance is added to the base (Model 1b) and full models (Model 2b), the magnitude of the effect of MPC on unmet need for PHC increases. In other words, once distance is accounted for in the analysis, MPC further reduces unmet need, but as the moderating effect is not significant (Model 1c, 2c), we cannot determine conclusively whether distance plays a role in the relationship between MPC and unmet need.

This finding does not confirm the hypothesis, which posited that as proximity decreases, the magnitude of the relationship between MPC and unmet need weakens. In the disaggregated models, however, we do see greater significant effect of MPC on those further from facilities, which indicates the possibility of distance decay. "Distance decay" literature discussed in the literature review section of this study generates strong evidence in support of the deterioration of health care access and measures of utilization for those living further from facilities.[13] What these findings show, however, is that MPC has the potential to mitigate that effect.

[13] See Nesbitt et al., 2016, Karra et al. 2017, Lohela et al., 2017, Kashima et al., 2012, Buor, 2003, Shiferaw et al., 2017, Al-Taiar et al., 2010, Sarrassat et al., 2018, De

5.1.3. Effects of MPC and distance on sample subgroups

While the primary purpose of this study was to understand the effect of distance on the relationship between MPC and unmet need for PHC, another crucial component was the disaggregation of the models by individual and household characteristics that might be linked with greater vulnerability. Disaggregating by selected characteristics revealed key disparities in the effect of MPC and distance on the outcome, and contributes to evidence gaps in the literature with regard to the relationship between cash and key socio-demographic dimensions of interest (Bastagli et al., 2016).

After disaggregating Model 2b by age, chronic illness, residency, housing structure, and young males versus young females, we found that where MPC has a significant effect, it consistently has a negative effect on unmet need for PHC. MPC, but not distance, had a significant effect on unmet need for PHC among young males aged 18-44 (Table 18). Where distance had significant effect, it consistently had a positive effect on unmet need for PHC. Distance, but not MPC, had a significant effect on unmet need for PHC among those aged 45+ with chronic illness, as well as individuals in households living in non-residential structures. Both MPC and distance played significant roles in unmet need for PHC among those aged 18-64, individuals in households living in non-permanent shelters, and individuals in households where all

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Allegri et al., 2011, Hounton et al., 2008, Malqvist et al., 2010, Masters et al., 2013, and Tanser et al., 2006.

working age members had legal residency. MPC had the largest magnitude of impact on unmet need among 18-44 year olds living further than 2.2 km from facilities, followed by those living in non-permanent shelters further than 2.2 km from facilities (Table 18). Distance had the largest impact on unmet need for those furthest from facilities; when models were disaggregated by those living above and below the median distance, the distance coefficient increased substantially (Table 18).

Table 18: Significant effects in disaggregated models (Models 3 – 8)			
Group	**Model**	**MPC coefficient (95% CI)**	**Distance coefficient (95% CI)**
Age 18-64	3a	**-0.0504*** (-0.092, -0.009)	**11.689**** (3.149, 20.230)
Age 18-64 > 2.2 km	3b	**-0.1036**** (-0.165, -0.042)	**39.164**** (14.254, 64.074)
Age 18-44 without chronic illness	4a	**-0.0580**** (-0.097, -0.019)	7.3156 (-1.022, 15.623)
Age 45+ with chronic illness	4b	-0.0698 (-0.197, 0.057)	**37.6488***** (8.633, 64.665)
Individuals in households with full legal residency	5a	**-0.0602*** (-0.108, -0.013)	**17.5082**** (6.345, 28.672)
Individuals in households with full legal residency > 2.2km	5b	-0.0596 (-0.121, 0.002)	**31.2016*** (0.568, 61.835)
Individuals living in non-residential structures	6a	-0.0374 (-0.149, 0.074)	**32.8269*** (2.584, 63.070)
Individuals living in non-permanent shelters	6a	**-0.0608*** (-0.116, -0.005)	**21.4738**** (7.420, 35.527)
Individuals living in non-permanent shelters >2.2 km	6b	**-0.0844*** (-0.157, 0.011)	**32.306*** (1.357, 63.256)
Males 18-44	7a	**-0.0637*** (-0.121, -0.006)	-0.0420 (-0.092, 0.008)

*Bolded coefficients marked by significance at 95%, * (<0.05), ** (<0.01), *** (<0.001)

5.1.3.1. Age and unmet need for primary health care

In our sample, just under 60% of children under 5 required PHC. While one might expect that MPC might reduce unmet need among children under age 5, given the need for essential primary health care in this age group, such as management of childhood illness (Simon et al., 2018) and immunization (Mansour et al., 2019), neither MPC nor distance affected unmet need in young children. This could be explained by the already comparatively low proportions of unmet need among children under 5 (comparison: 8.81%, intervention: 6.25%); MPC is not affecting what are already low levels of unmet need, and adults in the household may be prioritizing the needs of the

children over their own, although there was limited literature addressing this theory. Conversely, the highest proportions of unmet need were found in the 65+ age group (comparison: 14.79%, intervention: 13.55%), as were the highest proportions of PHC requirement (comparison: 72.92%, intervention: 72.25%), but the effect of MPC and distance on this age group could not be conclusively tested due to lack of power.

While the crude effect of distance on the relationship between MPC and unmet need is small – resulting in only a 0.08 percentage point change in unmet need in the full model (Model 2a, 2b) – the potential impact of distance is clearer once disaggregated. Among 18-64 year olds (Model 3b), MPC and distance had no impact on unmet need for individuals living in households within a mean of 2.2 km to the first and second closest PHCs. For those individuals living further than 2.2 km, however, each 10% increase in mean distance in km increased unmet need by 3.733 percentage points, and the coefficient for MPC more than doubled. This indicates that effect of both MPC and distance is potentially concentrated among those who are further away from facilities.

As opposed to MPC having impact on age groups in which PHC requirement is greatest (children <5, 65+) (Table 7), MPC significantly reduced unmet need for PHC among 18-44 year olds, particularly males. Among males ages 18-44, unmet need fell an estimated 6.37 percentage points to 8.34%. Young men are not the traditional targets of humanitarian health programming, which seeks to support the "most vulnerable" – usually women, children, and in some cases, the elderly (Zeid et al., 2015). Perception, in this case, is key – as noted in a 2016 survey on the vulnerability of Syrian refugee men in Lebanon, "refugee men are sometimes perceived as relatively less vulnerable as

they are not as affected by cultural constraints on movement and interaction in the public sphere in the same way as women, making them (it is assumed) better able to access informal support networks in their community" (IRC, 2016). More than 8 in 10 survey respondents, however, reported knowing five or fewer people from whom they could expect support (IRC, 2016), suggesting that these crucial informal networks (Moon, 2018) are not as robust as assumed by program implementers. Furthermore, in general, men shoulder greater disease burden and have a lower life expectancy than women (Winn, 2008), which is in part attributable to men's lower care seeking and less frequent use of health care services compared to women (White, 2008)

Literature specifically addressing health-seeking habits among males, and particularly refugees, in LMICs is limited. Gender-based violence prevention and maternal and child health programs targeting male refugees are common in humanitarian and development programming. The aim of these programs, however, is ultimately to improve the health of women and children (Barker et al., 2008, Blanchet et al., 2015, Kraft et al., 2014, Tappis et al., 2016). Programs explicitly targeting men's health needs and health care seeking habits in humanitarian and development programming are rare, and thus constitutes a critical gap in the evidence. One possible explanation, however, for the large magnitude impact of MPC on unmet need for PHC among young males is that these groups, perceived to be the least vulnerable, may not be prioritized in household care seeking when financial resources are limited; with increased financial resources, those who would not normally seek care are able to access it.

5.1.3.2. Chronic illness and unmet need for primary health care

Chronic illnesses are common among Syrian refugees in Lebanon – a 2018 non-representative survey of non-camp refugees reported that about 1 in 10 respondents had a chronic condition, and more than one-third of households had at least one member with a chronic condition (UNHCR, 2018a). Similarly, a 2016 community-based survey of non-camp refugees found that half of refugee households had at least one member with a chronic condition (Doocy et al., 2016). In our sample, the estimates were higher - 19.48% (n=2461) and 17.12% (n=1663) of individuals reported chronic conditions in the comparison and intervention groups respectively, with over 60% of households in both groups reporting at least one individual with a chronic condition.

Cost of services and transport is a documented barrier to care for chronic illnesses for Syrian refugees in Lebanon (Akik et al., 2019). One could expect, then, that MPC might have one of two logical impacts on unmet need for PHC among those with chronic illnesses, 1) MPC increases financial accessibility of care, in turn reducing unmet need for PHC, or 2) the majority of those with chronic illnesses are already largely meeting their care needs, and therefore MPC has little impact on unmet need. Instead, we found that among those with chronic conditions, unmet need for PHC increases by 13.68 points (Model 2b), from 7.08% to 20.76% with all other variables held constant. Individuals with chronic illnesses are thus not meeting their PHC needs. When chronic illness was disaggregated by age (18-44, 45+), MPC did not have a significant impact on unmet need for those with chronic illness in either age group. Therefore, those with chronic conditions have high unmet need for PHC and MPC receipt has no impact on that need.

As found in other contexts, increased distance to facilities would also presumably have significant positive impact on unmet need among those with chronic illnesses (Lall et al., 2018, Brundisini et al., 2013, Houben et al., 2012) compared to the healthy population. While distance did not have an effect on individuals with chronic illness under the age of 45, it had a large, significant effect on those with chronic illness over the age of 45 (Table 18).

5.1.3.3. Residency and unmet need for primary health care

It might be posited that MPC would have greater negative impact on unmet need for PHC among individuals living in households where all working age members held legal residency, as those without residency would still face barriers to movement (HRW, 2016) despite increased financial accessibility of care. Supporting this hypothesis, a 2014 community-based survey found that the greatest challenge to accessing health care for Syrian refugees without legal status was fear of movement (and particularly, fear of crossing checkpoints) followed by the cost of services and transportation (NRC, 2014). This hypothesis held true – MPC had a significant negative impact on unmet need for individuals in households with legal residency, while it had no impact at all on individuals in households with no residency or with only some members with residency. In other words, with the base variables and all other socio-demographic and assistance variables held constant, MPC only had an impact for individuals if *every* working age member of their household held legal residency. Notably, however, distance to facilities also had a significant impact only on individuals in households with full legal residency (17.5082, 95% CI: 6.345, 28.672), and the

relationship had greater magnitude than that of the effect of distance on the whole sample in the full model (Model 2b, 9.4847, 95% CI: 3.175, 15.794). In Model 5b, with households with legal residency disaggregated by those living above and below the median distance, only distance was significant ($p<0.05$) for those living further than the median mean distance of 2.2 km, suggesting that distance, especially for those living furthest from facilities, is an important predictor of unmet need for PHC. Given, however, that the assumption that those with legal residency have greater freedom of movement than others in the sample, the fact that distance has a larger impact on those with legal residency compared to the full sample is an unexpected finding and could perhaps warrant further investigation.

