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The effects of violent conflict on household resilience and food security: Evidence from the 2014 Gaza conflict

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ABSTRACT

This paper studies how conflict affects household resilience capacity and food security, drawing on panel data collected from households in Palestine before and after the 2014 Gaza conflict. During this escalation of violence, the majority of the damages in the Gaza Strip were concentrated close to the Israeli border. Using the distance to the Israeli border to identify the effect of the conflict at the household level through an instrumental variable approach, we find that the food security of households in the Gaza Strip was not directly affected by the conflict. However, household resilience capacity that is necessary to resist food insecurity declined among Gazan households as a result of the conflict. This was mainly due to a reduction of adaptive capacity, driven by the deterioration of income stability and income diversification. However, the conflict actually increased the use of social safety nets (expressed in the form of cash, in-kind or other transfers that were received by the households) and access to basic services (mainly access to sanitation) for the households exposed to the conflict. This finding may be related to the support provided to households in the Gaza Strip by national and international organizations after the end of the conflict. From a policy perspective, the case of the conflict in the Gaza Strip demonstrates that immediate and significant support to victims of conflict can indeed help restore resilience capacity.

1. Introduction

Violent conflict could reduce households' food availability and consumption. For example, the presence of war may effectively reduce food imports, make food production and purchasing more dangerous, raise food prices, and reduce food stocks and disposable income. Significant empirical literature documents such adverse food security outcomes of war. Martin-Shields & Stojetz (2018) provide a survey of these war-induced effects on food security.

However, it is less clear how conflict may shape the capacity of households to cope with adverse shocks in general. There is comparatively more analytical ambiguity on this link between conflict and resilience capacity than in other related fields, and there is less empirical evidence as well. For example, does conflict increase or decrease the willingness of families and neighbors to help adversely-affected households? Does the provision of aid reach those communities that are more affected by conflict than others? This builds on the growing literature on the micro-level analysis of violent conflict, which has grown rapidly in recent years (Brück et al., 2016; Justino, Brück, & Verwimp, 2013).

This paper addresses these research gaps by estimating the effects of the 2014 conflict in Gaza Strip on both household resilience capacity and food security. Specifically, we estimate the impact on overall resilience of households, on the distinct "pillars of resilience" adopted in this analysis, and on each indicator these pillars are comprised of. This paper draws on a panel survey of households conducted before and after the conflict.

The Gaza Strip is part of the Palestinian territories, which also include the West Bank.[1] It borders Israel to its north and east, Egypt to its south, and the Mediterranean Sea to its west. Israel and the Gaza Strip are separated by a wall with regulated border crossings. According to the latest data available from the Palestinian Central Bureau of Statistics (PCBS), the population density in the Gaza Strip is very high.[2] In 2014, its economy was highly regulated by Israel and

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[1] The Gaza Strip does not share any borders with the West Bank.
[2] In 2016, there were 5,154 individuals per square kilometer, compared to 519 in the West Bank.

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it is almost entirely dependent on aid, making almost 80 percent of the Gaza Strip's population aid dependent (WB, 2015). The Israeli Defense Forces administer a security corridor along its border with the Gaza Strip. Before and after the 2014 Gaza conflict, this was a 300 meter wide zone wherein no access is permitted for the first 100 meters, while access on foot to farmers was permitted for the remaining 200 meters. Food security in the Gaza Strip was very poor in 2013 and 2014, in contrast with the improvement reported in the West Bank in the same period (PCBS & FSS, 2016). Following rising tensions in 2014, a conflict took place between Israel and the Gaza Strip, from early July until late August. The conflict was very short in time, but very intense.

The case of Gaza Strip is interesting for several reasons. Firstly, the conflict was quite brief and consisted of events that were easily defined, and took place across a well enumerated area for which sound data is available. The ease with which conflict activity could be identified was relevant for the methodology used in this analysis, as the brevity of the conflict event meant it could be treated as a shock rather than a long-lasting war. Second, the data was collected from the same households before and after the conflict, therefore creating a panel dataset. Third, the survey included a range of key outcome variables that allow for the study of both household resilience capacity and food security. In terms of the external validity of this analysis, the 2014 Gaza conflict is comparable to other brief conflicts, such as that which occurred in Burundi in 2015 and in Georgia in 2008. Further, as this analysis focuses on the experience of conflict at the household level, this case study may have wider relevance for households in similar scenarios elsewhere, despite their differences in characteristics.

The employed dataset is part of the Socio-Economic and Food Security (SEFSec) survey, administered regularly by the Palestinian Central Bureau of Statistics (PCBS) in coordination with the Food Security Sector (FSS) since 2007 in the West Bank and Gaza Strip. The SEFSec is a monitoring instrument for providing timely information on key socio-economic and food-related indicators. The relevant rounds of the panel dataset studied here were collected in the first quarter of 2014 (two months before the conflict occurred) and in the first quarter of 2015 (four months after the conflict occurred).

Given the short and sharp nature of this specific conflict, it was possible to adopt an Instrumental Variable (IV) approach for estimating the causal effects of conflict on household resilience capacity and food security. First, one question in the post-conflict data asked if the household's residence was partially or fully destroyed; building damage thus represented a direct measure of conflict exposure and cost within this analysis. Second, we argue that the distance from a household to the Gaza Strip-Israel border is a proxy for conflict exposure, especially because aerial bombardment that took place intensified closer to the border (UNOSTAT, 2014; OCHA, 2016).

The main findings of the analysis are that although the Gaza conflict reduced overall household resilience capacity – and specifically the adaptive capacity of households (based on the employment characteristics of household members, their level of education, the diversification of income sources, and on the available coping strategies) – it actually increased household use and access of social safety nets. These results are interpreted as a reflection of the severe disruption to labor markets in the Gaza Strip during and after the conflict, and as indicative of the strong inflow of aid into the Gaza Strip in the post-conflict period. Interestingly, the socio-economic sectors (such as agriculture, services, health, etc.) that received significant aid contributed to the stabilization of the resilience capacity of conflict-affected households. Conversely, the sectors to which aid was not provided (such as for the labor sector) saw a decline in household resilience capacity. The findings suggest that a longer or more intense conflict would have eroded household resilience capacity much further, perhaps to a point below which the recovery capacity could be definitely compromised. While post-conflict assistance can help preserve resilience capacity, it is not clear if the same can be done while a conflict is ongoing, given that in this case the relevant household data was not collected while the conflict in question was taking place.

This contributes at understanding how household resilience is shaped by a brief, acute conflict – which is a short and sharp shock. The demonstration of how this type of shock affects different elements of resilience is a new finding in this emerging literature. In terms of food security, this analysis captures the effects of conflict on food security very precisely.

The remainder of this paper is structured as follows: Section 2 reviews the literature on resilience and food security linked to the literature on the micro-level effects of conflict; Section 3 and 4 introduce the case of the Gaza Strip and the dataset employed, respectively. Section 5 presents the estimation and identification approach used in this analysis, while Section 6 summarizes the results of the analysis and Section 7 concludes.

2. Literature review

As suggested by Martin-Shields & Stojetz (2018) "defining conflict is not straightforward". Accordingly, the number of battle deaths per year is generally employed for differentiating conflict and war. In the same article, Martin-Shields & Stojetz (2018) investigate the literature on the conflict effects on food security. However, the nexus between conflict and resilience has not been analyzed yet, to the best of our knowledge.

Resilience is generally expressed as a capacity (Alinovi et al., 2010; Vaitla et al., 2012; Smith et al., 2014; Barrett & Constas, 2014; Alfani et al., 2015; d'Errico, Garbero, & Constas, 2016; d'Errico & Pietrelli, 2017; d'Errico & Di Giuseppe, 2018). In this paper, the definition of resilience used by the Technical Working Group on Resilience Measurement[3] is followed, which sees resilience as "the capacity that ensures adverse stressors and shocks do not have long-lasting adverse development consequences" (Constas, Frankenberger, & Hoddinott, 2014). This definition implies that: (i) resilience is an outcome-based concept, as is food security in the case of this paper; (ii) resilience is analyzed with regards to the experience of specific shocks; (iii) resilience emphasizes long-lasting effects on the outcome variable at hand; and (iv) resilience explicitly requires agency, that is, the agent's actual adoption of livelihood adaptation strategies to offset the negative impacts of a shock.

Following the FAO Resilience Index and Measurement Analysis (RIMA) framework (Alinovi, Mane, & Romano, 2008; Alinovi et al., 2010; FAO, 2016),[4] households are the central decision-making units when it comes to maintaining a certain level of food security (through consumption smoothing, asset selling, coping strategies, etc.) when a shock occurs. At the household level, the "ability to acquire the food needed by its members to be food secure" makes a household food secure (Pinstrup-Andersen, 2009).[5] In fact food

[3] The Technical Working Group on Resilience Measurement is a group of experts set up in 2013 by the Food and Agriculture Organization of the United Nations (FAO), the International Food Policy Research Institute (IFPRI) and the World Food Programme (WFP) to build consensus on a common analytical framework and guidelines for food and nutrition security resilience measurement.

[4] A review of the different approaches to estimating resilience at the household level can be found in Constas et al. (2014).

[5] The concept of food security originated from the World Food Summit in 1996. The definition agreed during the Summit is that "food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food to meet their dietary needs and food preferences for a healthy and active life" (FAO, 1996). The concept has been operationalized by FAO in four dimensions – availability, accessibility, utilization and stability – as presented by Martin-Shields & Stojetz (2018).

security changes over time – in the face of shocks and stressors such as conflict or violence – are linked to resilience; that is, a more resilient household is expected to suffer a smaller reduction in food security in the face of a negative shock compared to a less resilient household. Therefore, household resilience capacity and food security are strongly interlinked.

Resilience is a multi-faceted phenomenon. Examples of resilience structures can be found in Béné et al. (2012), Béné et al. (2015), Ellis (2000), Dercon (2002), DFID (2011), and Smith and Frankenberger (2018). The FAO-RIMA approach, followed in this paper, coined the following dimensions (or pillars) of resilience: Access to Basic Services (ABS), Assets (AST), Adaptive Capacity (AC) and Social Safety Nets (SSN). FAO (2016) extensively explains this conceptual framework of resilience, expanding on the definitions of these four pillars. The advantage of this approach is that it allows the analysis of the effect of conflict to be unpacked through the different aspects of resilience. Otherwise, the interpretation of the Resilience Capacity Index is a latent construct which approximates a measure of resilience capacity, ranging from low to high.

Access to services, such as schools, health centers, water provision, sanitation and markets, is considered a fundamental aspect of household resilience capacity. For example, road density can influence not only access to markets, which is crucial for generating income, but also the efficacy of aid distribution in response to a disaster (Adger et al., 2004). Recent evidence supports the association between access to basic services before a disaster and the rate of recovery after a disaster (Khan, 2014). Additionally, access to basic services can contribute to the reduction of illness risk, which is linked to inadequate sanitation and water supplies (Dercon, Bold, & Calvo, 2008). According to Justino (2012), there is "little evidence on the impact of armed conflict on the operation and access to local markets". Depending on the dynamics of the conflict in a given situation, conflicts might involve the destruction of infrastructure at the meso-level, for example of health or transportation facilities. How this can affect household resilience capacity, at the micro-level, depends on how the destruction translates into hardship for households in each specific context.

