WHITE PAPER

How to create resilient recovery after disasters via Schools

(Based on interventions concerning the 2018 Sulawesi Earthquake and Tsunami)

MARCH 2024

UCL EPICentre TDMRC TSUNAMI AND DISASTER MITIGATION RESEARCH CENTER

GCRF Global Challenges Research Fund

UKRI Economic and Social Research Council

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Authors (all academics from UCL, UK and TDMRC and Tadulako University, Indonesia)

Helene Joffe, Priti Parikh, Tiziana Rossetto, Carmine Galasso, Ella Meilianda, Sukiman Nurdin, Elinor Parrott, Emily-Marie Pacheco, Martha Lomeli-Rodriguez, Andrea Bernardino, Margarita Garfias Royo, Imaduddin Ahmed, Eyitayo Opabola, Alfi Rahman, Yulia Direzkia, Yunita Idris, Ibnu Rusydy

This White Paper sets out **the existing evidence for creating resilient recovery after disasters such as earthquakes, tsunami and landslides. It shows how to intervene to change psycho-social, water and sanitation hygiene (WASH) and physical infrastructure resilience, focusing on how *practices within schools* can be changed to make students and their teachers more resilient to future disasters**.

Our central goal is to integrate our work into the safeguarding training that already exists in Indonesian schools. We hope this White Paper will be of use to the National Agency for Disaster Management, the Ministry of Health and the Ministry of Education and Culture.

This paper, comprised of *Psycho-Social*, *WASH*, and *physical infrastructure* sections, provides the **recommendations** that we have established, along with some **background information** on **how we alighted on these recommendations.**

The work in the psycho-social, WASH and infrastructure domains was united by:

1. Incorporation of the **perspective of the beneficiaries** of the interventions [school principals benefiting from structural and WASH changes in schools; students benefiting from less taboo concerning WASH and more knowledge of how to foster their own psycho-social resilience].
2. Trying to ensure the **sustainability** of the intervention [by incorporation into the school curriculum of psychosocial interventions with students and teachers, and WASH/structural interventions for the school as a whole].
3. A **focus on group-based activities**, rather than individual interventions [psycho-socially this is very important, as importing Western models has led to the use of individual therapies that may not be most beneficial in this context. A move to group-based activities can also facilitate reaching more people in a cost-effective way].

This **report is important insofar as it makes evidence-based suggestions for what we can do to build resilient recovery via school hubs post-disaster.**

RECOMMENDATIONS FOR FOSTERING PSYCHO-SOCIAL RESILIENCE IN SCHOOLS POST-DISASTER

From the perspective of disaster survivors across various emergency settings in lower and lower-middle-income countries, psycho-social support is regarded as most important for building community resilience (Murphy et al., 2018).

Yet, to date, the ASEAN school frameworks for resilience have not integrated the psycho-social and WASH aspects (see Pacheco et al. 2021). This project set out to develop these two crucial areas for disaster recovery.

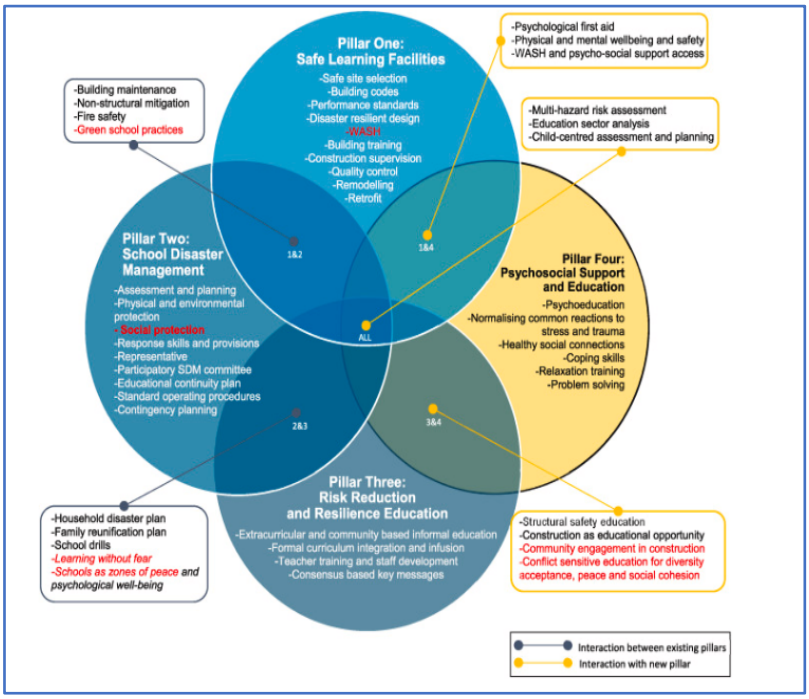


Figure 1. Adapted ASEAN schools framework with the proposed pillar Four to introduce psycho-social support and integration of WASH into pillar One (Pacheco et al. 2021)

Regarding the psycho-social aspect, we examined **how teenage girls, their caregivers (usually a parent), and their teachers coped** with the 2018 earthquake/tsunami/landslide and what they saw the **role of the school** to be. This formed the basis of two interventions: one with the teenage girls and one with their teachers, with the aim of increasing psycho-social resilience for both groups. Here we report the assessment of how both groups coped, how we intervened to increase their coping and, on this basis, we provide recommendations for increasing psycho-social resilience.

