

Challenges and Opportunities for Pre-disaster Strategic Planning in Post-disaster Temporary Housing Provision. Evidence from Earthquakes in Central Italy (2016-2017)

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ABSTRACT

The purpose of this paper is to investigate the challenges and opportunities of pre-disaster strategic planning in supporting temporary housing provision, using as a case study the earthquakes occurred in Italian central Apennines in 2016 and 2017. The paper explores such challenges and opportunities in several municipalities along four affected regions. Primary data were retrieved from fieldwork conducted in March 2017 in some affected municipalities, supported by interviews to relevant organizations

and stakeholders involved in emergency and reconstruction in the affected areas. Findings report that in the assessed municipalities delays occurred in temporary housing provision due to both technical and governance aspects, undermining the possibility to satisfy local needs in a timely way. Therefore, the paper sheds new light on the role of pre-disaster strategic planning in temporary housing provision. The paper discusses and supports the advances of international practices for pre-disaster strategic planning. It also calls for embracing mechanisms able to avoid delays and lock-ins embedded within the socio-political context-specific factors.

INTRODUCTION

In post-disaster reconstructions, a variety of actors at different scales, and with different priorities, perceptions and interests, need to quickly address short-term recovery goals (Ismail et al., 2017). These goals could potentially conflict with long-term trajectories of reconstruction that aim at accommodating community expectations (Chang et al., 2010; 2011; Cheng et al., 2015). Indeed, any decision taken during the emergency phase can affect the recovery path for decades (Jha et al., 2010; Yi and Yang, 2014). One of the major challenges within post-disaster reconstruction processes stands in framing the right compromise between maximizing the speed of decision-making processes while being able to support a collective and strategic vision about the future redevelopment path (Olshansky et al., 2008; Cheng et al., 2015). Housing provision plays a key role within this challenge (Jha et al., 2010; Lizarralde et al., 2010; Bilau and Witt, 2016). According to Davis and Alexander (2015), in the aftermath of a disaster, there are three main modes of shelter and housing:

1) Provisional shelters: spontaneous or provided shelters for people displaced within hours from the disaster, and for short time (from few hours to overnight). Spontaneous shelters can be repaired shelters, stays with host families, or be provided by remittances or by purchasing building materials. Provided shelters can be hotels, caravans, mobile homes, containers, tents, plastic sheeting, or donor shelters.

2) Transitional shelters: shelters that can be temporary or can evolve into permanence, provided within few days or weeks after the event.

3) Permanent dwellings, that can be built by users or contractors in the same place as before or in a different place, to be ideally provided within few years after the event (Davis and Alexander, 2015).

The duration of each phase depends on the existing overlaps between two or more phases; however, the clear distinction among these three phases relies in the everyday activities and routines, which usually are lost during the *sheltering* living, and recovered within the *housing* provision (Quarantelli, 1982, 1995; Félix et al., 2013; 2015). Meanwhile, the decision-making and implementation of each phase, as well as the quality of materials, design and locations of sheltering and housing vary according to a series of factors, including: i) preparedness activities in the affected areas (Nigg et al., 2006), ii) the social processes emerging after the hazardous event (Bolin and Stanford, 1991), and iii) the adopted organizational and technical solutions (Johnson et al., 2006).

For temporary transitional shelters, the etymology of the adjective *temporary* defines a way of living in a house that is limited in time, allowing people to be provided with a protected, secure, and

comfortable space for returning to their everyday life (Félix et al., 2013; 2015). However, temporary shelters and housing are still a contested issue within post-disaster recovery debate (Oliver-Smith, 1990; Olshansky et al., 2008; Johnson, 2007a; Rafieian and Asgary, 2013). Worldwide evidences from cases of temporary housing provided by governmental and non-governmental agencies have demonstrated that sometime housing provision has been unnecessary, too expensive, late, not sustainable, and thus shifted away relevant resources from permanent reconstruction, or became a source of socio-environmental concerns (Lizarralde et al., 2010; Rafieian and Asgary, 2013; Naylor et al., 2018; Biswas, 2019). Most of the times, these problems emerge from the challenge of reaching the above introduced compromise between speed and deliberation (Olshansky et al., 2008). While some decisions need to be taken quickly for meeting the basic needs of the affected people, the way temporary housing is conceptualized, planned, projected and implemented can deeply influence (positively or negatively) the long-term trajectories of disaster recovery. Therefore, cautiousness, long-term vision, and assessment of potential impacts are required to avoid problems potentially arising in the future (Jha et al., 2010).

On this regard, Johnson (2007b) identifies a series of organizational features, factors and resources needed for supporting temporary housing provision. These are: i) quick timing, ii) adequate cost in relation to country standards, iii) overall reconstruction strategy consideration, iv) adequate unit design and comfort, v) location considering access to jobs and social networks, vi) provision of services and amenities, vii) maintenance of pre-disaster social ties or

development of new ones, viii) institutional support to secure permanent housing and ix) consideration of long-term consequences. According to Johnson (2007b), pre-disaster strategic planning can support and facilitate the identification and implementation of these organization designs and resources for temporary housing provision in specific post-disaster situation. It also contributes to establish a set of pre-determined ways for working together with a set of stakeholders, ranging from the construction industry and real estate market to governmental agencies and communities, to activate desirable resourcing strategies and procedures (Chang et al., 2010). On a similar vein, Berke and Campanella (2006) consider a pre-disaster recovery planning as important to identify potential hazard-free sites that could serve as relocation zones for redevelopment, guiding the latter to the least hazardous parts of building areas, and modifying construction practices to minimize existing or potential vulnerability. Therefore, a pre-disaster strategic plan is key in providing standardized procedures for implementing temporary housing protocols and ensuring positive impacts on the long-term recovery (Johnson, 2007b). As a general protocol, in its implementation stage a pre-disaster strategic plan must be contextual and adaptable to the physical, socioeconomic, and cultural characteristics of the affected places, for being easily metabolized in a post-disaster territory (Jha et al., 2010). The involvement of local actors is key to avoid unexpected or unsustainable outcomes (Davidson et al., 2007; Jha et al., 2010; Bilau and Witt, 2016).

Against this background, this paper contributes to the debate around the role of pre-disaster strategic planning in temporary housing

provision. The paper investigates the challenges and opportunities of implementing post-disaster temporary housing provision in the light of a national pre-disaster strategic plan. Specifically, it investigates the case of Central Italy earthquakes occurred between August 2016 and January 2017.