5.1.3.4. Housing and unmet need for primary health care

Both MPC and distance had significant impact on unmet need for individuals living in non-permanent shelters. The significant effect of cash could be related to the relative economic vulnerability, food insecurity, and disconnection from services and utilities faced by households in non-permanent structures (UNHCR & WFP, 2018). A 2010 study on the effect of small, unrestricted cash transfers in Sri Lanka found that poorer households, who were far likelier to live in non-permanent shelters, showed the greatest effects of the cash transfers, increasing both non-food expenditure and dietary diversity (Sandström & Tchatchua, 2010).

Non-permanent shelters, or groups of non-permanent shelters which form informal tented settlements, are dispersed widely throughout Lebanon. Some of these

settlements are located near to urban areas, while others are located along highways and in fields that may require walking or transport to the main road network. As such, it is not unexpected that once disaggregated by distance above and below the median of mean 2.2 km from the first and second closest facilities, MPC and distance only remain significant, and increase in magnitude, for those living further away. Those within 2.2 km of a facility could conceivably walk or take shared, inexpensive public transport for short distances to access care, whereas those living further would need to manage greater transportation costs and are possibly not connected to the road network. This is consistent with the finding that the effect of MPC and distance is concentrated on 18-64 year olds living further than a mean of 2.2 km from facilities, compared to those living closer.

5.2. Limitations

5.2.1. Methodological limitations

5.2.1.1. Geospatial limitations

Limitations to the geospatial data available posed significant challenges to the analysis. The lack of complete and reliable road network data in Lebanon meant that no impedance measures other than length in meters could be used for this analysis, and some error was introduced due to positional errors in the road network data (Frizelle et al., 2009). More comprehensive data including speed limits, road barriers, and other transportation features was not available. Further, since the road network data did not include many smaller roads and footpaths, the route calculations relied on snapping health centers and cluster locations to the network rather than actual distance. Some

cluster points were approximated using cadaster centroids due to connectivity issues faced by data collectors mainly in Bekaa governorate. Snapping the points to the lines could introduce a certain amount of error, but routes cannot be calculated in ArcGIS Network Analysis unless the points are linked to the network features. The snapping distance was minimal in most cases, with a mean of less than 50 meters for PHCs and less than 250 meters for mean cluster locations and cadaster centroids. Elevation was not accounted for in this analysis.

5.2.1.2. Other limitations

In order to calculate overall unmet need for PHC, gender-specific PHC services such as routine women's health checks and reproductive health services were not included in the outcome. Women's health care and reproductive health services form an important and frequently utilized component of PHC for Syrian refugees in Lebanon (UNHCR, 2018a, Medair, 2016). Therefore, comparisons of health access outcomes (required PHC, accessed required PHC, unmet need for PHC) between males and females should be interpreted with caution. It would also be important to investigate the impact of MPC on access to sexual and reproductive health care in women in future analyses.

Another methodological limitation in this study was statistical power when disaggregating by population subgroups. Given the limited number of individuals over the age of 64, as well as the limited number of individuals with disabilities, we could not evaluate whether MPC and distance had an effect on unmet need among these groups.

Furthermore, estimations of the effect of distance, especially in the disaggregated models, produced wide confidence intervals due to the use of cluster-level coordinates, limiting the variability of the data.

Finally, the usual limitations associated with self-reported survey data apply to this study, as well. Although GPS coordinates were generated by data collectors or by ArcGIS software, information on primary health care requirement and access was reported by the survey respondent on behalf of his or her entire household. Self-reported survey data is prone to recall bias, and respondents may be inclined to misrepresent household characteristics and experiences if they believe that the survey may affect their eligibility for aid.

5.2.2. Conceptual limitations

Measures of access to primary health care access vary, and while financial and geographic accessibility are essential dimensions of access, so too are other supply and demand-side dimensions of access. As discussed by Peters et al. (2008), other dimensions of access include quality, availability, and acceptability of services, which were not accounted for in this study. In particular, availability of services is a concern. Availability includes awareness of services, which, as shown in multiple surveys of Syrian refugees in Lebanon (UNHCR, 2018a, UNHCR, 2017, VASyR, 2018) is a consistently cited barrier to care. Other specificities of dimensions not included in this study include supply-side issues such as lack of welcoming staff in facilities, inadequate staff in available facilities, and demand-side issues such as low self-esteem by users,

stigma associated with certain conditions, especially mental health, and the lack of time or familial permission to attend health services (Jacobs et al., 2008).

The results of this study are limited in their generalizability. The amount of MPC provided to Syrian households in Lebanon on a monthly basis is intended to help vulnerable households meet their basic needs. The amount provide is based on calculations of Minimum Expenditure Basket for the specific, contextual needs of Syrian households in Lebanon. It should also be noted that MPC in the amount provide is limited in its capacity to increase financial accessibility of health services. Health care expenditure in Lebanon can far exceed the value of monthly MPC, especially if an individual requires specialized care. Secondary and tertiary care is not necessarily covered or subsidized by UNHCR (Refugees-Lebanon, 2019). Furthermore, although medication for chronic conditions is a subsidized by UNHCR, repeat prescriptions and expensive follow-up tests may cause health care costs to compound rapidly for households with one or more individuals with chronic illness.

5.3. Conclusions

This study conceptualized MPC as a mechanism of increasing financial accessibility to health care, and distance to facilities as a measure of geographic accessibility. By increasing the financial accessibility of PHC, populations living further from facilities who may not otherwise be meeting their health care needs have the opportunity to do so. In this sense, contrary to the conceptualization of distance in this study as an issue of geographic accessibility, which may or may not include associated

costs, distance in this context may be better understood as an issue of *financial* accessibility, accounting for geographic elements such as transport costs.

While this study establishes that financial accessibility of services is a key element of meeting unmet need for primary health care, particularly among young males, other barriers remain. The results show that MPC does not reduce unmet need among refugees with chronic illnesses, and that chronic illness is significantly and strongly associated with unmet need for PHC. This study lends evidence to the conclusion that MPC has the capacity to reduce unmet need for PHC, and that distance to services should be taken into account. Moreover, efforts to increase awareness of available PHC services among Syrian refugees should be intensified, with an emphasis on discerning between UNHCR-subsidized facilities and facilities in which refugees must cover the full cost of care.

Additional research is warranted on the effect of MPC and distance on unmet need for PHC among the elderly, particularly those with chronic illnesses, on the relationship between MPC, distance, and reproductive health outcomes specifically, and on strategies to reduce unmet need among those with chronic illnesses.

5.4. Ethical considerations

The CAMEALEON project is faculty-driven and IRB approval was obtained (IRB: SBS-2018-0322) through the American University of Beirut. All study subjects

gave informed consent to participate in the research according to standard IRB procedures for the interviewing of human subjects.

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Appendices

Appendix 1: Codebook

Notes

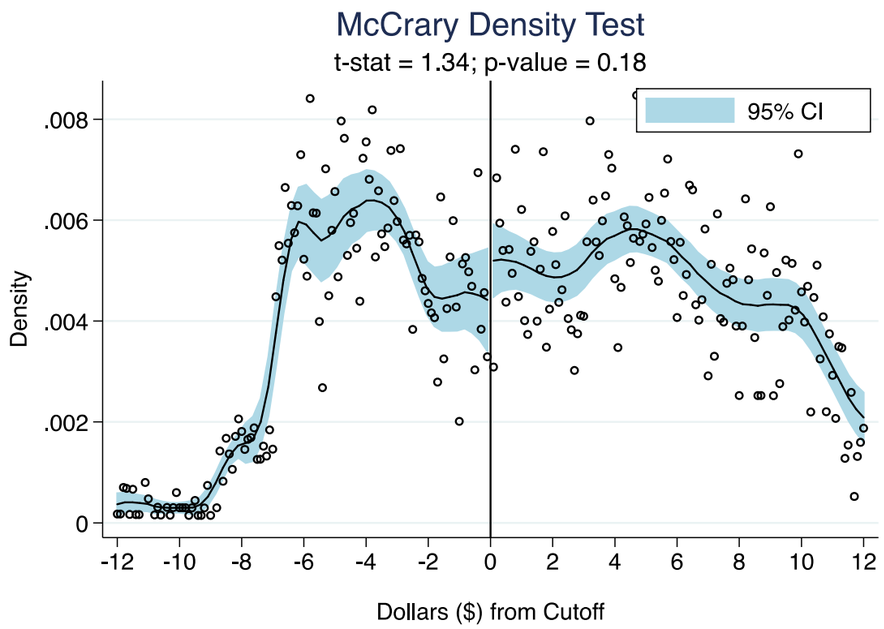
***** These variables are reported in the bivariate analysis and were main variables used to create the outcome.

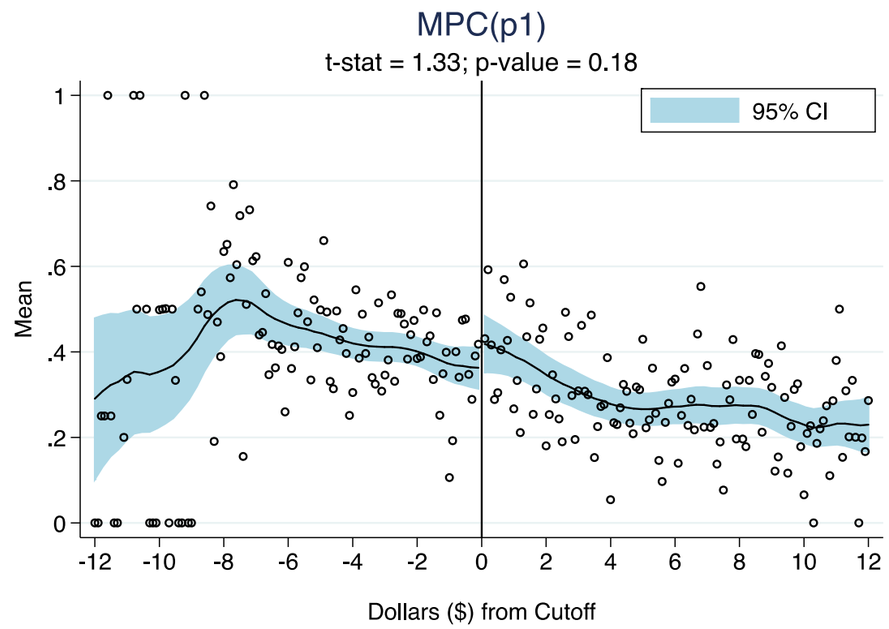
† Independent covariate indicates that the variable was used in the bivariate analysis and/or multivariable models, PMT indicates that the variable was used the balance checks