LESSONS LEARNED FROM EXAMINING HOW THE STUDENTS AND TEACHERS COPED POST-DISASTER

A. STUDENTS

How the teens coped

The teens coped primarily by:

1. **gaining social support** (e.g. 'getting rid of trauma by spending time with my family')
2. **keeping calm** (e.g. 'your mind needs to be calm')
3. **using religion** (e.g. praying)

The role played by schools for the teens

Students tend to feel a strong sense of attachment to their schools – this includes a feeling of belonging and other positive emotions (Pacheco et al., 2022).

The following were the most important elements of schools for the teens post-disaster:

1. **Being with friends** (e.g. playing, sharing stories)
2. Gaining **positive emotional experiences** (e.g. feeling happy, no longer afraid)
3. Getting **access to positive practical experiences** (e.g. trauma healing workshops)

B. TEACHERS

How teachers coped

The teachers coped primarily by:

1. **gaining social support** (e.g. 'Sharing stories with other people to reduce the anxiety I felt')
2. **using religion** (e.g. praying for protection and well-being)
3. **using inner psychological resources** (e.g. Inner strength)

How did teachers felt the teens could be helped to recover resiliently?

1.Teachers' key role was to **provide social and emotional support** post-disaster
Yet:
2. **Many teachers felt they lacked post-disaster psychosocial support for themselves**
3. They **experienced panic and trauma triggers**
4. They **found it difficult to support some of the students**

Having examined how students and teachers coped with the disasters, we intervened, successfully, with both the students and the teachers to improve their disaster resilience. The student intervention was a song-based intervention, which also included mindfulness and tree of life activities. Mindfulness and tree of life activities were also used in the teacher intervention, though it also included how to support the psycho-social resilience of students and themselves.

TECHNICAL RESOURCES AND TOOLS

A. STUDENTS

The intervention for students

How disaster resilience can be improved for students

Psycho-social interventions that work

Interventions for students (aged 13-16)

Drawing together how teens in our study coped and the existing literature on how to create resilient recovery, our intervention aimed to instil six principles of resilient recovery:

- **Mutual help ('gotong royong')**
- **Opening up to support [from friends, family and teachers]**
- **Accepting that you have good days and bad days**
- **Playing with friends to recover**
- **Breathing to stay calm**
- **Believing that Palu is strong – 'Palu rise'**

We used these in our **music-based interventions, where teens created songs to express what had worked for them and others in building their resilience since the disaster** to help them become more resilient. The **following four activities were run over a one-day workshop** facilitated by psychologists, a social scientist and two music creation specialists:

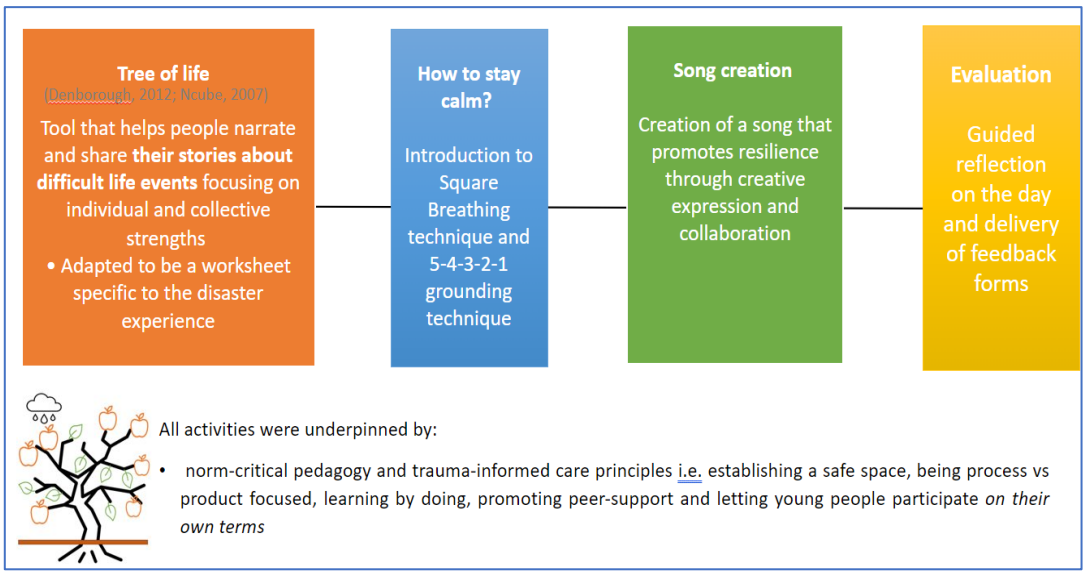


Figure 2. Student intervention activities

Why we used song: The power of songs

Evidence shows that singing is associated with beneficial physiological and psychological effects such as decreased negative affect and anxiety (Sanal & Gorsev, 2014; Caetano et al., 2019)

Moreover, singing in groups has been associated with the promotion of social bonding, the experience of feelings of belonging, inclusion and connectivity as well as positive affect – all of which yield health and well-being benefits (Pearce et al., 2015, 2016; Weinstein et al.,2015)

In the context of disaster-related resilience in Indonesia, song has been used as a powerful tool for risk awareness, risk communication and disaster preparedness (e.g. 'Smong song' (Sutton et al.2020)), providing evidence for the use of the song as both efficient and culturally appropriate

B. TEACHERS

How teachers can improve disaster resilience

Interventions for teachers

For teachers to support students, they need to know what is happening in the minds of their students post-disaster, the importance of their role in their students' eyes and how to foster resilience in both themselves and their students.