THE ITALIAN CONTEXT: TRENDS OF POST-DISASTER TEMPORARY HOUSING PLANNING AND PROVIDION

Across centuries, post-disaster temporary housing provision and planning in Italy has led to social, economic, and environmental issues and paradoxes (Di Giovanni, 2016) that had and still have consequences on the affected places and communities in both short and long term (Forino and Carnelli, 2019). A plethora of cases exists about temporary housing provisions which were supposed to be temporary but then lasted for decades (Alexander, 1989; Dickie et al., 2002). In addition, temporary housing provision often contributed also to (re)produce long-term inequalities and marginalization, including emigration and an increase of vulnerability and poverty. Saitta (2013) analysed the city of Messina (Sicily) 100 years after the 1908 earthquake and associated tsunamis, which destroyed 90% of the built environment and caused thousands of deaths. He found that the area where temporary houses/prefabs (called *baracche*) were provided for the affected people at the time, still suffer of one-century long inequality effects in terms of unemployment, labour rights, resource access, and life opportunities (Saitta, 2013; see also Farinella and Saitta, 2019). Similarly, in other areas of Southern Italy such as the Belice area affected by the 1968 earthquake (see Parrinello, 2015)

and the Irpinia area affected by the 1980 earthquake (see Ventura, 2013), the Italian government provided for temporary housing that often lacked of an in-depth understanding of local needs and priorities.

After the L'Aquila earthquake (April 2009), the temporary housing provided by the Italian government represented an “extravagant form” (Alexander, 2013, p. 63) of prefabricated post-disaster transitional housing. Indeed, the provided 185 multi-store buildings (Complessi Antisismici Sostenibili ed Ecocompatibili, abbreviated as CASE project), able to host more than 15,000 people on 19 areas spread around the city, have been paradoxically built on top of very expensive permanent anti-seismic basements. According to Alexander (2019), the CASE project was “a grandiose failure, and destined to be so right from its conception”. It was excessively expensive and did not consider crucial issues including durability and maintenance; longevity and future uses; availability of public services and urban functions; ecological preservation; safety (Alexander, 2013; 2019); corruption, and social fragmentation of pre-existing communities (Calandra, 2018). The mentioned disasters show how temporary housing provision in Italy is historically and deeply entangled with governance and power issues, as well as with social and economic conflicts around built environment and natural resource management (Parrinello, 2015).

In the light of this background, the paper wishes to test whether having a pre-disaster strategic plan contributes to increase the efficiency of the temporary housing provision, avoiding the above mentioned un-lucky experiences. After corruption scandals which

emerged in L'Aquila (Alexander, 2013), responsibilities and powers of the National Department of Civil Protection (henceforth NDCP) in post-disaster management were reformulated by the Law n°100/2012 (Italian Government, 2012). Before 2012, the NDCP had executive and administrative powers in managing public bidding processes and related funds. With the Law n°100/2012, the NDCP lost part of these powers and was left just with advisory and coordinative powers in the temporary housing provision. On 9th April 2014, the NDCP reached an official agreement (which was however signed only in 2016) with the CONSIP, a limited company owned by the Italian Ministry of Economy and Finance, to establish a set of standard organizational procedures and technical characteristics for post-disaster temporary housing provision. The CONSIP has the mission of ensuring efficacy and transparency in the use of Italian public administration's resources. In this way, CONSIP provides public administrations with tools and skills such as framework agreements, strategic planning, e-procurement through electronic marketplace and digital tenders to manage and track their purchases and to stimulate public-private partnerships¹.

Such agreement led to the ratification of a pre-disaster strategic plan (known as *Accordo Quadro*) (CONSIP and NDCP, 2016), that allows the NDCP and the City Councils of the affected areas to subcontract the temporary housing provision to private companies for a timespan up to six years, for a maximum of 18,000 temporary housing units for

¹ <http://www.consip.it/> (Access 31/05/2019).

all the affected areas, and with an estimated value of €1.2 billion. The Italian government will select subcontractors according to the budget compliance of their proposal with the technical document (known as *Capitolato Tecnico D'Appalto*) of the pre-disaster strategic plan (CONSIP and NDCP, 2014). The earthquakes that occurred in Central Italy in 2016 and 2017 were the first seismic disaster after the ratification of the pre-disaster strategic plan (CONSIP and NDCP, 2016). Due to damage and loss to public and private buildings and houses, temporary housing provision was considered a necessary step.

THE EARTHQUAKES IN CENTRAL ITALY

Between August 2016 and January 2017, four major earthquakes (plus thousands of seismic repeats) occurred in Central Italy in less than five months (Valensise et al., 2017; Bedini and Bronzini, 2018). On 24th August 2016, an earthquake (Mw. 6) occurred in the Lazio and Marche regions and affected several villages on the Apennines, including Amatrice, Accumoli, and Arquata del Tronto. 299 people were killed and 4,800 were displaced (INGV, 2016a). On 26th October 2016, two earthquakes (Mw. 5.4 and Mw. 5.9) occurred in some of the villages that were already in the emergency phase and included also part of the Umbria region (INGV, 2016b), with one reported victim. On 30th October 2016, another earthquake (Mw. 6.5) struck again the same area, and particularly the Perugia province (Umbria) (INGV, 2016c). The displaced people increased up to 30,000. Finally, on 18th January 2017, a four earthquakes sequence (Mw. 5-5.5) occurred in just four hours and hit particularly the

Abruzzo region (INGV, 2017). Impacts were worsened by the combination of simultaneously occurring cold snaps, heavy snowfalls, avalanches, and landslides. 34 people were killed, and several villages and settlements were damaged (NDCP, 2017a).