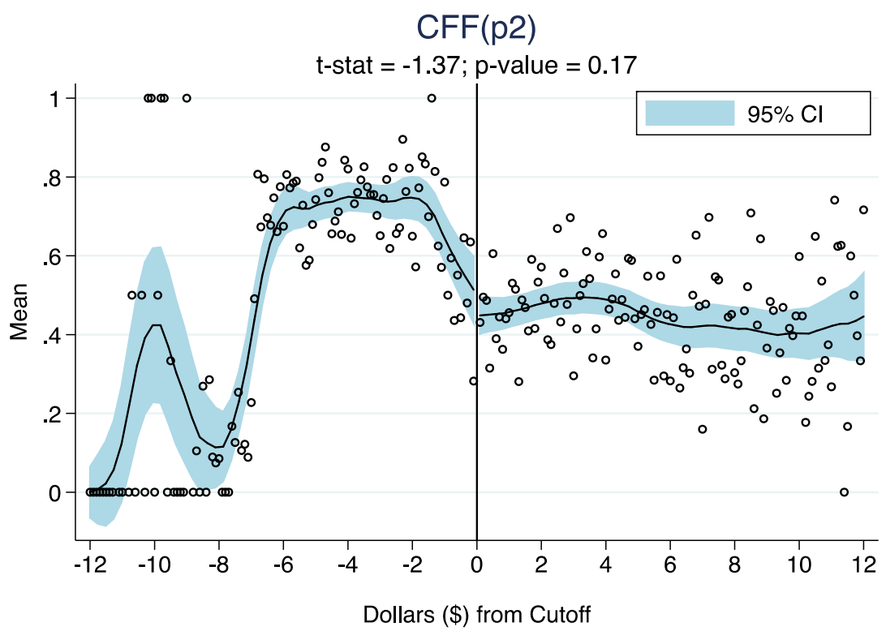
Variable description	**Category**	**Variable (code)**	**Type**
Intervention status	Exposure	mpc_period2	Binary (2 levels; 0 = No, 1 = Yes)
Mean of the log distance to the first and second nearest PHCs in kilometers	Potential moderator	d1	Continuous (logarithmic scale)
Unmet need for PHC	Outcome	unmetneed_any_PHC	Binary (2 levels; 0 = Met need, 1 = Unmet need)
Required PHC*	Component of outcome	require_any_phc	Binary (2 levels; 0 = No, 1 = Yes)
Accessed PHC*	Component of outcome	accessed_PHC	Binary (2 levels; 0 = No, 1 = Yes)
Proxy Means Test score	Forcing variable	newscore	Continuous
Cutpoint	Cutoff point	cutpoint	Binary (2 levels; 0 = Below the cutpoint, 1 = Above the cutpoint)
Gender	Independent covariate; PMT †	dem4	Binary (2 levels; 1 = Male, 2 = Female)
Age	Independent covariate; PMT	dem5	Continuous
Governorate	Independent covariate	locationlevel1	Categorical nominal (3 levels; 1 = Bekaa, 2 = Mount Lebanon, 3 = North)
Chronic condition	Independent covariate	chronic	Binary (2 levels; 0 = No, 1 = Yes)
Disability	Independent covariate	disability	Binary (2 levels; 0 = No, 1 = Yes)
Household size	Independent covariate; PMT	hhsize1	Continuous
Household size (squared)	PMT	hhsize2	Continuous
Year of arrival to Lebanon	Independent covariate; PMT	arrival_year	Continuous
Age of the head of the HH	Independent covariate; PMT	agehoh_ind	Continuous
Gender of the head of the HH	Independent covariate; PMT	femalehoh_ind	Binary (2 levels; 0 = No, 1 = Yes)
Dependency ratio	Independent covariate; PMT	dependency_ratio	Continuous
Adult members (15+) of the household with legal residency	Independent covariate	residency	Categorical nominal (3 levels; 0 = None, 1 = At least one but not all, 2 = All members)
Type of housing	Independent covariate	house_type	Categorical nominal (3 levels; 1 = Residential, 2 = Non-residential, 3 = Non-permanent)
At least one working age (15+) member of the household worked in the last month	Independent covariate	curr_employed_ind	Binary (2 levels; 0 = No, 1 = Yes)
Multiple UNHCR case numbers in the same household	Independent covariate; PMT	multcase	Binary (2 levels; 0 = No, 1 = Yes)
Received MPC prior to Nov 2017	Independent covariate; PMT	mpc_period1	Binary (2 levels; 0 = No, 1 = Yes)
Received CFF after Nov 2017	Independent covariate; PMT	cff_period2	Binary (2 levels; 0 = No, 1 = Yes)
Received vouchers after Nov 2017	Independent covariate; PMT	voucher_period2	Binary (2 levels; 0 = No, 1 = Yes)
Received UNICEF cash after Nov 2017	Independent covariate; PMT	unicef_period2	Binary (2 levels; 0 = No, 1 = Yes)
Received winter cash assistance after Nov 2017	Independent covariate; PMT	winter_period2	Binary (2 levels; 0 = No, 1 = Yes)
Percent of members less than age 5	PMT	u5_share	Continuous
Percent of male members aged 18-50	PMT	b1850_mshare	Continuous
Percent of female members aged 18-50	PMT	b1850_fshare	Continuous
Percent of members aged 6-10	PMT	b610_share	Continuous

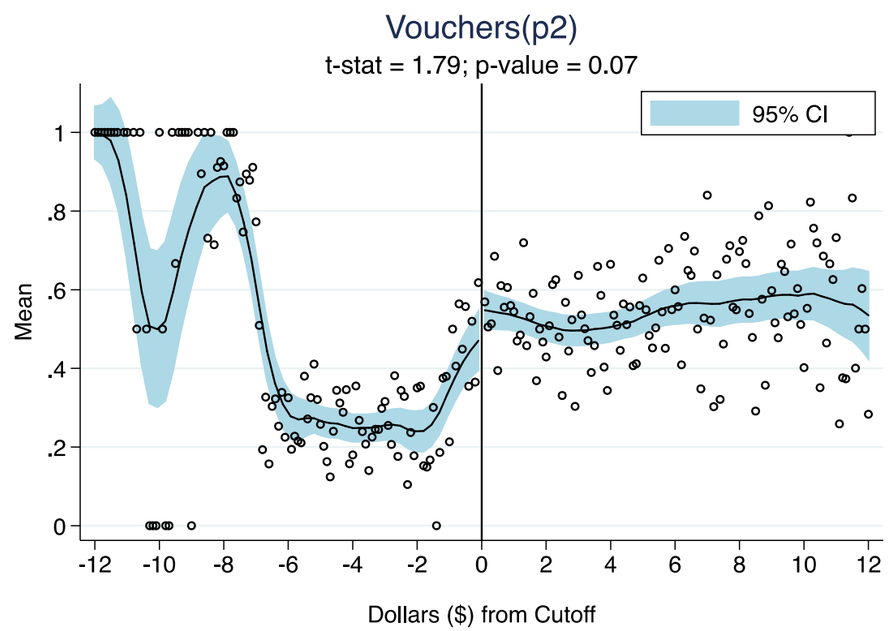
Percent of members aged 11-17	PMT	b1117_share	Continuous
Percent of members aged 18-60	PMT	b1860_share	Continuous
Percent of members greater than age 60	PMT	above60_share	Continuous
Percent of members with a disability	PMT	disabled_share	Continuous
Sum of members under age 5	PMT	u5_sum	Discrete
Sum of members aged 6-10	PMT	b610_sum	Discrete
Sum of members aged 11-17	PMT	b1117_sum	Discrete
Sum of members aged 18-60	PMT	b1860_sum	Discrete
Sum of members greater than age 60	PMT	above60_sum	Discrete
Sum of members with a disability	PMT	disabled_sum	Discrete
At least 1 HH member above age 60 has a medical condition	PMT	above60_medcon1	Binary (2 levels; 0 = No, 1 = Yes)
Head of HH has a medical condition	PMT	hoh_has_medcond	Binary (2 levels; 0 = No, 1 = Yes)
Head of HH is disabled	PMT	hoh_disabled	Binary (2 levels; 0 = No, 1 = Yes)
Head of HH has reached an intermediate level of education or higher	PMT	hoh_intermediate	Binary (2 levels; 0 = No, 1 = Yes)
Married head of HH	PMT	marriedhoh_ind	Binary (2 levels; 0 = No, 1 = Yes)
More than 3 dependents	PMT	dependents3	Binary (2 levels; 0 = No, 1 = Yes)
At least 1 dependent is disabled	PMT	atleast1_depdis	Binary (2 levels; 0 = No, 1 = Yes)

Appendix 2: Balance checks (two-way local polynomial regression plots)



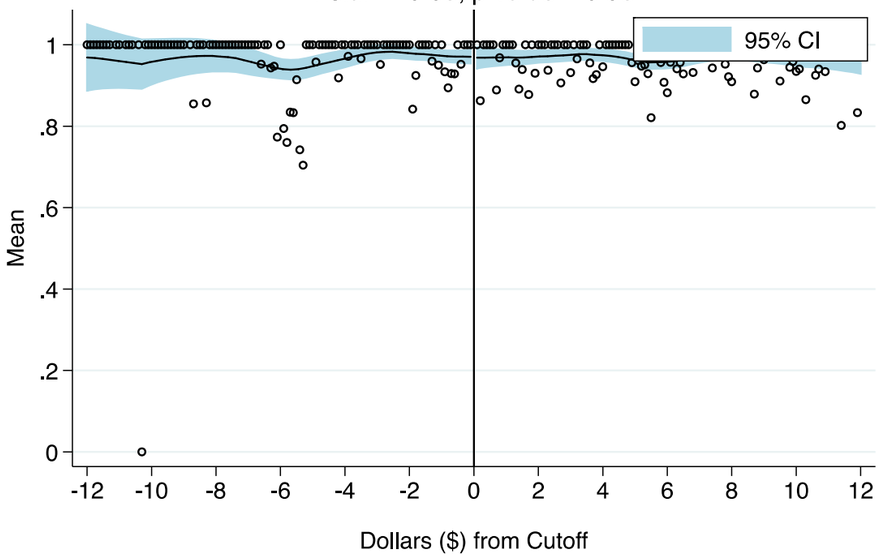






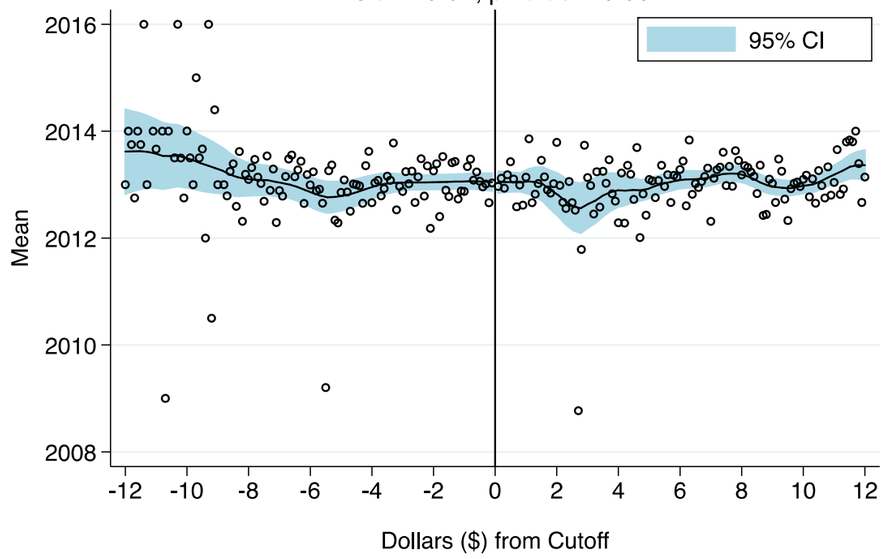
Winter asst.(p2)