We developed **five principles to help teachers foster resilient recovery in their students** based on **teachers**' experiences and the existing evidence base.

We aimed to promote these principles through our teacher intervention:

- **Knowing how to manage intense feelings**
- **Seeing disaster recovery as an opportunity for growth and hope**
- **Finding strength in sharing talk (Tutura)**
- **Complementing prayer with actions to promote well-being**
- **By supporting yourself you will increase your capacity to support students**

To achieve these aims the following programme of activities constituted the teacher intervention:

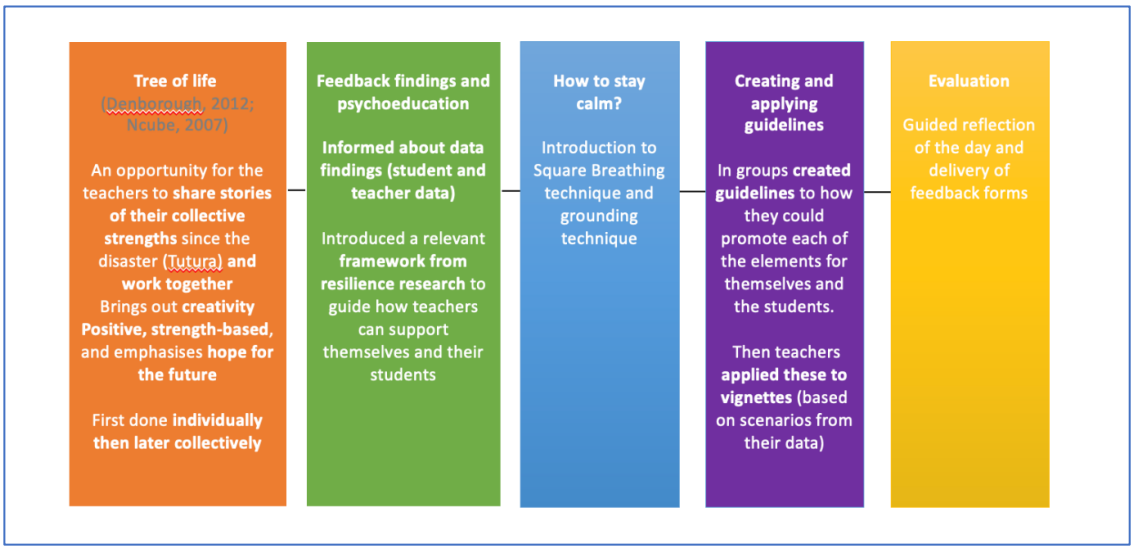


Figure 3. Teacher intervention activities

A tree of life was created (one per school) depicting teachers' disaster experiences and the different sources of strength they could draw on to support their recovery after the disaster. Engaging in such artistic practice is itself therapeutic. The Tree of Life was also used to **memorialise the disaster by displaying it in the school.**

Figure 4. Tree of Life created by teachers

Teachers used what they had reflected on during the day to develop guidelines for supporting themselves and students. The guidelines were structured by a well-evidence framework of recovery (Hobfoll et al., 2007):

