Policy Research Working Paper 9155

Iraq's Universal Public Distribution System

Utilization and Impacts During Displacement

Lokendra Phadera
Dhiraj Sharma
Matthew Wai-Poi

WORLD BANK GROUP
Poverty and Equity Global Practice
February 2020

Policy Research Working Paper 9155

Abstract

Subsidized or free distribution of food has been a central pillar of social protection programs in many countries. With the number of forcibly displaced persons at record levels, the question arises of whether in-kind food transfer programs are effective in mitigating the loss of welfare induced by forced displacement. This paper examines whether Iraq's Public Distribution System, a universal food subsidy program, has buffered the impacts of displacement on households. Using propensity score matching to account for the observable differences between Public Distribution System recipients and non-recipients, the analysis finds that displaced households with continued access to Public Distribution System benefits have higher food and non-food expenditures compared with displaced households that lost access. Likewise, the beneficiaries have higher calorie intakes and are less vulnerable to falling into poverty. However, displaced beneficiaries remained significantly worse off and more vulnerable to poverty than non-displaced households, suggesting that, although the Public Distribution System helped mitigate displacement to a degree, it may not be the most effective protection program for such shocks. Given the considerable resources the universal program consumes, it is vital to think of alternative approaches, such as targeted cash transfers, that might be more effective in protection and cost.

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Produced by the Research Support Team

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Lokendra Phadera,[2] Dhiraj Sharma,[2] Matthew Wai-Poi[2]

Keywords: Public distribution system (PDS); Displacement; Welfare; In-kind food; Iraq
JEL Classification: H420, H430, O220

[1] This document is an output from a project funded by the UK Department for International Development (DFID). The findings, interpretations and conclusion expressed in this paper are entirely those of authors. We are grateful for the guidance of the peer reviewers Nandini Krishnan and Rene Antonio Leon Solano. Maria Eugenia Genoni led the project in its early stage. We are also thankful to the Central Statistical Office (CSO) of Baghdad and Kurdistan Regional Statistical Regional Office (KRSO) for sharing the data.
[2] Poverty and Equity Global Practice, World Bank. Please contact lphadera@worldbank.org, dsharma5@worldbank.org, or mwaipoi@worldbank.org.

1. Introduction

Subsidized or free distribution of food has been a mainstay of social protection programs in many countries and accounts for significant portions of the countries' safety net spending. For example, one of the world's largest food transfer schemes, and one of the largest social safety net programs in India, is the Targeted Public Distribution System (TPDS). The program provides rice, wheat, sugar, edible oils, and kerosene at highly subsidized prices to families below the poverty line. The program reaches almost 800 million people, and at $7 billion per year, constitutes almost 1 percent of India's GDP (World Food Programme 2014, Alderman, Gentilini and Yemtsov 2018). Indonesia's flagship food subsidy program, *Rastra*, was a targeted rice subsidy program. In 2016, it reached 15.5 million households and absorbed more than half of total social assistance expenditure (Rp 21 trillion) (Alderman, Gentilini and Yemtsov 2018), although it has now been phased out and replaced with a targeted e-voucher assistance program to reduce inefficiencies from distribution losses and improve targeting (World Bank 2020).

Iraq too has one of the largest food distribution programs in the world, the Public Distribution System (PDS). The PDS was instituted in 1990 in response to food shortages after the UN-imposed sanctions. In 1996, Iraq was allowed to import food under the Oil for Food Program. PDS played an important role in meeting the minimum caloric needs of Iraq's population during the period of sanctions. When the program was initiated, ten items were subsidized. Presently, under the PDS, households receive four food items every month: wheat flour, rice, sugar and vegetable oil. In 2018, the spending on PDS approximated 1.7 trillion Iraqi dinars, or 1.4 billion USD[3], and it accounted for approximately 2.3 percent of the 2018 current expenditure.

Unlike the targeted food programs in India and Indonesia, the PDS program in Iraq is universal and has played an important role in all Iraqi households' budgets and expenditures. In 2007, rations provided 1,998 calories per person per day on average, accounting for 85 percent of required calories and 68 percent of actual calories consumed, with the proportion as high as 78 percent for the poor (World Bank 2010). In 2012, food receipts from the PDS provided about 70 percent of total calories of the poorest 40 percent of the population (World Bank 2014). Even the richest quintile drew 45 percent of its calories from PDS receipts. The value of PDS-sourced food accounted for 30 percent of food expenditure and 16 percent of total expenditure of the poorest decile. Simulations show that removal of the PDS without a compensating measure would have deleterious effect on poverty headcount, depth of poverty, and inequality (World Bank 2010).

Given the preeminence of PDS receipts in household welfare, this paper examines whether the in-kind food transfer had similar impacts during the period of conflict. Specifically, the study assesses the role Iraq's PDS program played in mitigating the potential loss of welfare induced by forced displacement and an economic crisis. Iraq was buffeted by two severe crises in 2014. Starting early 2014, triggered by the Daesh's campaign of violence against civilians and counter operations by the military, people in northwest Iraq started fleeing to safer areas. At its peak, in March 2016, 3.4 million Iraqis were displaced internally - net of returnees (IOM 2019).[4] The active hostilities ended with the ouster of Daesh from Mosul in

[3] At the exchange rate of 1 USD = 1194.46 Iraqi dinars (https://www.xe.com/currencyconverter/convert/?Amount=1&From=USD&To=IQD)

[4] Since IOM started tracking in 2014, more than 6 million people (15% of the population) have been displaced internally in Iraq. While the majority (4.5 million) have returned, 1.4 million are still displaced within the country (IOM 2019).

December of 2017. The security crisis was compounded by an economic crisis, which was triggered by the plunge of oil prices in the international market in 2014.

Using data from the 2017-18 Rapid Welfare Monitoring Survey (SWIFT), this study sheds light on the level of resiliency of the PDS program during this recent period of conflict and economic crisis. First, it explores if internally displaced households are less likely to access the PDS benefits and the characteristics associated with access. Second, the study tries to establish a causal role of the PDS program in mitigating welfare losses among the displaced population by measuring the program's impacts on nutrition (calorie intake and food consumption), its spillover impacts on non-food expenditure including education, and its overall impact on vulnerability to poverty and subjective life assessment using a regression framework and a matching approach.

The analysis finds that compared to non-displaced households, displaced households fare poorly across all measures of welfare. IDPs have lower daily calorie intake and are more likely to face hunger, and they are 18 percentage points more likely to be poor (relative to the poverty rate of 15 percent of non-displaced). More important, even those who are not in poverty are more vulnerable to falling into poverty, with the probability 17 percentage points higher for displaced households. By their own assessment, their current living conditions are far worse than before January 2014, the onset of the latest wave of displacement.

Access to PDS, however, plays an important role in mitigating the welfare loss. Displaced households that retain the PDS benefits have higher food and non-food expenditures, thus, have lower odds of being in poverty than those who lost access during the displacement. Similarly, the displaced PDS beneficiaries have significantly lower level of vulnerability to poverty, and have higher calorie intake and thus are more food secure than the displaced non-beneficiaries. Although they have a greater total calorie intake, the PDS beneficiaries consume significantly fewer calories from non-ration food than the comparison displaced non-beneficiaries. Combining the program's positive impact on non-food consumption with this result suggests that the constant supply of ration food may ease the strain of fulfilling households' calorie requirement, freeing up resources that can be diverted to other needs. However, our other results suggest that the PDS program alone is not sufficient to alter one's overall economic outlook during the time of economic distress – we find zero statistical association between one's subjective perception of his/her overall economic situation and the ration program. These results along with the results from the comparison of displaced and non-displaced households suggest that forced displacement distresses one's economic condition to such an extent that the food ration program compensates some of the welfare loss and reduces vulnerability, but is unable to reinstate the displaced families to their original level of well-being.

Despite a recent expansion of a targeted cash assistance program, PDS remains the only notable social assistance program in Iraq (largely because its size and cost, which divert resources away from other social protection spending and programs). Because all households are eligible to receive it, the program reached almost 99 percent of the population before the crisis (World Bank 2010, 2014).[5] Our results suggest that

[5] The only cash transfer scheme in the country is the Social Safety Net (SSN) program, which has limited coverage. Before the reforms initiated in 2015, the use of demographic characteristics rather than a poverty criterion for targeting resulted in most of the poor being left out of the cash transfer program. Only 11 percent of the poor received benefits, while of those receiving benefits, only 26 percent were poor. A poverty targeting criterion was introduced for SSN transfers starting in 2015 after the new Social Protection Law for Iraq (Law 11/2014). The

conditioned on having access, the PDS program in Iraq is significant in fulfilling households' basic calorie and food requirements even during the time of crisis for both displaced and non-displaced households. However, access to PDS remains elusive for many displaced Iraqis. Fourteen percent of the displaced households did not receive a ration of any kind even once in the 12 months preceding the survey. The data also show that even those IDPs receiving some PDS benefits do not receive the full benefits that they are entitled to. Thus, while continued access to PDS did mitigate the impacts of displacement relative to those who lost access, it was not fully effective as an emergency assistance tool, while questions remain about its cost effectiveness as a safety net in normal times. Although beyond the scope of this paper, it is vital to rethink the efficiency of universal in-kind transfers, given their significant budgetary demands and the resources that are received by rich households at the cost of expanding poverty-targeted programs.

The remainder of the paper is structured as follows. The next section describes the twin crises experienced by Iraq in 2014. While section 3 describes the data used in the study, section 4 describes the empirical strategy. Section 5 examines the effects of PDS access on subjective well-being, calorie intake, poverty, and vulnerability to poverty. Section 6 summarizes the main findings and concludes with a discussion of the design of social assistance programs in Iraq.

2. Anatomy of the crises

Iraq was buffeted by two severe crises in 2014. Starting in early 2014, Daesh militants began making inroads into major towns and cities in northwest Iraq. The fighting between the rebel group and the security forces near Fallujah and Ramadi in January and February sent nearly 480,000 people fleeing to safer areas of Anbar, Baghdad, Salah al-din and the Kurdistan region. Fallujah fell into the hands of the militants in January 2014 and the fighting spread to Mosul in June and July. The fighting displaced more than a million individuals, with some of those originally displaced from Anbar suffering displacement for the second time. Daesh took control of Mosul and Tikrit in June. Triggered by the threat of violence in Sinjar, 740,000 individuals were displaced in August, making it the worst month of displacement. After a relative slowdown, the flow of displaced persons spiked again in April 2015 as the battle for Ramadi intensified. The fall of Ramadi in May 2015 displaced many within the governorate while others fled to Baghdad. At its height, in March 2016, 3.4 million people were internally displaced in Iraq (Figure 1a). With Daesh's campaign of violence against civilians and counter operations by the military, civilian deaths rose again in 2014 after a relative lull from 2009 to 2012 (Figure 1b). The bulk of active hostilities ended with the ouster of Daesh from Mosul in December of 2017.

The security crisis was compounded by an economic crisis, which was triggered by the plunge of oil prices in the international market in 2014. From $115 a barrel in June 2014, it tumbled to $70 a barrel in December of the same year. The drop exposed the fault lines of the Iraqi economy. In a country where more than 90 percent of the total government revenue is derived from the sale of oil and oil accounts for

number of households that receive monthly cash transfers now totals 1.1 million. However, the coverage of SSN is inadequate, considering that the number of poor increased since the twin crises of 2014. It is estimated that directly after the crises poverty increased to 22.5 percent from 18.9 percent in 2012 and remains above the 2012 rate at 20.0 percent in 2017-18 (World Bank 2019). Public pension is the other main social protection program in Iraq, but it too has low reach. It reached less than 20 percent of the poor in 2012 (while reaching more than a quarter of the non-poor) because they are not intended as anti-poverty transfers (World Bank 2014).

more than 95 percent of its exports, the fall in oil prices was catastrophic. The fiscal deficit reached 11.0 percent of GDP in 2015 and 13.4 percent in 2016 (World Bank 2018).

The dual crises have been costly to Iraq's economy. The economy is yet to recover from the crash of 2014. After contracting for three consecutive years – 2014 (-3.9 percent), 2015 (-9.6 percent), and 2016 (-8.1 percent) –non-oil GDP showed modest growth in 2017 and 2018 (International Monetary Fund 2017). Oil prices remain below that which is needed for Iraq to achieve fiscal balance and external account balance. Had it continued to grow at the pre-conflict rate, non-oil GDP would have been far higher than where it is today. Absent the emergence and spread of Daesh, Iraq's economy would have been a quarter larger in real terms in 2015 (Ianchovichina and Ivanic 2014). This contraction is a product of the direct effects stemming from the destruction of infrastructure, disruption to trade, refugee outflows and loss in productivity, and the indirect effects of the opportunity cost of deeper trade integration with neighbors. By 2017, the loss had ballooned to an estimated 72 percent of the 2013 GDP (World Bank 2018).

The crises have also exacted a toll on people's well-being. Iraq had been making slow but steady progress in poverty reduction, with the poverty rate declining from 22.4 percent in 2007 to 18.9 percent in 2012. During this period, a lion's share of the increase in per capita consumption, and consequently decrease in poverty, was due to the rise in labor income (World Bank 2014). But the twin shocks of 2014 more than eroded five years' worth of progress in poverty reduction, with the poverty rate climbing back to 22.5 percent in 2014 (Krishnan and Olivieri 2016). Three years after the onset of the crises, the living standards are still below the 2012 level, with the poverty rate in 2017-18 estimated at 20.0 percent (World Bank 2019).[6]

The crises have especially affected internally displaced persons. The immediate impacts of the crises on IDPs were severe, when per capita *income* in IDP households dropped by 62 percent, while per capita *consumption* fell by 22 percent (Krishnan and Olivieri 2016).[7] By 2017-18, the displacement impact had only compounded, with IDPs almost three times as likely to be poor and be vulnerable to poverty as non-IDPs (World Bank 2019).

3. Data

This study uses data from the 2017-18 Rapid Welfare Monitoring Survey (SWIFT) conducted by the Central Statistical Organization (CSO) and Kurdistan Regional Statistics Organization (KRSO). The survey was conceived with the express purpose of tracking household well-being at a time when it was infeasible to implement full-scale household surveys in Iraq. Its objective was to provide interim estimates of welfare and well-being until another survey comparable in scope and coverage to the Integrated Household and Socioeconomic Survey (IHSES) could be fielded. Many questions in the 2017 questionnaire were taken from previous rounds of IHSES. A few new modules were added to the 2017 survey to understand how the crises might have left the population more vulnerable, the mechanisms through which people coped with shocks, and how they assessed their own life situation.