Productive and non-productive assets are considered relevant aspect of resilience. While productive assets contribute to the income-generating process, they can also be sold to protect consumption in the case of shocks – which is known as consumption smoothing (Hoddinott, 2006). The destruction of assets is one of the channels studied in the literature on the effects of conflicts on local populations (Justino, 2012). The potential effect of conflict on resilience capacity via assets can in general be differentiated according to the type of violence (ground operations versus air attacks) and the asset ownership of the household.[6] As suggested by Martin-Shields & Stojetz (2018), one of the links between conflict and food security is agricultural production. Access to land and agricultural assets, if weakened because of the conflict, may affect farmers' food production as well as their resilience capacity. Furthermore, violence, through forced displacement, can modify location specific assets as land.

Social safety nets – namely transfers received by the household, whether formal or informal, cash or in-kind – can act as insurance mechanisms before the occurrence of a shock, or can be activated after a shock has taken place. For example, Yang & Choi (2007) find in a case study on Philippines that remittances increased when households are affected by shocks, effectively functioning as insurance instruments to cope with the shock. On the other hand, Ghorpade (2017) shows that the exposure to long term-conflict in Pakistan reduces the likelihood and amount of remittances. Some recent literature investigates, with mixed results, the effects of violence on social capital and attitudes (i.e., the possible increase or decrease of altruism between households in conflict areas), which might influence the flow of informal transfers between households. While Voors et al. (2012) show that altruism toward neighbors increased for individuals exposed to the civil war in Burundi, De Luca & Verpoorten (2015) find that in Uganda, there is a short-term negative effect of violence on self-reported trust in general and on people's association membership. Overall, there is a lack of evidence on the changes that take place within social alliances and networks in contexts of violent conflict, although the relationship is well recognized. Furthermore, formal transfers can be activated by humanitarian organizations after the occurrence of a shock. Crost, Felter, & Johnston (2016) underline that conditional cash transfer programs are becoming more popular in conflict-affected areas around the world. Focusing on food transfers, Tranchant et al. (2019) find that this type of assistance protects the food security of rural population in Mali while Verme & Gigliarano (2019) propose a method for determining the optimal targeting strategy of food voucher programs in humanitarian context.

Finally, resilience is seen as the capacity not only to absorb shocks, but also to reorganize while the effects of a shock are taking place (Alinovi et al., 2008; Folke, 2006; Walker et al., 2004). Therefore, adaptive capacity is seen as a fundamental element in reacting and adapting to shocks such as conflicts. The ability of a household to change income-generating activities might result in an positive outcome for one household (for instance, households effectively gain access to new markets, such as informal or illegal markets via support for associated conflict actors), but a negative outcome for another, even following exactly the same shock (Justino, 2012). Human capital and livelihood diversification are crucial aspects of the household adaptive capacity (FAO, 2016; Smith & Frankenberger, 2018). Additionally, the demographic structure of a household, i.e. the share of household members economically active, affects household adaptive capacity (Vincent, 2007). Mercier et al. (2017) note that conflict might affect the household members composition, thus affecting the ability to pursue work and education for surviving household members.

In sum, the role of household resilience in a scenario of conflict is of interest for two main reasons. Firstly, more resilient households can mitigate the potentially negative effects of conflict on household food security. In fact, more resilient households are expected to smooth the effect of the shock (in this case, the conflict) on food security compared to less resilient households. Second, conflicts might affect household resilience itself by directly affecting its various dimensions.

This paper seeks to understand whether the 2014 conflict in the Gaza Strip impacted resilience and, consequently, food security for households in the Gaza Strip. In particular, we are interested in understanding if a reduction in resilience took place as a result of the conflict and through which components. We will do so by estimating the resilience capacity and its pillars through the FAO-RIMA approach, and assessing the impact of the conflict on each of those. This paper specifically examines the following questions:

- Did the 2014 conflict in the Gaza Strip affect (presumably adversely) the food security and resilience of households living in the Strip?
- If any effect is detected on overall resilience capacity, what are the main drivers of such changes? Which are the main resilience components affected by the violent conflict?

[6] For example, rural households are affected by different aspects of conflict compared to urban households, such as the destruction of crop farms affecting rural areas while damage to infrastructure in a capital city affecting urban areas.

3. The case of Gaza

The Gaza Strip is a very small (360 square kilometers) and densely populated (1.8 million) region of the Palestinian territories.[7] In the past few years, the Palestinian territories have seen a gradual decline in economic performance and an increase in political uncertainty (PCBS & FSS, 2016).

The economy of the Gaza Strip has been struggling since before the 2014 conflict. The region's economic growth rate started to decline in 2012 as a result of sharp drop in foreign aid, and significantly deteriorated in the first quarter of 2014. This sharp drop was primarily related to the closure of tunnels[8] that connected the Gaza Strip to Egypt, representing the main trade channels for the Gaza Strip after the blockade of the Gaza Strip by Israel[9] (WB, 2014). Unemployment reached 45 percent in the Gaza Strip by middle of 2014, particularly affecting women and youth (WB, 2014). According to the latest data available, a quarter of the Palestinian population in both the Gaza Strip and in the West Bank lived in poverty in 2014, with the rate in the Gaza Strip (39 percent) twice as high as in the West Bank (WB, 2014).

During the summer of 2014, the tension between Palestinian armed groups,[10] which are linked to political movements of various ideologies, operating in the Gaza Strip and Israel escalated to violent conflict. The number of rocket attacks being sent from the Gaza Strip into Israel increased during June 2014. The discovery of tunnels leading into Israel also heightened the sense of insecurity among the Israeli population. Meanwhile, tensions in the West Bank ran high. Widespread protests and violent clashes ensued between Palestinians and the Israel Defense Forces (IDF). On June 12, 2014, three Israeli teenagers were kidnapped and murdered in the West Bank. In response, Israel launched a search and arrest operation, which lasted until the bodies of the teenagers were found on June 30. On July 2, a 16-year-old Palestinian teenager was murdered in what appeared to be an act of revenge over the murdered Israeli teenagers.

A few days later, the IDF commenced an operation called "Protective Edge" in the Gaza Strip, with the objective of stopping the rocket attacks and the conflict operations against Israel. Up to ten organized armed groups were active in the Gaza Strip in the summer of 2014. However, their military capacity and their level of involvement in the hostilities against the IDF varied significantly. Several of these groups not only fired rockets (4,881) and mortar shells (1,753), but also participated in violent confrontations with the IDF (HRC, 2015). After an initial phase of airstrikes, on July 17, 2014 Israel launched a ground operation inside the Gaza Strip. A third phase began on August 5, characterized by alternating ceasefires and ongoing airstrikes. The operation concluded on August 26, when both Israel and Palestinian armed groups agreed on an unconditional ceasefire.

According to HRC (2015), during the summer of 2014, six Israeli civilians were killed (as reported by the Israel Ministry of Foreign Affairs) and up to 1,600 Israelis injured, including over 270 children (as reported by the Israeli Ministry of Health). Additionally, the Government of Israel estimates that approximately 10,000 Israeli civilians were displaced, and the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) reports that as many as 70 percent of residents in the communities living close to the border with the Gaza Strip left their homes (HRC, 2015).

The IDF carried out more than 6,000 airstrikes in the Gaza Strip during their operations[11] there in 2014. These included targeted attacks on residential and other buildings. IDF airstrikes destroyed – in whole or in part – a significant number of houses[12] (HRC, 2015). As stated in the United Nations Operational Satellite Applications Programme (UNOSAT), the concentration of damage in the Gaza Strip was found along the Armistice Line[13] with Israel; 74 percent of all damaged and destroyed buildings and craters, identified by satellite imagery, were found within three kilometers of the Armistice Line (UNOSTAT, 2014). Fig. A1 in the Appendix 1 shows the localization of damages to public infrastructure as a result of the 2014 Gaza conflict.

Even if the 2014 hostilities erupted in a context of long-lasting and complex crisis between the Palestinian territories and Israel, the events of the summer of 2014 can be considered a short and sharp episode of conflict. The violence that occurred there during July and August 2014 saw dramatic consequences in terms of fatalities, displacements and damages. In fact, as reported by B'tselem, the number of fatalities resulting from IDF activities during the Protective Edge operation is comparable to the number of fatalities (of Palestinians killed in the Gaza Strip by the IDF) reported over an eight-year period, from 2000 to 2008 (2,998), and is approximately double the number of fatalities (again, of Palestinians killed in the Gaza Strip by the IDF) reported during the "Cast Lead" operation[14] (1,391). Therefore, the conflict events of summer 2014 in the Gaza Strip can be considered an exogenous variation of violence in a context of a protracted crisis.

4. Data

4.1. Dataset

The dataset used in this analysis is from the fifth and sixth SEFSec surveys administered in 2014 and 2015 in the Gaza Strip and the West Bank by the PBCS in coordination with the FSS. The last two editions of SEFSEc surveys (namely the fifth and sixth SEFSec) constitute a panel dataset, interviewing the same sample of households before and after the Gaza conflict took place. The attrition

[7] For further information on the Palestinian territories – the West Bank and Gaza Strip – visit the country profile for this region on the World Bank website: http://www.worldbank.org/en/country/westbankandgaza.

[8] The tunnel trade involves the movement of goods through illegal tunnels that were dug underneath the border between the Gaza Strip and Egypt. The main exports from the Gaza Strip are fruits and flowers, which are exported mainly to the Netherlands (WB, 2014).

[9] The Israeli government ordered the IDF to restrict the movement of goods and people into and out of the Gaza Strip on 19th September 2007, with the decision B/34 (Etkes & Zimring, 2015).

[10] The two largest groups were the Izz Ad-Din Al-Qassam Brigades and Al-Quds Brigades. Another relevant group was the Al-Nasser Salah Al-Din Brigades, which is the military wing of the Popular Resistance Committees (a coalition of armed Palestinian groups). The other groups with a lower level of engagement include: the Abu Ali Mustafa Brigades, the military wing of the Popular Front for the Liberation of Palestine (PFLP); the Gaza branch of the Al-Aqsa Martyrs Brigades, the military wing of Fatah (a Palestinian nationalist political party); the National Resistance Brigades; and the military wing of the Democratic Front for the Liberation of Palestine (DFLP). Other, smaller armed groups were present in the Gaza Strip, but it remains unclear whether they participated in the 2014 hostilities.

[11] As a result, according to OCHA, during the 2014 hostilities, 142 Palestinian families had three or more members killed in the same incident owing to the destruction of residential buildings, resulting in a total of 742 fatalities. An even higher figure is reported by some non-governmental organizations, which claim that 1,066 people, including 370 children and 241 women, were killed inside their homes (HRC, 2015). The total number of Palestinians killed by IDF during the Protective Edge operation is 2,202, according to B'tselem. For additional information on the fatalities, visit the B'tselem website: http://www.btselem.org/2014_gaza_conflict/en/.

[12] According to OCHA (2016), 12,620 housing units were totally destroyed and 6,455 severely damaged.

[13] The Armistice Line or Green Line is a demarcation line set by the 1949 Armistice Agreements at the end of the 1948 conflict between Israeli and neighbor countries (Egypt, Jordan, Lebanon and Syria). The line sets the border between the Gaza Strip and Israel.

[14] The Cast Lead operation refers to a series of strikes in the Gaza Strip by the Israeli army that took place between December 27, 2008, and January 18, 2009, following rocket attacks launched from the Gaza Strip into Israel.

rate between the two editions is very low (PCBS & FSS, 2016). These two editions of data collection were undertaken, respectively, during the first quarter of 2014 and of 2015, with a reference period covering the six months preceding the interviews. As shown in Fig. 1, the first round of data collection preceded by two months the 2014 Gaza conflict, while the second round took place four months after the ceasefire was established.