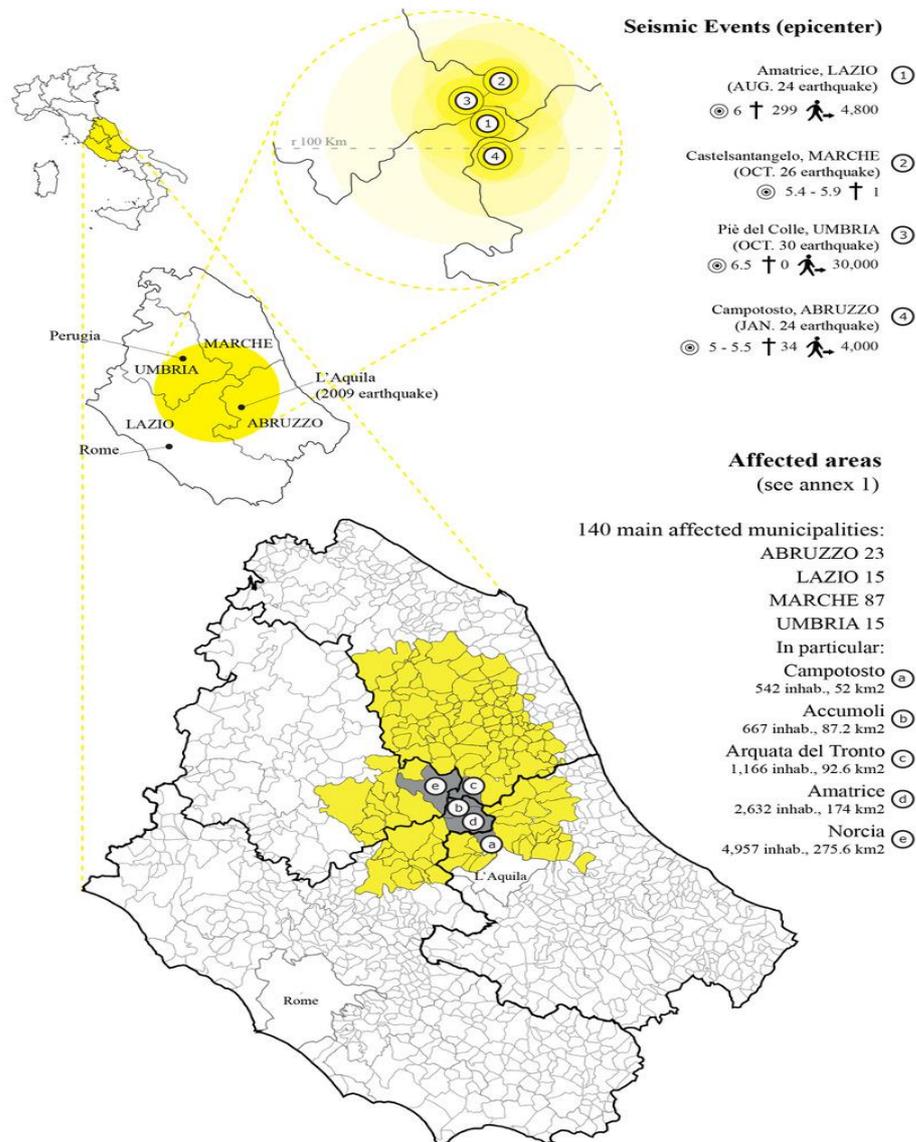
140 municipalities (approximately 500,000 inhabitants) fall into the whole area affected between August 2016 and January 2017 (Figure 1), sprawled within small mountainous villages and hamlets characterized by aging population and low density. 70% of the hit residential buildings were built prior to 1974 (year of the first national anti-seismic legislation)² and made by non-earthquake proof material. According to the Impact Assessment Office of the Senato della Repubblica (2018), these damages accounted for over €14 billion for the reconstruction (including also emergency and support to local economy and public administration) to be allocated by the Italian Government between 2016 and 2047.

The scale of these disasters represented a challenge for temporary housing provision. In this way, questions can be posed about whether the temporary housing provision did align (or not) to the pre-disaster strategic plan *Accordo Quadro* (CONSIP and NDCP, 2016). Also, questions arise about whether the *Accordo Quadro* supported (or not) a timely temporary housing provision (Emidio di Treviri, 2018). The next sections seek to answer to these questions by exploring

² Law n°64/1974: Provvedimenti per le costruzioni con particolari prescrizioni per le zone sismiche, *Gazzetta Ufficiale* n°76 1974, March 21. Retrieved from http://www.gazzettaufficiale.it/atto/serie_generale/caricaDettaglioAtto/originario?atto.dataPubblicazioneGazzetta=1974-03-21&atto.codiceRedazionale=074U0064&elenco30giorni=false (Access 08/09/2019)

challenges and opportunities for the linkage between temporary housing provision and the pre-disaster strategic plan (CONSIP and NDCP, 2014; 2016).

Figure 1 - The Central Italy areas affected by four main earthquakes in August 2016, 26th and 30th October 2016, and January 2017.



Source: Authors' Elaboration on NDCP data. On top, the figure reports the epicentres (1, 2, 3, 4) of the four seismic events. On the bottom, the figure highlights the official list of 140 municipalities that have been affected by the earthquakes³ and indicates the main affected localities (a, b, c, d, e).

METHODS

On-site visits to the main affected regions of Lazio, Marche, Umbria, Abruzzo were conducted in March 2017 with the logistical support of the NDCP. For each region, some Municipalities were visited according to the availability of the NDCP. During these visits, the whole temporary housing provision process and the technical and organizational characteristics of the implemented temporary housing solutions were assessed. To do this, 17 in-depth interviews were conducted with representatives of different organizations and stakeholders working in temporary housing provision (see Table 1 for interviewees' details). Interviews were semi-structured and framed around 3 clusters related to: organizational characteristics (timing and governance), technical characteristics (design, location and cost), and future use of the temporary housing units. Participant observation was also employed during strategic meetings, coordinated by the NDCP with other relevant national and regional stakeholders for managing the emergency and the temporary housing provision. Policy documents by the Italian Government related to post-disaster procedures and grey literature (newspapers, online news) were also

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https://www.sara.it/fileadmin/user_upload/Documenti/Libero_domani/elenco_comuni_colpiti_da_sisma_27_luglio_2017.pdf (Access 08/09/2019).

consulted to collect updates on post-disaster management in the affected areas.

Table 1: Interviewees' details.