[6] The 2012, 2014, and 2017-18 poverty estimates are not strictly comparable. The 2014 estimates are based on microsimulation. The 2017-18 survey collected consumption information using recall method (compared to diary method for 2012 and 2014), and the survey was not collected over a 12-month period to account for seasonal variation.

[7] The drop in per capita consumption was lower than that in income, presumably due to consumption smoothing.

Although the security situation had improved significantly since 2014, many parts of the country were still insecure in 2017. Thus, nine out of ten districts in Nineveh governorate, the seat of Daesh-occupied Iraq, were intentionally excluded from the sampling frame. As the data collection proceeded, five additional districts – three in Anbar, one in Baghdad, and one in Salah al-din – were judged to be too insecure for fieldwork, so the selected enumeration areas from these areas were replaced with other clusters from the same governorate. Thus, the final sample covers only 106 of 120 districts in the country, or 74 of 88 districts from the governorates outside the Kurdistan region.

The sampling strategy for the 2017 survey proceeded in conventional two stages of cluster sampling. First, within each governorate, the out-of-camp sample was selected using the exhaustive list of census enumeration areas (EAs) as primary sampling units (PSUs). Between 60 to 150 EAs in each governorate were selected using a probability proportional to size (PPS) criterion, with the number of households in each area as the measure of size. A total of 1,440 enumeration areas were selected in the first stage. A listing exercise was conducted in the selected areas to update the list of households. In the second stage, using households as secondary sampling units (SSUs), six households were selected in each cluster with equal probability from the post-listing sampling frame. In selecting six households from a cluster, three each of IDP and non-IDP households were selected in the non-Kurdistan region. In the Kurdistan region, two each of IDP, non-IDP, and Syrian refugee households were selected. In clusters where there were not enough IDP and/or refugee households, resident households filled the shortfall. Table 1 summarizes the sampling design and the response rate for the survey.

The survey sampled 8,615 households, with everyone responding to a short questionnaire that collected information on household demography, education, employment and other core non-monetary indicators of well-being ("short-form"). A random subset of 1,500 sampled households also responded to a set of questions on household food consumption and non-food expenditure ("long-form"). While the short form sample was representative for each governorate, the long-form sample was representative only for four regions: Kurdistan, North, Center, and South. The consumption modules included food items purchased in the market as well as those received through the PDS.

The survey also provides information on the displacement status of household members. Internal displacement has a well-defined status in Iraq. The Ministry of Migration and Displacement (MoDM) is the government agency with the remit of registering internally displaced persons. Registered households are issued an identification card recognizing their status as internally displaced, and the card makes them eligible for assistance issued by the government or other parties. The survey asked if any member in the household is an IDP and, if so, how many. Additionally, the survey respondents were asked about number of refugees in the household and whether the household experienced forced displacement since January 2014. We categorized a household as displaced if any of its members are IDPs or refugees or if the household was forced to relocate from its place of origin. Using the criterion, 1,849 households in the sample are classified as displaced units.[8]

Table 2 (columns 1 to 4) reports descriptive statistics by displacement status. While almost all (97 percent) of the non-displaced families in Iraq received transfers through the PDS in the 12 months preceding the survey, only 86 percent of the displaced families received the assistance. Compared to the non-displaced families, the displaced have significantly greater household size and dependency ratio, mostly due to having more children. Other characteristics such as age, marital status and educational attainment of the household head and the highest level of education attained by adult members, however, are statistically

[8] Almost all households were either entirely comprised of IDPs or contained none at all; very few were mixed.

indistinguishable between the two groups. As expected, forced migrants started inhabiting the current governorate of residence more recently than the non-displaced families. Most of the displaced households reside in the Northern and Kurdistan regions (78 percent and 13 percent, respectively), as the locus of the conflict has been in the North and Kurdistan has acted as the safe haven for many people fleeing persecution. In contrast, a majority of the non-displaced families live in the Central and Southern regions of Iraq (44 percent and 26 percent, respectively).

Within the displaced population, there is significant heterogeneity in demographic composition and place and duration of residence by households' access to the public distribution system (PDS). Descriptive statistics of the displaced families by access to the PDS and their differences are presented in columns 5 to 7 (Table 2). Compared to displaced families without access to the PDS, the displaced with access to the PDS have larger family size, more children, higher number of working-age males and an older household head. Forced migrants with PDS access are likely to be residing in the present governorate for a longer duration, and settled in a rural place, especially in the Northern region of the country. In contrast, their PDS non-recipient counterparts have significantly greater odds of residing in the Kurdistan region.[9] The observable and unobservable differences in the characteristics of displaced households with and without PDS access complicate the interpretation of differences in outcomes between the groups because the same characteristics that explain PDS access might also explain the welfare differences. As described below, our empirical strategy addresses this problem by controlling for observable characteristics in a regression framework and by comparing households based on observables in a matching framework.

Table A1 reports descriptive statistics of the variables examined in Table 2 but only for the sub-sample of households that also responded to the "long-form" of the survey. The averages of the characteristics and their differences between displaced and non-displaced population and among displaced with and without the PDS are comparable to the full-sample statistics, although the differences often are not statistically significant owing to the smaller sample size. These results are reassuring in that the sub-sample is representative of the full sample. Core welfare outcomes such as household consumption, vulnerability, and poverty can be compared only for this sub-sample.

4. Empirical strategy

The paper attempts to understand and quantify the impact of the PDS on alleviating the loss of welfare induced by forced displacement. The simplest empirical strategy to answer the question is to limit the analysis to the displaced population and estimate the following equation:

$$y_i = \beta \times PDS_i + X_i + \varepsilon_i \qquad (1)$$

where, y is an outcome of a displaced household i, which is a function of a vector of the household characteristics, X, its access to the ration program, PDS, and an unobserved error term, ε_i. Under the random assignment of the treatment, PDS, the β coefficient identifies the causal (average treatment on treated - ATT) effect of the ration program in regaining welfare losses experienced due to displacement.

A household's PDS status observed in the survey data, however, is unlikely to be random. Both observed and unobserved selection mechanisms may have played a part in a household losing or retaining access to the PDS benefits, which may, in turn, affect household welfare. For example, households that had time

[9] Note that almost 94% of the non-displaced in Kurdistan received PDS assistance.

to plan and prepare for their departure may have all their documents together and they may move to a location with better economic opportunities and denser social network. Contrast that to households with little time for preparation because their property was damaged or destroyed. They might lose access to the PDS because of missing documents, and at the same time have fewer options to work or informal support network. Families' choice of destination itself, therefore, can have important implications in having access to the PDS. A household's ration card is linked to a specific local ration agent. When moving to a new location, the household is required to establish an official residency, and only then can it start the process of transferring the linkage to a new agent in a new location and start receiving the assistance. A household that values the PDS highly may choose a destination where it is easy to establish a residency, and which has uninterrupted supply of rations. To control for both the observed and unobserved geography-specific association with PDS accessibility, we modify equation 1 as follows:

$$y_{ijm} = \beta \times PDS_i + X_i + \eta_m + \varepsilon_{ijm} \quad (2)$$

where, subscripts i, j, and m index a household i, resident in census block j and district m. The SWIFT survey covered 106 qhadas (districts), which are added as fixed-effects, η_m, to account for qhada-level variation in the availability of ration and other characteristics that influence households' welfare and the PDS accessibility. Census blocks (EA) served as the primary sampling units for the survey which were selected with a probability proportional to size. The standard errors, hence, are clustered at this level to allow for the correlation among error terms within these blocks.[10]

Equation 2 teases out the confounding factors between the PDS and outcomes of interest at the specified geographic level. The non-random assignment of the treatment, however, entails that the heterogeneity in a household's selection into the PDS program within qhadas, if present, will bias the coefficient estimates. We try to overcome such biases by employing the propensity score matching (PSM) technique, which is a popular method to adjust for confounding in the context of non-random treatment assignment in observational studies to establish causal inference.[11]

An underlying conjecture of all the matching estimators is the conditional independence assumption (CIA). The assumption states that treatment allocation is random conditional on a set of observable covariates X that are not influenced by treatment, i.e., unconfoundedness. A counterfactual household for each program participant is constructed by matching units from the untreated group exclusively on the observed X. The downside, however, is that conditioning on all the relevant covariates can be limited, specifically, in the context of high dimensional vector X ("curse of dimensionality"). Rosenbaum & Rubin (1983) show that if potential outcomes are independent of treatment conditional on covariates X, the outcomes are also independent of treatment conditional on the propensity score $P(X) = P(PDS = 1|X)$, i.e., the probability of one's participation ($PDS = 1$) given her observed characteristics X. The additional "overlap and common support" condition, $0 < P(PDS = 1|X) < 1$, rules out the perfect predictability of treatment status and ensures units with the same values of X have a positive probability of being both participants and non-participants (Heckman, Lalonde and Smith 1999). Given both the conditions hold,

[10] Only 327 displaced households were sampled for the "long-form" questionnaire (Table A1). Therefore, we use governorate fixed-effects and cluster standard errors are at the nahiya (sub-district) level when analyzing the outcomes from the "long-form".

[11] PSM is used widely across the disciplines – from labor market research see (Dehejia and Wahba 1999, 2002, R. Dehejia 2005) or (Heckman, Ichimura and Smith, et al. 1996, Heckman, Ichimura and Todd 1998, Smith and Todd 2001, 2005a), to cardiovascular research (Deb, et al. 2016), or pharmacoepidemiology (Perkins, et al. 2000) etc.

the propensity score matching (PSM) estimator for ATT is simply a difference in outcome means over the common support weighted by the distribution of the propensity score of the participants as below:

$$\Delta_{ATT}^{PSM} = E_{P(X)|PDS=1}\{E[Y(1)|PDS = 1, P(X)] - E[Y(0)|PDS = 0, P(X)]\} \quad (3)$$

The assertion that selection is solely based on the observed covariates is a strong assumption and needs to be justified by the data. Therefore, careful consideration is required in the implementation of PSM, particularly, in choosing a set of covariates that credibly satisfies the CIA condition.[12] We identify a list of demographic, educational, migration and shocks variables that are likely to simultaneously affect the "treatment" (PDS status) and the potential outcome but are not likely to have been impacted by the PDS status or by its anticipation.[13] To avoid over-parametrization (Bryson, Dorsett and Purdon 2002, Augurzky and Schmidt 2001), we use "k-fold cross-validation" as in Black & Smith (2004) in selecting an optimal set of regressors from the list of identified covariates.

We start the model selection procedure for PDS participation with an equation containing a single regressor – household size – and subsequently add an additional variable or blocks of additional variables.[14] Given the binary nature of the model, i.e., classification into participation vs. non-participation, we adopt the receiver operating characteristics (ROC) analysis and employ the area under the curve (AUC) criteria, which calculates the rate of successful classification by a logistic model. While a model with 100 percent incorrect predictions has an area of 0, a model with perfect prediction has an area of 1 and an area of 0.5 is equivalent to random guessing. We use the k-fold cross-validation approach to assess the performance of each model. The technique is apt to perform efficiently even in a relatively small data set (such as SWIFT) and allows us to explore model performance in different segments of the data. To implement k-fold validation, the full data set is partitioned into k groups or folds, in this case 10. A model is estimated using k-1 folds and the remaining one "hold out" sample is used to validate the prediction accuracy of the model. This ROC AUC exercise is repeated k times until each fold/set is chosen as the "hold out" set exactly once. The average of the AUCs given by each of the k model estimates is used as the model accuracy statistic.[15] As a robustness check, we re-estimate ATTs using the full set of originally identified covariates for all the outcomes explored in the paper. While logit is our choice model for estimating propensity scores, nearest neighbor matching is the preferred algorithm for the baseline specification. Results using other algorithms are also presented as part of the robustness checks.

[12] Caliendo and Kopeinig (2005) document in details the practicalities of implementing the propensity score matching estimator. Similarly, Heckman and Todd (2009) provides a note on adopting propensity score matching and selection models to choice-based samples.

[13] We do not include the place of origin as a matching variable because we do not have information on the district of origin and there is little variation in the governorate of origin.

[14] The procedure is similar to the step-wise regression technique. We start with the household size variable and add one at a time a square of household size, age of household head, square age of household head, dependency ratio, number of working age males, number of children between 0 to 6, number of children between 7 to 14, number of elderly, and rural location. Only variables that add to the improvement of the AUC are retained. Then subsequently we add additional variables in blocks – marital status of household head variables, household head educational achievement, highest education of adult members, and variables for duration living in current governorate as listed in Table 2 and three additional shock variables: experienced violence, destruction of assets and property, death and other health shocks in the family since January 2014. In total we examined 15 different models.

[15] The final selected model consists of variables household size, age of household head, number of children between 7 to 14, rural location, household head educational variables, duration of residency in current governorate, and shock variables. The average AUC of the final model from the 10-fold cross-validation is 0.78.

5. Results

We start this section with the description of the main outcomes of interest, including households' vulnerability to poverty and simple comparisons by displacement status and access to PDS. Then we measure the impacts of the PDS program on household welfare by limiting the analytical sample to displaced households. Regression-based associations between access to PDS and the measures of welfare among displaced households using specification 2 are presented next. The probable causal impacts of the PDS on household subjective well-being, food security, poverty, vulnerability, and calorie intake using the PSM technique are presented at the end of the section.

5.1 Variable definitions and descriptive findings

Our analysis takes advantage of both the short-form and the long-form questionnaires of the SWIFT survey. The analysis focuses on household consumption, vulnerability to poverty, food security and self-assessment of current and future economic status. While the food security/household hunger and subjective well-being questions were answered by all the households (short-form), information on food consumption and expenditure was collected only on the long-form subsample.

Variables on subjective well-being are presented in Table 3 (Panel A). The survey collected information on what a respondent thinks of her household's current economic condition, how is it compared to the past condition, and her perceived outlook for the next two years. We combine all three binary variables into one by simply adding them up and call it the subjective well-being index (row A4). Not surprisingly, the displaced paint a gloomier picture about their current economic situations compared to the non-displaced Iraqis (rows A1 and A2). However, they are more optimistic about their future economic prospects (row A3). Responses are more homogeneous among the displaced households regardless of their access to the PDS program.