t-stat = -0.05; p-value = 0.96



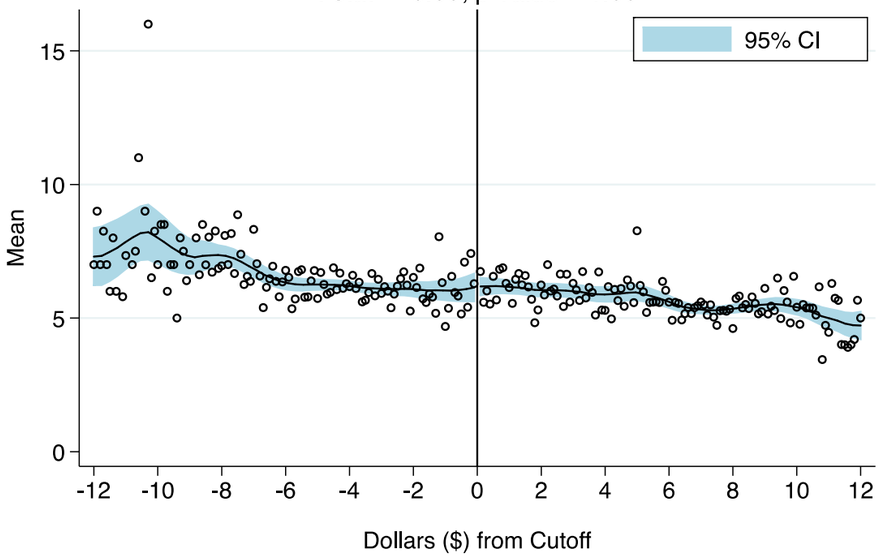
Arrival year to Lebanon

t-stat = 0.01; p-value = 0.99



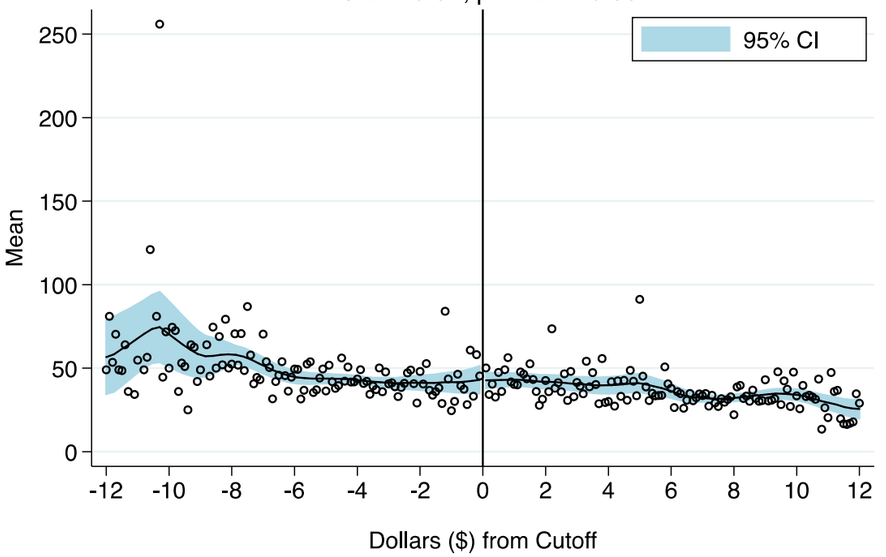
Household size

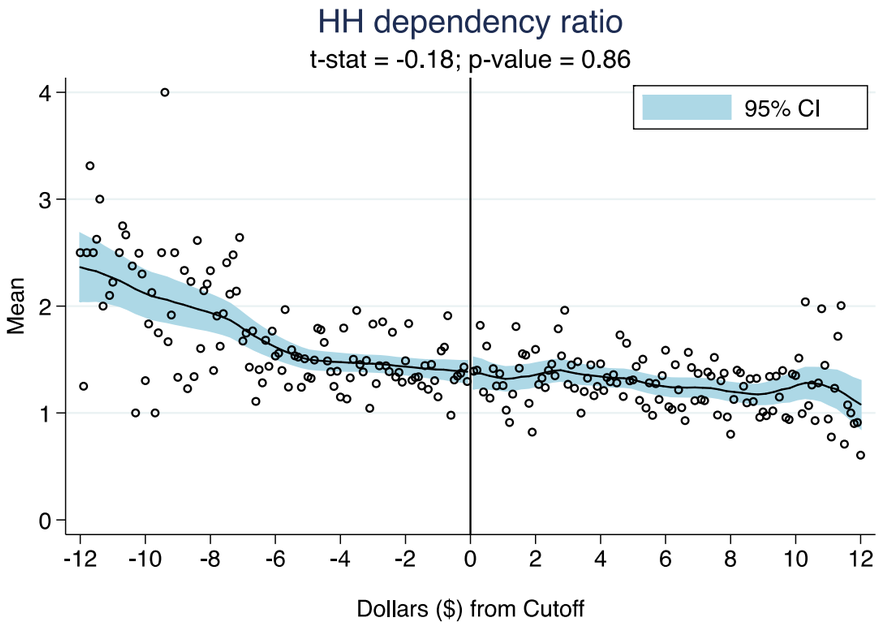
t-stat = -0.00; p-value = 1.00

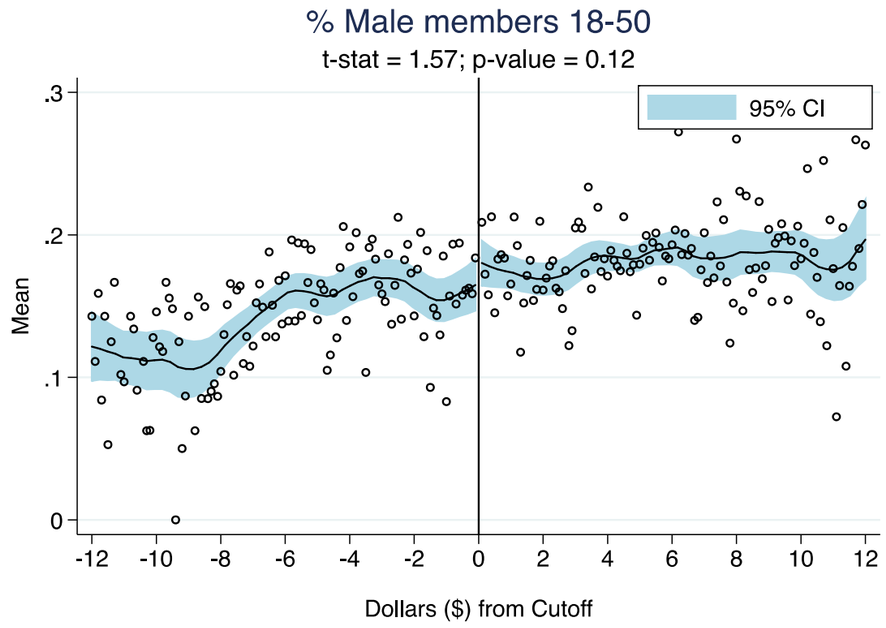


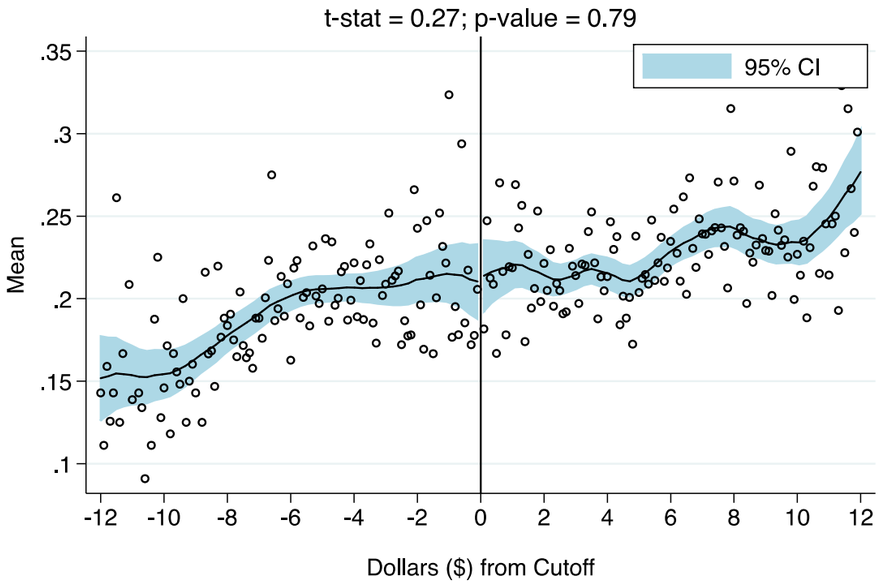
HH size squared

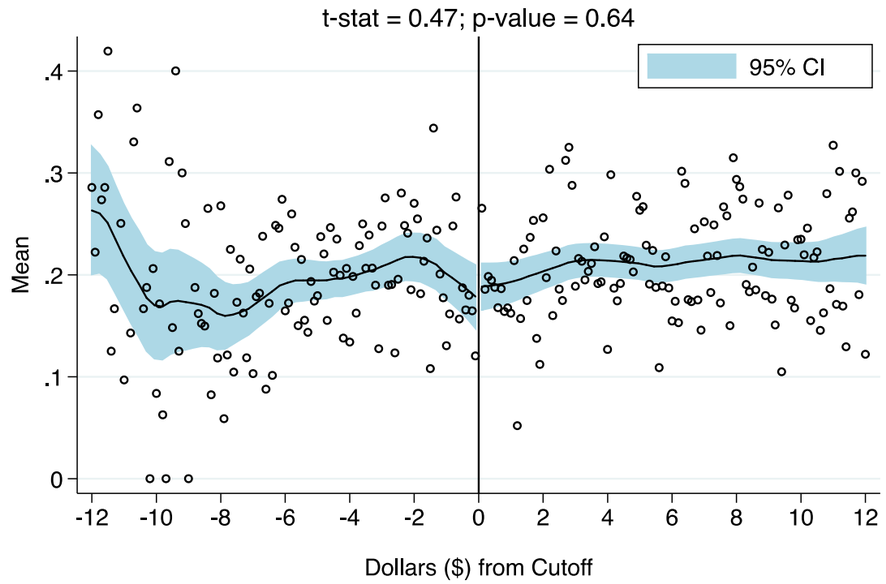
t-stat = 0.01; p-value = 0.99

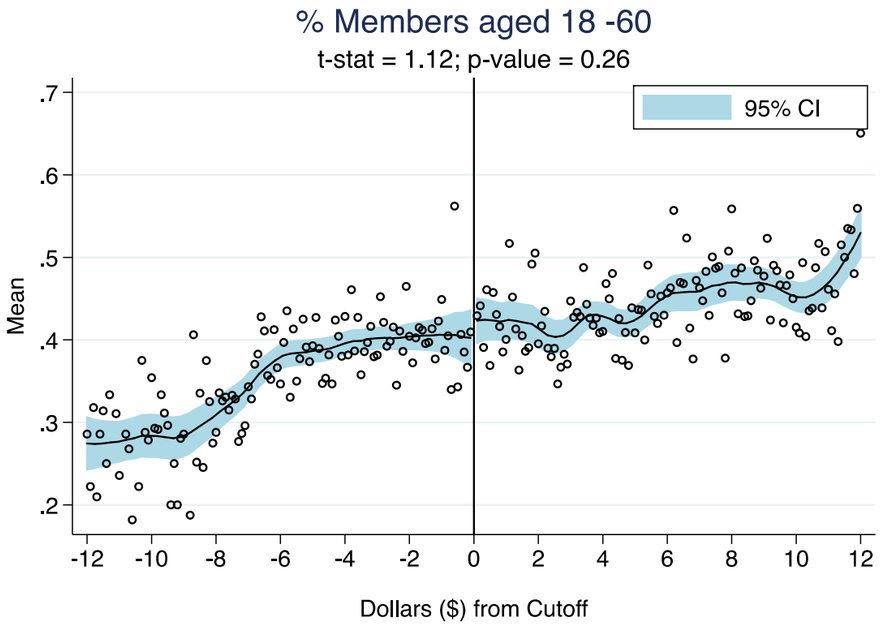


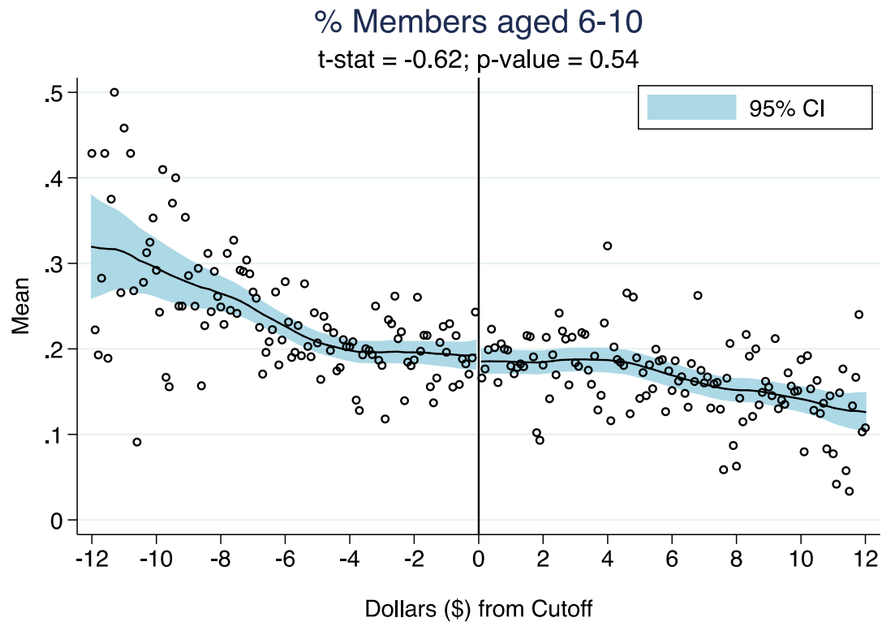

HH dependency ratio
t-stat = -0.18; p-value = 0.86
95% CI
Mean
0
1
2
3
4
-12
-10
-8
-6
-4
-2
0
2
4
6
8
10
12
Dollars ($) from Cutoff

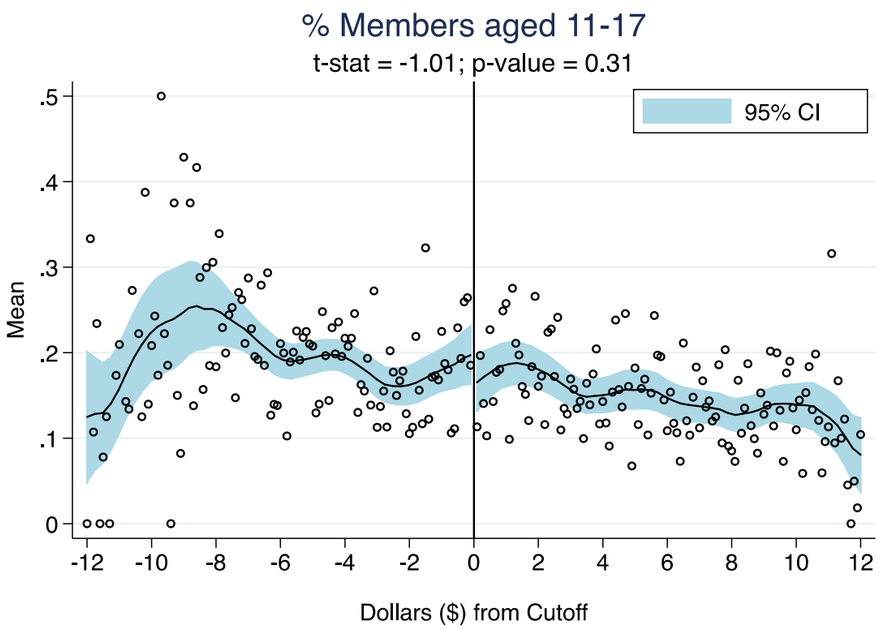

% Male members 18-50
t-stat = 1.57; p-value = 0.12
95% CI
Mean
0
.1
.2
.3
-12
-10
-8
-6
-4
-2
0
2
4
6
8
10
12
Dollars ($) from Cutoff

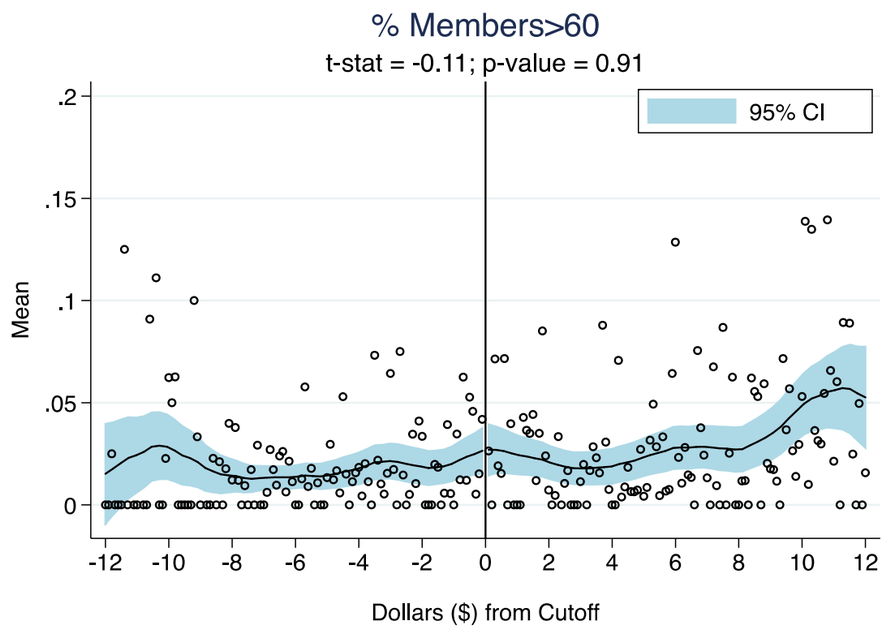