Finally, the sample is representative regarding the gender of household head, refugee status, governorate and locality of the households; these last two categories are respectively the second (after region) and third levels of administrative units in the Palestinian territories. Due to the scope of the study the sample of households living in the West Bank is not included in the analysis. The panel sample for the Gaza Strip employed in this analysis consists of 2,412 households.[15]

4.2. Conflict exposure

In the sixth round of the SEFSec survey, households in the Gaza Strip were asked questions related to the 2014 conflict (see Table A1). One of the most relevant questions for capturing conflict exposure at the household level is whether the "household's main residence has been fully or partially damaged because of the aggression". The importance of this question is based on the nature of the Gaza conflict, which mixed airstrikes and ground operations and resulted in significant building damages. Based on this question, 58 percent of the interviewed households reported to have been directly exposed to the 2014 Gaza conflict, considering together full or partial residence damages (see Table 1).

The difference between full/extreme or partial residence damages reported in the survey strongly reflects the aggregated data from OCHA (2016) and confirms the suitability of this variable for capturing conflict exposure at the household level. In fact, according to OCHA (2016), almost 18,000 homes were rendered uninhabitable because of the conflict and 16,965 households lost their home. This affected approximately only 5.49 percent (estimation of the authors based on the OCHA homes' damages and PCBS data on the Gazan population)[16] of the total number of households located in the Gaza Strip in 2014. This percentage becomes closer in numbers to that reported in the survey, if minor home damages are also taken into consideration.[17]

In addition to the SEFSEc dataset (descriptive statistics reported in Table A2) we employed the maps on Google, in oder to calculate the distance from the center of the locality (the third level of regional administrative units in the Gaza Strip, after region and governorate/district) where the household was located in the pre-conflict[18] time period to the border with Israel. Since the size of the Gaza Strip is very small, while the number of localities is high (25 are represented in the survey[19]), the constructed distance gives an informative indication on the households' location in relation to the border. Moreover, to allow this variable to provide further insights, the constructed distance (measured in kilometers) was interacted with a dummy equal to one if the household is located more than 1 km from the buffer zone – this is also referred to as the "access restricted areas (ARA)", a 300-meter wide strip[20] of land running along the border inside the Gaza Strip, which has been under Israeli control since 2005.

The mean value of the distance to the border – interacted with the dummy variable equal to zero for housing unit located less than 1 km from the buffer zone – is 3.8 km; the range starts from zero kilometers, referring to households located less than 1Km from the buffer zone, to a maximum of 8.5 km from the border (see Table A3). On average, the households closer to the border are located in Gaza governorate, while those that are further away from the border are in the governorate of Rafah (see Table A4).

4.3. Food security

Despite the fact that a very extensive list of food security indicators at the household level (reviewed by Pangaribowo, Gerber, & Torero, 2013) is used in the empirical literature, two indicators are employed in this analysis. The choice of two indicators here is based on data availability and on the correspondence between food security and resilience pillars' indicators (Section 4.4).

The food expenditure (expressed in monthly per capita terms using the rate for US dollars in 2014) captures the monetary aspect of food security, while the Household Dietary Diversity Score (HDDS) focuses on diversification of the household diet. The HDDS represents the total number of consumed food groups where the food groups considered in the score are the following: cereals, tubers, vegetables, fruits, meat, egg, fish, pulses, milk, oil, sugar and miscellaneous (Swindale & Bilinsky, 2006). The food consumption questions included in the SEFSEc survey are not detailed enough to allow us to compute the household caloric acquisition (Hoddinott, 1999) which would require information at the level of consumed food items.

The two indicators used in the analysis mainly refer to the availability of food and do not express the other dimensions of food security (accessibility, utilization and stability). To capture the dimension of food utilization, individual anthropometric data for children should be considered but they are not included in the SEFSec survey. Furthermore, child anthropometric post-conflict data are not available in any other dataset (the most updated child malnutrition data pre-conflict can be found in PCBS, 2015) collected in the Gaza Strip.

To take into account the food accessibility, non-food factors such as indicators of sanitary household conditions, water quality, access to primary care should be used (Pinstrup-Andersen, 2009). This type of indicators are included in this analysis such as part of the ABS pillar. The same applies to the indicators of social safety nets as the participation in safety nets program that are recognized as a proxy of the food stability in the empirical literature on food security (Pangaribowo et al., 2013) but included in the SSN resilience pillar in this paper.

Both food security indicators employed in this analysis show a minor reduction in the post-conflict period compared to the preceding round of data (see Table 2). Nevertheless the difference of food security variation (post-pre conflict) between households

[15] From the original sample of 2,413 households, one observation has been dropped in the analysis due to the lack of information related to the 2014 conflict.

[16] The estimated number of households located in Gaza in 2014 was 308,622. The total population in Gaza was 1,790,010 and the average household size was 5.8 (PCBS, 2014).

[17] Taking into account minor damages dramatically increases the number of homes damaged to 171,000. If the same proportion of home destruction is applied, the total damages affected approximately 179,400 households, roughly 58 percent of the total households located in Gaza. The proportion applied is the following: 17,800 (home destroyed or severe damaged): 16,965 (households affected by destruction or severe damages) = 171,000 (home destroyed or severed or major or minor damaged): X. The estimated number of households affected by any (from total to minor) damages is 179,416, which corresponds to 58.13 percent of the total number of households.

[18] Changes to place of residence during the time periods studied in this analysis is not a concern. In fact, the distance variable can be considered fixed during the pre- and post-conflict periods. Only a small percentage of households (approximately 3 percent, equivalent to 72 households) changed their place of residence because of the conflict (see Table A1). Furthermore, changing place of residence does not necessarily imply changing locality, from where the distance to the border is calculated. Indeed, only 30 households report a different locality code in the two rounds of the survey.

[19] There is a total of 42 localities in Gaza. The 25 localities represented in the survey are distributed as follows: 5 in North Gaza, 3 in Gaza City, 7 in Deir al Balah, 6 in Khan Yunis and 4 in Rafah.

[20] A map showing the closed and restricted areas in the Gaza Strip is available here: https://www.ochaopt.org/sites/default/files/Gaza_A0_2014_18.pdf.

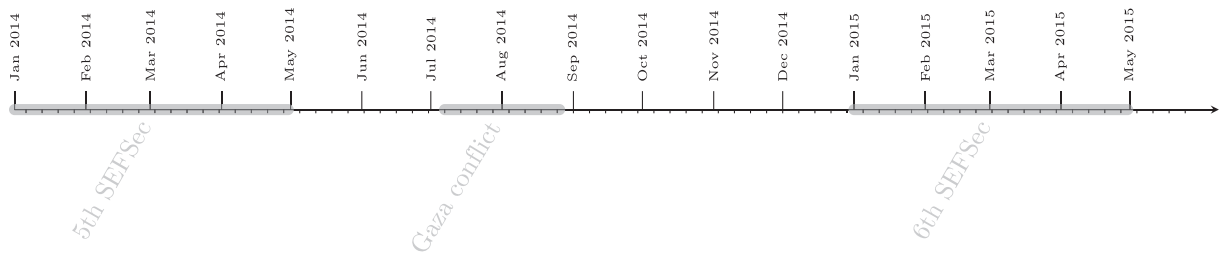

Fig. 1. Timeline of data collections.

Table 1
Conflict exposure: residence damage.

	Frequency	Percent	Cumulative
Residence damage			
Fully/extremely	117	4.85	4.85
Partly	1,295	53.69	58.54
Any	1,000	41.46	100.00
Total	2,412	100.00	

that were and were not affected by the conflict is not statistically significant.

Finally, recent food security analyses stress the role of perception and past experience to measure household food security (Pinstrup-Andersen, 2009). As a robustness check this paper employes the Household Food Insecurity Access Scale (HFIAS) score (Coates et al., 2007). The latter is a measure of the degree of food insecurity in the household in the past four weeks (30 days) before the interview. The score sums up the frequency during the past four weeks that a household has experienced a list of particular food insecurity-related conditions.The conditions are the following: (1) anxiety that household will not have sufficient food; (2) household members were not able to have preferred types of food due to lack of resources; (3) household members had to eat limited types of food due to lack of resources; (4) household members had to eat undesirable food due to lack of resources; (5) household members had to eat less food than what they need because of insufficiency; (6) household members had to eat less number of meals because of insufficient food; (7) absence of/insufficient food at home because of insufficient resources to purchase; (8) any of household members had to sleep at night hungry because there was insufficient food; (9) any household members had to abstain from eating all day long because of insufficient food. The possible answers are: never (0); once or twice (1); from 3–10 times (2); more than 3 times (3); don't know. The score ranges between 0 and 27; the higher the score, the more food insecurity the household experienced.

4.4. Resilience

Following the FAO-RIMA methodology, factor analysis is used to estimate the so-called pillars of resilience, starting from observed variables. The choice of the variables adopted for estimating each pillar is based on literature review, data availability, context analysis and the statistical properties of the variables.

- Access to Basic Services includes the following variables:
  - Distance to health service – Distance in minutes to reach the nearest health service. The variable is transformed into a closeness indicator through a (min–max) re-scaling where 1 corresponds to zero distance in minutes and 0 to the maximum distance in minutes.
  - Distance to school – Distance in minutes to reach the nearest school. The variable is transformed into a closeness indicator through a (min–max) re-scaling where 1 corresponds to zero distance in minutes and 0 to the maximum distance in minutes.
  - Water cut – Dummy for not experiencing cut off in water provision.
  - Quality movement index – Perception on the effects of restriction mobility to reach different places as work, land etc. (0 big difficulty, don't know; 1 minor difficulty; 2 no difficulty).
  - Toilet – Dummy equal to one for having a toilet with piped water in the housing unit.
  - Share of members with insurance -Number of household members with health insurance divided by the household size.
- Assets includes:
  - House value pc – Monthly rental value of the house per capita in USD.
  - Land (ha) pc-Agricultural land (hectares) owned by the household in per capita terms. It includes area of irrigated, protected and rain fed vegetable, field crops, horticultural and olive trees.

Table 2
Mean differences (post – pre conflict) food security indicators by household conflict exposure (affected or not by residence damage).

	(1) Mean total sample	(2) Mean households affected by residence damage	(3) Mean households not affected by residence damage	(4) Mean difference affected - not affected
Food expenditure pc	−0.201	−0.193	−0.212	0.020
	(0.804)	(0.796)	(0.816)	(0.033)
HDDS	−0.306	−0.256	−0.376	0.120
	(1.736)	(1.773)	(1.683)	(0.071)
Observations	2,413	1,412	1,000	2,412

Mean coefficients. Standard deviation in parentheses.
Food expenditure is expressed in logarithms.
T-test on the mean differences between households affected and not by residence damage.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Table 3
Mean differences (post – pre conflict) of RCI and resilience pillars by household conflict exposure (affected or not by residence damage).

	(1) Mean total sample	(2) Mean households affected by residence damage	(3) Mean households not affected by residence damage	(4) Mean difference affected – not affected
RCI	−0.131	−0.133	−0.129	−0.004
	(0.393)	(0.391)	(0.396)	(0.016)
ABS	−0.268	−0.284	−0.245	−0.039*
	(0.386)	(0.384)	(0.388)	(0.016)
AST	0.059	0.052	0.068	−0.016
	(0.754)	(0.731)	(0.786)	(0.032)
AC	−0.109	−0.100	−0.121	0.021
	(0.819)	(0.800)	(0.847)	(0.034)
SSN	0.074	0.302	−0.248	0.549***
	(1.656)	(1.718)	(1.507)	(0.066)
Observations	2,413	1,412	1,000	2,412

Mean coefficients. Standard deviation in parentheses.
T-test on the mean differences between households affected and not by residence damage.
***p < 0.01, **p < 0.05, *p < 0.1.