The SWIFT survey asked four questions regarding household food deprivation in the last 30 days, namely: if any member in a household had to eat fewer meals, if the household ever had no food of any kind to eat, if member(s) went to bed hungry, and if any member went a whole day and night without eating due to lack of resources. The latter three are recommended screening questions by the Food and Nutrition Technical Assistant (FANTA) III project (Ballard, et al. 2011) to calculate a household hunger score (HHS).[16] As with subjective economic well-being, we create a household hunger score by simply adding the latter three binary responses. As seen in Panel B (Table 3), the displaced population is significantly more food-deprived than the non-displaced population. Again, we do not observe much heterogeneity by PDS status when limiting the sample to displaced households only.

The SWIFT survey collected detailed information regarding expenditure on food and non-food items. Following the standard Deaton & Zaidi (2002) consumption aggregate method, we construct each household's per capita expenditure. The aggregate is used for estimating the country's official poverty rate and also serves as a focal welfare indicator for this study to determine household's calorie intake, poverty status, and vulnerability to poverty. Table 4 (Panel A) reports household consumption and poverty status. Displaced households, on average, have lower aggregate expenditure, spend less both on food and

[16] Usually follow-up questions regarding frequency of deprivation during the 30-day window are asked after a positive response to these three questions. The follow-up responses are used to weigh and classify units into different hunger categories.

non-food items, leading to higher poverty rates than for the non-displaced households. The difference in means between the PDS participants and non-participants among the displaced population is statistically zero. Household calorie intake follows a similar pattern (Panel B), that an average displaced person consumes fewer calories per day mostly because she has fewer calories available from the PDS food items. Among the forced migrants, the ration program plays a major role in filling one's calorie need and appears to significantly reduce the burden to fill the calorie requirement from other sources.

Besides current impact on lower food intake and higher material deprivation, equally strong is the concern that the shock pushes the displaced into a poverty trap by damaging their long-term income generating capacity. One manifestation of the trap is lower investment in children's schooling, leading to lower educational outcomes and lifetime earnings of the next generation. Descriptive results show that, on average, compared to non-displaced, displaced households spend significantly less on education. Similarly, among the displaced population, those with access to the PDS program spend significantly more on education than those without PDS access (Table 4 Panel A).[17]

While the first moments (mean) of welfare outcomes are important in understanding one's present wellbeing status, incorporating higher moments is equally important in understanding one's ability to withstand shocks and/or one's risk to poverty in the long run - resilience (Barrett and Constas 2014, Cissé and Barrett 2018, Phadera, et al. 2019) - and in the immediate future - vulnerability (Chaudhuri 2003).[18] We estimate vulnerability to poverty using Chaudhuri's (2003) approach, which measures a household's probability of consumption falling below the poverty line in the next period conditional on its present consumption level. Once we calculate the vulnerability to poverty (p) for each household as in equation B.9, we classify households as highly vulnerable ($p > 0.5$), moderately vulnerable ($0.2 < p > 0.5$), or not vulnerable ($p < 0.2$).

The cumulative distributions of estimated vulnerability by displacement and PDS status are presented in Figure 2. There is a clear dominance of the non-displaced population over displaced families. The cumulative distribution converges to 1 much faster, signifying a majority of the non-displaced mass is at a lower level of vulnerability. Among the displaced, the difference between those with and without PDS is equally striking. Displaced families with access to the PDS have a similar dominance over those without the PDS. The least well off are displaced households without PDS access; only slightly more than 30 percent of displaced households without the PDS are not vulnerable to poverty, whereas 50 percent of the displaced with the PDS and almost 80 percent of non-displaced are not vulnerable. The results are reconfirmed by the between group differences of means of these outcomes (Table 4: Panel C).

5.2 Regression results

[17] We observe a similar pattern in health spending, i.e., non-displaced have higher health expenditure than the forcibly displaced households and displaced households with PDS have slightly higher health spending than displaced non-PDS beneficiaries (not shown). However, these are descriptive findings and do not establish causal relationship between spending, displacement status and access to PDS.

[18] Implementation of the moment-based measure of resilience to poverty requires panel data with a minimum of two time periods (Cissé and Barrett 2018, Phadera, et al. 2019). Vulnerability, on the other hand, can be implemented in cross-sectional data and, hence, is our choice of estimation. Appendix B details Chaudhuri's (2003) concept of vulnerability and its estimation strategy.

The descriptive statistics presented above show simple differences by displacement status and PDS access. These differences, however, do not accurately depict the program impacts of the PDS because of non-random selection. We minimize the selection problem using a regression framework by controlling for a host of household characteristics that are likely to influence the PDS participation and household welfare simultaneously but are not affected by the program or by its anticipation.[19] Additionally, we add location-specific fixed-effects that ameliorate concerns related to the availability of the PDS and regional level taste for it. Tables 5 to 7 report the regression results from the fixed-effect model presented in equation 2.

As seen in Table 5, among displaced families, PDS participation has zero association with one's own overall subjective economic status. Households' views on their present economic status and future prospects are statistically identical between PDS recipients and non-recipients and this is reflected in the composite subjective wellbeing index as well. In contrast, access to the ration program has large and meaningful effect on household food security for displaced families (Table 5). Having the PDS access is associated with decreased chances of forgoing meals, not having food of any kind, going to bed hungry, and going a whole day and night without eating. As a result, the household hunger score decreases by 0.157 (of a total of 3) or 55 percent of the mean of non-participants. These are plausible results given the context and the program's objectives. Forced migration may have distressed one's economic condition to such an extent that the availability of ration food may do little to affect her assessment of her economic condition. In contrast, the direct impact of regular and predictable supply of food from the PDS program mitigates the risk of food deprivation.

The significance of the food ration program in improving Iraqi households' diet and expenditure is well-documented (World Bank 2010, 2014). Consistent with these findings, the regression results show that the program is important for displaced families in sustaining their consumption and calorie intake and reducing vulnerability to poverty. Entry into the PDS system is associated with higher food and non-food consumption and, thus, lower poverty incidence. Displaced households with PDS have a 14.6 percentage point lower probability of being poor compared to displaced households without PDS (Table 7). Per capita calorie intake is higher in households with PDS access (Table 8), likely reducing one's burden to fill the calorie requirement from other sources and possibly freeing up resources to divert to meet other household needs. Additionally, PDS access is associated with smaller chances of being highly or moderately vulnerable to poverty and 10 percentage points lower probability of falling into poverty in the subsequent period (Table 8).

Besides exploring the differences by PDS participation and non-participation among the displaced population, one may also wish to compare displaced and non-displaced households. We employ the following strategy, including all the available observations in the survey, which avoids potential shortcoming from having a small sample size when limiting analysis to displaced households only.

$$y_{ijm} = \beta_0 + \beta_1 \times Displaced\ PDS_i + \beta_2 \times Displaced\ non\ PDS_i + X_i + \eta_m + \varepsilon_{ijm} \qquad (4)$$

All the coefficients have the same meaning as in equation 2, except the comparison group is composed of non-displaced households and the difference between the β_1 and β_2 coefficients ($\delta = \beta_1 - \beta_2$) shows the advantage of having access to the PDS program among the displaced families. We reevaluate all the

[19] We add the variables described in Table 2 as controls, X, in all the fixed-effect regressions. The fixed-effects implemented are at lower geographical level than the four regions defined in Table 2, hence, the four regional dummies are excluded from the vector of X.

outcomes explored in this section using equation 4, however we report estimates of β_1, β_2 and δ coefficients for only the most important outcomes in Table A2. Irrespective of the PDS status, displaced households fare poorly compared to non-displaced households in all the explored outcomes. Consistent with the results presented earlier, the PDS program helps recover a portion of the losses of the forcibly displaced.

Results presented in this subsection robustly associate the importance of the public distribution system for household well-being during a time of distress . These results advance a plausible story that having access to the PDS benefits is associated with higher consumption, lower vulnerability and lesser food deprivation – the central objectives of the program. However, it has no association with one's subjective perception of the overall economic situation. Furthermore, displaced families, regardless of their PDS status, fared poorly across all measures of welfare when compared with non-displaced families. Taken together, the results suggest that forced displacement distresses one's economic condition to such an extent that the food ration program compensates some of the welfare loss and reduces vulnerability, but it does not reinstate the displaced families to their original level of well-being. The method employed in this subsection minimizes the selection problem by controlling for a host of observed household characteristics, yet the results presented here reflect associations and not causal impacts of the PDS program. In the next subsection we use the PSM method to argue that the observed associations have causal relationships.

5.3 Propensity score matching results

Central to the matching method is the conditional independence assumption (CIA), which asserts that the selection is solely based on observables and, thus, one is required to select a set of covariates, X, that credibly fulfill such requirement. We use a 10-fold cross validation as described in the empirical strategy section to choose the optimal set of covariates from a long list of covariates that are likely to affect the PDS participation and outcomes but are not likely to have been impacted by program participation. In addition to the CIA, the overlap and common support conditions should also hold, as treatment effects are only defined in the region of common support. We follow Lechner (2008) in arguing that the visual comparison of the density distribution of propensity scores between the treatment and comparison groups is sufficient to identify the support problem. Figure 3 presents the comparison of the densities between the two-groups. The common support condition is likely met, as all the density bins of the treatment groups have comparison supports.

To assess the quality of the match, we consider three different balancing tests. The basic idea behind all the approaches is that treatment participation conditional on the propensity score is independent of each covariate considered (Rosenbaum and Rubin 1983). First, we perform t-tests for equality of means between the treated and comparison groups on the on-support sample after matching. The means of the two groups and *P*-values from the equality tests are reported in Table 9 (Columns 1 to 3). There are only two variables with *P*-values below 0.01 and three below 0.05 of the 14 selected variables. Second, for each covariate, we calculate Rosenbaum & Rubin's (1983) standardized bias (SB) – a workhorse approach in evaluation studies. It measures the difference of sample means between the treated and matched control subsamples as a percentage of the square root of the average of the two samples' variances. An SB value of 20 percent is considered "large" (Rosenbaum and Rubin 1983). As reported in Table 9 (Column 4), all the 14 covariates have standardized bias below 20 percent and 12 of them have below 10 percent. Finally, we consider a regression-based balancing test suggested by Smith & Todd (2005b) and estimate the following regression for each covariate k.

$$X_k = \alpha + \beta_1 D + \delta_1 \hat{P}(X) + \delta_2 \hat{P}(X)^2 + \delta_3 \hat{P}(X)^3 + \delta_4 \hat{P}(X)^4$$
$$\beta_1 D\hat{P}(X) + \beta_2 D\hat{P}(X)^2 + \beta_3 D\hat{P}(X)^3 + \beta_4 D\hat{P}(X)^4 + \eta \quad (5)$$

where, D is the PDS participation and $\hat{P}(X)$ is the estimated propensity scores. A joint null that all the coefficients involving the treatment dummy, D, equal zero is tested. If the balancing condition is satisfied, D conditional on quartic $\hat{P}(X)$ should not provide any information regarding a covariate X_k. *P*-values from the tests of joint-nulls are presented in Column 5 of Table 9. Again, the balancing condition is fairly satisfied, as of the 14 variables included, only four variables have the P-values below 0.1 and three of them have *P*-values below 0.05 and 0.01.[20] All three tests suggest a high quality of covariate match.

After the common support and balancing conditions checks, we proceed with the estimation of ATT using nearest neighbor matching with replacement algorithm. Assuming that the selection is solely on observable covariates, and given the balancing and common support conditions hold, the reported results in this section are the causal impacts of the PDS program on displaced families. Consistent with the results from the fixed-effect models, having access to the PDS program does not have an impact on current subjective well-being status (Figure 4 – Column 1 and 2). However, it helps households to be more optimistic about their future (Figure 4 – Column 3). We also observe some evidence of a positive impact of PDS participation on the subjective well-being index (Figure 4 – Column 4).

The impact of the PDS program on displaced families' food deprivation is reported in Figure 5. The program helped reduce the chances of any member of the family having to eat less due to resource constraints by 17 percent. In addition, the PDS program significantly reduced the risk of not having food of any kind, members going to bed hungry and going a day and night without eating by 10 percent, 9 percent and 12 percent, respectively. Given these results, it is not surprising that the program has a significant and meaningful impact on the household hunger score – reduction of 0.31 or 109 percent of the control mean.

Concurrently, the PDS program played a significant role in increasing household consumption and, hence, decreasing the odds of being in poverty (Figure 6).[21] Not surprisingly, the program helped displaced recipients increase their food consumption. The program also has a spillover impact on total nonfood consumption.[22] The combined effect is reflected on households' odds of being below the poverty line. Compared to the displaced non-recipients, the displaced PDS recipients are 26 percent less likely to be poor, which is two-thirds of the poverty rate of the comparison group.

As discussed earlier, we implement Chaudhuri's (2003) approach to assess households' vulnerability to poverty and use that as an outcome variable in the matching exercise. The results are reported in Figure 7. Compared to the displaced families without access to the PDS, the program beneficiaries are

[20] We perform similar analysis on the smaller "long-form" sample. While the density distribution of estimated propensity scores for the common support condition is reported in Figure A1, the balancing test results are presented in Table A3. We can deduce a similar conclusion as in the "short-form" sample regarding the common support and balancing condition.

[21] Food items from the ration program are valued at market prices when creating the consumption aggregate.

[22] Non-food spending is expenditures on housing, utilities, clothing, education, transportation, communication, durables, recreation, etc. but do not include health spending.

significantly less likely to be poor in the next time period. The program decreased recipients' probability of being poor in the next period (vulnerability) by 27 percentage points and of being highly vulnerable by 31.0 percentage points. The program's impact on daily calorie consumption is presented in Figure 7. Consistent with previous studies, Iraq's PDS program significantly increases recipients' daily calorie consumption while decreasing calories from non-ration food. Combining with the program's positive impact on nonfood consumption, this is an important finding. The constant supply of rations through the PDS program is likely to reduce the strain of fulfilling calorie requirements and, thus, free up resources that can be diverted to other needs.