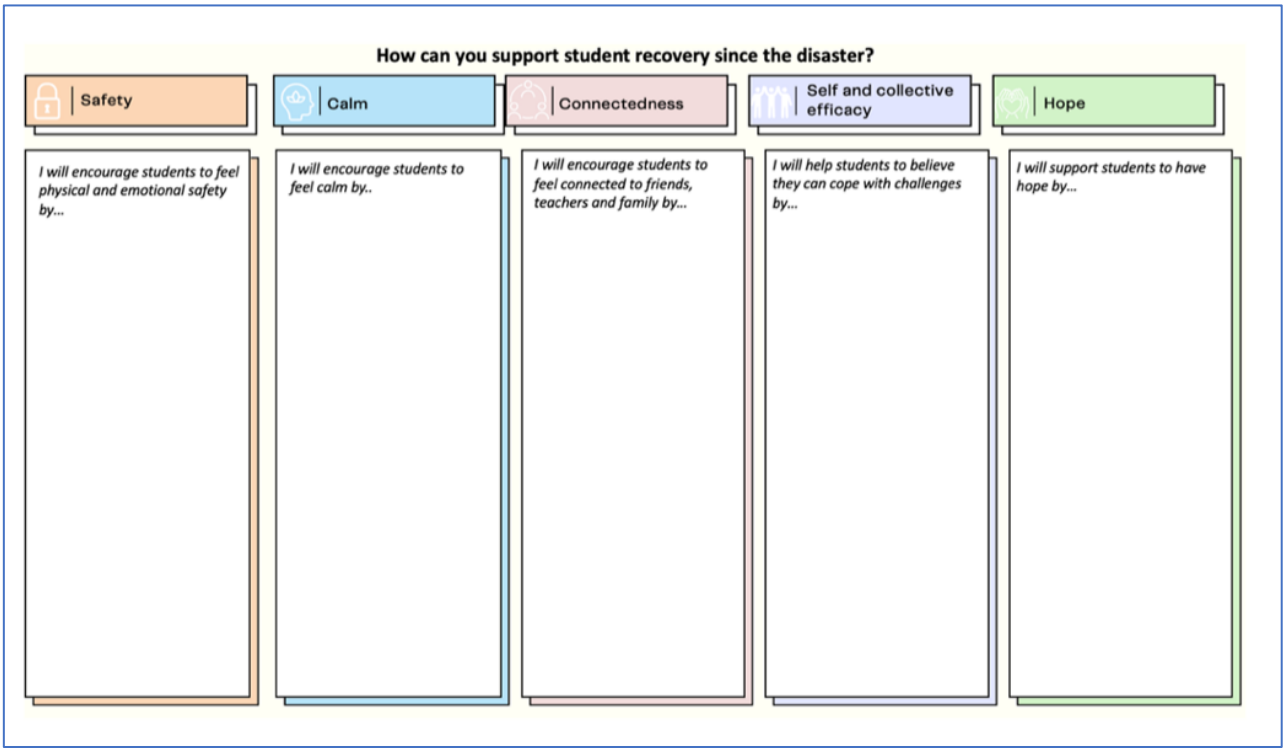


Figure 5. Teacher guidelines worksheet

Teachers were then supported by psychologists to collectively problem-solve how to best deal with scenarios that may trigger panic/trauma in themselves and students, such as:

> *"During teaching a class, a large truck drives past outside. The movement of the truck causes the building to shake. Before the 2018 disaster, this would have felt normal so no one would have noticed. However, the shaking reminds the teacher of the disaster so startles them and they can feel themselves panicking. Some students exchange worried looks. The teacher feels their hands shaking, even though the truck has now gone by."*

They were helped to think about how to support themselves and their students in the face of such scenarios, using the evidence-based guidelines (i.e. safety, calm, connectedness, efficacy, hope)

EVALUATION OF THE IMPACT OF THE STUDENT INTERVENTION ON THE STUDENTS

The song and other aspects of the intervention that led to it made the students feel a **host of positive feelings and no negative feelings:**

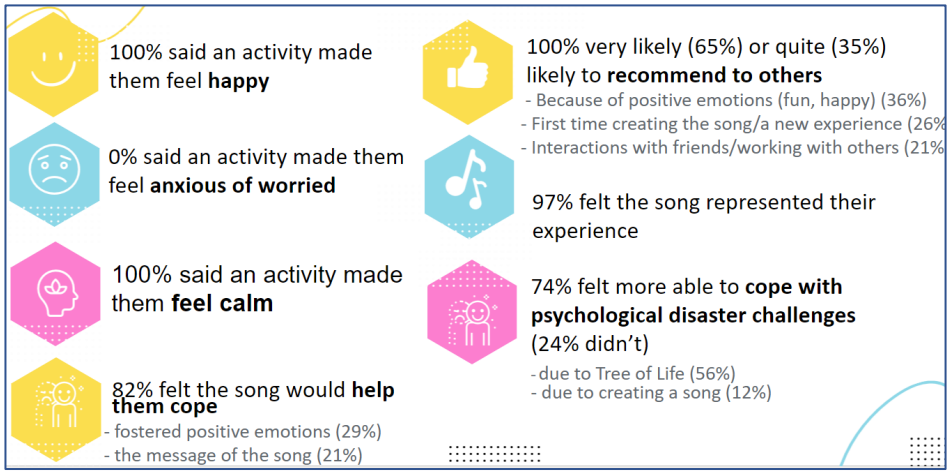


Figure 6. Student intervention feedback form results

The challenge was to **sustain such effects**, which we did via **follow-up workshops** where they made **collages to animate their songs** and kept in touch via a **WhatsApp group**. During the intervention workshops, an observing researcher identified student role models who played an influential role among their peers. These role models then supported the perpetuation of the song in the collage workshops and on WhatsApp, based on evidence that young people look to influential peers to guide what is socially normative (Paluck et al., 2016).

Students who participated in the workshop were gifted with reminders. Students each received a mug, tote bag and t-shirt featuring their school's song lyrics.

Figure 7. Reminders gifted to students

After this process, we looked for changes in the students by comparing post-intervention measures to their measures at baseline. Overall, two months after the song creation intervention, the students attributed the disaster to God significantly less, used meditation or prayer significantly less and perceived themselves to have significantly less social support from family.

One year after the baseline assessment, the following were the significant changes: a decrease in PTSD (post-traumatic stress disorder) symptoms, a reduction in fatalism and anxiety, and an increase in the sense of peer support.

We concluded that intervening beyond the immediate aftermath of a disaster is essential for young people's recovery.

EVALUATION OF THE IMPACT OF THE TEACHER INTERVENTION

We wanted to ensure the sustainability of the teacher intervention beyond the day. To do so, we created reminders (tote bags and mugs) and a WhatsApp group for the teachers, with role models identified on the day being tasked with sustaining the intervention.