- Tropical Livestock Unit (TLU) – TLU standardizes different types of livestock into a single unit of measurement. The conversion factor adopted is: 0.7 camel; 0.5 cattle; 0.3 donkeys/mules; pigs 0.2; 0.1 sheep/goats; 0.01 chickens.
- Wealth index – Index which includes the number of wealth assets (car, mobile, solar heater etc.) owned by the household.
- Agricultural asset index-Index which includes the ownership (dummy variables) of different agricultural assets (tractor, plough, etc.).

• Adaptive capacity is composed by:
- Average education – Average years of education of household members.
- Coping Strategy Index (CSI) – Designed in 2008 by Dan Maxwell for World Food Programme, the CSI is a rapid assessment tool for measuring behaviour: specifically people's basic consumption-related coping responses to inadequate access to food. The CSI is a weighted sum of the number of days the household adopted different strategies to cope with food shortage in the past week. The strategies and the associated weights in parentheses are the following: Purchased low quality markets "leftover" (1); Purchased food on credit (2); Reduced the portion of meals for all household members (1); Reduced portion of food for adults in favour of children's (3); Reduced number of daily meals (1).
- Share of full-employed members – The share of people within the household with full-time (35 h) employment.
- Income diversification – Number of different sources of household income (agriculture, business, private wage; public wage, Israeli labour sector, transfers, properties, other)

• Social safety nets incorporate:
- Assistance in-kind – Monetary value of received in-kind assistance per capita (food; free treatment/medicine; clothing; food ratio; school nutrition; inputs; drinking water; electricity charging; housing).
- Assistance cash – Monetary value of received cash assistance per capita (cash; compensation for martyrs).
- Assistance other – Monetary value of other assistance received (not included as cash or in-kind) per capita (employment/jobs; other).

In the second step, a Multiple Indicators Multiple Causes (MIMIC) model is estimated (Bollen et al., 2010). A system of equations is constructed, specifying the relationships between an unobservable latent variable (resilience capacity), a set of outcome indicators (food security indicators), and a set of attributes (pillars). The food security indicators employed in the MIMIC model are food expenditure per capita and HDDS. The main advantage of using the MIMIC model in the second step is that it allows for the inclusion of the food security indicators in the measurement part of the estimation. Therefore, the Resilience Capacity Index (RCI) is jointly estimated by its causes, the pillars, and its food security indicators. In other words, this ensures that the estimated RCI is properly linked with household food security.

Appendix 2 presents the details on the FAO-RIMA methodology employed for the estimation of the RCI and the resilience pillars.

The descriptive statistics in Table 3 illustrate that in the post-conflict period, the households exposed to the conflict, namely those that experienced residence damage, have a lower figure for ABS (thus, they have less access to basic services) and a higher figure for SSN (thus, they use social safety networks to a greater extent) than non-exposed households, compared to during the pre-conflict period.

5. Methodology for assessing the effect of conflict

We use a panel dataset of Gazan households interviewed before and after the 2014 conflict to investigate the effect of violent conflict on (i) household resilience and food security; and (ii) resilience pillars and indicators (observed variables).

In order to identify households that were affected by the conflict, and based on data available from the SEFSec dataset, we employed a dummy variable equal to one if the household's main residence had been fully or partially damaged as a result of the conflict. Due to the mixed nature of Israeli operations (both ground operations and airstrikes) during the 2014 conflict, damages to residences can be considered one of the most relevant discriminating factors of conflict exposure at the household level. A symmetrical indicator of conflict exposure was taken into consideration (Section 6.3).

To overcome the endogeneity concerns related to the link between conflict, on one side, and food security or resilience, on the other, we use an IV approach. First, households' conflict exposure may be not random. This is the case if the operations carried out by the IDF, and consequently damages, were targeted rather than random.[21] Second, although panel data can be used for controlling household heterogeneity time invariant, which may have an impact on resilience in each period, they do not address every possible source of endogeneity. Indeed, there are several reasons why conflict exposure (proxied by the residence damage variable) might be endogenous to resilience capacity: there may be omitted factors that affect both resilience capacity and conflict exposure; there may also be a measurement error in how we measured the conflict exposure. This may be driven by the use of a self-reported measure of residence damages. The same applies to the link between conflict and food security.

We adopt an IV approach, calculating conflict exposure using the distance from the household's location to the Israeli border (which is also the Armistice Line). The closer the household is located to the Israel border, the more likely its residence was to be damaged during the Gaza conflict. This is supported by the data on localization of building damages reported in Section 3 and Fig. A1. Furthermore, the strategy of instrumenting conflict exposure with the distance to geographical areas of maximum conflict intensity – which could be either the border or the capital of a country – is widespread in the empirical literature (Akresh & de Walque, 2008; Voors et al., 2012; Miguel & Roland, 2011; Rohner, Thoenig, & Zilibotti, 2013; Serneels & Verpoorten, 2015; Ghorpade, 2017).

We believe that, under normal circumstances, there is no reason why Palestinians households' resilience or food security should be influenced by their distance to the border. In fact, due to the small size of the Gaza Strip, living conditions (job opportunities, food availability, market access, etc.) in the territory can be considered homogenous across the different districts. This is confirmed by the prevalence of food insecurity in the sub-regions in 2014**,** where the prevalence of severe food insecurity is consistent at 18 percent in all the sub-regions (North, Center and South Gaza) (PCBS & FSS, 2016). The instrumental variable strategy we adopt in this analysis assumes that the distance to the Israeli border has no fundamental impact on household resilience capacity and food security in general; this only has an impact for during the 2014 conflict, as a result of the conflict itself. In the spirit of Ghorpade (2017), if variations in food security and resilience that are correlated with the distance to the Israeli border are essentially caused by the conflict, there would be no threat to the exclusion restriction.

5.1. Food security and resilience

The main causal relationship of interest to the present analysis is expressed as:

$$\Delta Y_i = \alpha_1 + \beta_1 CON_i + \beta_2 X_i + \epsilon_i \quad (1)$$

in which i = household; CON reports the conflict exposure (residence damage) dummy; X is the matrix of household control characteristics,[22] governorate (district) dummy variables indicating in which of five governorate of the Gaza Strip the household is living, dummy for whether any of the family members experienced a market shocks in the six months preceeding the interview, dummy for whether any of the family members experienced a manmade shocks in the same period, dummy for natural shock, dummy for household, dummy for other type of shock that affected the household that are not included in the estimation of the RCI;[23] Y represents, in separated models, food expenditure, HDDS, or the RCI. Owing the endogeneity of CON_i with Y_i discussed in the previous section, β_1 in Eq. (1) will be biased. We therefore estimate a IV model to estimate causal effects using 2-Stage Least Squares (2SLS). IV first stage equation:

$$CON_i = \alpha_2 + \gamma_1 Dist_{ij} + \gamma_2 X_i + u_i \quad (2)$$

$Dist_i$ represents the distance between household i living in the locality j and the Israeli border. As presented in Section 4.2 the distance to the border is interacted with the dummy variable equal to zero for housing unit located less than 1 km from the buffer zone.

The second stage equation is given by Eq. (3) below, where β_1' now reflects the effect of conflict on Y_i:

$$\Delta Y_i = \alpha_1' + \beta_1' \widehat{CON}_i + \beta_2' X_i + \epsilon_i \quad (3)$$

Table 4 shows the IV first-stage results for the instrumentation of conflict (residence damage) with the distance to the Israeli border. As expected, a higher distance from the Israeli border decreases the likelihood that the household's residence is damaged by the conflict. In terms of basic diagnostics, the instrument appears robust and valid: the Cragg-Donald (F) test shows a value of 83.81, which is comfortably above the level of 10, below which is recommended for identifying a weak instrument (Stock & Yogo, 2002).

Among the control variables, the only coefficient that significantly changes with the inclusion of the distance variable is the rural dummy. The potential concern related to the use of the distance as an instrument, which may proxy the rural location of households in the Gaza Strip (if rural households are predominantly located close to or far away from the border with Israel) will be addressed below through a dedicated robustness check.

[21] A balance test on pre-conflict household characteristics was employed here in order to test the randomness of exposure to residence damage. In other words, the balance test is employed for investigating whether households exposed and not exposed to residence damage present similar observable characteristics in the pre-conflict period. The balance test, carried out on the mean differences of variables used for estimating the RCI (Table A5) and control variables (Table A6), between households exposed and not exposed to residence damage disproves the randomness of the conflict. In fact, before the conflict, households that were not affected by residence damage later on during the 2014 conflict were spending more on food; had a more diverse diet; were wealthier, as confirmed by their higher house value and wealth index; were more educated; and were less supported by cash and in-kind assistance, compared to households that were not affected by residence damage.

[22] Dummy equal to one for living in rural localities, dummy equal to one for living in urban localities, dummy equal to one for living in refugee camps; number of household members; dummy equal to one for female household head; number of children divided by the household size.

[23] The list of shocks included in the two questionnaires is not the same. They have been aggregated as following:

- Market shocks – 5th SEFSec: rising cost of food; rising cost of production inputs; rising cost of other living; head of household or any members loss his job; loss part or all wage/income; late in salary. 6th SEFSec: high cost of food supply; high cost of production input; loss of part or all of salary/income; delay of payment of salary.
- Manmade shocks – 5th SEFSec: loss of property business due to Israeli procedures; failure to obtain a permit. 6th SEFSec: loss in assets or projects due to Israeli measures; restriction imposed on access to land; lack of permits.
- Natural shocks – 5th SEFSec: loss of property or business due to natural disasters. 6th SEFSec: bad weather conditions (storm, inundation, drought); damage to crops (disease, failure, storage damage).
- Household shocks – 5th SEFSec: death/disability of the of one of the household members (not bread winner); death/disability of the bread winner. 6th SEFSec: serious illness that inhibits performance of routine activities; death of family's main breadwinner; divorce cases; birth.
- Other shocks – 5th SEFSec: loss part or all aids. 6th SEFSec: shortage of water; inability to repay loans; inability to receive health care because of lack of medicine and equipment; inability to pay treatment cost; inability to travel abroad for education; inability to travel abroad for treatment; inability to travel abroad for other reasons (other than education or health); loss of assistance; loss in assets (including land) and projects.

Table 4
Residence damage and the distance to the Israeli border: IV first-stage results.

	(1) Residence damage	(2) Residence damage
Distance to border * more than1 km from the buffer zone		−0.058***
		(0.006)
Rural	0.169***	−0.037
	(0.052)	(0.055)
Urban	0.020	−0.038
	(0.029)	(0.029)
Household size	0.013***	0.011***
	(0.004)	(0.004)
Female household head	0.035	0.022
	(0.037)	(0.036)
Children share	−0.038	−0.029
	(0.042)	(0.042)
North Gaza	−0.141***	−0.136***
	(0.034)	(0.033)
Gaza	−0.238***	−0.271***
	(0.032)	(0.032)
Khan Yunis	−0.206***	−0.087**
	(0.034)	(0.036)
Rafah	0.093**	0.277***
	(0.037)	(0.042)
Market shocks	0.088	0.066
	(0.071)	(0.070)
Manmade shocks	0.072	0.063
	(0.111)	(0.109)
Natural shock	0.047	0.045
	(0.050)	(0.049)
Household shocks	0.032	0.012
	(0.059)	(0.058)
Other shocks	−0.013	−0.034
	(0.044)	(0.0445)
Constant	0.539***	0.815***
	(0.080)	(0.084)
Observations	2,412	2,412
R-squared	0.066	0.098
Cragg-Donald F Stat.		83.811

Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.
The excluded dummies are camp for the localization and Deir al Balah for districts.