% Female members 18-50
t-stat = 0.27; p-value = 0.79
95% CI
Mean
.1
.15
.2
.25
.3
.35
-12
-10
-8
-6
-4
-2
0
2
4
6
8
10
12
Dollars ($) from Cutoff


% Members <5
t-stat = 0.47; p-value = 0.64
95% CI
Mean
0
.1
.2
.3
.4
-12
-10
-8
-6
-4
-2
0
2
4
6
8
10
12
Dollars ($) from Cutoff


% Members aged 18 -60
t-stat = 1.12; p-value = 0.26
95% CI
Mean
.2
.3
.4
.5
.6
.7
-12 -10 -8 -6 -4 -2 0 2 4 6 8 10 12
Dollars ($) from Cutoff

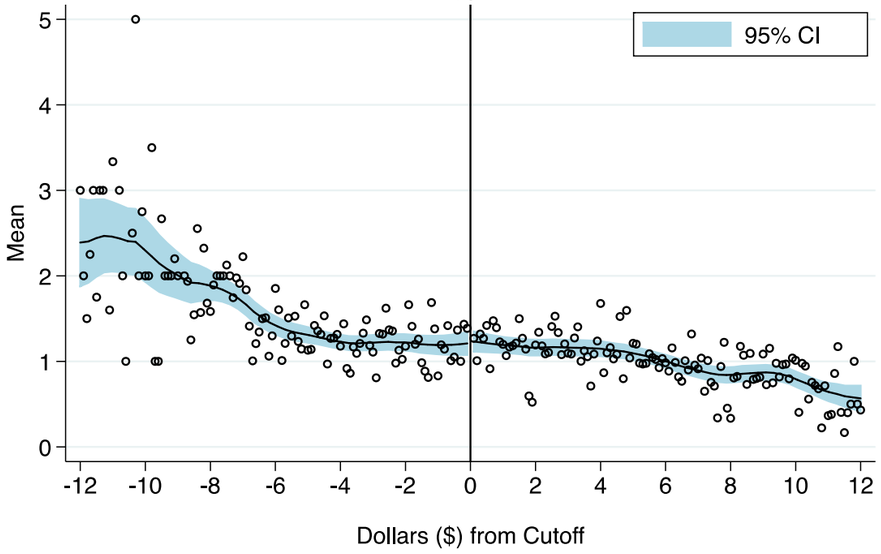

% Members aged 6-10
t-stat = -0.62; p-value = 0.54
95% CI
Mean
0
.1
.2
.3
.4
.5
-12 -10 -8 -6 -4 -2 0 2 4 6 8 10 12
Dollars ($) from Cutoff


% Members aged 11-17
t-stat = -1.01; p-value = 0.31
95% CI
Mean
0
.1
.2
.3
.4
.5
-12 -10 -8 -6 -4 -2 0 2 4 6 8 10 12
Dollars ($) from Cutoff


% Members>60
t-stat = -0.11; p-value = 0.91
95% CI
Mean
0
.05
.1
.15
.2
-12 -10 -8 -6 -4 -2 0 2 4 6 8 10 12
Dollars ($) from Cutoff