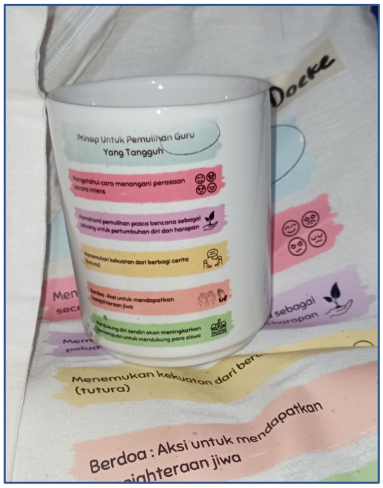


Figure 8. Reminders gifted to teachers

Local designers were commissioned to **make posters** of each of the teachers' guidelines (both for themselves and their students) and of the Tree of Life, to be displayed in their schools. These are the posters that were produced – one with information and one more visually pleasing, for each school:

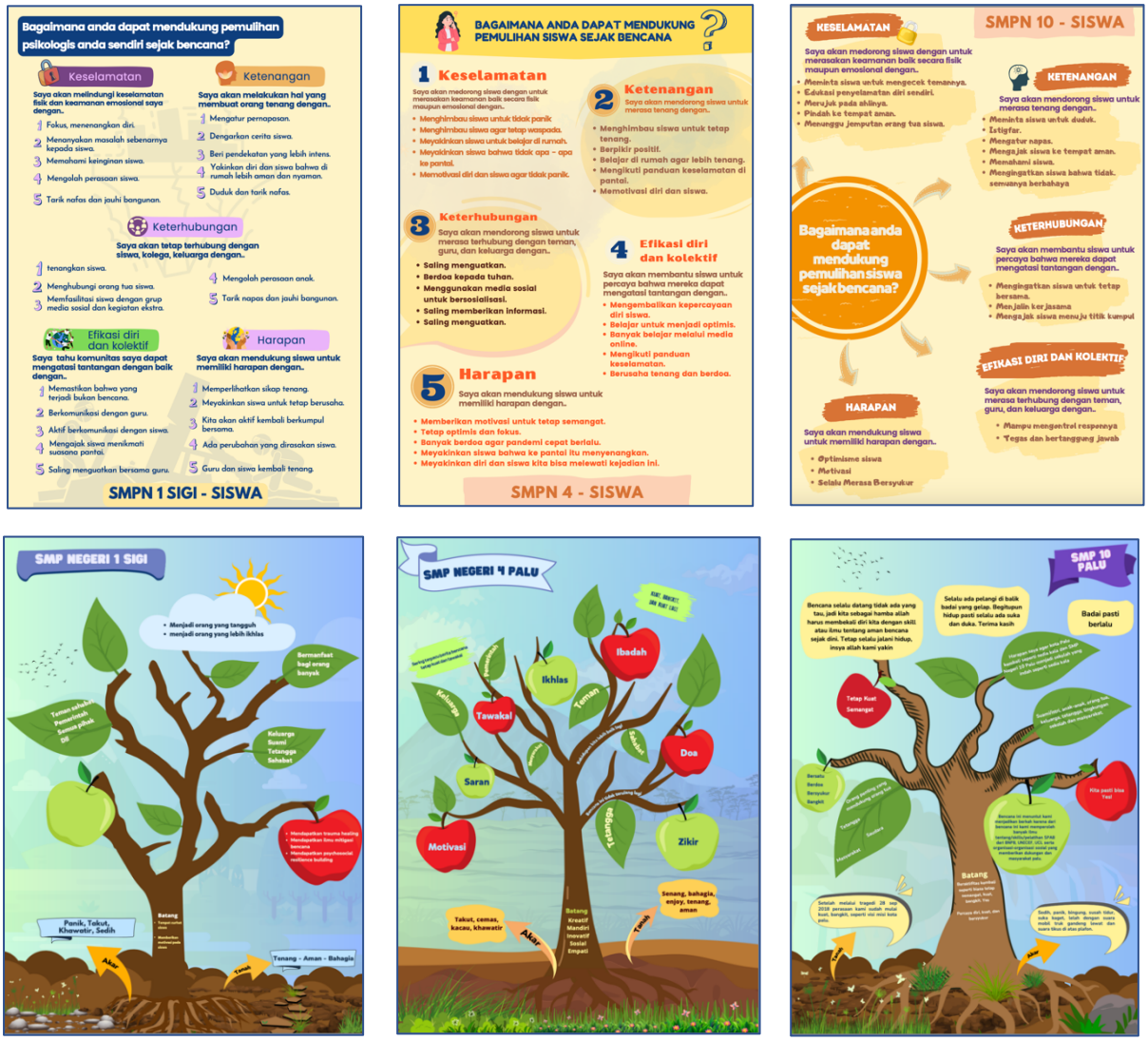


Figure 9. Posters displayed in schools

We looked at changes in teachers after this process by comparing post-intervention measures to their measures at baseline. Teachers from three disaster-affected schools participated in a one-day workshop exploring collective strengths and strategies to develop their own and their students' post-disaster resilience. There were significant improvements in the teachers' sense of personal resilience, community resilience, social support, adaptive coping strategies, psychological help-seeking, earthquake anxiety, post-traumatic stress, complex post-traumatic stress and fatalism. In addition, answers to open-ended survey questions indicated that most teachers reported subjective improvements in their recovery and capacity to support students psychologically.