The size of the household is a positive and significant predictor of conflict exposure, captured by the dummy for residence damage. A household's location in North Gaza, Gaza City and Khan Yunis decreases its likelihood of being exposed to the conflict, compared to those located in Deir al Balah where exposure likelihood is higher. On the contrary, households in the Rafah district are more exposed to the conflict than households in Deir al Balah. Consequently, the district in which the household is located is an important variable to be included in any empirical specification.

None of the self-reported shocks (other than conflict), classified as market, man made, natural, households and other, have an effect on the likelihood of experiencing residence damage. This confirms the sudden and severe nature of the Gaza conflict. In fact, there is no relationship detected between exposure to the Gaza conflict and exposure to other (pre-conflict) shocks. For example, the loss of assets as a result of IDF operations or the failure to obtain a permit by Israel (the main man made shocks), cannot be considered explanations for conflict exposure at the household level during 2014. In other words, we cannot find any significant association between being a target for these kinds of Israeli regulatory procedures (i.e. the need for a permit) pre-conflict and being affected by residence damage during the 2014 conflict.

We believe that spurious correlation between instrumental variable and endogenous conflict exposure variable as warned by Christian & Barrett (2017) shuold not be a concern in our analysis. In all specifications, we control for the governorate (district) dummies, the second administrative unit after region. Furthermore, our instrument varies across the third administrative unit, namely the localities. We do not think that the potential unknown sources of coincident spatial trends (between residence damage and food security or resilience) can apply at that administrative level. Finally, we believe that the instrumental variable we use can limit the selection bias between households exposed to and not exposed to residence damage. In fact, in the first step, instrumenting the binary dummy (for residence damage) with the continuous variable (distance to the border) allows us to compare households exposed and not exposed to conflict within specific distance ranges from the border.[24]

5.2. Resilience pillars

To investigate the relationship between conflict and resilience further, the estimated pillars – ABS, AST, AC and SSN – are used as outcomes of interest in additional models using 2SLS. Therefore the model 3 is estimated by employing the four resilience pillars as outcome of interest, in separated equations:

$$\Delta ABS_i = \alpha'_3 + \beta'_1 \widehat{CON}_i + \beta'_2 X_i + \epsilon_i \quad (4)$$

$$\Delta AST_i = \alpha'_4 + \beta'_5 \widehat{CON}_i + \beta'_6 X_i + \epsilon_i \quad (5)$$

$$\Delta AC_i = \alpha'_5 + \beta'_7 \widehat{CON}_i + \beta'_8 X_i + \epsilon_i \quad (6)$$

$$\Delta SSN_i = \alpha'_6 + \beta'_9 \widehat{CON}_i + \beta'_{10} X_i + \epsilon_i \quad (7)$$

Finally, to investigate the mechanisms that drive the potential effect of the Gaza conflict on household resilience capacity, all the observed variables employed for estimating the pillars are used as outcomes of interest in additional regression models.

6. Results

6.1. Food security and resilience

Table 5 shows the second-step results of the 2SLS approach.[25] Households affected by the conflict through residence damage show a lower resilience capacity compared to non-affected households, compared to the pre-conflict situation.

Any statistically significant effect of the conflict is detected on the two food security indicators. The effect estimated here only refers to the 2014 conflict. On the contrary, the Gaza Strip has a long history of violence and instability that can impact how the 2014 conflict affected household food security in the considered period. In fact, the persistency of the violence over time may have "structurally" affected the capacity of the households to cope with the shocks. The lack of panel data referring to the period preceeding the 2014 does not allow us to investigate this aspect.

6.2. Resilience pillars and indicators

The following Tables (from 6–9) further analyze the negative effect of conflict on resilience by reporting the results of models

[24] The differences in the observable variables between affected and non-affected households are not statistically significant if the balance test – t-test on the mean differences of the variables used for estimating the RCI and control variables – is performed on sub-samples of households located less than 1 km from the buffer zone; 1 km from the border; 2 km from the border; 3 km and so on; up to the final group of households located 9 km from the border. These results are not presented in this analysis, but are available upon request.

[25] The results obtained from the 2SLS specifications are quite different in terms of the significance and magnitude of the coefficients as compared to the panel approach. Thus, there is evidence that unobserved household time-varying heterogeneity affects the OLS results that are available upon request.

Table 5
Impact of residence damage on resilience and food security indicators: IV second-stage results.

	IV estimates
Dependent variable expressed in difference	
RCI	−0.151*
	(0.089)
HDDS	−0.034
	(0.401)
Food expenditure pc	−0.108
	(0.176)
Household controls	Yes
Shock dummies	Yes
District dummies	Yes
Observations	2,412

Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.
Food expenditure is expressed in logarithms.
Household controls: household size, female household head, children share, and rural/urban/camps.
District dummies: North Gaza, Gaza, Khan Yunis, and Rafah.
Shock dummies: market shocks, manmade shocks, natural shocks, household shocks and other shocks.
The excluded dummies are camp for the localization and Deir al Balah for districts.

(4)–(7), which unpacks the resilience pillars (ABS, AST, AC and SSN). Furthemore, the effect of conflict on each pillars' indicators is tested.

6.2.1. Access to basic services

Table 6 looks at ABS. All the distances are expressed as closeness indicators. The bigger the value, the closer the household is located to the service. Household exposed to conflict have a higher figure for ABS. The effect is mainly driven by an improvement in toilet quality and by a reduction in the distance to school.

After the conflict, a significant shortage of water services and public healthcare affected the population in the Gaza Strip. More than 33,000 meters of water and wastewater networks were damaged (WB, 2016). These damages affected all households, not only those directly exposed to residence damage. As soon as the conflict was over many restoration interventions were put in place, mainly targeting damaged households. Therefore, it could be the case that conflict exposure in this instance resulted in an increase in access to specific services for those affected by residence damage. Also, we found that the proximity to school variable increases for households that experienced residence damage and in particular for those that reported a full or extreme destruction.[26] One potential explanation is that schools have been used as residences from those who completely lost their homes. Similarly the access to improved sanitation could be linked to a change of residence because of the residence damages.

6.2.2. Assets

Despite there being no statistically significant effects of the conflict on the pillar of AST, Table 7 shows some effects on land ownership, the wealth index and the agricultural asset index. The greatest impact is found on the decrease in the wealth index. The variable employed for capturing the exposure to conflict, residence damage, can presumably explain the decrease in non-productive assets associated with the household, for example a television or solar heater. The destruction of assets is recognized as one of the main cause of the persistency of poverty induced by conflict (Justino, 2012). The positive effect of the conflict on land owned by households is less clear. The reported area of land owned, in hectares, is based on a self-assessment by the survey respondent and can be affected by measurement errors. Furthermore, the sample of households owning a plot of land is very small in the Gaza Strip, due to the fact that the context is mainly urban.[27]

Table 6
Impact of residence damage on ABS and indicators: IV second-stage results.

	IV estimates
Dependent variable expressed in difference	
ABS	0.277***
	(0.096)
Closeness to health service	−0.012
	(0.023)
Closeness to school	0.080***
	(0.028)
Water cut	−0.075
	(0.080)
Quality movement	−0.308
	(0.198)
Sanitation	0.277***
	(0.070)
Share of members with health insurance	0.051
	(0.056)
Household controls	Yes
Shock dummies	Yes
District dummies	Yes
Observations	2,412

Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.
The variable closeness to health services is a re-scaling (min–max) transformation of the variable distance to health services (expressed in minutes).
The same transformation has been employed for the variable distance to school.
Household controls: household size, female household head, children share, and rural/urban/camps.
District dummies: North Gaza, Gaza, Khan Yunis, and Rafah.
Shock dummies: market shocks, manmade shocks, natural shocks, household shocks and other shocks.
The excluded dummies are camp for the localization and Deir al Balah for districts.

Table 7
Impact of residence damage on AST and indicators: IV second-stage results.

	IV estimates
Dependent variable expressed in difference	
AST	−0.082
	(0.174)
House value	0.060
	(0.146)
Land	0.010*
	(0.006)
TLU	0.006
	(0.005)
Wealth index	−0.403**
	(0.195)
Agricultural asset index	−0.120*
	(0.069)
Household controls	Yes
Shock dummies	Yes
District dummies	Yes
Observations	2,412

Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.
Household controls: household size, female household head, children share, and rural/urban/camps.
District dummies: North Gaza, Gaza, Khan Yunis, and Rafah.
Shock dummies: market shocks, manmade shocks, natural shocks, household shocks and other shocks.
The excluded dummies are camp for the localization and Deir al Balah for districts.

[26] The difference (between the post- and pre-conflict periods) in proximity to school indicators for households with residence damage is 0.001, while for households without residence damage it is −0.008. The difference between the differences (between households without damages and households with damages) is 0.030 (std. err. 0.004).

[27] Only 198 households reported to own a plot of land in 2014, while 308 households reported to own land in 2015.

Table 8
Impact of residence damage on AC and indicators: IV second-stage results.

	IV estimates
Dependent variable expressed in difference	
AC	−0.415**
	(0.188)
Average household education	−1.373
	(0.948)
CSI	−3.148
	(2.622)
Share of household members with full-time employment	−0.108**
	(0.045)
Income diversification	−0.497**
	(0.224)
Household controls	Yes
Shock dummies	Yes
District dummies	Yes
Observations	2,412

Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.
Household controls: household size, female household head, children share, and rural/urban/camps.
District dummies: North Gaza, Gaza, Khan Yunis, and Rafah.
Shock dummies: market shocks, manmade shocks, natural shocks, household shocks and other shocks.
The excluded dummies are camp for the localization and Deir al Balah for districts.

Table 9
Impact of residence damage on SSN and indicators: IV second-stage results.

	IV estimates
Dependent variable expressed in difference	
SSN	2.498***
	(0.425)
Assistance cash pc	1.311***
	(0.411)
Assistance in-kind pc	1.567***
	(0.333)
Assistance other pc	1.722***
	(0.307)
Household controls	Yes
Shock dummies	Yes
District dummies	Yes
Observations	2,412

Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.
Household controls: household size, female household head, children share, and rural/urban/camps.
District dummies: North Gaza, Gaza, Khan Yunis, and Rafah.
Shock dummies: market shocks, manmade shocks, natural shocks, household shocks and other shocks.
The excluded dummies are camp for the localization and Deir al Balah for districts.

6.2.3. Adaptive capacity

The only pillar of resilience that was negatively and significantly affected by the 2014 conflict is AC. Table 8 shows this effect on the components that make up the AC pillar. AC is composed of the variables of education, CSI, and two variables for the employment status of household members: one for the quality and stability of the household members' jobs and one for the diversification of the income sources. While the effect of conflict on education and CSI is not statistically significant, the effect is statistically significant and negative for the share of household members with full-time employment and for the income diversification indicator (number of income-generating activities).

Any potential effects on education could be hidden by the fact that the post-conflict survey was carried out four months after the end of the conflict, which is too soon after the conflict ended; the effect on education (measured using the number of years of education of the household members) needs a longer time period to be captured. In fact, Brück, Di Maio, & Miaari (2014) focus on the effect of violent conflict on the academic achievement of high school students during the period of the Second Intifada[28] (2000–2006) in the West Bank and find that the conflict has a negative effect – on both the probability to pass the final high school exam and to be admitted to university afterwards. Furthemore, the 2014 conflict in the Gaza Strip took place during summer when the schools were closed.