P1	NDCP architect responsible for the implementation of the <i>Accordo Quadro</i> .
P2	NDCP technician assisting P1 during on-site visits.
P3	NDCP technician assisting P1 during on-site visits.
P4	NDCP technician assisting P1 during on-site visits.
P5	ISPRA (National Institute for Environmental Protection) geologist.
P6	Regional Civil Protection (henceforth RCP) technician of Abruzzo Region.
P7	Mayor of Colledara (Abruzzo region).
P8	Mayor of Tossicia (Abruzzo region).
P9	Mayor of Torricella Sicura (Abruzzo region).
P10	Architect of Torricella Sicura City Council (Abruzzo region).
P11	Technician of Urbanization Company in Accumoli - Capoluogo (Lazio region).
P12	Mayor of Arquata del Tronto (Marche region).
P13	Director of Construction Company in Arquata del Tronto – B. Arquata (Marche region).
P14	Technician of Norcia City Council (Umbria region).
P15	Technician of Construction Company in Norcia – Z. Industriale “A” (Umbria region).
P16	Technician of Urbanization Company in Norcia – Z. Industriale “A” (Umbria region).
P17	Archaeologist working in Norcia – Z. Industriale “A” (Umbria region).

FINDINGS

Organizational and technical aspects of temporary housing provision

In the affected areas (see Figure 1), the NDCP, the RCP, and local authorities provided these different typologies of temporary housing:

1. Temporary emergency housing solutions (*Soluzioni Abitative Emergenziali*, SAEs henceforth) units, allowing affected people to remain close to their villages;
2. Prefabricated emergency rural units (*Moduli Abitativi Prefabbricati Rurali Emergenziali*, MAPREs), which were

- provided particularly to farmers and breeders which needed to continue crop production or take care of their livestock in rural areas;
3. Alternative shelters already available in the affected areas, such as hotels, municipal buildings (e.g. multipurpose buildings), and available shelters which were implemented and utilized as temporary houses after the previous earthquakes in Umbria and Marche regions (1997) and in L'Aquila (2009);
 4. Public heritage buildings⁴ (e.g., apartments or buildings that are owned by the Municipalities, that meeting safety seismic standards' compliance);
 5. Collective containers⁵ (NDCP, 2017b; 2017c);
 6. Isolated tents or campers, which were provided autonomously by the affected people or by volunteers. On this regard, the Italian Government provided self-accommodation subsidies (*Contributi di Autonoma Sistemazione, CAS*⁶ henceforth) for those people which opted for autonomously finding an accommodation until the completion of the reconstruction (NDCP, 2017b; NDCP, 2017c).

⁴ This option was introduced in late December 2016. However, the legislation does not force City Councils of the affected villages to assess their existing building heritage before ordering SAEs.

⁵ As the one unique experience in the municipality of Tolentino (Umbria region), the only one who did not require SAEs but implemented collective containers. See problems related to this choice in: <http://www.lostatodellecose.com/portfolios/vite-scatola-tolentino-dentro-villaggio-dei-container/> (Access 08/09/2019)

⁶ Ordinance n° 388/2016 and n° 408/2016. The contribution is 300€/family member/month up to a maximum of 900€/month. If the family is composed by one person, the contribution is 400€/month. For elderly (>65 years old) and people with disability (disability >67%) 200€/month/person add to the CAS (regardless of the 900€/month limit). The contribution will be anticipated by families and then refunded by the State according to the Ordinance timing.

This paper focuses specifically on the SAEs provision, since this represents the major public expenditure in relation to temporary housing provision. On 9th April 2014, the NDCP and CONSIP reached an official agreement (*Accordo Quadro*) signed on 25 May 2016 with different economic operators for each of the three geographical areas of Italy (Northern Italy, Central Italy, Southern Italy). Through this agreement, the municipalities exposed to hazards and the NDCP could subcontract the work of SAEs when required for a period up to six years, for a maximum of 18,000 modules to an estimated value of €1.2 billion. The bid winners were selected according to the economic compliance of their proposal with the technical document (*Capitolato D'Appalto*) (CONSIP and NDCP, 2014). The first subcontractor can supply a maximum of 850 SAEs within six months, at a cost of €1,075/m² each and with a 4-year warranty. The second one can supply a maximum of 780 SAEs within six months, at a cost of €1,067/m² each and with a 4-year warranty. The third one can supply a maximum of 225 SAEs within six months, at a cost of €1,044,45/m² each and with a 3-year warranty. The subcontractor should decide the final layout of temporary settlements, urbanization executive projects, and SAE installation (CONSIP and NDCP, 2014). Prices and solutions were decided in 2014 during the original bidding process so they would not change according to specific location. The construction companies that win the bid and are responsible for providing the SAE should decide the final layout of settlements and design of SAE.

For the Central Italy area, CNS together with other companies (Rti and Cogeco7 Srl) won the bid followed by Consorzio Stabile Arcale

(2nd classified) and Modulcasa Line Spa (3rd classified, together with Ames Spa and Nav system Spa)⁷. Each subcontractor proposed a standard typology of SAE and a related price for the whole national area, regardless of specific contextual characteristics in which SAEs would be implemented. This implies that the temporary units provided in Central Italy have been the same modular houses that would have been provided in other contexts of other potentially affected regions of Central Italy.

Accordingly, SAEs can have three sizes based on the number of people to be hosted: 40m² (for 1-2 people); 60m² (for 3-4 people); and 80m² (for 5-6 people). SAEs can be installed as standalone units (with a building lot of 200m²/unit) or grouped, can have up to two floors and must ensure access to people with disabilities. SAEs should indeed “satisfy high housing standards, independently from the area of intervention” (CONSIP and NDCP, 2014, p. 8) and should be designed according to eco-sustainable technologies (A+ energetic class) and bioclimatic criteria of energy efficiency, orientation, shading, natural ventilation, trees, and green spaces. The lifespan of each SAE should be ten years as a SAE is not considered as a permanent house (CONSIP and NDCP, 2014). SAEs should also be flexible and adaptable to diverse future uses, as well as be modular and easily assembled, removed and recycled. However, there are no specifications about the materials to be used. In addition, the cost of

⁷ <http://www.consip.it/bandi-di-gara/gare-e-avvisi/aq-soluzioni-abitative-in-emergenza-per-protezione-civile-2> (Access 03/07/2019).

each SAE would not include the cost for primary urbanization works - approximately €20.000 (CONSIP and NDCP, 2014).