5.4 Robustness checks

To check the robustness of the results, we re-estimate the average treatment on treated (ATT) effects using different model specifications and matching algorithms. First, instead of limiting the model to the covariates selected through the cross-validation exercise, we exploit the full set of covariates identified to be potentially exogenous. Contrary to a less parsimonious model, a minimalistic specification does not suffer from a weak common support problem, but the plausibility of the CIA is of concern (Black and Smith 2004). To account for this trade-off between plausibility of the CIA and the variance of the estimates, we reassess the effects of the program by including the full set of covariates and report them in columns 1 to 3 in Table A4.[23] The results align well with the baseline findings, i.e., the PDS program is significant in decreasing participants' probability of food deprivation, increasing consumption and reducing vulnerability to poverty. It is further reassuring that the same conclusions can be drawn from using different matching algorithms, in particular, radius matching (columns 4 to 6).[24]

Treatment effects using inverse probability weighting (IPW) and regression adjustment (RA) estimators are the other two robustness checks we perform. The regression adjustment estimator uses the difference of averages of treatment-specific predicted outcomes. An average treatment effect, conditional on covariates, is estimated for each observation regardless of the actual treatment assignment. The average over all the observations gives the ATE. The IPW estimator accounts for the missing potential outcomes by weighting the observations by the inverse of the probability that it is observed. While observations that are not likely to contain missing data (potential outcome) are assigned weights closer to one, those likely to have missing data get a larger weight. The results are reported in columns 7 to 9 (IPW) and 10 to 12 (RA), respectively, in Table A4. Both sets of results present the same robust narrative that PDS plays an important role in displaced households' welfare.

6. Conclusion

This paper assesses if PDS, the largest social assistance program in Iraq and one of the world's largest food ration programs, played a role in mitigating the welfare loss of forcibly displaced households following the most recent wave of violence and displacement in 2014. We find that displaced households that continue to receive the PDS benefits are more food secure, less poor, and less vulnerable to poverty than displaced households that have lost access to the PDS. Yet access to the PDS program alone is not sufficient to alter displaced households' overall economic outlook. We find zero statistical association between displaced person's subjective perception of her overall economic situation and having access to the ration program.

[23] We report ATTs on three main outcomes for all the robustness checks, other results are available on request.

[24] The presented results are from using nearest neighbor with caliper of 0.2. We also use caliper of 0.1, 0.5, 0.7, 1 and 2, and the results are robust across all radii.

Our inquiry does not lend itself to experimental evaluation, since PDS benefits could not be randomly assigned among displaced households to measure the impact of the program. Therefore, the study relies on a non-experimental propensity score matching method to test the hypothesis that access to PDS benefits improves food security, household welfare, and vulnerability.

While our analysis compares displaced households with no access to the PDS to households with some access, our data show that even those IDPs receiving some PDS benefits do not receive the full benefits that they are entitled to. For instance, in the last 12 months, IDPs received on average about 4 months' worth of wheat flour. The pattern holds for the other three PDS food items as well. Further investigation is necessary to understand why the full PDS benefits are not reaching displaced households. It is noteworthy that even non-displaced households do not receive the full amount they are entitled to. For instance, in the last 12 months, non-displaced households received about 8 months' worth of wheat flour. This suggests that there are supply shortages due to budget constraints or frictions in the delivery of food rations unrelated to direct incidence of conflict or displacement. Further work is necessary to understand the delivery bottlenecks.

The "cash versus food" debate is a large and longstanding debate that has lately received renewed attention (Gentilini 2016, Blattman, et al. 2017). Despite increasing interest from governments to move away from in-kind to unconditional cash transfer programs (Blattman, et al. 2017), subsidized food programs remain the mainstay of social assistance programs in low and middle income countries (Alderman, Gentilini and Yemtsov 2018). Justifications for these large and financially demanding programs are presented mostly in the context of improved nutrition and food security among beneficiaries.[25] Where markets are nonexistent or weak and food availability is limited, simply giving people food might be the best way to guarantee food security (Hoddinott, Gilligan, et al. 2013, Hoddinott, Sandstrom and Upton 2018, Gentilini 2007). In situations where there is high variability in food prices and supply, regular and predictable food transfers can play an important role in smoothing consumption. It is argued that the food received from the transfers decreases households' need to acquire such items from the market, potentially freeing up resources to purchase more nutritious and higher valued items.

The general consensus in the empirical literature on subsidized food and nutrition, however, is that the in-kind ration programs have either marginal or zero impact on nutritional outcomes. The evidence in developing country contexts mostly comes from the Indian TPDS program. Studies have found that expansion of the monthly staple subsidy led to marginal increments in overall calorie intake (Kochar 2005, Himanshu 2013, Kaul 2018) and consumption of other nutritious food items such as pluses, animal-based protein, and oil (Krishnamurthy, Pathania and Tandon 2017, Kaul 2018, Shrinivas, et al. 2018). Similarly, making the program universal in highly food deprived districts of Odisha state increased household dietary diversity, but again, only marginally (Rahman 2016). Several other studies, including Svedberg (2012), Balasubramanian (2015) and Kaushal & Muchomba (2015), on the other hand, show zero impact of the TPDS program on household nutrition or dietary diversity.

Cash transfers, in contrast, are among the most rigorously evaluated development interventions and in general are more efficient than food-based interventions (Gentilini 2016). The arguments for providing cash instead of food support are rooted in economic theory. Cash expands the budget set of an individual, enlarging the choice set. An individual also knows her preference better than anyone else, so it is optimal to allow her to decide what bundle of goods to consume with the additional resources. Cash distribution has practical advantages as well. Cash can be delivered to the intended recipients with minimal leakage,

[25] Currie & Gahvari (2007) provide a review on justification for the in-kind transfers.

on time, and at low cost. Furthermore, food ration may not be appropriate in fragile settings where the risk of conflict is high. Delivery of food to local agents is but the last step in a long logistical chain, and disruption in one link of the chain will disrupt the final delivery of food. Active conflict and general insecurity may disrupt delivery of food, depriving the population of food support at a time of high need.

Our study was designed to shed light on the performance of the PDS in its current form in providing a social protection floor to Iraqi households during emergency. It cannot speak directly to the larger question of whether universal food subsidy is the most effective and efficient way to deliver social assistance in Iraq. There is, however, scope to redesign the PDS in the margins to make it more effective. To access the PDS benefits, households must have a PDS card with the number of household members listed on it and the benefits are received from a designated local ration agent. When a household moves to a new location, it must establish its residency in the new place. Only then can it request its ration card to be transferred to an agent in the new location. Until recently, the applications had to be sent to the Ministry of Trade office in Baghdad, which made the process cumbersome.[26] Establishing residency and proving identity might be especially difficult for displaced households if their documents have been lost or damaged. Simplifying the procedures for transferring residency and agent affiliation can prevent displaced households from losing access to an important source of calories and implicit income at a time when the support is most needed. Instituting an e-distribution platform, such as the one World Food Program (WFP) is piloting in collaboration with the Ministry of Trade through digitalization of the beneficiaries' database and biometric registration, may enable displaced persons to update their location information more easily and, thus, may speed up the process of transferring the affiliation from an agent at the place of origin to a new agent at the current location.

Iraq could also consider targeting the benefits to only poor households or those in the bottom parts of income distribution. This would allow the government to increase the benefits per beneficiary or use the fiscal savings to expand poverty-targeted social safety net (SSN) programs. Indeed, one of the reasons why non-subsidy social safety net programs in Iraq remain stunted is because PDS absorbs a large amount of the government budget. The poverty targeting criteria introduced in 2015 and currently used for the cash transfer program provide a natural starting point to identify PDS beneficiaries. If a transition from universal eligibility to poverty-targeted distribution is thought to be too disruptive, the eligibility threshold can be set generously high to encompass, say, the poorest 60 percent of households.

In the long term, the PDS program can be gradually phased out and replaced by a poverty-targeted cash transfer program (conditional or unconditional). Before doing so, however, a robust system must be in place to enroll beneficiaries, verify that they meet the necessary conditions (in case of conditional transfer), and deliver the benefits. Additionally, any PDS reform should be accompanied by a compensatory measure for those current beneficiaries that are likely to be impacted negatively by the reform. Previous studies have found that household consumption of PDS items is relatively inelastic to price changes (Krishnan, Olivieri and Ramadan 2019). Without the compensating differential provided by the new programs, removal of subsidies may have a large negative impact on current beneficiaries' household budget, household welfare, and calorie intake.

Alternatively, the Indonesian replacement to its subsidized food program could be considered. As discussed, Rastra (originally Raskin) was a food distribution program. Rastra has been well-studied, due to its large coverage and historically weak targeting accuracy (see for example Alderman, Gentilini and

[26] In the interim, it was not uncommon for households to make periodic trips to their original location to collect the benefits.

Yemtsov). The availability of strong evidence of Rastra's relatively poor performance and effectiveness motivated the government's decision to reform the delivery of subsidized food by transitioning beneficiaries from Rastra to the BPNT program (World Bank 2020). Under BPNT, only targeted households, identified by a program debit card ownership and validated using a personal identification number, can exchange a monthly IDR 110,000 voucher for 10 kilograms of rice or eggs at controlled distribution points. In 2018, non-cash food assistance under BPNT covered about 5.3 million families, rising to 12.6 million households by mid-2019. By the end of 2019, Rastra was fully phased out and 15.6 million families were covered under BPNT. In 2020, the Government of Indonesia broadened the scope of BPNT by including several new nutritious items eligible for purchase and increasing the benefit level to allow the purchase of those items.

The above discussion only points to possibilities. They are not meant to be prescriptive. Nevertheless, it is high time to reopen the dialogue on how the PDS can be reformed to provide social assistance to as many Iraqis as possible at as little cost as possible.

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8. Figures

Figure 1: Scale of recent conflict and displacement

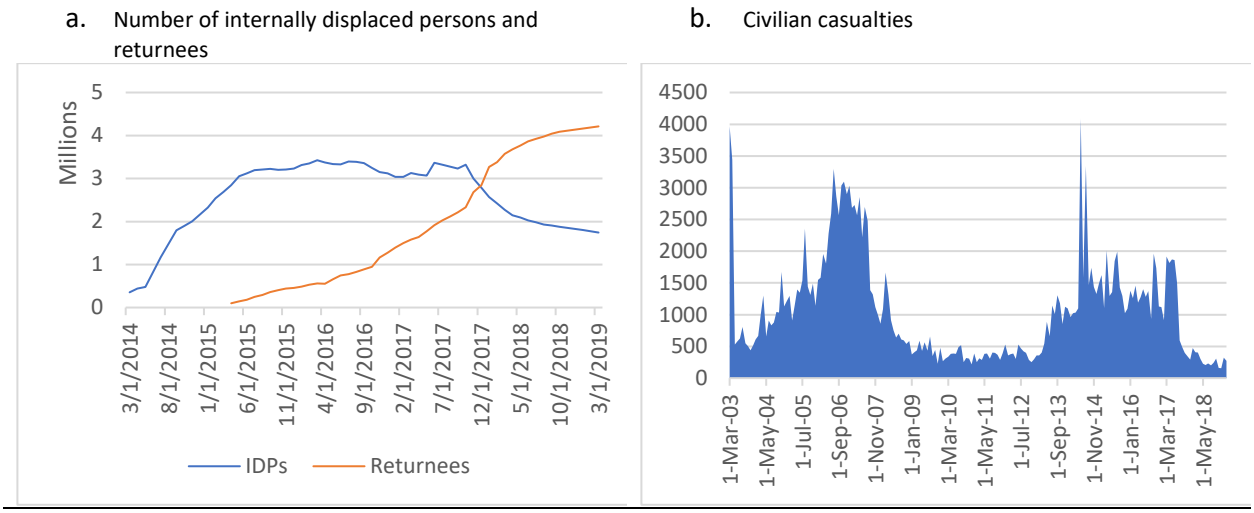
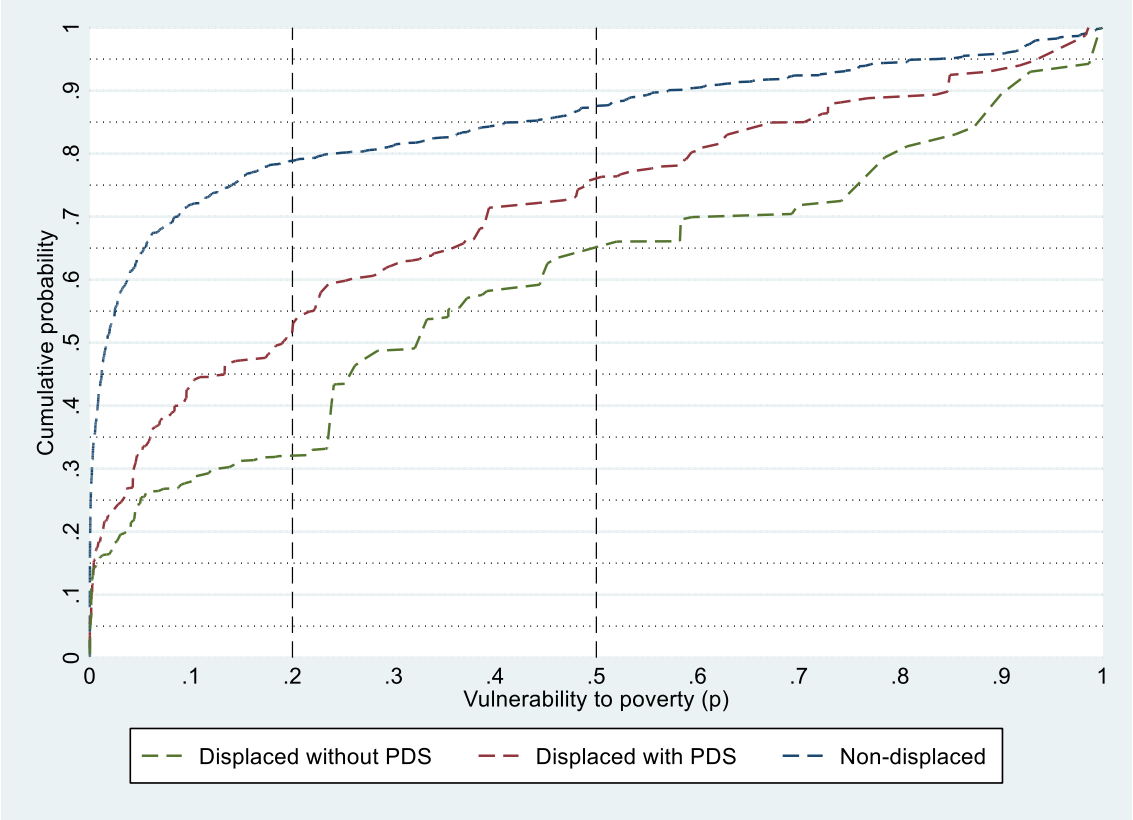
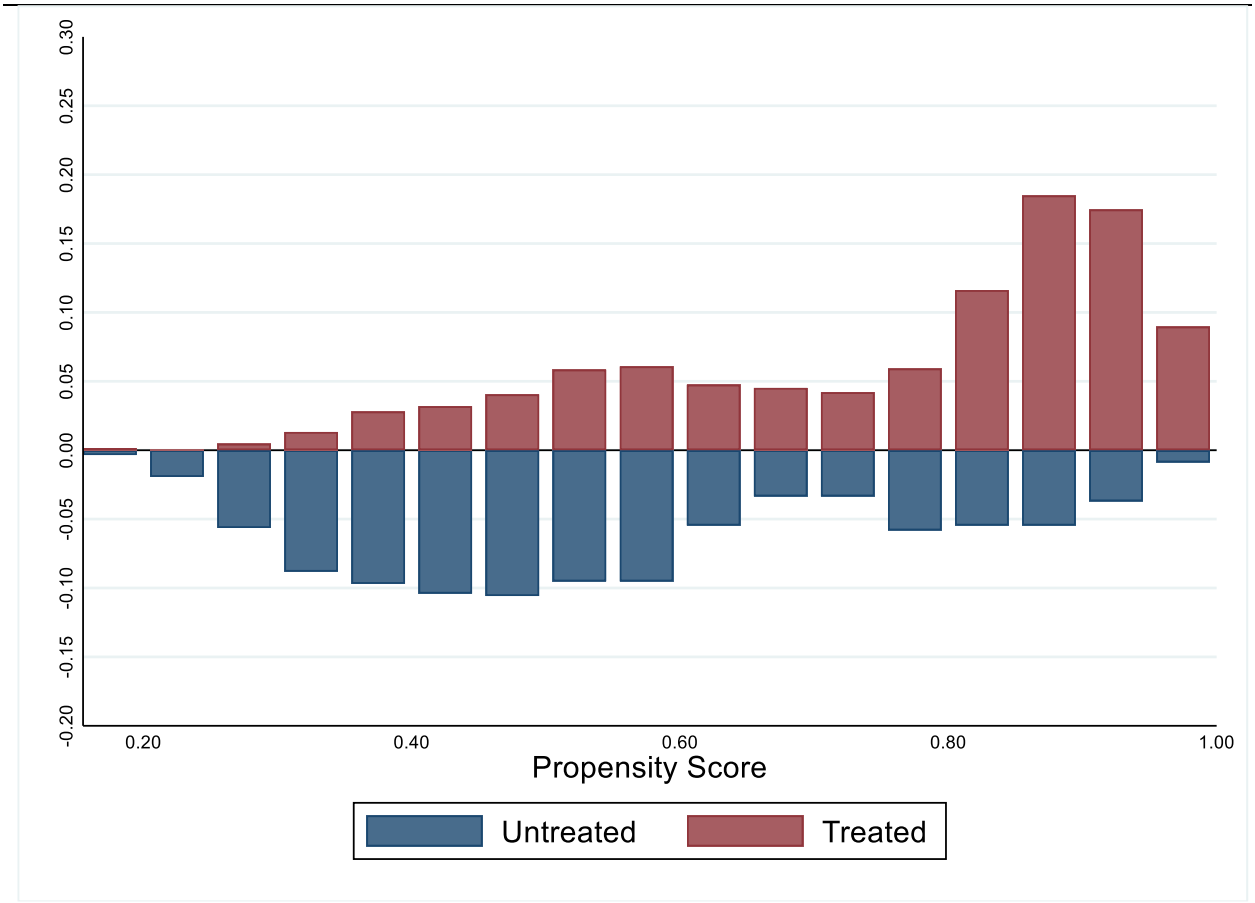