The negative effect of the conflict on the AC pillar is presumably driven by the consequences on the labor market. As stated in World Bank (2016), the 2014 Gaza conflict significantly affected the local economy: "economic activities have been and will continue to be drastically reduced for the duration of the conflict." The consequences on local employment opportunities have been severe. ILO (2015) estimates an impact of the conflict on the Gaza Strips' labor market, the so called "disemployment" due to physical destruction of productive assets, equal to about 6.4 percent of employed persons and about 11.6 percent of the private and non-governmental sectors' 2013 workforce. Furthermore, these effects tend to be persistent due to the fact that there is a time lag between economic performance and the resulting effects on the labor market.

The effect of the conflict on employment variables is clearly detected. As expected, the conflict caused a decrease in stable employment as well as in income diversification. This result is aligned with other empirical analyses on the association between employment opportunities and conflict, especially in the West Bank. Recently, Amodio & Di Maio (2017) found that the Second Intifada negatively affected the output value (in terms of total and per-worker) of Palestinian establishments. On the other side of this relationship, Miaari, Zussman, & Zussman (2014) find that the localities heavily involved in the conflict during the Second Intifada reported a bigger drop in employment opportunities than did localities that were lesser involved in that conflict. To the best of our knowledge, the empirical literature mainly focuses on the West Bank and on the hostilities there preceding the summer of 2014. More evidence is needed on the effect of the 2014 Gaza conflict on the employment sector in the Gaza Strip.

The time lag between the ceasefire and the post-conflict data collection may also explain the lack of effect on the CSI, which measures consumption-related coping responses to inadequate food access. The strategies considered in the index are, for example, reducing the number of meals, and reducing the portion of adult meals in favor of children's meals. These strategies, if adopted, would have presumably been adopted during the summer of 2014 and right after the end of the conflict. The significant flow of food assistance received (during and after the conflict) may have smoothed the adoption of coping strategies and therefore reduced the impact of the conflict on the CSI four months after the end of the hostilities.

6.2.4. Social safety nets

Among the different resilience pillars, the biggest impact of the conflict is detected on SSN (Table 9). A possible explanation for this result is the timeline of the data collection. As presented in the data section, the post-conflict data collection took place four months after the end of the Gaza conflict. During that period, many national and international organizations supported the affected populations with a substantial flow of assistance. The same day of the ceasefire, more than 1,600 tons of aid and humanitarian supplies entered the Gaza Strip (State of Israel, Ministry of Defense, 2014). In the months following the end of the conflict, assistance to the Gaza Strip involved not only cash transfers but also assistance for health and sanitation, which are relevant aspects of basic

[28] The First Intifada refers to a period of intensified violence between Palestinians and the IDF that lasted from December 1987 until 1993. The Second Intifada, a period characterized by frequent clashes between Palestinians and the IDF, lasted from September 2000 to June 2006.

services considered in the analysis (which, accordingly, are represented within the calculations of the ABS pillar). Between the 2014 conflict and June 2016, the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) distributed assistance to the value of more than USD190 million as part of its Emergency Shelter Programme. This type of assistance involved food, non-food items and potable water (UNRWA, 2015).

Table 9 shows the effect on the three singular components of SSN. There is a positive and significant effect on all the types of assistance considered in the analysis; cash, in-kind and other assistance (mainly in the field of employment provision). As discussed above, this is likely explained by the time lag between the end of the conflict and the data collection. In terms of magnitude, the biggest impact is found on "other" forms of assistance, rather than cash and in-kind assistance, which mainly includes employment or job assistance (for the definition of the categories included in this type of assistance, please see Section 4.4). Households exposed to the conflict in terms of residence damage received more cash and in-kind assistance than non-affected households (even in the pre-conflict period). On the contrary, looking at "other" types of assistance (employment or job) in the pre-conflict period, there is no statistically significant difference in the mean value of this type of assistance received by households that will ultimately be exposed and not exposed to the conflict (Table A5). While in the pre-conflict period there are no differences in the amount of employment or job assistance received among households, we find that the conflict increased this type of assistance for the most affected households.

6.3. Robustness checks

In order to test the robustness of the analysis, we first checked whether households located in rural areas of the Gaza Strip compound the conflict effect, given that households' distance to the border was employed for assessing levels of conflict exposure. One may argue that rural households, if concentrated in some specific area of the Gaza Strip close to the Israeli border, may be more exposed to the conflict. First, the majority of the population in the strip is urban or made up of camp dwellers,[29] without access to agricultural land. In this context, the "urban agriculture" has become a key strategy for the Gazan population.

Second, Table A12 shows the second step results for the subsample of non-rural households with the same format as Table 4. In this step, the sample becomes slightly smaller because the 115 rural households have been removed. Nevertheless, the statistical significance and magnitude of the coefficients is stable. The first step results are shown in column 1, Table A13 in the annex. These confirm that the distance between the household and the border is a good predictor of residence damage, even in the sample of non-rural households (the Cragg-Donald F. statistic decreases, but it is comfortably above the acceptance value of 10).

To further check the analysis, we consider a symmetrical indicator for conflict exposure. This robustness check is aimed at taking into consideration potential measurement errors that affect the indicator for residence damage. The alternative indicator employed here is a dummy equal to one if the household hosted another family or family member during the conflict. This indicator can be considered symmetrical to the one for residence damage. In fact, the further away a household is from the border, the less it is affected by the conflict and the more it is expected to offer help to other families or individuals. Furthermore, this indicator can be considered as a proxy of the household's capacity to react and resist to shocks. As expected, the effect of hosting another family or family member has a symmetrical effect compared to the effect of reporting residence damage, which is the direct indicator of conflict exposure. In fact, we find a statistically significant and positive effect on the RCI as a result of hosting another family or family member, through an increase in AC and a reduction in SSN and ABS (Table A14). First-step results are reported in column 2 of Table A13.

As a final robustness check, we adopt an alternative indicator of household food security as an outcome variable. Specifically, we employ the HFIAS score. Table A15 shows the second-step IV results of the conflict's effect on the HFIAS variation. As expected, the effect of the conflict is positive. The conflict has increased the level of food insecurity for Gazan households. However, the effect is not statistically significant when conflict exposure is instrumented with the distance from the household to the border. Some unobserved factors, such as for example aspirations or expectations on the future, may play a role in explaining household food security measured by HFIAS, due to subjective components of the questions (for example, regarding "anxiety that the household will not have sufficient food"). This may explain why, when the unobserved heterogeneity is controlled for by the IV approach, the effect of the conflict loses significance.

7. Conclusions

In this paper, we study how a short but intense conflict affected the resilience capacity and food security of households in the Gaza Strip. By comparing the resilience capacity of households just before and after the 2014 conflict, we are able to identify the causal effects on key outcomes of interest. We find that while conflict reduced the overall resilience capacity of households to a certain extent, it also induced an aid response which led to an increase in access to basic services and to social safety nets for conflict-exposed households in the Gaza Strip. The importance of this finding is threefold, including from a policy perspective.

Firstly, and in line with the significant volume of literature on the micro-economics of conflict, the results highlight the importance of health and social sectors for development in a conflict-affected economy. From medical services, to potable water access and sanitation, to education, the recovery and resumption of these basic services is critical for household resilience capacity, both for households that are directly and indirectly affected by conflict.

Second, and beyond basic government services, the results indicate the importance of labor markets in achieving sound household resilience capacity. In particular, labor markets in the Gaza Strip were unable to provide the income streams households needed in order to maintain their livelihood. However, labor markets in the Gaza Strip (and in Israel) are highly regulated and by no means free and flexible. Yet in the case of the Gaza conflict, the negative effects of restrictive labor markets for Palestinians in the Gaza Strip were compounded further by the conflict.

Third, the results indicate the importance of the humanitarian response to conflict. Development and humanitarian responses to conflict are often analyzed separately. This paper demonstrates the relevance that quick, short-term humanitarian aid deliveries can have for the resilience capacity of households. This is likely to have a long-lasting impact in the Gaza Strip, in what continues to be a challenging environment for human development even in the absence of active conflict. In other words, this paper contributes to support the idea of bridging humanitarian and development interventions, at least within the framework of conflict response mechanisms.

Another major finding of this paper, which also contributes to the literature on the nexus between conflict, resilience and food security, is the reduction of adaptive capacity which ultimately

[29] The Gaza Strip counts eight recognized Palestinian refugee camps within its borders, which host over half a million Palestinian refugees (UNRWA website, 2016 data). Additional information can be found here: https://www.unrwa.org/where-we-work/gaza-strip.

translates into a contraction of household resilience. While a potential negative effect on education is not detected with a short time panel dataset such as the one that we adopted, the analysis clearly demonstrates how the 2014 conflict has induced a contraction in income sources and stable employment. The reduction of local employment opportunities is an immediate negative effect which can be attributed to the conflict. This, besides being in line with existing literature, provides clear policy indications as an immediate response plan.

From a policy perspective, the case of the Gaza conflict also demonstrates that immediate and significant support to victims of conflict can indeed help restore resilience capacity. This is an important finding in times when support for conflict victims is being increasingly encouraged by people in Western democracies. What remains to be investigated is if such support could even be provided while conflict is ongoing, such as in the case of the recent conflicts in Syria and South Sudan.

From a research perspective, the ways in which resilience capacity is recovered in the long-term, several years after the end of a conflict, still needs studying. The literature also needs to establish how lower intensity conflict impacts on resilience capacity. Most importantly, we need to understand if either type of conflict – lower intensity and higher intensity – may force households below a lower critical threshold of resilience capacity, from which households cannot recover without external assistance. This threshold may be lower for individual households, but higher if a large number of households are concurrently affected by conflict. In the extreme scenario, conflict may create poverty traps from which even initially resilient households cannot recover.

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Fig. A1. Damages (Source: OCHA, 2016).

Appendix 1. Damage map of Gaza Strip and descriptive statistics

Table A1
Conflict exposure.

	Freq.	Percent	Cum.
Residence damage			
Fully/extremely	117	4.85	4.85
Partly	1,295	53.69	58.54
Any	1,000	41.46	100.00
Total	2,412	100.00	
Change of residence because of aggression			
no	2,340	97.01	97.01
yes	72	2.99	100
Total	2,412	100	
Food products on credit			
no	973	40.41	40.41
yes	1,435	59.59	100
Total	2,408	100	
Loan, borrowing or debt			
no	1,121	46.5	46.5
yes	1,290	53.5	100
Total	2,411	100	
Living standard deterioration			
no	802	33.31	33.31
yes	1,606	66.69	100
Total	2,408	100	
Income deterioration during aggression			
no	1,151	47.76	47.76
yes	1,259	52.24	100
Total	2,410	100	
Income deterioration after aggression			
no	1,354	56.18	56.18
yes	1,056	43.82	100
Total	2,410	100	
Any martyrs among household members			
no	2,393	99.25	99.25
yes	18	0.75	100
Total	2,411	100	
Hosting other family/members			
no	1,501	62.26	62.26
yes	910	37.74	100
Total	2,411	100	

Table A2
Summary statistics pre- and post-conflict.