Following the Legislative Decree n°189/2016⁸ and the *Capitolato Tecnico D'Appalto* (CONSIP and NDCP, 2014), SAEs can be implemented through a 7-step process. The steps are: 1) SAE request by regional and local institutions; 2) Proposal and Evaluation by regional and local governments of the proposed Settlement Areas; 3) Settlement Planning Design and Layout; 4) Urbanization Executive Project; 5) Primary Urbanization; 6) SAE Installation; 7) Settlement Inauguration. The phases 3-6 will be mostly provided by the SAEs' providers and subcontracted companies (e.g., construction companies, utilities companies) (Emidio di Treviri, 2018). The NDCP would have just advisory powers on regional and local governments. According to the *Capitolato Tecnico D'Appalto* (CONSIP and NDCP, 2014), the estimated timing for completing these steps should have been 6 months. However, according to interviews (P1, see Table 1), a precise timeframe cannot be established as the SAEs can be physically assembled only once regional and local governments approve the suitable area and the number of needed SAEs has been officially declared. Moreover, the timeframe to start the bidding process for primary urbanization work is not specified. According again to P1, the NDCP can try to speed up the process, for example by suggesting modifications or starting SAE installation while urbanization works are in progress. The City Councils of the affected

⁸ Decreto Legge n. 189 del 17 ottobre 2016: interventi urgenti in favore delle popolazioni colpite dal sisma del 24 agosto 2016. Retrieved from <http://www.gazzettaufficiale.it/eli/id/2016/10/18/16G00205/sg> (Access 08/09/2019).

villages select the companies in charge of the primary urbanization through an *ad hoc* bid (CONSIP and NDCP, 2014).

Assessing temporary housing provision

This section presents an assessment of the temporary housing provision in 52 affected villages across Abruzzo, Lazio, Marche, and Umbria regions. This assessment was conducted in March 2017, 7 months after the first earthquake (August 2016) and 2 months after the last one (January 2017). The assessment aimed at evaluating the 7-step process for SAEs implementation (CONSIP and NDCP, 2014). Authors chose to perform the fieldwork in March 2017 because accordingly to the regulations, all the SAEs should have been at least already delivered for those communities and villages affected by the first earthquake in August 2016.

Abruzzo

In March 2017, the viability of the proposed SAEs areas was still under evaluation in the Abruzzo region. Out of the seven sequential steps, just the SAE request (1) and proposal and evaluation of the proposed settlement areas (2) were partially implemented. Six months after the earthquake, 14 out of 23 affected City Councils informally urged the necessity for SAEs. However, just 8 out of these 14 made an official request for SAEs to the subcontractor *Modulcasa Line Spa*. This happened because the Town Councils still cannot make a final decision about the best settlement areas for SAEs. Therefore, the request for SAEs was not officially forwarded yet, as well as the SAEs' production did not start yet. In two villages, namely Castelli and Civitella del Tronto, the Town Councils were evaluating the

option to move assisted people into pre-existing public buildings in the villages, in order to require less SAEs.

Authors conducted the assessment in three villages, namely Colledara, Torricella Sicura, and Tossicia. From the assessment, it was found that one of the main causes of delay in SAEs' provision was the lack of suitable areas for SAEs' implementation, as in Colledara and Tossicia. In Colledara (specifically in the Capoluogo hamlet), a public land was selected, but it was later realized that it was too small to host all the required SAEs. According to P1, each SAE required 200 m²/unit of land, but there was space just for 8 SAEs instead of 11. P5 also added that one of the slopes had unstable soils, therefore implementing the other 3 SAEs would have been difficult. Due to these issues, the NDCP proposed two options to Colledara Town Council: to add a plot of public land to the selected area; or, to find an alternative, larger area. However, the impasse around these options resulted in a relevant delay, and therefore the construction works were postponed. In Tossicia, the mayor (P8) and the NDCP technicians (P1, P2) organized a meeting to assess the suitability of the three proposed areas. According to P5, at the end of the meeting the proposed areas were assessed as "acceptable with prescription" as they did not completely align to land use requirements. Therefore, a further assessment would have been necessary, with expected delays.

Further reasons for the delay were related to conflicts into governance. For example, according to P2, conflicts emerged around the implementation of 48 scheduled SAEs in Torricella Sicura. During a meeting between the NDCP (P1, P2), the Abruzzo RCP

(P6), the mayor of Torricella Sicura (P9) and an architect invited by the mayor (P10), the last two proposed a modification from an original terraced layout to a layout of independent SAEs. According to P1, the option of independent SAEs should have been considered just in case the layout of the selected area would not allow other options. Therefore, P1 argued that with such request the mayor of Torricella Sicura (P9) aimed at potentially maximizing electoral benefits from the reconstruction, as citizens would be more satisfied with an independent SAE to be potentially used in the future for rent. P1 also added that the *Capitolato Tecnico D'Appalto* (CONSIP and NDCP, 2014) does not mention the possibility for introducing external stakeholders, such as the architect invited by the mayor, in the SAE process. Notwithstanding this, the mayor of Torricella Sicura firmly declared that he would have only accepted independent SAEs. In this way, the final decision would have been taken by the Head of the NDCP, but until then the temporary housing provision would have been stuck by waiting for resolving these conflicts.

Lazio

The Lazio region was the most affected one by the earthquakes of 24th August 2016. Therefore, the temporary housing provision process should have been ideally finished or close to the end according to the *Accordo Quadro* (CONSIP and NDCP, 2016) at the time of fieldwork (March 2017). However, the viability of several of the proposed SAE areas was still under evaluation. In the affected municipalities, SAEs were required to the subcontractor *Consorzio Nazionale Servizi* for just 31 out of 57 hamlets. The assessment of the

SAEs' areas was ongoing in 23 hamlets. Primary urbanization works were ongoing just in 19 hamlets, while SAEs' installation was ongoing in 8 hamlets. Just one SAE settlement was inaugurated. Our assessment was conducted in the municipalities of Accumoli and Amatrice. Also in these cases several delays in temporary housing provision were found.

For example, P2 revealed that in the Grisciano hamlet (located in Accumoli) the NDCP found unstable soils in the selected area. A further assessment was therefore required and would have caused delays in the layout's approval and in turn in the SAEs' production. Furthermore, primary urbanization works did not start yet, as the bidding process by the City Council of Accumoli for selecting subcontractors took more than one month. In Accumoli, the Illica hamlet was the only one where SAE installation started. P2 claimed that the bidding process for the urbanization works took just one week and SAEs' installation started mid-March, while urbanization works were still ongoing. On-site visits confirmed that all the subcontractors already positioned the concrete platforms for the 7 SAEs and were assembling the steel matrix of each SAE. Conversely, in Amatrice, the settlement Campo 0, which hosted 25 SAEs, was the only inaugurated in the Lazio region and therefore able to meet the six-month requirement by the *Accordo Quadro* (CONSIP and NDCP, 2016).