Implications and recommendations

1. Disasters live on in the minds of their sufferers for decades. Thus such interventions are useful even when not directly after the disaster
2. Important to have skilled psychologists present for interventions with teens and teachers as the content can bring emotions to the surface
3. Song creation is a very effective way of fostering resilience in teens
4. Group work is valued - it is both engaging and an efficient way of conveying principles - can reach more people than the 1:1 methods often used by clinical psychologists
5. Important to provide a space for teachers to engage in collective storytelling, and this is faciliated by a collective Tree of Life activity
6. There needs to be time for focusing on teachers' own psychosocial needs and on how they can support their students

RECOMMENDATION FOR FOSTERING WASH RESILIENCE IN SCHOOLS POST-DISASTERS

Young people's experiences of psychological distress may be exacerbated by inadequate water, sanitation and hygiene (WASH) facilities after a disaster (Pacheco et al., 2021)**, with girls likely to experience further emotional barriers to returning to school due to WASH issues** (Garfias Royo et al., 2022). Lack of water availability, non-working or dirty sanitation facilities and no provision of menstrual hygiene products can negatively impact schoolgirls as a result of societal and biological factors (Garfias Royo et al., 2022; van der Gaag, 2013).

We **assessed the condition and perceptions of WASH facilities in schools to understand how resilience can be fostered**. We examined WASH through mixed methods, using observations, structured interviews with school principals, surveys with schoolgirls and focus group discussions with schoolgirls and teachers. We then designed interventions to increase WASH and Menstrual Hygiene Management (MHM) awareness and increase the safety of sanitation facilities.

WASH Interventions that Work

According to UNICEF, WaterAid and WSUP (2018), female-friendly toilets must:

1. **Be safe and private with clearly marked female toilets that have a separate entrance, good lighting and robust private cubicles with functioning doors and inner locking mechanisms.**
2. **Cater for menstrual and other hygiene needs by providing water, soap, hooks, mirrors, access to menstrual products and means for washing, changing and/or disposing of menstrual products.**
3. **Be accessible and available when needed, through ensuring that toilets have accessible paths and enough cubicles to avoid long queues.**
4. **Be well maintained and managed through adequate management arrangements, allocation of maintenance and cleaning budget and safe waste solutions.**

Responding to MHM, especially in emergencies, requires consideration of the needs of girls (Sommer et al., 2017) (see Figure 10). for hierarchy of needs, from the most basic at the bottom to the ideal at the top). These include the need for basic materials and supplies to safely and adequately manage WASH needs, practical information on basic hygiene and menstrual hygiene practices, safe facilities in good condition and addressing harmful cultural norms and taboos to encourage a supportive environment.

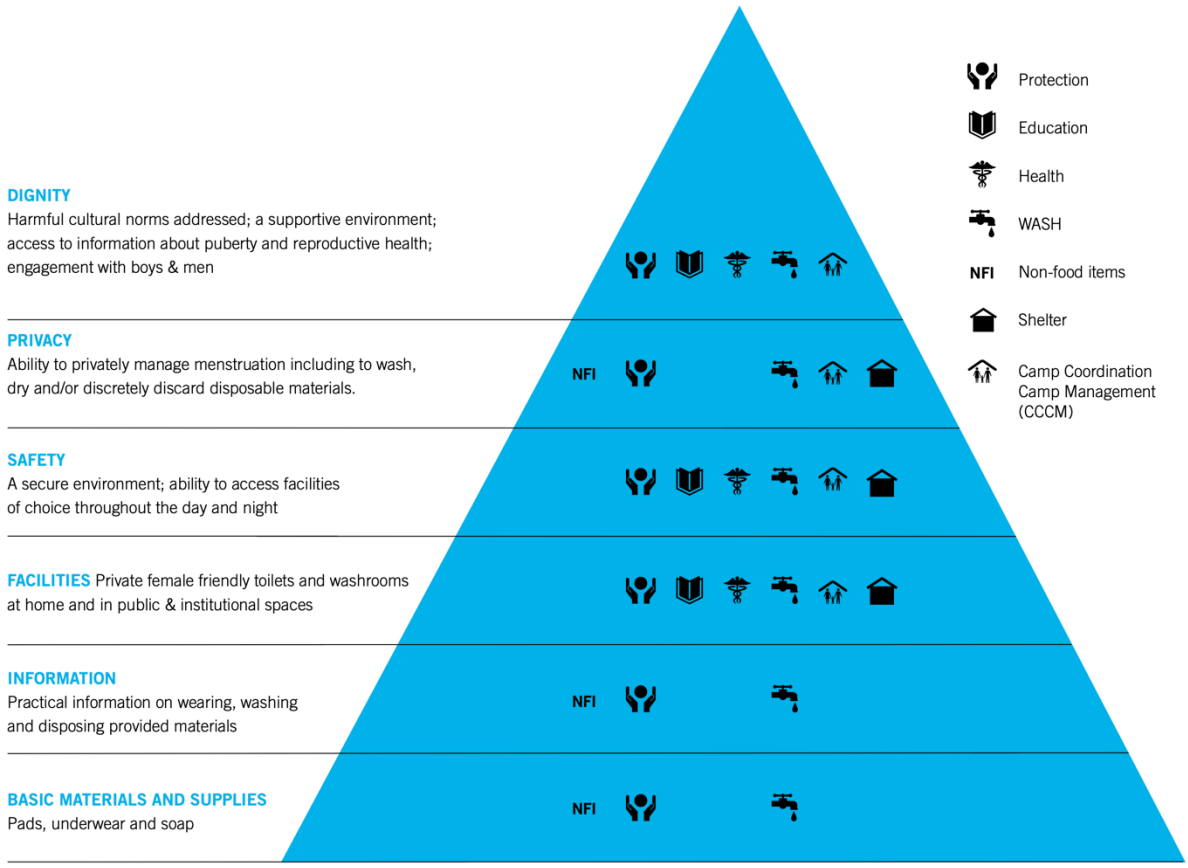


Figure 10. Hierarchy of WASH and MHM needs (Sommer et al., 2017).