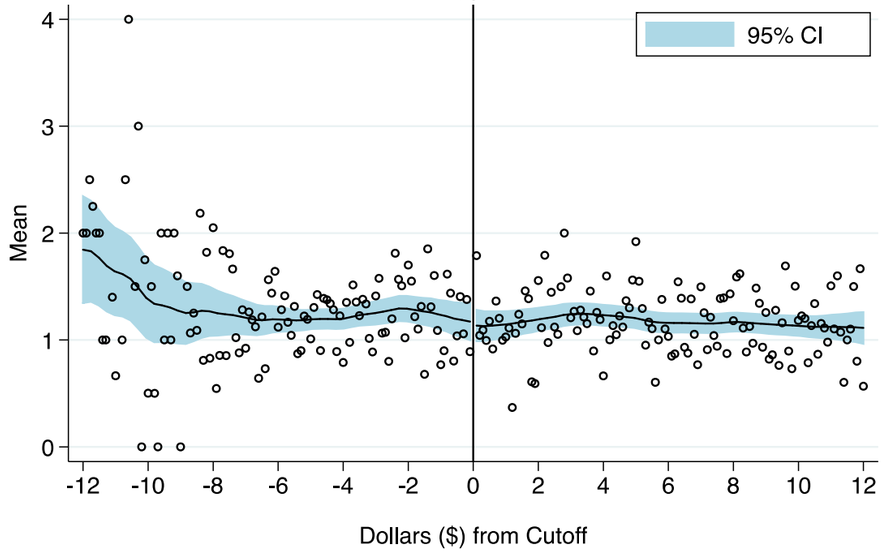
Members aged 6-10

t-stat = -0.09; p-value = 0.93



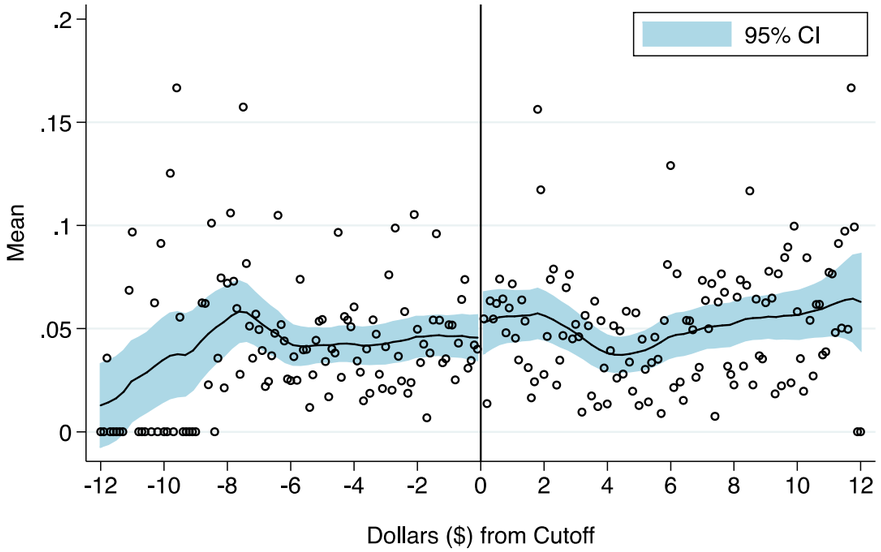
Members <5

t-stat = -0.32; p-value = 0.75



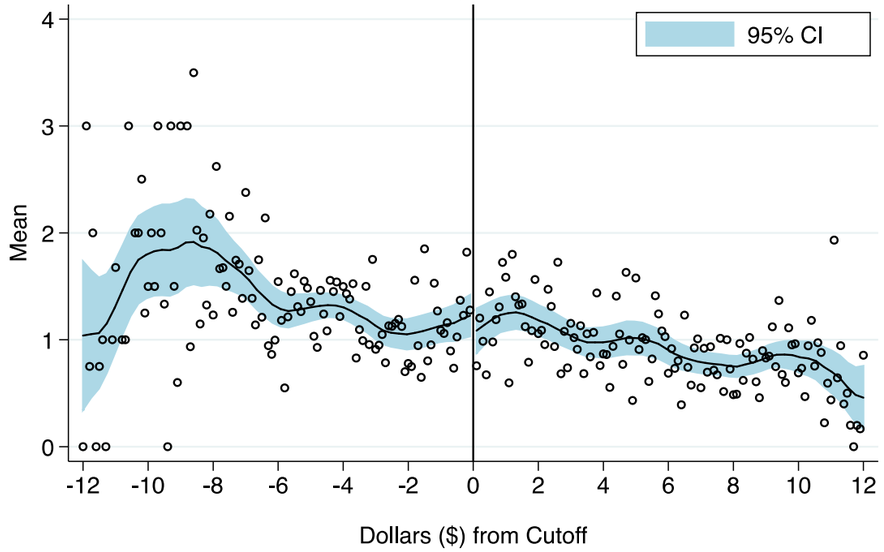
% Members with a disability

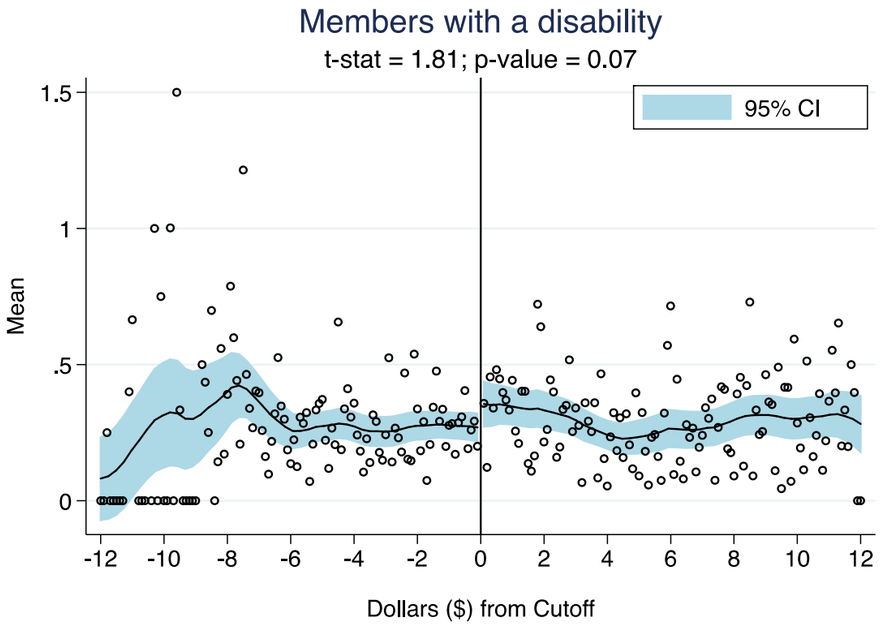
t-stat = 0.96; p-value = 0.34

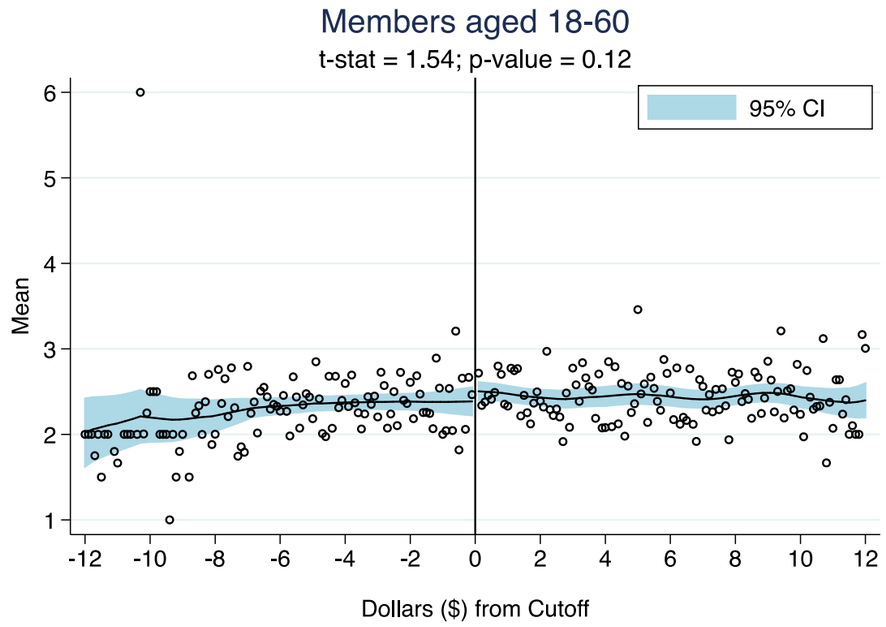


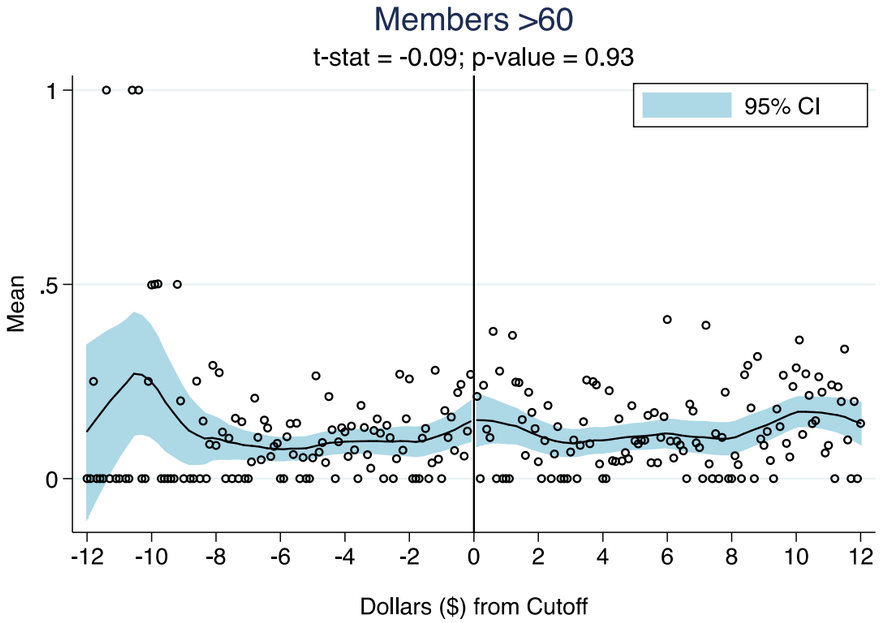
Members aged 11-17

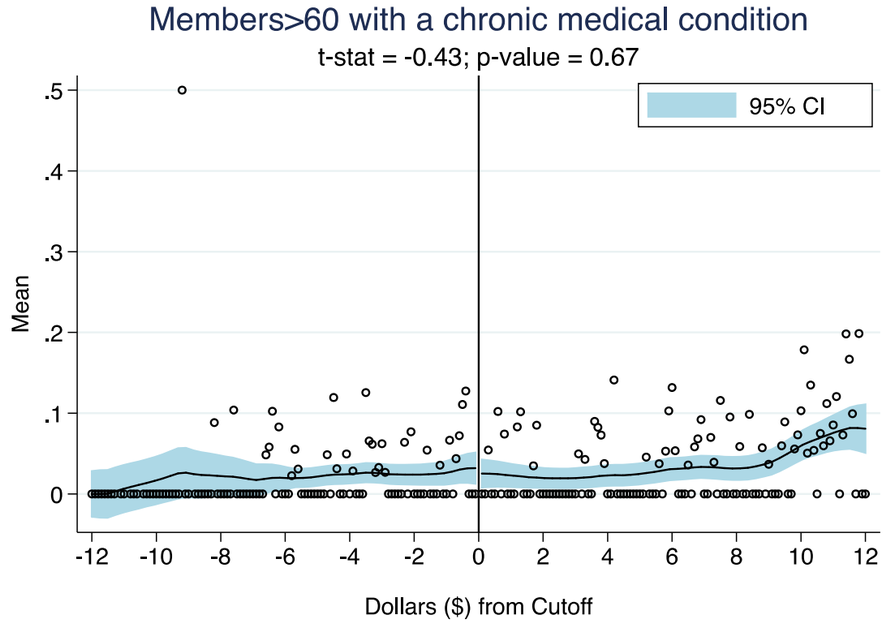
t-stat = -0.48; p-value = 0.63

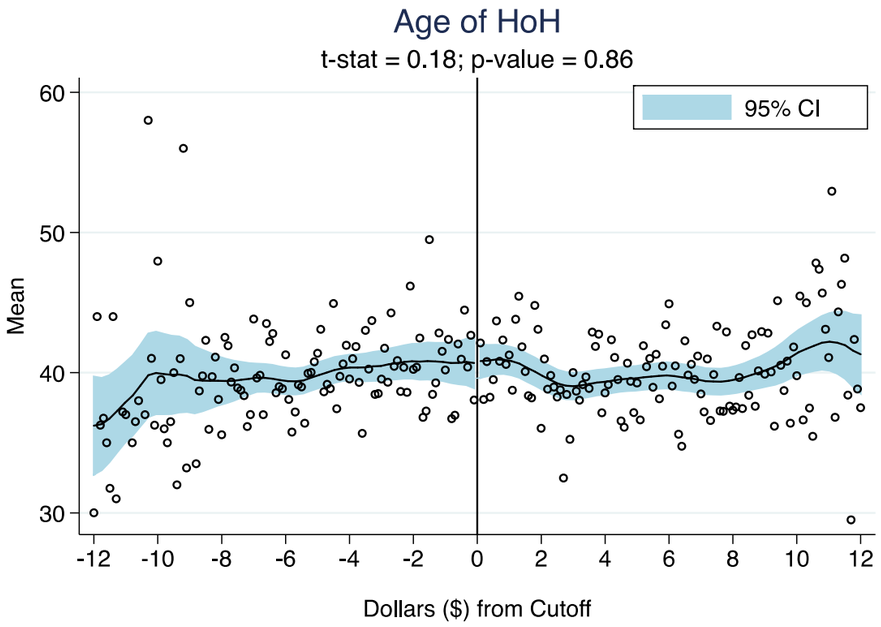