Figure 2: Vulnerability to poverty cumulative distribution



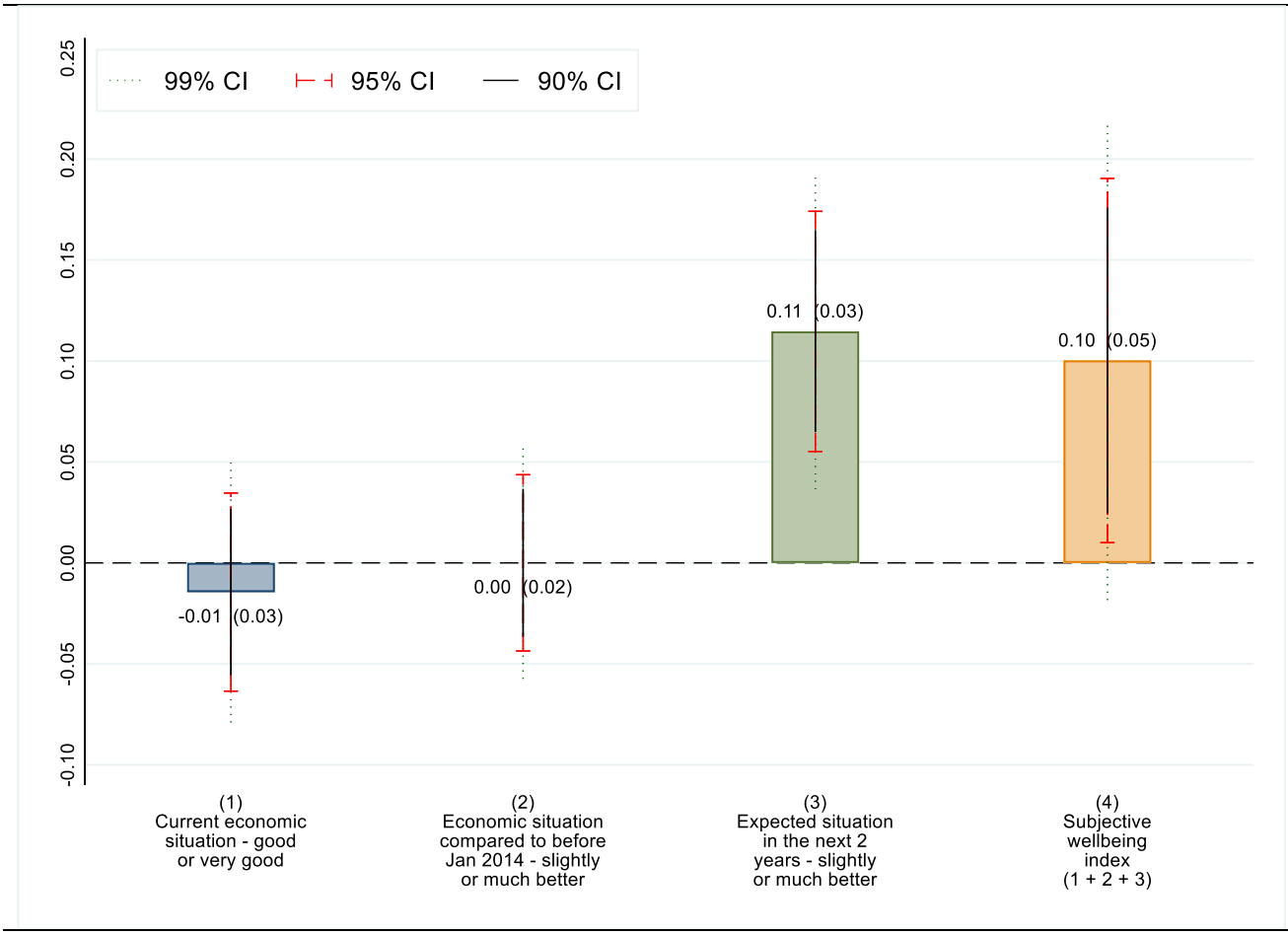
Note: Vulnerability score is calculated using Chaudhuri (2003) approach. A household with score of 0.5 or higher is considered highly vulnerable, between 0.2 and 0.5 is considered moderately vulnerable, and with score less than 0.2 is considered not vulnerable.

Figure 3: Distribution of propensity score across treatment and comparison groups



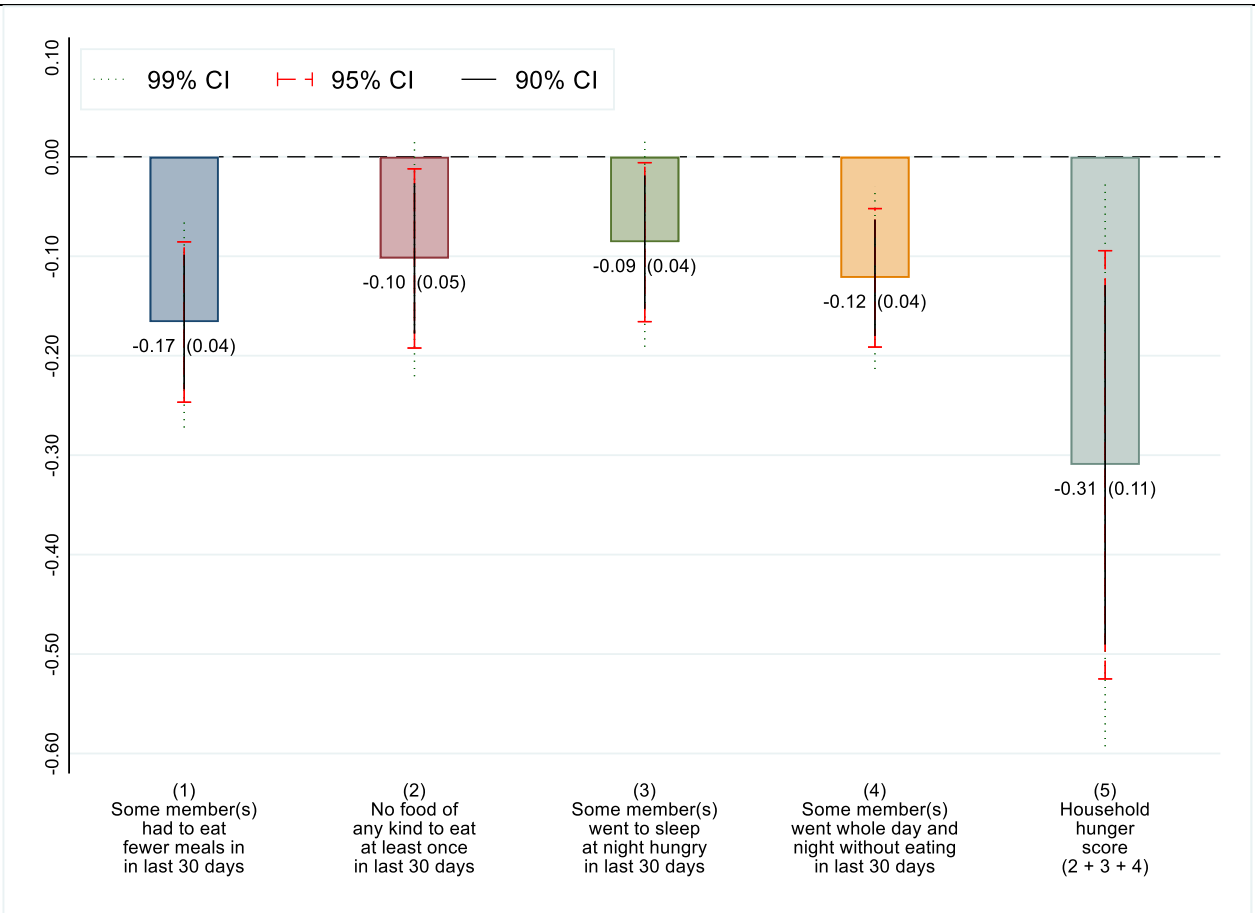
Note: Sample is limited to displaced households from the "short-form" sample.

Figure 4: Impact of the PDS on subjective wellbeing



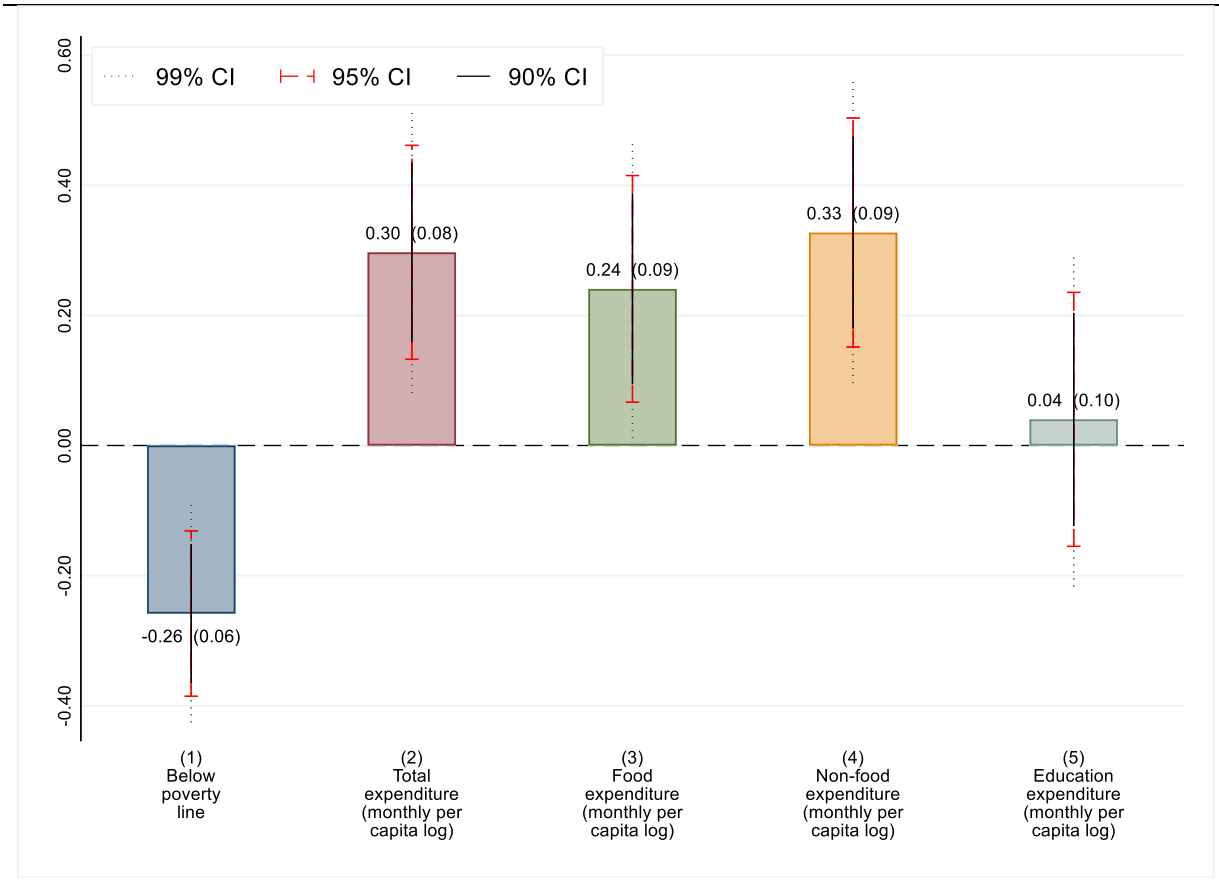
Note: Treatment on the treated estimates are reported based on nearest neighbor propensity score matching. Robust standard errors are in parentheses. While columns 1 to 3 are binary outcomes, subjective wellbeing index in column 4 is a sum of the three binary outcomes, thus, can have maximum value of 3 and minimum of 0.