		Pre-conflict				Post-conflict			
	Variable	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
FS	Food expenditure (USD) pc	46.828	29.821	2.84	368.71	41.301	32.431	0.13	384.96
	HDDS	10.509	1.289	5	12	10.203	1.328	0	12
ABS	Distance to health service (min.)	10.741	4.951	1	25	10.443	4.65	0	30
	Distance to school (min.)	10.658	4.916	0	30	11.339	6.114	0	30
	Water cut (dummy)	0.082	0.275	0	1	0.054	0.226	0	1
	Quality movement index	1.807	0.462	0	2	0.648	0.787	0	2
	Sanitation (dummy)	0.984	0.126	0	1	0.936	0.244	0	1
	Share of members with insurance	0.96	0.164	0	1	0.944	0.194	0	1
AST	House value pc	33.426	25.129	2.58	255.26	34.219	25.885	0	300
	Land (ha) pc	0.002	0.015	0	0.37	0.003	0.02	0	0.50
	TLU	0.001	0.019	0	0.82	0.001	0.013	0	0.42
	Wealth index	−0.011	0.635	−2.09	6.43	−0.009	0.737	−1.79	4.14
	Agricultural asset index	0.058	0.219	0	1.02	0.077	0.238	0	1.04
AC	Average education	8.914	3.239	0	20	8.596	3.229	0	18.50
	CSI	9.728	9.802	0	48	9.607	8.275	0	48
	Share of full-employed members	0.124	0.148	0	1	0.088	0.127	0	1
	Income diversification	1.656	0.648	0	5	1.826	0.728	0	5
SSN	Assistance in-kind (USD) pc	4.255	5.195	0	80.36	5.063	9.633	0	127.04
	Assistance cash (USD) pc	6.57	16.07	0	226.90	5.185	14.076	0	233.54
	Assistance other (USD) pc	1.401	3.522	0	44.91	3.174	11.184	0	193.55
Control	Rural (dummy)	0.048	0.213	0	1	0.047	0.213	0	1
	Urban (dummy)	0.805	0.396	0	1	0.804	0.397	0	1
	Camp (dummy)	0.148	0.355	0	1	0.148	0.355	0	1
	Household size	6.073	2.782	1	26	6.274	2.701	1	24
	Female household head (dummy)	0.085	0.278	0	1	0.088	0.283	0	1
	Share of children	0.374	0.249	0	0.83	0.377	0.248	0	0.83
	North Gaza (dummy)	0.197	0.398	0	1	0.198	0.398	0	1
	Gaza (dummy)	0.325	0.469	0	1	0.325	0.469	0	1
	Khan Yunis (dummy)	0.147	0.354	0	1	0.147	0.354	0	1
	Deir al Balah (dummy)	0.202	0.401	0	1	0.202	0.402	0	1
	Rafah (dummy)	0.128	0.335	0	1	0.128	0.334	0	1
Shocks	Market (dummy)	0.981	0.138	0	1	0.964	0.185	0	1
	Manmade (dummy)	0.008	0.088	0	1	0.261	0.439	0	1
	Natural (dummy)	0.041	0.199	0	1	0.329	0.470	0	1
	Household (dummy)	0.029	0.168	0	1	0.150	0.358	0	1
	Other (dummy)	0.052	0.223	0	1	0.913	0.281	0	1
	Observations	2,413				2,413			

Table A3
Distance to the Israeli border: summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Distance (km) from locality centre to Israeli border	2,413	4.161	1.829	1.32	8.5
Dummy equal to one for housing unit located more than1 km from the buffer zone	2,413	0.904	0.295	0	1
Distance (km) to Israeli border interacted with the dummy housing unit located more than1 km from the buffer zone	2,413	3.886	2.148	0	8.5

Table A4
Distance (km) to the Israeli border interacted with the dummy housing unit located more than1 km from the buffer zone by governorate of Gaza Strip.

Variable	Obs.	Mean	Std. Dev.	Min	Max
North Gaza	476	3.346	1.548	0	4.45
Gaza	785	2.604	1.564	0	6.9
Khan Yunis	355	3.353	0.983	0	4.15
Deir al Balah	487	5.288	1.581	2.26	7.23
Rafah	310	6.370	2.619	0	8.5

Table A5
Summary statistics of variables used for estimating the RCI by residence damage (pre-conflict).

	(1) Mean total sample	(2) Mean households affected by residence damage	(3) Mean households not affected by residence damage	(4) Mean difference affected – not affected
Food expenditure pc (log)	3.712	3.668	3.775	−0.107***
	(0.552)	(0.544)	(0.557)	(0.023)
Dietary Diversity Score	10.510	10.430	10.620	−0.189***
	(1.289)	(1.326)	(1.227)	(0.053)
Dist. to health service	10.740	10.830	10.620	0.211
	(4.951)	(4.890)	(5.039)	(0.206)
Dist. to school	10.660	11.030	10.140	0.891***
	(4.916)	(4.779)	(5.059)	(0.204)
Water cut	0.083	0.097	0.062	0.035**
	(0.275)	(0.296)	(0.241)	(0.011)
Quality movement	1.807	1.795	1.824	−0.029
	(0.462)	(0.482)	(0.430)	(0.019)
Toilet	0.984	0.981	0.988	−0.007
	(0.126)	(0.137)	(0.109)	(0.005)
Household members with health insurance	0.960	0.963	0.956	0.007
	(0.164)	(0.157)	(0.174)	(0.007)
House value pc	3.357	3.294	3.445	−0.151***
	(0.577)	(0.582)	(0.558)	(0.024)
Land (Ha) pc	0.002	0.002	0.003	−0.001
	(0.015)	(0.012)	(0.018)	(0.001)
TLU pc	0.001	0.000	0.002	−0.001
	(0.019)	(0.002)	(0.030)	(0.001)
Wealth index	−0.011	−0.071	0.073	−0.144***
	(0.635)	(0.603)	(0.670)	(0.027)
Agricultural asset index	0.058	0.063	0.051	0.012
	(0.219)	(0.228)	(0.207)	(0.009)
Average education	8.914	8.704	9.216	−0.512***
	(3.239)	(3.170)	(3.311)	(0.134)
CSI	9.728	10.520	8.608	1.912***
	(9.802)	(9.907)	(9.551)	(0.401)
Full-employed members	0.124	0.115	0.138	−0.023***
	(0.148)	(0.144)	(0.153)	(0.006)
Income diversification	1.656	1.687	1.613	0.074**
	(0.648)	(0.665)	(0.623)	(0.027)
Assistance cash pc	0.832	0.893	0.746	0.148**
	(1.360)	(1.395)	(1.305)	(0.056)
Assistance in-kind pc	1.186	1.269	1.069	0.200***
	(1.026)	(1.020)	(1.024)	(0.042)
Assistance other pc	0.486	0.492	0.476	0.015
	(0.746)	(0.734)	(0.762)	(0.031)
Observations	2,413	1,412	1,000	2,412

Standard deviation in parentheses.
T-test on the mean differences between households exposed and not to conflict.
***p < 0.01, **p < 0.05, *p < 0.1.

Table A6
Summary statistics of control variables by residence damage (pre-conflict).

	(1) Mean total sample	(2) Mean households affected by residence damage	(3) Mean households not affected by residence damage	(4) Mean difference affected – not affected
Rural	0.048	0.062	0.027	0.035***
	(0.213)	(0.242)	(0.162)	(0.008)
Urban	0.805	0.786	0.832	−0.046**
	(0.396)	(0.410)	(0.374)	(0.016)
Camp	0.148	0.152	0.141	0.011
	(0.355)	(0.359)	(0.348)	(0.015)
Household size	6.073	6.186	5.914	0.272*
	(2.782)	(2.948)	(2.523)	(0.112)
Female household head	0.085	0.088	0.080	0.008
	(0.278)	(0.283)	(0.271)	(0.011)
Children share	0.374	0.373	0.375	−0.003
	(0.249)	(0.249)	(0.250)	(0.010)
North Gaza	0.197	0.193	0.203	−0.010
	(0.398)	(0.395)	(0.402)	(0.017)
Gaza	0.325	0.270	0.403	−0.133***
	(0.469)	(0.444)	(0.491)	(0.020)

(*continued on next page*)

Table A6 (*continued*)

	(1) Mean total sample	(2) Mean households affected by residence damage	(3) Mean households not affected by residence damage	(4) Mean difference affected – not affected
Khan Yunis	0.147	0.180	0.101	0.079***
	(0.354)	(0.384)	(0.301)	(0.014)
Deir al Balah	0.202	0.178	0.236	−0.058***
	(0.401)	(0.382)	(0.425)	(0.017)
Rafah	0.128	0.179	0.057	0.122***
	(0.335)	(0.384)	(0.232)	(0.013)
Market shocks	0.981	0.984	0.976	0.008
	(0.138)	(0.127)	(0.153)	(0.006)
Manmade shocks	0.008	0.009	0.006	0.003
	(0.088)	(0.096)	(0.077)	(0.004)
Natural shocks	0.041	0.042	0.041	0.001
	(0.199)	(0.200)	(0.198)	(0.008)
Household shocks	0.029	0.031	0.027	0.003
	(0.168)	(0.172)	(0.162)	(0.007)
Other shocks	0.052	0.051	0.054	−0.003
	(0.223)	(0.220)	(0.226)	(0.009)
Observations	2,413	1,412	1,000	2,412

Standard deviation in parentheses.
T-test on the mean differences between households exposed and not to conflict.
***p < 0.01, **p < 0.05, *p < 0.1.

Appendix 2. Resilience estimation

In the first step, factor analysis is used to estimate the so-called pillars of resilience. Tables A7–A10 show the results of the factor analysis employed for estimating the pillars of resilience. The factors considered for each pillar are only those able to explain at least 95 percent of the variables' variance.

In the second step, a Multiple Indicators Multiple Causes (MIMIC) model is estimated. A system of equations is constructed, specifying the relationships between an unobservable latent variable (resilience capacity), a set of outcome indicators (food security indicators), and a set of attributes (pillars). The MIMIC model is made up of two components, namely the measurement Eq. (1) – reflecting that the observed indicators of food security are imperfect indicators of resilience capacity – and the structural Eq. (2), which correlates to the estimated attributes of resilience capacity, expressed as the Resilience Capacity Index (RCI):

$$\begin{bmatrix} Food\,expenditure \\ HDDS \end{bmatrix} = [\lambda_1, \lambda_2] * [RCI] + [\epsilon_1, \epsilon_2]$$

Table A7
ABS: Factor Loadings.

	Factor1	Factor2	Factor3	Factor4	Factor5	Uniqueness
Closeness to health service	0.394	−0.173	−0.045	0.036	0.021	0.811
Closeness to school	0.344	−0.080	0.150	−0.051	−0.010	0.850
Water cut	−0.159	0.018	0.198	0.008	0.057	0.932
Toilet	0.176	0.276	−0.080	−0.001	0.064	0.882
Quality movement	0.131	0.336	0.048	−0.019	−0.041	0.865
Share of household members with insurance	0.067	0.085	0.080	0.106	−0.023	0.970

The indicators of closeness to health services and school are re-scaling (min–max) transformations of respectively the distances to health services and to school (expressed in minutes).
The number of factors used for estimating ABS is 3.
They jointly explain the 96 % of the variable variance.

Table A8
AST: Factor Loadings.

	Factor1	Factor2	Factor3	Factor4	Uniqueness
House value pc	0.032	0.413	0.048	0.039	0.825
TLU pc	0.163	0.009	0.067	0.235	0.914
Land (Ha) pc	0.583	0.146	−0.232	−0.057	0.581
Agricultural asset index	0.706	−0.162	0.089	0.015	0.468
Wealth index	0.175	0.081	0.346	−0.093	0.835

The number of factors used for estimating AST is 3.
They jointly explain the 95 % of the variable variance.

Table A9
AC: Factor Loadings.

	Factor1	Factor2	Factor3	Uniqueness
Average education	0.538	−0.069	−0.115	0.692
CSI (inverse)	0.450	−0.170	0.109	0.756
Income diversification	0.056	0.351	0.022	0.873
Full-employed members	0.616	0.153	0.019	0.597

The number of factors used for estimating AC is 2.
They jointly explain the 97 % of the variable variance.