The three key components for an effective humanitarian WASH and MHM response include:

1. Materials and supplies

2. Supportive facilities

3. Information

Figure 11. Essential components of WASH and MHM response (Sommer et al., 2017).

Identified Challenges

Against the backdrop of this knowledge, the 'Resilient School Hubs' research set out to determine what the **specific needs were in Palu**, Indonesia, post – earthquake/ tsunami/landslide. The results of our observations, interviews with school principals, surveys with schoolgirls and focus group discussions with schoolgirls and teachers showed that across schools there was **a culture of littering**, **antisocial behaviour** and **bullying** by opening toilet doors while the facilities were occupied, and among a third of schools, fixes post-disaster were inadequate, not allowing schools to deliver WASH services as well as they had before the disaster. There was also felt to be a need to **increase awareness of the importance of toilet cleanliness and MHM**; these would go some way to helping teenage girls to **manage their feelings of shame and disgust** experienced while using toilets at school during the period of menstruation.

How WASH Resilience can be Improved

To address the identified WASH-related challenges, **we designed two types of interventions to be tested in 3 schools: physical and behavioural interventions**. The aim of our WASH interventions was **to foster a supportive and private environment where schoolgirls feel safe to use the toilets and to change menstrual products at school, stopping antisocial behaviour such as opening doors while people are inside as well as discouraging littering around school**. These measures form a part of resilient recovery from the disruption of disasters as well as being needed in an ongoing way.

BOX 1. Physical interventions for the schools

We provided schools **with lidded bins and locks** to install inside the toilet doors, a cost-effective and easy-to-implement intervention. Lidded bins were provided to ensure safe disposal of menstrual products and encourage privacy for girls to feel safe to change menstrual products at school. Including lidded bins or similar disposal mechanisms within the cubicles of school toilets could help reduce missed school days (Oduor et al., 2015). Building on existing work in the field (e.g. Sommer et al., 2017), the lidded bins should be installed inside each cubicle for privacy in disposing of menstrual products' and attention should be paid to the shame that surrounds menstrual hygiene in all messaging. The locks can additionally provide safety against bullying through physically preventing doors being opened from the outside.

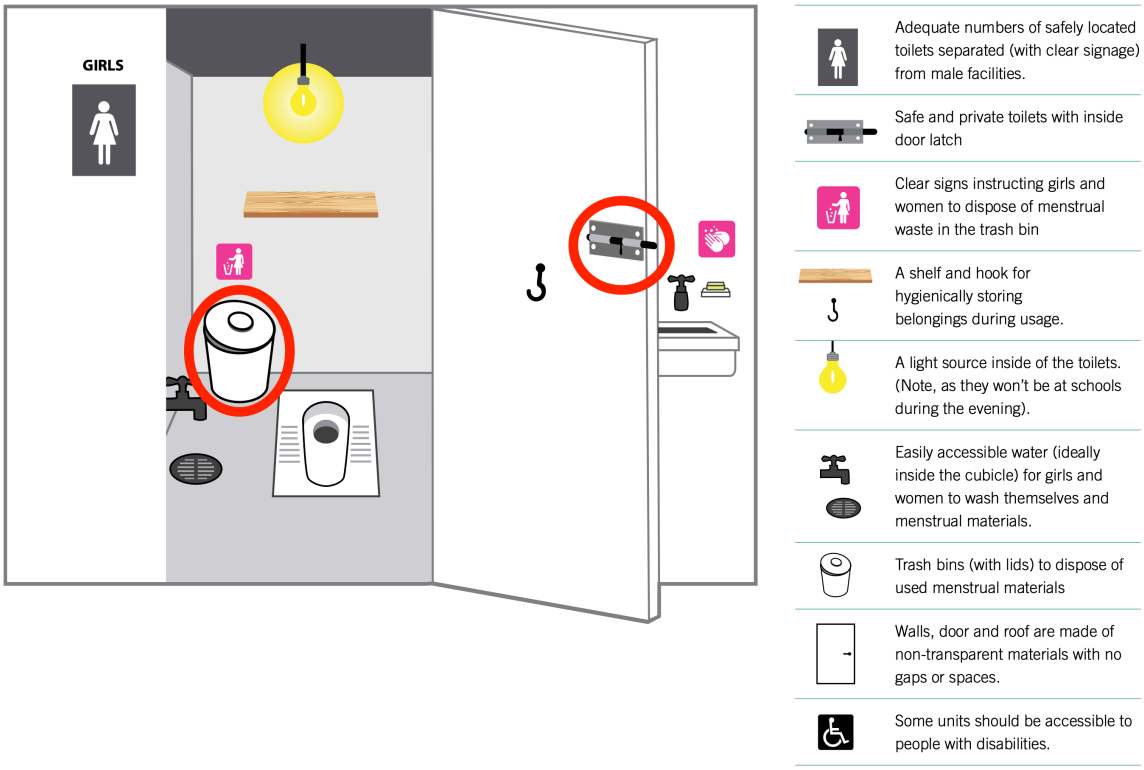


Figure 12. Example of a female-friendly toilet (Sommer et al., 2017).