Marche

Also in the Marche Region the viability of several SAEs' areas was still under assessment. The first SAEs were required to the *Arcale* company

in October 2016, while the last ones were required only in March 2017. The implementation of SAEs was in progress just in 1 Town Council over 87, and no settlements were inaugurated yet. Our assessment was conducted in Arquata del Tronto. Delays occurred in this case too. P3 revealed that in Pescara del Tronto hamlet the settlement area was close to the highway, and therefore an agreement between NDCP and the national road infrastructure agency (ANAS) was necessary to regulate traffic flow and speed in the nearby areas. This caused delays in the SAE installation. In the Borgo Arquata hamlet, primary urbanization works started at the end of February 2017. They were progressing slowly because the construction site was a former football field and laying foundations required more time than expected. In addition, P3 claimed that the limits of the settlement design overlapped an adjacent private property, and therefore there was insufficient space to install the SAEs according to urban planning regulations.

Umbria

Finally, also in the Umbria region the viability of several SAEs areas was under evaluation. The first SAEs were required to the subcontractor *Consorzio Nazionale Servizi* on September 2016, while the last ones were required on March 2017. Just 2 SAEs' areas were inaugurated over 31, while SAE installation was underway in one City Council over 3.

Our assessment was conducted just in Norcia, as it was the only municipality where SAE installation was ongoing. The San Pellegrino hamlet was the first inaugurated settlement in all the Central Italy affected area and included 18 SAEs. According to P14, 18 SAEs were

assigned. Out of them, 5 were assigned to families with elders, minors, and people with disability. P4 also explained the key factors of SAE implementation in San Pellegrino. First, the SAE order and the settlement area's approval were done simultaneously, thanks to the coordination between the local institutions in charge of taking decisions and the NDCP in charge of coordinating the process. Second, the bidding process took only ten days from the project approval, and this speeded up the whole SAE process. Third, primary urbanization works took 2.5 months, simultaneously to the SAE installation as the NDCP recommended. In this way, the 7-step process was completed in 4.5 months, less than the six months required by the *Capitolato Tecnico D'Appalto* (CONSIP and NDCP, 2014).

The Zona Industriale A hamlet was the largest SAE area of Umbria region with 63 SAEs. The SAEs were ordered at early November 2016 but the bidding process took one month. Therefore, primary urbanization works started only at late 2016 and were still in progress in March 2017, as well as the SAE installation was still ongoing. Some interviewees (P4, P15, P16) revealed that further delays occurred. Both urbanization and construction works were postponed due to lack of coordination between two companies. Issues also emerged in terms of accessibility of the 7 SAEs for people with disability: doors were too small for allowing access to wheelchairs, while no access ramp was designed; in addition, a metal slope designed from the door to the platform required to cut the door frames but not all the door entrances could be re-adjusted due to design reasons. In this way, it was decided that new SAEs would

have been installed with proper accessibility for people with disability, causing in turn further delays. As P17 revealed, archaeological remains were also discovered during the construction works: therefore, the City Council of Norcia and the Ministry of Cultural Heritage decided to leave buried the remains so that SAE concrete platforms would not damage them.

DISCUSSION AND CONCLUSIONS

This paper explored challenges and opportunities arising in the SAEs' provision following the earthquakes in Central Italy between August 2016 and January 2017 with respect of a pre-disaster strategic plan (CONSIP and NDCP, 2014; 2016). According to the *Capitolato Tecnico D'Appalto* (CONSIP and NDCP, 2014), SAE should be provided through a 7-step process up to six months after a disaster. On-site visits and interviews in the affected areas were conducted to assess the evolution of the temporary housing process six months after the first earthquake.

In terms of challenges, the paper aligns with evidences on challenges in temporary housing provides as discussed in Emidio di Treviri (2018). In particular, the paper highlights how governance issues led to delays in delivering the SAEs. In March 2017, six months after the first earthquake, just 3 SAEs areas out of expected 210 were inaugurated in the four affected regions. For most of the assessed settlements, findings also revealed a more than two-month large time-gap existing between the occurrence of each disastrous event (the earthquake) and the beginning of the SAEs' provision. This means that the initial steps of the process, namely the selection and the

assessment of the SAEs' areas, significantly impacted on the whole schedule and caused delays. These delays are related mainly to the suitability of the selected areas for housing purposes (e.g., Grisciano, where unstable soils were found), the local morphology (e.g., Capoluogo, where the available public land was too small to meet space requirements) or unexpected circumstances (e.g., Zona Industriale A, where archaeological remains were discovered). Furthermore, the *Accordo Quadro* (CONSIP and NDCP, 2016) did not consider potential issues emerging into the decision-making process among stakeholders, such as the time gap between the approval of the executive project and the beginning of urbanization works. In addition, in some cases there have been attempts to implement SAEs as they had to be permanent. An example of this is in Torricella Sicura, where the mayor's intention was the creation of an individual layout for each SAE which could be easier to rent in the future. This point brings up some further considerations about the necessity for considering future use alternatives of temporary housing units and avoiding the temporary usage lasts for decades⁹.

In terms of opportunities, findings revealed that timing estimated by the pre-disaster strategic plan was achieved when coordination among different stakeholders was successful, as in the case of the Campo 0

⁹ See for example this reportage from the Italian newspaper "La Stampa" on a temporary unit in the village of Calitri, hit by the 1980 earthquake in Campania and Basilicata regions. Still today, the temporary unit hosts some health agencies offices in very bad conditions: <https://www.lastampa.it/2018/11/29/italia/a-anni-dal-sisma-in-irpinia-il-comune-di-calitri-avr-finalmente-un-vero-ambulatorio-asl-nThOW1oWtOhFiAHZAnQOO/pagina.html> (Access 04/05/2019).

hamlet or when the NDCP was able to speed up the whole process, as in Illica or San Pellegrino hamlets.