Figure 5: Impact of the PDS on household food deprivation



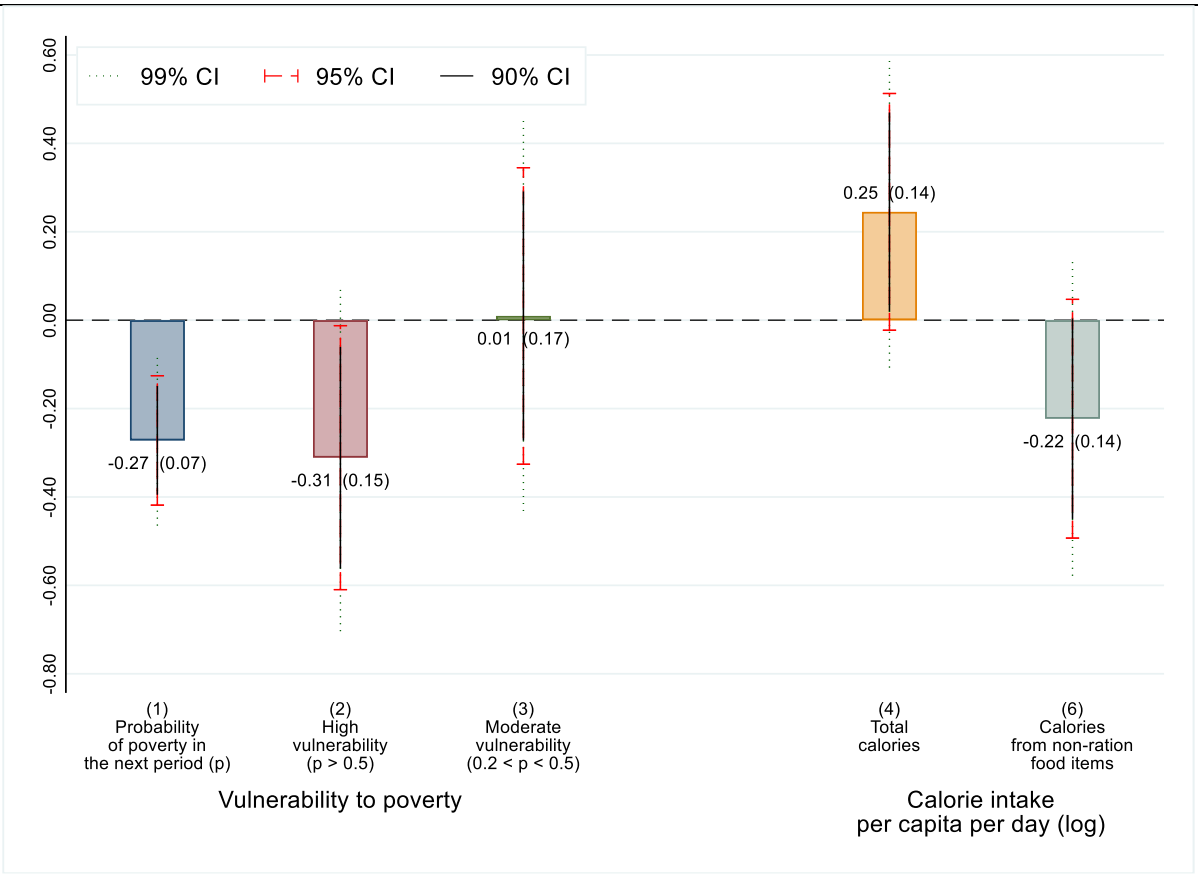
Note: Treatment on the treated estimates are reported based on nearest neighbor propensity score matching. Robust standard errors are in parentheses. Columns 1 to 4 are binary outcomes indicating household food deprivation in last 4 weeks, household hunger score is the sum of columns 2 to 4, thus, can have maximum value of 3 and minimum of 0.

Figure 6: Impact of the PDS on poverty and consumption



Note: Treatment on the treated estimates are reported based on nearest neighbor propensity score matching. Robust standard errors are in parentheses.

Figure 7: Impact of the PDS on vulnerability and calorie intake



Note: Treatment on the treated estimates are reported based on nearest neighbor propensity score matching. Robust standard errors are in parentheses.

9. Tables

Table 1: Sampling design and response rate for the 2017-18 survey

	Short form				Long form (Household expenditure)			
Governorate	Number of clusters	Households per cluster	Number of households sampled	Number of households interviewed	Number of clusters	Households per cluster	Number of households sampled	Number of households interviewed
Dohuk	150	6	900	899	60	3	180	180
Sulaymaniyah	150	6	900	888	60	3	180	180
Erbil	150	6	900	894	60	3	180	180
Nineveh	60	6	360	360	30	2	60	60
Kirkuk	60	6	360	360	30	2	60	60
Diyala	60	6	360	360	30	2	60	60
Anbar	60	6	360	360	30	2	60	60
Salah al-Din	60	6	360	358	30	2	60	60
Baghdad	150	6	900	898	60	2	120	120
Babylon	60	6	360	360	30	2	60	60
Karbala	60	6	360	360	30	2	60	60
Wasit	60	6	360	358	30	2	60	60
Najaf	60	6	360	360	30	2	60	60
Qadisiyah	60	6	360	360	30	2	60	60
Muthanna	60	6	360	360	30	2	60	60
Dhi Qar	60	6	360	360	30	2	60	60
Maysan	60	6	360	360	30	2	60	60
Basra	60	6	360	360	30	2	60	60
Total	1440		8,640	8,615	660		1500	1500

Table 2: Descriptive Statistics

	All Iraqi residence				Displaced		
	(1) All	(2) Displaced	(3) Non-Displaced	(4) Difference (2 - 3)	(5) PDS	(6) Non-PDS	(7) Difference (5 - 6)
Variables	Mean [SD]	Mean [SD]	Mean [SD]	b (se)	Mean [SD]	Mean [SD]	b (se)
Received rations in last 12 months (PDS)	0.95	0.86	0.97	-0.12***	--	--	--
	[0.22]	[0.37]	[0.16]	(0.01)	--	--	--
Household size	7.34	8.15	7.16	1.00***	8.32	7.12	1.20***
	[3.33]	[3.85]	[3.18]	(0.18)	[3.46]	[5.34]	(0.35)
Number of children between 0 to 6	1.38	1.63	1.32	0.30***	1.65	1.47	0.18*
	[1.38]	[1.50]	[1.34]	(0.07)	[1.37]	[1.98]	(0.11)
Number of children between 7 to 14	1.58	1.84	1.52	0.32***	1.87	1.67	0.20
	[1.42]	[1.71]	[1.35]	(0.07)	[1.55]	[2.40]	(0.13)
Number of elderly 65 and more	0.23	0.18	0.25	-0.07***	0.18	0.15	0.03
	[0.51]	[0.47]	[0.52]	(0.02)	[0.43]	[0.66]	(0.04)
Dependency ratio (dependents/hh size)	0.43	0.44	0.42	0.02**	0.44	0.44	-0.00
	[0.21]	[0.23]	[0.21]	(0.01)	[0.20]	[0.37]	(0.02)
Number of working age males 15 to 64	2.09	2.19	2.06	0.13**	2.27	1.74	0.53***
	[1.36]	[1.47]	[1.34]	(0.06)	[1.32]	[2.02]	(0.12)
Household head age	48.00	47.37	48.15	-0.78	47.84	44.57	3.26***
	[13.14]	[13.30]	[13.07]	(0.52)	[11.98]	[18.73]	(0.93)
Marital status of household head							
Male and married	0.89	0.88	0.90	-0.02	0.88	0.89	-0.01
	[0.31]	[0.35]	[0.30]	(0.01)	[0.32]	[0.49]	(0.03)
Male and single	0.01	0.01	0.01	-0.00	0.01	0.00	0.01*
	[0.09]	[0.09]	[0.09]	(0.00)	[0.09]	[0.08]	(0.00)
Male widower	0.02	0.02	0.02	0.00	0.02	0.00	0.02**
	[0.12]	[0.13]	[0.12]	(0.01)	[0.13]	[0.07]	(0.01)
Female and married	0.01	0.02	0.01	0.01	0.02	0.03	-0.01
	[0.10]	[0.14]	[0.09]	(0.01)	[0.12]	[0.26]	(0.02)
Female and single	0.01	0.00	0.01	-0.00**	0.00	0.01	-0.01**
	[0.08]	[0.05]	[0.08]	(0.00)	[0.04]	[0.14]	(0.00)
Female widower	0.07	0.08	0.06	0.02	0.08	0.07	0.01
	[0.25]	[0.29]	[0.24]	(0.01)	[0.26]	[0.40]	(0.02)
Education of household head							
Illiterate	0.15	0.13	0.16	-0.03**	0.12	0.15	-0.03
	[0.36]	[0.36]	[0.36]	(0.01)	[0.32]	[0.56]	(0.03)
Some primary	0.46	0.45	0.47	-0.01	0.46	0.42	0.04
	[0.50]	[0.53]	[0.49]	(0.02)	[0.48]	[0.77]	(0.04)
Intermediate/secondary/vocational degree	0.28	0.29	0.28	0.01	0.30	0.27	0.03
	[0.45]	[0.49]	[0.44]	(0.02)	[0.44]	[0.69]	(0.04)
Post graduate degree	0.10	0.13	0.10	0.03**	0.12	0.16	-0.04
	[0.31]	[0.36]	[0.29]	(0.01)	[0.31]	[0.58]	(0.03)
Highest education by adult members							
Illiterate	0.03	0.03	0.03	-0.00	0.03	0.06	-0.03
	[0.18]	[0.19]	[0.18]	(0.01)	[0.16]	[0.36]	(0.02)
Some primary	0.30	0.32	0.29	0.03	0.32	0.33	-0.01
	[0.46]	[0.50]	[0.45]	(0.02)	[0.45]	[0.73]	(0.04)
Intermediate/secondary/vocational degree	0.46	0.43	0.47	-0.04**	0.44	0.40	0.03
	[0.50]	[0.53]	[0.49]	(0.02)	[0.48]	[0.77]	(0.04)
Post graduate degree	0.20	0.22	0.20	0.02	0.22	0.21	0.01
	[0.40]	[0.44]	[0.39]	(0.02)	[0.40]	[0.64]	(0.03)
Date since living in current governorate							
Before 2003	0.93	0.76	0.97	-0.21***	0.81	0.42	0.40***
	[0.26]	[0.46]	[0.17]	(0.02)	[0.37]	[0.77]	(0.04)
Between 2003 and 2014	0.04	0.10	0.03	0.08***	0.07	0.27	-0.20***
	[0.20]	[0.32]	[0.16]	(0.01)	[0.25]	[0.69]	(0.04)
After 2014	0.03	0.14	0.01	0.13***	0.11	0.31	-0.20***
	[0.17]	[0.37]	[0.08]	(0.01)	[0.30]	[0.72]	(0.04)
Current place of residence							
Rural	0.26	0.27	0.26	0.01	0.30	0.11	0.19***
	[0.44]	[0.47]	[0.43]	(0.03)	[0.44]	[0.49]	(0.04)
Kurdistan	0.16	0.13	0.16	-0.04***	0.08	0.43	-0.35***
	[0.36]	[0.36]	[0.36]	(0.01)	[0.26]	[0.77]	(0.04)
North	0.26	0.78	0.14	0.64***	0.82	0.52	0.30***
	[0.44]	[0.44]	[0.34]	(0.02)	[0.37]	[0.78]	(0.05)
Center	0.37	0.08	0.44	-0.35***	0.09	0.05	0.04
	[0.48]	[0.30]	[0.49]	(0.03)	[0.28]	[0.33]	(0.03)
South	0.21	0.01	0.26	-0.25***	0.01	0.00	0.01
	[0.41]	[0.09]	[0.43]	(0.01)	[0.09]	[0.04]	(0.00)
Observations	8615	1849	6766	8615	1282	567	1849
Sample = "Short-form"							

Note: Standard deviations are in brackets and standard errors are in parentheses. Significance levels are denoted as follows: * p<0.10 ** p<0.05 *** p<0.01.