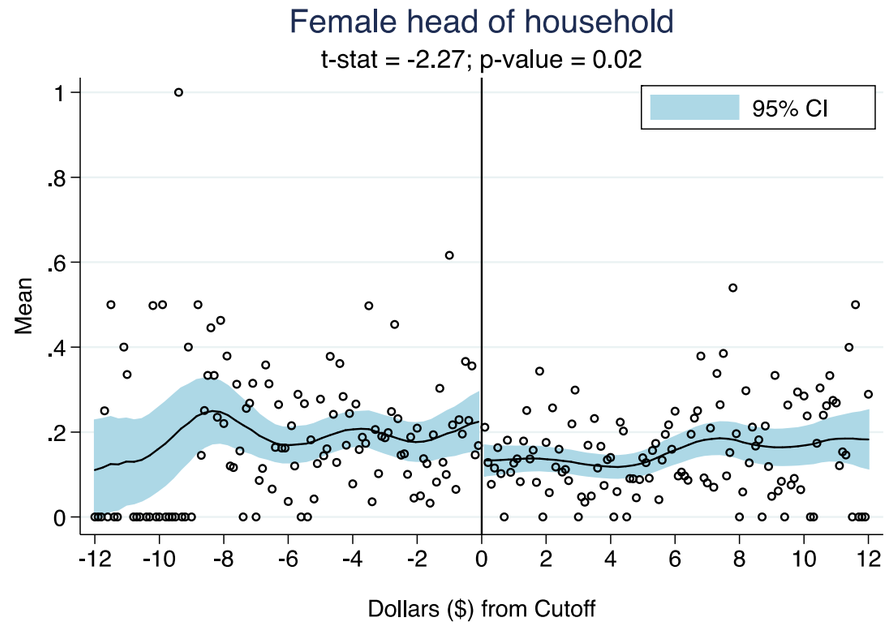

Members with a disability
t-stat = 1.81; p-value = 0.07
95% CI
Mean
Dollars ($) from Cutoff

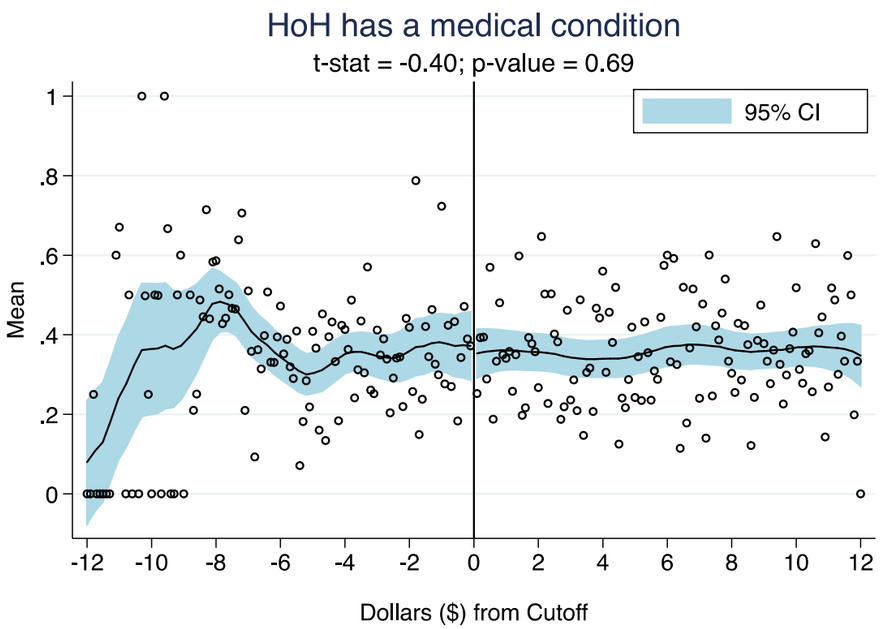

Members aged 18-60
t-stat = 1.54; p-value = 0.12
95% CI
Mean
Dollars ($) from Cutoff

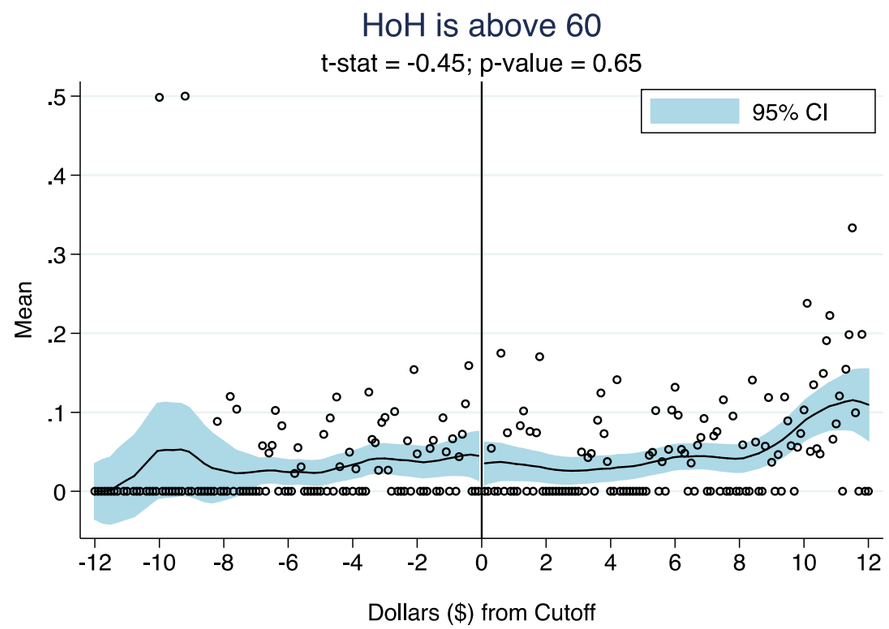

Members >60
t-stat = -0.09; p-value = 0.93
95% CI
Mean
Dollars ($) from Cutoff

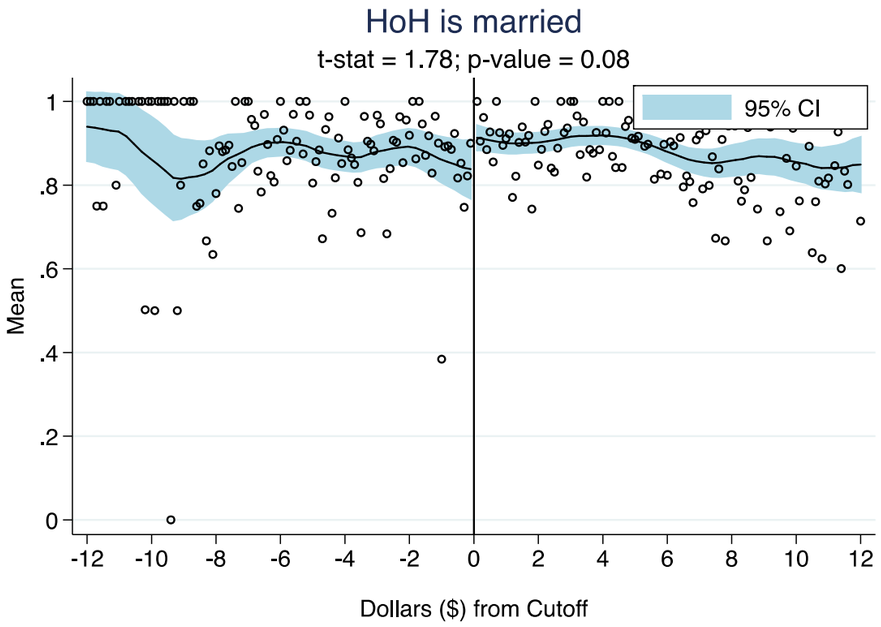

Members>60 with a chronic medical condition
t-stat = -0.43; p-value = 0.67
95% CI
Mean
Dollars ($) from Cutoff