Table A10
SSN: Factor Loadings.

	Factor1	Factor2	Uniqueness
Assistance cash	0.574	−0.114	0.657
Assistance in-kind	0.681	−0.001	0.536
Assistance other	0.544	0.121	0.690

The number of factors used for estimating SSN is 1.
They jointly explain the 97 % of the variable variance.

Table A11
MIMIC results.

	RCI
ABS	0.219***
	(0.023)
AST	0.142***
	(0.013)
SSN	-0.050***
	(0.006)
AC	0.293***
	(0.013)
Food expenditure pc	1.000
	(0.000)
HDDS	1.596***
	(0.075)
Chi2	2.390
P > Chi2	0.494
RMSA	0.000
P RMSEA <= 0.05	1.000
CFI	1.000
TLI	1.001
Observations	4,826

Standard errors in parentheses. ***p < 0.01.

$$[RCI] = [\beta_1, \beta_2, \beta_3, \beta_4] * \begin{bmatrix} ABS \\ AST \\ SSN \\ AC \end{bmatrix} + [\epsilon_3]$$

The MIMIC results present a good fit for the data (see Table A11). All the pillars' coefficients are statistically significant.

Appendix 3. Estimates of the robustness tests

Table A12
IV second-stage results: impact of residence damage on RCI, resilience pillars and food security indicators (urban sample).

	(1) Diff. RCI	(2) Diff. ABS	(3) Diff. AST	(4) Diff. AC	(5) Diff. SSN	(6) Diff. Food expenditure	(7) Diff. HDDS
Residence damaged	−0.164*	0.276***	−0.133	−0.404**	2.698***	−0.120	−0.053
	(0.091)	(0.097)	(0.163)	(0.190)	(0.442)	(0.179)	(0.409)
Urban	−0.005	−0.091***	0.033	−0.051	0.124	−0.012	0.249**
	(0.023)	(0.025)	(0.042)	(0.049)	(0.112)	(0.046)	(0.104)
Household size	0.028***	0.002	−0.001	0.048***	−0.022	0.073***	−0.017
	(0.003)	(0.004)	(0.006)	(0.007)	(0.016)	(0.007)	(0.015)
Female household head	0.107***	−0.026	0.049	0.437***	−1.026***	−0.034	0.114
	(0.031)	(0.033)	(0.055)	(0.064)	(0.149)	(0.061)	(0.138)
Children share	0.173***	−0.065*	0.331***	0.501***	0.850***	0.338***	−0.037

(continued on next page)

Table A12 (*continued*)

	(1) Diff. RCI	(2) Diff. ABS	(3) Diff. AST	(4) Diff. AC	(5) Diff. SSN	(6) Diff. Food expenditure	(7) Diff. HDDS
	(0.035)	(0.038)	(0.064)	(0.074)	(0.172)	(0.070)	(0.160)
North Gaza	−0.047	−0.100***	−0.044	−0.077	0.088	−0.042	−0.035
	(0.033)	(0.035)	(0.059)	(0.069)	(0.159)	(0.065)	(0.147)
Gaza	−0.052	−0.065*	−0.092	−0.101	0.750***	0.065	−0.173
	(0.036)	(0.039)	(0.066)	(0.076)	(0.177)	(0.072)	(0.164)
Khan Yunis	−0.059	−0.029	−0.063	0.055	0.546***	−0.202***	0.173
	(0.036)	(0.039)	(0.065)	(0.076)	(0.176)	(0.071)	(0.163)
Rafah	0.087***	−0.012	−0.107*	0.309***	0.300*	0.204***	−0.055
	(0.032)	(0.035)	(0.059)	(0.068)	(0.158)	(0.064)	(0.147)
Market shocks	0.042	−0.158**	−0.0003	0.042	−0.450	0.029	0.423
	(0.060)	(0.064)	(0.108)	(0.126)	(0.293)	(0.119)	(0.271)
Manmade shocks	−0.042	0.028	−0.106	−0.338*	−0.419	−0.159	0.694*
	(0.092)	(0.099)	(0.166)	(0.193)	(0.448)	(0.181)	(0.415)
Natural shock	0.055	0.106**	0.146*	−0.019	−0.065	0.100	0.028
	(0.042)	(0.045)	(0.076)	(0.088)	(0.204)	(0.082)	(0.188)
Household shocks	0.137***	0.045	0.254***	0.288***	−0.607**	0.056	0.327
	(0.049)	(0.053)	(0.088)	(0.103)	(0.238)	(0.097)	(0.220)
Other shocks	0.052	0.012	0.001	0.128*	−0.039	0.031	0.237
	(0.036)	(0.039)	(0.066)	(0.077)	(0.177)	(0.072)	(0.164)
Constant	−0.298***	−0.135	0.047	−0.400**	−1.669***	−0.718***	−0.801**
	(0.088)	(0.094)	(0.158)	(0.184)	(0.427)	(0.173)	(0.396)
Observations	2,297	2,297	2,297	2,297	2,297	2,297	2,297

Food expenditure is expressed in logarithms.
Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.
The excluded dummies are camp for the localization and Deir al Balah for districts.
The dummy for rural has been dropped from the analysis because the rural households (115) have been excluded.

Table A13
First-stage regression results.

	(1) Residence damage	(2) Hosting another family/family member
Distance to border * more than1 km from the buffer zone	−0.058***	0.044***
	(0.006)	(0.006)
Rural	–	−0.118**
		(0.056)
Urban	−0.030	−0.028
	(0.029)	(0.029)
Household size	0.011***	−0.003
	(0.004)	(0.004)
Female household head	0.044	0.061*
	(0.037)	(0.036)
Children share	−0.045	0.022
	(0.043)	(0.042)
North Gaza	−0.170***	−0.085**
	(0.034)	(0.034)
Gaza	−0.302***	−0.036
	(0.032)	(0.032)
Khan Yunis	−0.122***	−0.143***
	(0.037)	(0.036)
Rafah	0.294***	−0.371***
	(0.044)	(0.042)
Market shocks	0.012	0.004
	(0.073)	(0.070)
Manmade shocks	0.052	−0.129
	(0.112)	(0.110)
Natural shock	0.008	0.086*
	(0.051)	(0.049)
Household shocks	−0.009	0.149**
	(0.060)	(0.058)
Other shocks	−0.020	0.017
	(0.045)	(0.044)
Constant	0.891***	0.330***
	(0.087)	(0.084)
Observations	2,297	2,411
R-squared	0.109	0.055
Cragg-Donald F Stat.	48.86	81.75

Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.
The excluded dummies are Deir al Balah for the districts.
The excluded dummies are camp in both models and additionally rural for model (1).

Table A14
IV second-stage results: impact of hosting another family/family member on RCI, resilience pillars and food security indicators.

	(1) Diff. RCI	(2) Diff. ABS	(3) Diff. AST	(4) Diff. AC	(5) Diff. SSN	(6) Diff. Food expenditure	(7) Diff. HDDS
Hosting another family/family member	0.195*	−0.371***	0.107	0.535**	−3.257***	0.146	0.045
	(0.117)	(0.126)	(0.226)	(0.251)	(0.654)	(0.228)	(0.521)
Rural	0.006	−0.261***	−0.130	0.099	0.010	−0.016	0.484**
	(0.053)	(0.057)	(0.102)	(0.113)	(0.295)	(0.103)	(0.235)
Urban	0.005	−0.110***	0.028	−0.020	−0.057	−0.004	0.247**
	(0.025)	(0.026)	(0.047)	(0.053)	(0.137)	(0.048)	(0.109)
Household size	0.027***	0.003	0.000	0.045***	−0.006	0.073***	−0.0197
	(0.003)	(0.003)	(0.006)	(0.007)	(0.017)	(0.006)	(0.0138)
Female household head	0.092***	0.019	0.024	0.391***	−0.771***	−0.042	0.105
	(0.030)	(0.033)	(0.058)	(0.065)	(0.169)	(0.059)	(0.135)
Children share	0.178***	−0.062*	0.363***	0.510***	0.821***	0.337***	−0.0396
	(0.034)	(0.037)	(0.067)	(0.074)	(0.193)	(0.067)	(0.154)
North Gaza	−0.006	−0.170***	0.025	0.028	−0.614***	−0.026	−0.0220
	(0.029)	(0.031)	(0.056)	(0.063)	(0.163)	(0.057)	(0.130)
Gaza	0.004	−0.156***	−0.010	0.030	−0.084	0.103**	−0.149
	(0.027)	(0.028)	(0.052)	(0.057)	(0.149)	(0.052)	(0.119)
Khan Yunis	−0.009	−0.123***	0.010	0.177***	−0.281*	−0.159***	0.147
	(0.028)	(0.030)	(0.054)	(0.060)	(0.157)	(0.055)	(0.125)
Rafah	0.121***	−0.062	−0.083	0.375***	−0.255	0.230***	−0.0103
	(0.040)	(0.044)	(0.078)	(0.087)	(0.226)	(0.079)	(0.180)
Market shocks	0.040	−0.126**	−0.083	−0.003	−0.323	0.077	0.408
	(0.057)	(0.062)	(0.110)	(0.123)	(0.320)	(0.112)	(0.255)
Manmade shocks	−0.040	0.005	−0.093	−0.354*	−0.378	−0.122	0.658
	(0.091)	(0.098)	(0.176)	(0.196)	(0.511)	(0.178)	(0.407)
Natural shock	0.030	0.144***	0.185**	−0.050	0.480**	0.060	0.0249
	(0.041)	(0.044)	(0.080)	(0.089)	(0.231)	(0.081)	(0.184)
Household shocks	0.110**	0.090*	0.229**	0.219**	−0.195	0.028	0.349
	(0.050)	(0.054)	(0.096)	(0.107)	(0.279)	(0.098)	(0.223)
Other shocks	0.055	0.011	0.028	0.126*	−0.118	0.024	0.244
	(0.036)	(0.038)	(0.069)	(0.077)	(0.200)	(0.070)	(0.159)
Constant	−0.509***	0.205**	−0.065	−0.899***	1.692***	−0.922***	−0.824**
	(0.090)	(0.097)	(0.174)	(0.194)	(0.504)	(0.176)	(0.402)
Observations	2,411	2,411	2,411	2,411	2,411	2,411	2,411

The sample of the analysis is composed by 2,411 observations due to the presence of two missing values for the dummy for hosting another family/family member.
Food expenditure is expressed in logarithms.
Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.
The excluded dummies are camp for the localization and Deir al Balah for districts.

Table A15
IV second-stage regression results: impact of residence damage on Household Food Insecurity Access Scale.

	(1) IV Diff. HFIAS
Residence damaged	1.831
	(2.175)
Rural	−0.467
	(1.072)
Urban	1.380**
	(0.559)
Household size	−0.630***
	(0.079)
Female household head	−1.680**
	(0.720)
Children share	−1.091
	(0.835)
North Gaza	2.288***
	(0.732)
Gaza	2.519***
	(0.810)
Khan Yunis	−1.817**
	(0.799)
Rafah	−2.969***
	(0.760)
Market shocks	−4.604***
	(1.396)
Manmade shocks	−0.684
	(2.181)
Natural shock	−3.240***

(*continued on next page*)

Table A15 (*continued*)

	(1) IV Diff. HFIAS
	(0.976)
Household shocks	−1.229
	(1.149)
Other shocks	−3.445***
	(0.865)
Constant	4.156**
	(1.945)
Observations	2,412

Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.
The excluded dummies are camp for the localization and Deir al Balah for districts.

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