Table 3: Subjective assessment of own economic condition and food security

	All Iraqi residence				Displaced		
	(1) All	(2) Displaced	(3) Non-Displaced	(4) Difference (2 - 3)	(5) PDS	(6) Non-PDS	(7) Difference (5 - 6)
Variables	Mean [SD]	Mean [SD]	Mean [SD]	b (se)	Mean [SD]	Mean [SD]	b (se)
A. Assessment of own economic condition							
1. Current condition (good/very good =1)	0.13	0.06	0.14	-0.08***	0.06	0.05	0.01
	[0.33]	[0.25]	[0.34]	(0.01)	[0.23]	[0.34]	(0.02)
2. Current condition compared to before Jan. 2014 (slightly/much better = 1)	0.16	0.11	0.17	-0.06***	0.10	0.16	-0.06*
	[0.37]	[0.34]	[0.37]	(0.02)	[0.29]	[0.58]	(0.04)
3. Economic outlook for the next two years (slightly/much better = 1)	0.18	0.30	0.16	0.14***	0.31	0.24	0.07*
	[0.39]	[0.49]	[0.36]	(0.02)	[0.44]	[0.66]	(0.04)
Subjective wellbeing index (A1 + A2 + A3)	0.47	0.47	0.47	0.00	0.47	0.45	0.02
	[0.72]	[0.68]	[0.73]	(0.03)	[0.62]	[0.97]	(0.07)
B. Household food security in last 30 days							
1. Member(s) had to eat fewer meals (yes =1)	0.12	0.23	0.09	0.14***	0.23	0.25	-0.02
	[0.33]	[0.45]	[0.29]	(0.02)	[0.40]	[0.68]	(0.04)
2. No food of any kind to eat at least once (yes =1)	0.09	0.14	0.07	0.07***	0.15	0.10	0.05**
	[0.28]	[0.37]	[0.25]	(0.02)	[0.34]	[0.47]	(0.02)
3. Member(s) went to sleep at night hungry (yes =1)	0.05	0.09	0.05	0.04***	0.09	0.10	-0.01
	[0.23]	[0.30]	[0.21]	(0.01)	[0.27]	[0.47]	(0.02)
4. Member(s) went whole day and night without eating (yes =1)	0.04	0.06	0.03	0.02*	0.06	0.05	0.00
	[0.19]	[0.25]	[0.18]	(0.01)	[0.22]	[0.35]	(0.02)
Household hunger score - HHS (B2 + B3 + B4)	0.18	0.29	0.15	0.14***	0.29	0.25	0.04
	[0.61]	[0.80]	[0.56]	(0.04)	[0.73]	[1.07]	(0.05)
Observations	8615	1849	6766	8615	1282	567	1849
Sample = "Short-form"							

Note: Standard deviations are in brackets and standard errors are in parentheses. Significance levels are denoted as follows: * p<0.10 ** p<0.05 *** p<0.01.

Table 4: Household expenditure, calorie intake, and vulnerability to poverty

	All Iraqi residence				Displaced		
Variables	(1) All Mean [SD]	(2) Displaced Mean [SD]	(3) Non-Displaced Mean [SD]	(4) Difference (2 - 3) b (se)	(5) PDS Mean [SD]	(6) Non-PDS Mean [SD]	(7) Difference (5 - 6) b (se)
A. Monthly expenditure (per capita 000 IQD)							
Poverty rate (expenditure below poverty line)	0.18	0.33	0.15	0.18***	0.31	0.42	-0.11
	[0.38]	[0.52]	[0.35]	(0.04)	[0.46]	[0.76]	(0.11)
Total Expenditure (log)	5.19	4.96	5.24	-0.28***	4.98	4.91	0.07
	[0.53]	[0.55]	[0.51]	(0.05)	[0.47]	[0.89]	(0.12)
Food expenditure (log)	4.25	4.00	4.31	-0.31***	4.00	4.01	-0.01
	[0.48]	[0.48]	[0.47]	(0.04)	[0.41]	[0.72]	(0.09)
Non-food expenditure (log)	4.65	4.44	4.70	-0.25***	4.47	4.34	0.13
	[0.63]	[0.68]	[0.61]	(0.06)	[0.57]	[1.11]	(0.15)
Expenditure on education (log)	0.44	0.32	0.47	-0.16**	0.35	0.15	0.20***
	[0.90]	[0.73]	[0.92]	(0.07)	[0.67]	[0.72]	(0.08)
B. Calorie intake (per capita per day)							
Total calorie intake (log)	8.16	8.06	8.18	-0.11***	8.08	7.99	0.09
	[0.36]	[0.37]	[0.36]	(0.03)	[0.32]	[0.58]	(0.06)
Calories from ration food (log)	6.41	5.47	6.61	-1.14***	6.74	0.00	6.74***
	[2.15]	[3.28]	[1.83]	(0.24)	[1.46]	[0.00]	(0.13)
Calories from non-ration food (log)	7.68	7.62	7.70	-0.08	7.53	7.99	-0.45***
	[0.54]	[0.63]	[0.52]	(0.06)	[0.57]	[0.58]	(0.08)
C. Vulnerability to Poverty							
Probability of poverty in the next period (p)	0.18	0.31	0.15	0.17***	0.29	0.41	-0.11
	[0.28]	[0.36]	[0.25]	(0.03)	[0.31]	[0.53]	(0.08)
High vulnerability (p > 0.5)	0.15	0.26	0.12	0.14***	0.24	0.35	-0.11
	[0.36]	[0.49]	[0.32]	(0.04)	[0.42]	[0.74]	(0.10)
Moderate vulnerability (0.2 < p < 0.5)	0.12	0.26	0.09	0.17***	0.24	0.33	-0.09
	[0.32]	[0.49]	[0.28]	(0.04)	[0.42]	[0.72]	(0.09)
Observations *Sample = "Short-form"*	1500	327	1173	1500	209	118	327

Note: Standard deviations are in brackets and standard errors are in parentheses. Significance levels are denoted as follows: * p<0.10 ** p<0.05 *** p<0.01.

Table 5: Subjective wellbeing fixed-effect model

Variables	(1) Current economic situation - good or very good	(2) Economic situation compared to before Jan-2014 - slightly or much better	(3) Expected situation in the next 2 years - slightly or much better	(4) Subjective wellbeing index (1 + 2 + 3)
Displaced with PDS	0.006	0.020	0.030	0.056
	(0.015)	(0.024)	(0.026)	(0.043)
Observations	1,849	1,849	1,849	1,849
Adjusted R-squared	0.068	0.193	0.136	0.103
Qhada fixed effects	Yes	Yes	Yes	Yes
Number of clusters	597	597	597	597
Control mean (Displaced without PDS)	0.0826	0.177	0.270	0.529

Note: Standard errors are clustered at census blocks . Significance levels are denoted as follow: * p<0.10 ** p<0.05 *** p<0.01.
Sample is limited to displaced households from the full "short-form" sample.

Table 6: Household food security fixed-effect model

Variables	(1) Ate fewer meals	(2) No food of any kind to eat	(3) Went to sleep at night hungry	(4) Went whole day and night without eating	(5) Household hunger score (2 + 3 + 4)
Displaced with PDS	-0.111***	-0.077***	-0.046**	-0.034**	-0.157***
	(0.027)	(0.022)	(0.018)	(0.016)	(0.046)
Observations	1,849	1,849	1,849	1,849	1,849
Adjusted R-squared	0.241	0.229	0.178	0.268	0.267
Qhada fixed effects	Yes	Yes	Yes	Yes	Yes
Number of clusters	597	597	597	597	597
Control mean (Displaced without PDS)	0.382	0.0922	0.145	0.0459	0.283

Note: Standard errors are clustered at census blocks . Significance levels are denoted as follow: * p<0.10 ** p<0.05 *** p<0.01. Sample is limited to displaced households from the full "short-form" sample.

Table 7: Poverty and consumption fixed-effect model

Variables	(1) Below poverty line	Monthly per capita expenditure 000 IQD (log)			
		(2) Total	(3) Food	(4) Non-Food	(5) Education
Displaced with PDS	-0.146***	0.162***	0.128**	0.188***	0.017
	(0.047)	(0.049)	(0.057)	(0.060)	(0.113)
Observations	327	327	327	327	327
Adjusted R-squared	0.241	0.534	0.383	0.500	0.059
Governorate fixed effects	Yes	Yes	Yes	Yes	Yes
Number of clusters	91	91	91	91	91
Control mean (Displaced without PDS)	0.415	4.910	4.009	4.337	0.150

Note: Standard errors are clustered at Nahiya (sub-district) level. Significance levels are denoted as follow: * p<0.10 ** p<0.05 *** p<0.01. Sample is limited to displaced households from the "long-form" sub-sample.

Table 8: Vulnerability and calorie consumption fixed-effect model

	Vulnerability			Per capita calorie intake per day (log)		
Variables	(1) Probability to poverty (p)	(2) High vulnerability (p > 0.5)	(3) Moderate vulnerability (0.2 < P < 0.5)	(4) Total	(5) Ration food	(6) Non-ration food
Displaced with PDS	-0.100***	-0.072*	-0.125**	0.119*	5.731***	-0.198**
	(0.031)	(0.041)	(0.054)	(0.062)	(0.429)	(0.085)
Observations	327	327	327	327	327	327
Adjusted R-squared	0.645	0.455	0.109	0.198	0.777	0.332
Governorate fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of clusters	91	91	91	91	91	91
Control mean (Displaced without PDS)	0.408	0.354	0.326	7.987	0	7.987

Note: Standard errors are clustered at Nahiya (sub-district) level. Significance levels are denoted as follow: * p<0.10 ** p<0.05 *** p<0.01. Sample is limited to displaced households from the "long-form" sub-sample.

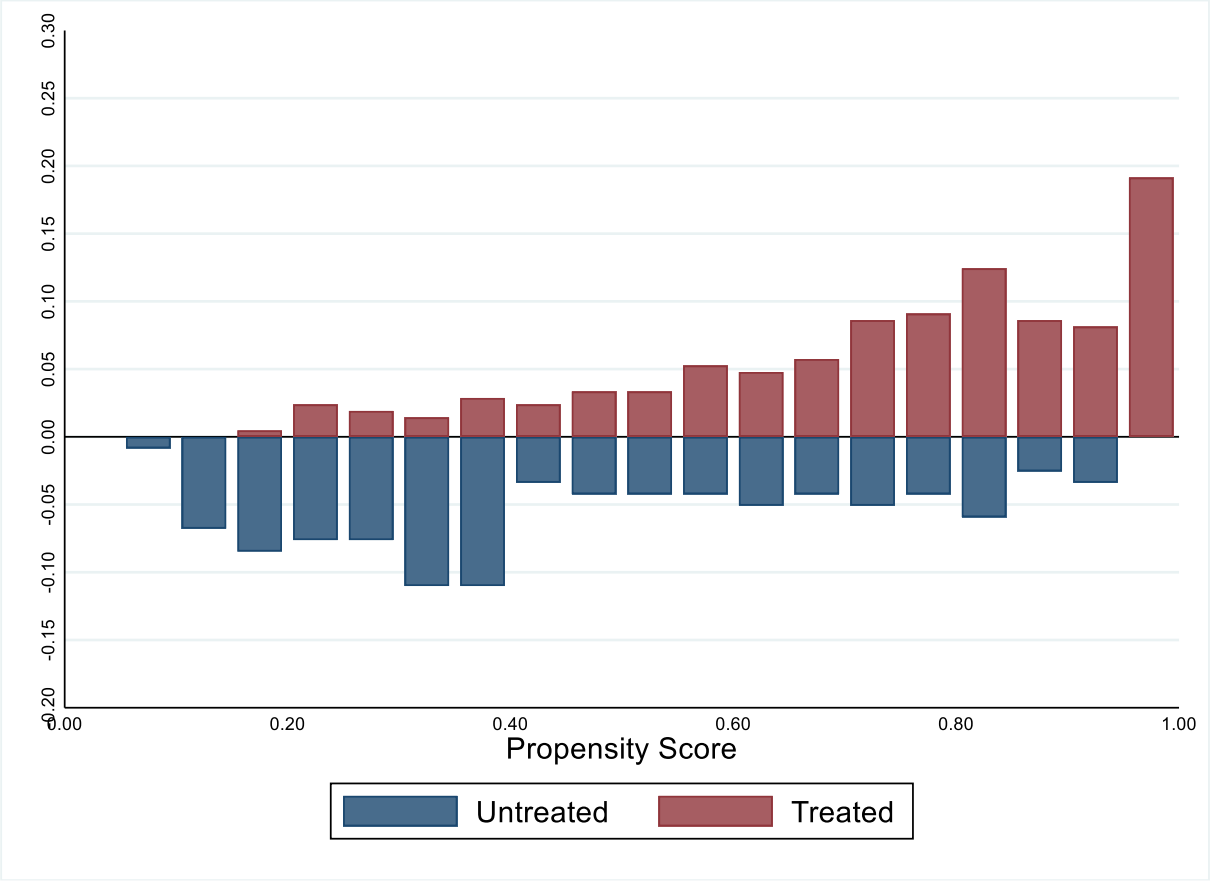
Table 9: Balancing tests from single nearest neighbor matching with replacement

Variables	(1) Treated (Mean)	(2) Control (Mean)	(3) Test of equality of means (Treated = Control) (P-Val)	(4) Standardized differences (% Bias)	(5) Regression based balance test (P-val)
Household size	7.02	7.29	0.054	-8.9	0.005
Household head age	46.13	47.22	0.027	-8.7	0.684
Number of children between 7 to 14	1.59	1.70	0.058	-8.0	0.117
Current place of residence is rural	0.26	0.26	0.893	0.6	0.000
Education of household head					
Illiterate	0.13	0.14	0.298	-3.9	0.365
Some primary	0.46	0.39	0.000	14.5	0.795
Intermediate/secondary/vocational degree	0.28	0.27	0.791	1.0	0.616
Post graduate degree	0.13	0.19	0.000	-18.4	0.242
Date since living in current governorate					
Before 2003	0.61	0.59	0.314	4.4	0.002
Between 2003 and 2014	0.15	0.15	0.782	-0.9	0.832
After 2014	0.24	0.26	0.361	-3.4	0.549
Shocks since January 2014					
Violence or insecurity	0.83	0.82	0.440	2.7	0.933
Damage or destruction of dwelling or assets	0.77	0.79	0.364	-3.2	0.824
Death, illness, or injury of family members	0.25	0.27	0.242	-4.6	0.020

Note: Sample is limited to displaced households from the "short-form" sample.

Appendix A

Figure A1: Distribution of propensity score across treatment and comparison groups (long-form sample)



Note: Sample is limited to displaced households from the "long-form" sample.