The research presented in the paper was conducted on a limited number of affected municipalities and was based on a fieldwork just 7 months after initial events, so it did not portray the long-term consequences of temporary housing provision in the affected areas. Notwithstanding this, it was able to reveal some of the key issues emerging in linking the temporary housing provision and the pre-disaster strategic plan, and potentially affecting also the long-term recovery. In addition, it was also able to show evidences for some of the root causes of delays occurring in the housing provision system in Central Italy. In the light of these considerations, the paper recommends that the pre-disaster strategic plan *Accordo Quadro* should better take into consideration both socioeconomic issues and the characteristics of the local built and natural environments. For example, by supporting existing literature (Johnson, 2007b; Jha et al., 2010), the paper argues that such plan should not just include standard specifications on technical and organizational aspects for the present use, but it should be also able to meet the contextual local necessities and cope with the very specific challenges that each post-disaster context presents. These challenges cover a range of technical and logistical issues, as well as they involve governance and political issues, uncertainties, and unexpected situations. In this way, the plan should have been provided with a more comprehensive perspective of complex issues occurring within disaster aftermaths.

In conclusion, the paper can represent a useful background for further studies on the topic and shed new light on the role of pre-disaster

strategic planning in post-disaster reconstruction. Further research is indeed necessary for a more in-depth understanding of the challenges and opportunities provided by a pre-disaster strategic plan in temporary housing provision in both the proposed case study and disaster-prone areas worldwide.

REFERENCES

Alexander, D. (1989). Preserving the Identity of Small Settlements during Post-Disaster Reconstruction in Italy. *Disasters*, 13(3), 228-236.

Alexander, D. (2013). An evaluation of medium-term recovery processes after the 6 April 2009 earthquake in L'Aquila, Central Italy. *Environmental Hazards*, 12(1), 60-73.

Alexander, D. E. (2019). L'Aquila, central Italy, and the “disaster cycle”, 2009-2017. *Disaster Prevention and Management: An International Journal*, 28(4), 419-433.

Bedini, M. A., & Bronzini, F. (2018). The post-earthquake experience in Italy. Difficulties and the possibility of planning the resurgence of the territories affected by earthquakes. *Land Use Policy*, 78, 303-315.

Berke, P. R., & Campanella, T. J. (2006). Planning for postdisaster resiliency. *The Annals of the American Academy of Political and Social Science*, 604(1), 192-207.

Bilau, A.A., & Witt, E. (2016). An analysis of issues for the management of post-disaster housing reconstruction. *International Journal of Strategic Property Management*, 20(3), 265-276.

Biswas, A. (2019). Exploring Indian post-disaster temporary housing strategy through a comparative review. *International Journal of Disaster Resilience in the Built Environment*, 10(1), 14-35.

Bolin, R., Stanford L. (1991). Shelter, Housing and Recovery: A Comparison of U.S. Disasters. *Disasters*, 15(1), 24-34.

Calandra, L. M. (2018). Governance of risk and disasters: considerations on the role of citizen participation in L'Aquila (Italy). In: Forino G., Bonati, S., Calandra L.M., *Governance of Risk, Hazards and Disasters*, Routledge, 91-106.

Chang, Y., Wilkinson, S., Seville, E., Potangaroa, R. (2010). Resourcing for a resilient post-disaster reconstruction environment. *International Journal of Disaster Resilience in the Built Environment*, 1(1), 65-83.

Chang, Y., Wilkinson, S., Potangaroa, R., & Seville, E. (2011). Identifying factors affecting resource availability for post-disaster reconstruction: a case study in China. *Construction Management and Economics*, 29(1), 37-48.

Cheng, S., Ganapati, E., & Ganapati, S. (2015). Measuring disaster recovery: bouncing back or reaching the counterfactual state?. *Disasters*, 39(3), 427-446.

CONSIP & NDCP (2014). Capitolato Tecnico D'appalto. Retrieved in March 2017, from

http://serviziosae.cnsofm.it/files/SAE/SAE2_Allegato_5_-_Capitolato_Tecnico_public.pdf

CONSIP & NDCP (2016). *Accordo Quadro per la fornitura, il trasporto ed il montaggio di Soluzioni Abitative in Emergenza e i servizi ad esse connesse per conto del Dipartimento della Protezione Civile (edizione 2)*. Retrieved from <http://www.consip.it/bandi-di-gara/gare-e-avvisi/aq-soluzioni-abitative-in-emergenza-per-protezione-civile-2> (Access 4 May 2019).

Davidson, C. H., Johnson, C., Lizarralde, G., Dikmen, N., & Sliwinski, A. (2007). Truths and myths about community participation in post-disaster housing projects. *Habitat International*, 31(1), 100-115.

Davis, I., & Alexander, D. (2015). *Recovery from disaster*. Routledge.

Di Giovanni, G. (2016). Post-earthquake recovery in peripheral areas: the paradox of small municipalities' reconstruction process in Abruzzo (Italy). *Italian Journal of Planning Practice*, 6(1), 110-139.

Dickie, J., Foot, J., & Snowden, F. M. (2002). *Disastro!: disasters in Italy since 1860: culture, politics, society*. Palgrave Macmillan.

Emidio di Treviri (2018). *Sul fronte del sisma. Un'inchiesta militante sul post-terremoto dell'Appennino centrale (2016-2017)*. DeriveApprodi, Rome.

Farinella, D. and Saitta, P. (2019), *The Endless Reconstruction and Modern Disasters: The Management of Urban Space through an Earthquake – Messina, 1908-2018*, Palgrave.

Félix, D., Branco, J. M., & Feio, A. (2013). Temporary housing after disasters: A state of the art survey. *Habitat International*, 40, 136-141.

Félix, D., Monteiro, D., Branco, J. M., Bologna, R., & Feio, A. (2015). The role of temporary accommodation buildings for post-disaster housing reconstruction. *Journal of Housing and the Built Environment*, 30(4), 683-699.