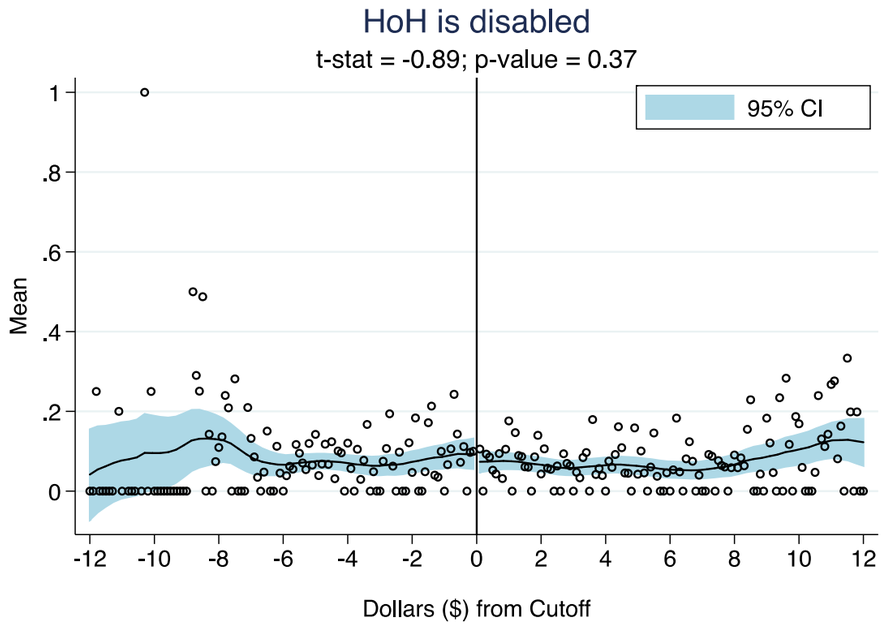

Age of HoH
t-stat = 0.18; p-value = 0.86
95% CI
Mean
60
50
40
30
-12 -10 -8 -6 -4 -2 0 2 4 6 8 10 12
Dollars ($) from Cutoff

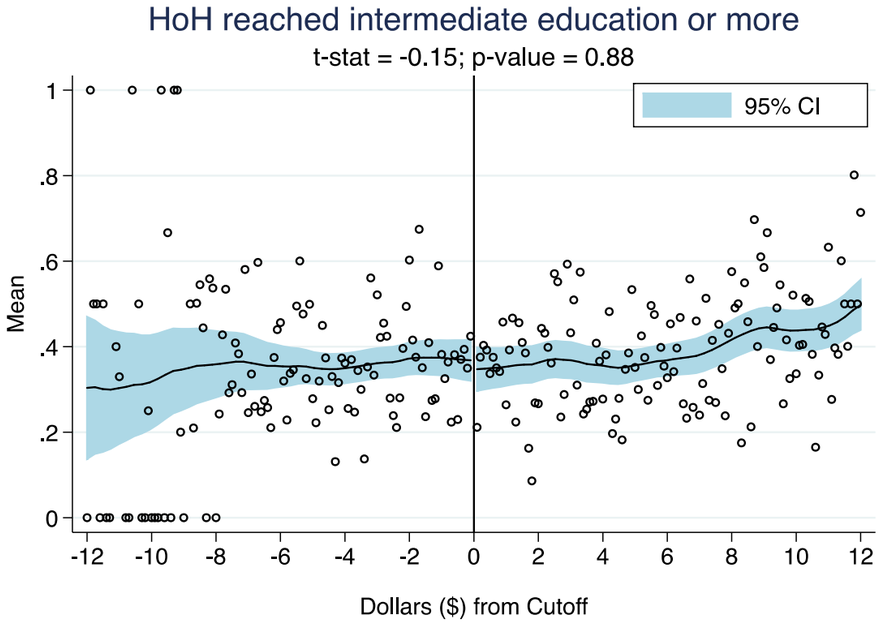

Female head of household
t-stat = -2.27; p-value = 0.02
95% CI
Mean
1
.8
.6
.4
.2
0
-12 -10 -8 -6 -4 -2 0 2 4 6 8 10 12
Dollars ($) from Cutoff

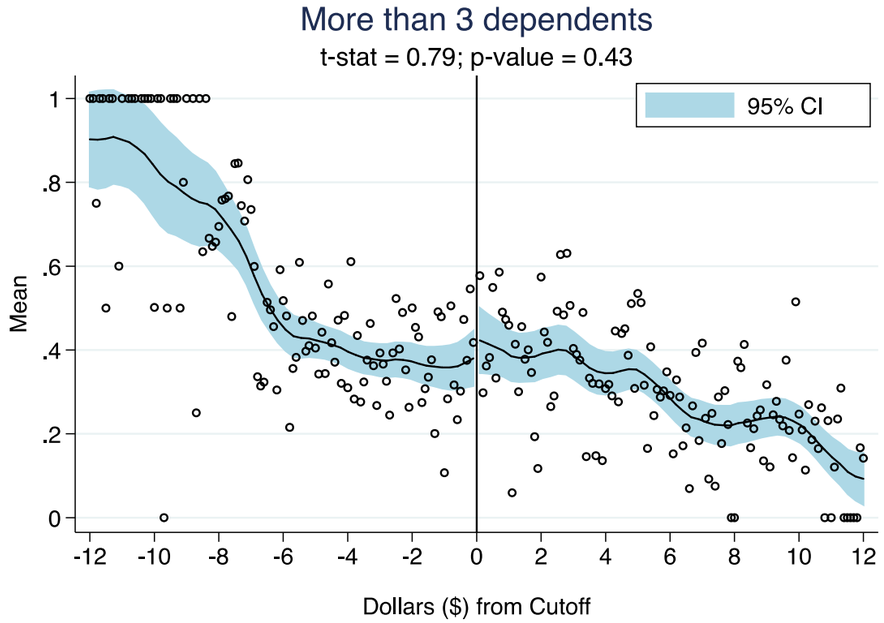

HoH has a medical condition
t-stat = -0.40; p-value = 0.69
95% CI
Mean
1
.8
.6
.4
.2
0
-12 -10 -8 -6 -4 -2 0 2 4 6 8 10 12
Dollars ($) from Cutoff

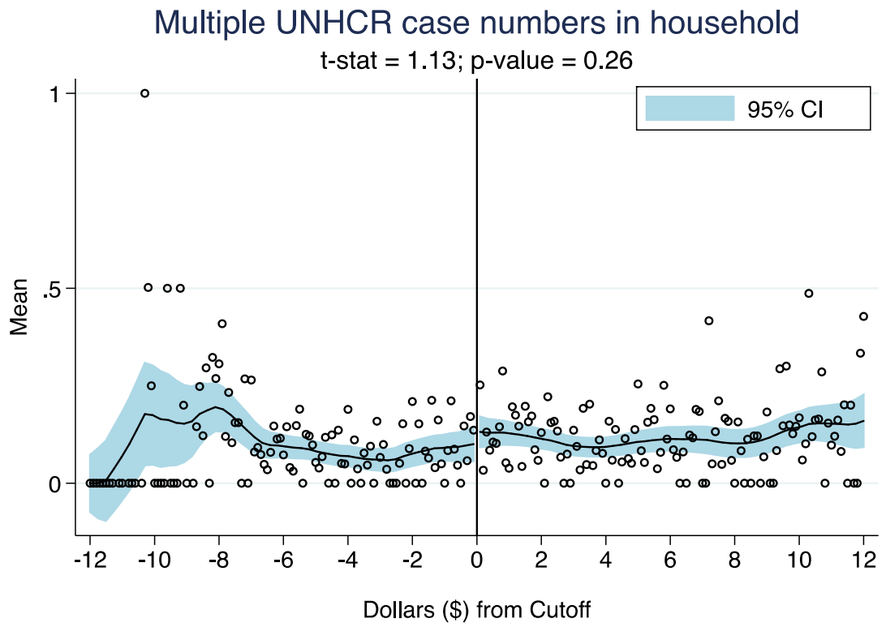

HoH is above 60
t-stat = -0.45; p-value = 0.65
95% CI
Mean
.5
.4
.3
.2
.1
0
-12 -10 -8 -6 -4 -2 0 2 4 6 8 10 12
Dollars ($) from Cutoff

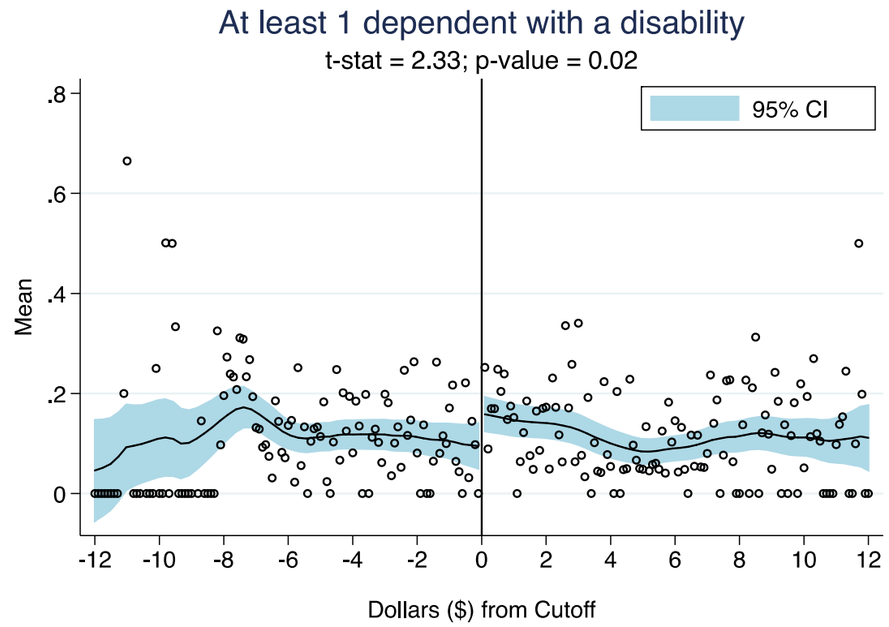

HoH is married
t-stat = 1.78; p-value = 0.08
95% CI
Mean
Dollars ($) from Cutoff


HoH is disabled
t-stat = -0.89; p-value = 0.37
95% CI
Mean
Dollars ($) from Cutoff


HoH reached intermediate education or more
t-stat = -0.15; p-value = 0.88
95% CI
Mean
Dollars ($) from Cutoff


More than 3 dependents
t-stat = 0.79; p-value = 0.43
95% CI
Mean
Dollars ($) from Cutoff


Multiple UNHCR case numbers in household
t-stat = 1.13; p-value = 0.26
95% CI
Mean
1
.5
0
-12
-10
-8
-6
-4
-2
0
2
4
6
8
10
12
Dollars ($) from Cutoff


At least 1 dependent with a disability
t-stat = 2.33; p-value = 0.02
95% CI
Mean
.8
.6
.4
.2
0
-12
-10
-8
-6
-4
-2
0
2
4
6
8
10
12
Dollars ($) from Cutoff