Table A1: Descriptive statistics - long-form respondents

	All Iraqi residence				Displaced		
	(1) All	(2) Displaced	(3) Non-Displaced	(4) Difference (2 - 3)	(5) PDS	(6) Non-PDS	(7) Difference (5 - 6)
Variables	Mean [SD]	Mean [SD]	Mean [SD]	b (se)	Mean [SD]	Mean [SD]	b (se)
Received rations in last 12 months (PDS)	0.94	0.81	0.96	-0.15***	1.00	0.00	1.00
	[0.25]	[0.43]	[0.19]	(0.03)	[0.00]	[0.00]	(0.00)
Household size	7.40	7.91	7.29	0.62*	8.02	7.40	0.62
	[3.60]	[3.82]	[3.53]	(0.36)	[3.38]	[5.27]	(0.75)
Number of children between 0 to 6	1.43	1.58	1.40	0.18	1.58	1.56	0.02
	[1.42]	[1.44]	[1.40]	(0.13)	[1.28]	[2.01]	(0.22)
Number of children between 7 to 14	1.62	2.02	1.54	0.48***	2.05	1.87	0.19
	[1.50]	[1.86]	[1.41]	(0.16)	[1.64]	[2.62]	(0.37)
Number of elderly 65 and more	0.18	0.16	0.19	-0.03	0.18	0.07	0.11**
	[0.48]	[0.48]	[0.47]	(0.04)	[0.45]	[0.39]	(0.05)
Dependency ratio (dependents/hh size)	0.42	0.45	0.42	0.04*	0.45	0.45	0.00
	[0.22]	[0.24]	[0.21]	(0.02)	[0.21]	[0.34]	(0.04)
Number of working age males 15 to 64	2.12	1.99	2.14	-0.15	2.06	1.71	0.35
	[1.50]	[1.48]	[1.49]	(0.15)	[1.36]	[1.63]	(0.23)
Household head age	47.24	45.75	47.56	-1.81	46.45	42.72	3.73*
	[12.91]	[13.12]	[12.78]	(1.15)	[11.83]	[16.02]	(1.99)
Marital status of household head							
Male and married	0.89	0.87	0.89	-0.02	0.85	0.94	-0.09*
	[0.31]	[0.37]	[0.30]	(0.03)	[0.35]	[0.36]	(0.05)
Male and single	0.01	0.01	0.01	-0.00	0.01	0.00	0.01
	[0.10]	[0.10]	[0.09]	(0.01)	[0.10]	[0.07]	(0.01)
Male widower	0.01	0.00	0.01	-0.01***	0.00	0.00	-0.00
	[0.10]	[0.03]	[0.11]	(0.00)	[0.00]	[0.08]	(0.00)
Female and married	0.01	0.01	0.01	-0.01	0.01	0.00	0.01
	[0.11]	[0.09]	[0.11]	(0.01)	[0.09]	[0.06]	(0.01)
Female and single	0.00	0.01	0.00	0.00	0.01	0.01	-0.00
	[0.06]	[0.09]	[0.05]	(0.00)	[0.08]	[0.14]	(0.01)
Female widower	0.08	0.11	0.07	0.04	0.12	0.04	0.08
	[0.26]	[0.34]	[0.25]	(0.03)	[0.32]	[0.32]	(0.05)
Education of household head							
Illiterate	0.15	0.10	0.16	-0.06*	0.11	0.07	0.04
	[0.36]	[0.34]	[0.36]	(0.04)	[0.31]	[0.39]	(0.05)
Some primary	0.46	0.39	0.47	-0.08*	0.39	0.36	0.03
	[0.50]	[0.54]	[0.49]	(0.05)	[0.48]	[0.74]	(0.09)
Intermediate/secondary/vocational degree	0.29	0.37	0.27	0.10**	0.37	0.35	0.02
	[0.45]	[0.54]	[0.43]	(0.04)	[0.48]	[0.74]	(0.10)
Post graduate degree	0.11	0.14	0.10	0.05	0.13	0.22	-0.09
	[0.31]	[0.39]	[0.29]	(0.03)	[0.33]	[0.64]	(0.08)
Highest education by adult members							
Illiterate	0.03	0.03	0.04	-0.01	0.02	0.03	-0.01
	[0.18]	[0.17]	[0.18]	(0.02)	[0.15]	[0.26]	(0.03)
Some primary	0.30	0.32	0.29	0.02	0.34	0.23	0.11
	[0.46]	[0.52]	[0.44]	(0.04)	[0.47]	[0.65]	(0.08)
Intermediate/secondary/vocational degree	0.46	0.45	0.46	-0.01	0.44	0.49	-0.05
	[0.50]	[0.55]	[0.49]	(0.05)	[0.49]	[0.77]	(0.10)
Post graduate degree	0.21	0.21	0.21	-0.01	0.20	0.25	-0.05
	[0.41]	[0.45]	[0.40]	(0.04)	[0.39]	[0.67]	(0.08)
Date since living in current governorate							
Before 2003	0.91	0.75	0.94	-0.18***	0.80	0.55	0.25***
	[0.29]	[0.48]	[0.24]	(0.04)	[0.39]	[0.77]	(0.09)
Between 2003 and 2014	0.06	0.08	0.06	0.02	0.05	0.20	-0.15***
	[0.24]	[0.30]	[0.23]	(0.02)	[0.22]	[0.62]	(0.05)
After 2014	0.03	0.17	0.00	0.16***	0.15	0.25	-0.10
	[0.18]	[0.41]	[0.07]	(0.03)	[0.35]	[0.67]	(0.07)
Current place of residence							
Rural	0.26	0.24	0.27	-0.03	0.29	0.01	0.28***
	[0.44]	[0.47]	[0.43]	(0.05)	[0.45]	[0.13]	(0.05)
Kurdistan	0.16	0.13	0.16	-0.03*	0.09	0.30	-0.21***
	[0.36]	[0.37]	[0.36]	(0.02)	[0.28]	[0.71]	(0.06)
North	0.26	0.82	0.14	0.67***	0.85	0.66	0.19***
	[0.44]	[0.43]	[0.34]	(0.03)	[0.35]	[0.73]	(0.07)
Center	0.37	0.05	0.44	-0.39***	0.06	0.04	0.02
	[0.48]	[0.25]	[0.48]	(0.02)	[0.23]	[0.30]	(0.03)
South	0.21	0.00	0.25	-0.25***	0.00	0.00	0.00
	[0.41]	[0.05]	[0.42]	(0.01)	[0.05]	[0.00]	(0.00)
Observations	1500	327	1173	1500	209	118	327
Sample = "Long-form"							

Note: Standard deviations are in brackets and standard errors are in parentheses. Significance levels are denoted as follows: * p<0.10 ** p<0.05 *** p<0.01.

Table A2: Fixed-effect model using all observations

	Sample = Short-Form		Sample = Long-Form				
Variables	(1) Subjective wellbeing index	(2) Household hunger score	(3) Below poverty line	(4) Monthly expenditure (000 IQD per capita log)	(5) Vulnerability to Poverty (p)	(6) Daily Calorie intake (per capita log)	(7) Calories from non-ration food (per capita log)
Displaced with PDS	-0.083***	0.124***	0.020	-0.085**	0.038***	-0.014	-0.066
	(0.031)	(0.029)	(0.026)	(0.036)	(0.014)	(0.041)	(0.049)
Displaced without PDS	-0.111***	0.204***	0.108***	-0.160***	0.114***	-0.057	0.230***
	(0.035)	(0.033)	(0.038)	(0.040)	(0.017)	(0.042)	(0.047)
Displaced: with PDS - without PDS	*0.0282*	*-0.0794**	*-0.0882**	*0.0751*	*-0.0758****	*0.0431*	*-0.296****
	(0.0388)	*(0.0409)*	*(0.0452)*	*(0.0469)*	*(0.0223)*	*(0.0538)*	*(0.0611)*
Observations	8,615	8,615	1,500	1,500	1,500	1,500	1,500
Adjusted R-squared	0.163	0.396	0.361	0.605	0.638	0.386	0.483
Sample	Short-form	Short-form	Long-form	Long-form	Long-form	Long-form	Long-form
Qhada fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of clusters	1440	1440	660	660	660	660	660
Control mean (non-displaced)	0.406	0.170	0.148	5.240	0.149	8.176	7.697

Note: Standard errors are clustered at census blocks . Significance levels are denoted as follow: * p<0.10 ** p<0.05 *** p<0.01.

Table A3: Balancing tests from single nearest neighbor matching with replacement (long-form)

Variables	(1) Treated (Mean)	(2) Control (Mean)	(3) Test of equality of means (Treated = Control) (P-Val)	(4) Standardized differences (% Bias)	(5) Regression based balance test (P-val)
Household size	7.12	7.31	0.595	-5.9	0.205
Household head age	45.68	45.88	0.852	-1.6	0.878
Number of children between 7 to 14	1.77	2.06	0.049	-19.9	0.695
Current place of residence is rural	0.27	0.04	0.000	67.4	0.566
Education of household head					
Illiterate	0.10	0.01	0.000	28.0	0.822
Some primary	0.47	0.66	0.000	-38.5	0.848
Intermediate/secondary/vocational degree	0.32	0.21	0.008	24.1	0.682
Post graduate degree	0.11	0.12	0.760	-3.0	0.197
Date since living in current governorate					
Before 2003	0.59	0.54	0.325	10.5	0.936
Between 2003 and 2014	0.15	0.13	0.674	3.3	0.017
After 2014	0.26	0.33	0.164	-13.6	0.106
Shocks since January 2014					
Violence or insecurity	0.82	0.81	0.706	3.3	0.274
Damage or destruction of dwelling or asse	0.79	0.78	0.811	2.1	0.239
Death, illness, or injury of family member	0.30	0.52	0.000	-50.5	0.719

Note: Sample is limited to displaced households from the "long-form" sample.

Table A4: Robustness check

Variables	(1) Using all covariates			(2) Nearest neighbor with 0.2 caliper			(3) Inverse-probability weighting (IPW)			(4) Regression adjustments		
	Household hunger score (HHS)	Consumption (log)	Vulnerability	Household hunger score (HHS)	Consumption (log)	Vulnerability	Household hunger score (HHS)	Consumption (log)	Vulnerability	Household hunger score (HHS)	Consumption (log)	Vulnerability
Displaced with PDS	-0.314***	0.138*	-0.086*	-0.310***	0.297***	-0.272***	-0.249**	0.216***	-0.199***	-0.188***	0.263***	-0.172***
	(0.096)	(0.081)	(0.044)	(0.110)	(0.084)	(0.075)	(0.101)	(0.075)	(0.051)	(0.070)	(0.091)	(0.029)
Observations	1,849	327	327	1,849	327	327	1,849	327	327	1,849	327	327

Note: Treatment on the treated estimates are reported. Robust standard errors are in parentheses. Significance levels are denoted as follow: * p<0.10 ** p<0.05 *** p<0.01.

Appendix B: Vulnerability to Poverty

The advantage of using Chaudhuri's (2003) vulnerability approach is that it allows for heteroskedasticity i.e., the variance of the disturbance is not the same for all households in the sample. Most of the previous work on vulnerability, however, implicitly assume that the error or the disturbance term is the result of measurement error or some unobserved factors that are incidental to the focus of the analysis. However, since it is the measure of volatility in inter-temporal consumption, it does not make sense to assume all households to have same variance. Similarly, literature has shown that there is a positive association between consumption volatility and size of average consumption level. Purely from the statistical term, since the estimate of the standard deviation of the disturbance term directly enters in generating vulnerability, failure to account for heteroskedasticity results in biased estimation of the parameter (standard deviation of the disturbance term) resulting in the biased vulnerability estimate. Following Amemiya (1977), one can use feasible generalized least square (FGLS) to account for heteroskedasticity.

Below are steps to estimate an unbiased measure of vulnerability:

Step 1: assume the consumption generating process of household h to be

$$\ln c_h = X_h\beta + e_h \tag{B.1}$$

where c_h is per capita consumption expenditure and X_hs are bundle of observable household characteristics.

Step 2: assume the variance of e_h be given by:

$$\sigma^2_{e_h} = X_h\theta \tag{B.2}$$

Estimate β and θ using three-step FGLS. Estimate B.1 using OLS then use the residuals to estimate:

$$\hat{e}^2_{OLS,h} = X_h\theta + \eta_h \tag{B.3}$$

using OLS. Use the predictions to rescale:

$$\frac{\hat{e}^2_{OLS,h}}{X_h\hat{\theta}_{OLS}} = \left(\frac{X_h}{X_h\hat{\theta}_{OLS}}\right)\theta + \frac{\eta_h}{X_h\hat{\theta}_{OLS}} \tag{B.4}$$

Then this transferred equation is estimated using OLS to obtain asymptotically efficient GLS estimator, $\hat{\theta}_{FGLS}$, thus $\hat{\sigma}^2_{e_h} = \sqrt{X_h\hat{\theta}_{FGLS}}$, is a consistent estimator of $\sigma^2_{e_h}$, the variance of the idiosyncratic component of consumption. The standard deviation i.e.

$$\hat{\sigma}_{e_h} = \sqrt{X_h\hat{\theta}_{FGLS}} \tag{B.5}$$

is used to rescale equation B.1 to account for the inefficiency of the OLS:

$$\frac{\ln c_h}{\hat{\sigma}_{e_h}} = \frac{X_h}{\hat{\sigma}_{e_h}}\beta + \frac{e_h}{\hat{\sigma}_{e_h}} \tag{B.6}$$

OLS estimate of B.6 i.e. $\hat{\beta}_{FGLS}$, yields a consistent and asymptotically efficient estimate of β. Using these consistent and asymptotically efficient estimators $\widehat{\beta_{FGLS}}$ and of $\widehat{\theta_{FGLS}}$, we can directly estimate the expected log expenditure for each household h,

$$\hat{E}[\ln c_h | X_h] = X_h\hat{\beta} \tag{B.7}$$

and variance of log expenditure of each h as:

$$\hat{V}[\ln c_h | X_h] = \hat{\sigma}_{e_h}^2 = X_h\hat{\theta} \tag{B.8}$$

Assuming consumption expenditure to be log-normally distributed one can calculate vulnerability of each household h as:

$$\hat{v}_h = \widehat{Pr}(\ln c_h < \ln z\,|X_h) = \Phi\left(\frac{\ln z - X_h\hat{\beta}}{\sqrt{X_h\hat{\theta}}}\right) \tag{B.9}$$

where, $\Phi(.)$ is a cumulative density of the standard-normal and $\ln z$ is the natural log of the pre-specified poverty threshold.