Forino, G., & Carnelli, F. (2019). Introduction to the special issue “The L’Aquila earthquake 10 years on (2009-2019): impacts and state-of-the-art”. *Disaster Prevention and Management: An International Journal*, 28(4), 414-418

Impact Assessment Office of the Senato della Repubblica (2018). Ricostruire. L’Aquila, Pianura padana, Centro Italia: politiche e risorse per l’Italia post terremoto, <https://www.senato.it/application/xmanager/projects/leg18/attachments/documento/files/000/029/090/DA21 - Ricostruire.pdf>

INGV (2016a). Relazione di dettaglio: Rieti Mw 6.0 del 2016-08-24 01:36:32 UTC; versione del 2016-08-24 ore 04:26:02 UTC. Retrieved from https://ingvterremoti.files.wordpress.com/2016/09/relazione_di_dettaglio_rieti_mw_6-0_del_2016-08-24_01_36_32_utc_versione_del_2016-08-24_ore_04_26_02_utc-1.pdf

INGV (2016b). Relazione di dettaglio: Macerata Mw 5.9 del 2016-10-26 19:18:05 UTC; versione del 2016-10-26 ore 22:42:54 UTC.

Retrieved from
[https://ingvterremoti.files.wordpress.com/2016/10/relazione_di_dettaglio_macerata_mw_5-9_del_2016-10-](https://ingvterremoti.files.wordpress.com/2016/10/relazione_di_dettaglio_macerata_mw_5-9_del_2016-10-26_19_18_05_utc_versione_del_2016-10-26_ore_22_42_54_utc.pdf)

[26_19_18_05_utc_versione_del_2016-10-26_ore_22_42_54_utc.pdf](https://ingvterremoti.files.wordpress.com/2016/10/relazione_di_dettaglio_macerata_mw_5-9_del_2016-10-26_19_18_05_utc_versione_del_2016-10-26_ore_22_42_54_utc.pdf)

INGV (2016c). Relazione di dettaglio: Perugia Mw 6.5 del 2016-10-30 06:40:17 UTC; versione del 2016-10-30 ore 11:27:08 UTC.

Retrieved from
https://ingvterremoti.files.wordpress.com/2016/12/relazione_detalle_30ott_m6-5.pdf

INGV (2017). Relazione di dettaglio dei tre eventi di $M > 5.0$ del 2017-01-18 avvenuti tra le 09:25 e le 10:25 UTC Retrieved from
<https://ingvterremoti.files.wordpress.com/2017/01/relazione-di-dettaglio-dei-3-eventi-di-m-5-0-del-2017-01-18.pdf>

Ismail, F. Z., Halog, A., & Smith, C. (2017). How sustainable is disaster resilience? An overview of sustainable construction approach in post-disaster housing reconstruction. *International Journal of Disaster Resilience in the Built Environment*, 8(5), 555-572.

Italian Government (2012). *Conversione in legge, con modificazioni, del decreto-legge 15 maggio 2012, n. 59, recante disposizioni urgenti per il riordino della protezione civile*, Retrieved from
http://www.protezionecivile.gov.it/jcms/it/view_prov.wp?contentId=LEG34883

Jha, A. K., J. Duyne Barenstein, P. M. Phelps, D. Pittet and S. Sena (2010). *Safer homes, stronger communities: a handbook for reconstructing after natural disasters*, World Bank Publications.

Johnson, C. (2007a). Impacts of prefabricated temporary housing after disasters: 1999 earthquakes in Turkey. *Habitat International*, 31, 36-52.

Johnson, C. (2007b). Strategic planning for post disaster temporary housing. *Disasters* 31(4), 435-458.

Johnson, C., Lizarralde, G., Davidson, C.H. (2006). A systems view of temporary housing projects in post-disaster reconstruction. *Construction Management and Economics*, 24(4), 367-378.

Lizarralde, G., Johnson, C., Davidson, C.H. (2010). *Rebuilding after disasters. From emergency to sustainability*. Spon Press, Oxon.

Naylor, A., Walker, J. F., & Suppasri, A. (2018). Suitability of the early warning systems and temporary housing for the elderly population in the immediacy and transitional recovery phase of the 2011 Great East Japan Earthquake and Tsunami. *International Journal of Disaster Risk Reduction*, 31, 302-310.

NDCP (2017a). *Terremoto Centro Italia*. Retrieved from http://www.protezionecivile.gov.it/jcms/it/terremoto_centro_italia_2016.wp

NDCP (2017b). *Soluzioni Abitative: container e SAE*. Retrieved from http://www.protezionecivile.gov.it/jcms/it/soluzioni_abitative_sae_e.wp

NDCP (2017c). *Assistenza alla Popolazione*. Retrieved from http://www.protezionecivile.gov.it/jcms/it/assistenza_alla_popolazio.wp

Nigg, J. M., Barnshaw, J., & Torres, M. R. (2006). Hurricane Katrina and the flooding of New Orleans: Emergent issues in sheltering and temporary housing. *The Annals of the American Academy of Political and Social Science*, 604(1), 113-128.

Oliver-Smith, A. (1990). Post-disaster housing reconstruction and social inequality: a challenge to policy and practice. *Disasters*, 14(1), 7-19.

Olshansky, R. B., Johnson, L. A., Horne, J., & Nee, B. (2008). Longer view: Planning for the rebuilding of New Orleans. *Journal of the American Planning Association*, 74(3), 273-287.

Parrinello, G. (2015). *Fault Lines: Earthquakes and Urbanism in Modern Italy*. Berghahn Books.

Quarantelli, E.L. (1982). Sheltering and Housing after major community disasters: Case studies and general observations. *Final Report for Federal Emergency Management Agency Washington, D.C. 20472*.

Quarantelli, E.L. (1995). Patterns of sheltering and housing in US disasters. *Disaster Prevention and Management: An International Journal*, 4(3), 43-53.

Rafieian, M., & Asgary, A. (2013). Impacts of temporary housing on housing reconstruction after the Bam earthquake. *Disaster Prevention and Management: An International Journal*, 22(1), 63-74.

Saitta, P. (2013). *Quota zero. Messina dopo il terremoto: la ricostruzione infinita*, Donzelli, Rome.

Valensise, G., Tarabusi, G., Guidoboni, E., & Ferrari, G. (2017). The forgotten vulnerability: A geology-and history-based approach for ranking the seismic risk of earthquake-prone communities of the Italian Apennines. *International Journal of Disaster Risk Reduction*, 25, 289-300.

Ventura, S. (2013). *Vogliamo viaggiare, non emigrare. Le cooperative femminili dopo il terremoto del 1980*. Officina Solidale, Avellino.

Yi, H., & Yang, J. (2014). Research trends of post disaster reconstruction: The past and the future. *Habitat International*, 42, 21-29.

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