BOX 2. Behavioural interventions for schoolgirls

We designed **workshops to create posters for awareness of cleanliness and anti-bullying concerning toilet use, as well as to provide information on menstrual hygiene management**. The workshops were held with schoolgirls in 7th and 8th grade. The schoolgirls were asked to create a poster on each of the topics in groups and to present their poster to the larger group, in the hope of starting conversations and raising awareness among students on these topics.

Figure 13. Girls in the poster-making sessions.

BOX 3. Evaluating the physical and behavioural interventions

We used a small sample of 30 girls in 3 schools (10 girls per school) to evaluate whether our interventions were effective. Our evaluation results gave us an idea of whether girls noticed the interventions, whether the schools announced the interventionsand whether the schools implemented or maintained the interventions. This was useful for future interventions.

All schools initially installed the bins in the bathrooms, and the research team was only able to observe that one school installed the latches. However, it was not possible to follow up with schools whether the bins had been kept in place, and whether the remaining 2 schools had installed the latches. Girls in only 1 out of the 3 schoola noticed that latches had been installed; they felt considerably safer because of this. Even though only 20% of girls noticed that bins were installed, most of the girls that noticed them started using the bins after their installation.

BOX 3. Evaluating the physical and behavioural interventions (cont.d)

The intention of the posters made by students was to display them somewhere in the school, as part of raising awareness of issues of shame and disgust concerning menstruation, safety in toilets and littering around school. We found, however, that only one school displayed the posters. We are unsure if this is because the poster images that the girls made were felt to be too shameful to put up or if other school dynamics were at play (for example, the school not being aware that the agreement was for the posters to be displayed).

In the school that displayed the posters and installed locks in toilets doors, girls reported higher levels of shame, fear and disgust. So, further research needs to be conducted on whether higher levels of awareness of menstrual hygiene management lead to higher self-reported feelings of shame, fear and disgust, whether there was something else in the school environment that led to girls feeling this way or if this particular cohort had higher levels of shame, fear and disgust despite the interventions.

Our study points to the vital need for follow up work with schools if interventions are to be carried out. Better approaches for WASH interventions in schools can only be designed if we understand barriers to carrying out interventions and their maintenance. Some examples include having a WASH coordinator teacher or selecting girl role models to communicate with teachers whether the interventions are being maintained or the status of the cleanliness of the toilets. In future, there needs to be a thorough evaluation of WASH intervention processes to understand how girls feel about making the posters, what they think about the information presented in thesession (in this case, awareness of MHM, littering and bullying) and if a poster-making session and subsequent display of the poster has an impact on their feelings of shame and disgust.

Implications and Recommendations

1. It is key to build toilets that are clean, safe and allow users to have privacy, including making sure that toilet or cubicle doors close correctly, without gaps and have secure locks
2. It is necessary to ensure water availability, space for changing and/or washing menstrual materials and convenient and private disposal options (e.g. lidded bins in each cubicle) that encourage schoolgirls to use toilets at school
3. It is not always possible to rebuild WASH facilities post-disaster, but some fixes are relatively practical and cost-efficient, such as installing lidded bins, changing locks and setting up a cleaning schedule
4. It is important to follow up and support schools to encourage application of improvements and maintenance. This includes funding the necessary changes, following up on whether interventions were carried out, and if so, what works and what does not
5. Schools should announce and communicate interventions to students, to encourage participation and awareness
6. It is important to include teachers and school management in interventions. For example, for the poster making exercise, while school staff should not necessarily be present while schoolgirls are designing their posters, it is important for students to present their work to teachers and school management to increase girls' sense of ownership and buy-in from the school as well as displaying the girls' work publicly in the school, to spark conversations
7. Having a WASH coordinator teacher or selecting a schoolgirl role model to communicate with teachers whether the interventions are being maintained or the status of the cleanliness of the toilets could help facilitate awareness of issues as they arise
8. Including all schoolgirls within the same school year in activities (whether asking the girls to place the bins in the toilets or in poster-making sessions) could encourage awareness and knowledge transfer

RECOMMENDATIONS FOR IMPROVED DISASTER PREPAREDNESS AND EFFECTIVE RECOVERY IN SCHOOL PHYSICAL INFRASTRUCTURE

School infrastructure plays a vital role in disaster **preparedness, response and recovery**. In a pre-disaster setting, school facilities can be used as sites for disaster **preparedness** learning activities. In post-disaster scenarios especially in the **response and recovery** stage, schools can serve as relief centres, as well as supply, storage and communication hubs. Several studies have highlighted the importance of post-disaster school continuity. There are various unintended social and economic consequences of education disruption to schools, students, teachers, their families, as well as the community at large. Hence, community resilience relies on the ability of schools to have efficient disaster preparedness and recovery management strategies.

On this basis, we carried out a series of analytical studies and stakeholder engagements (through interviews and focus group discussions) in Central Sulawesi (see Figure 14) to provide evidence-based recommendations for creating more resilient school physical infrastructure in the reconstruction of areas affected by the 2018 Central Sulawesi earthquake and tsunami.

The lessons learned and recommendations made for this event may be relevant to other areas of Indonesia, particularly those recommendations related to school physical infrastructure, as similar school construction types are present across the country.

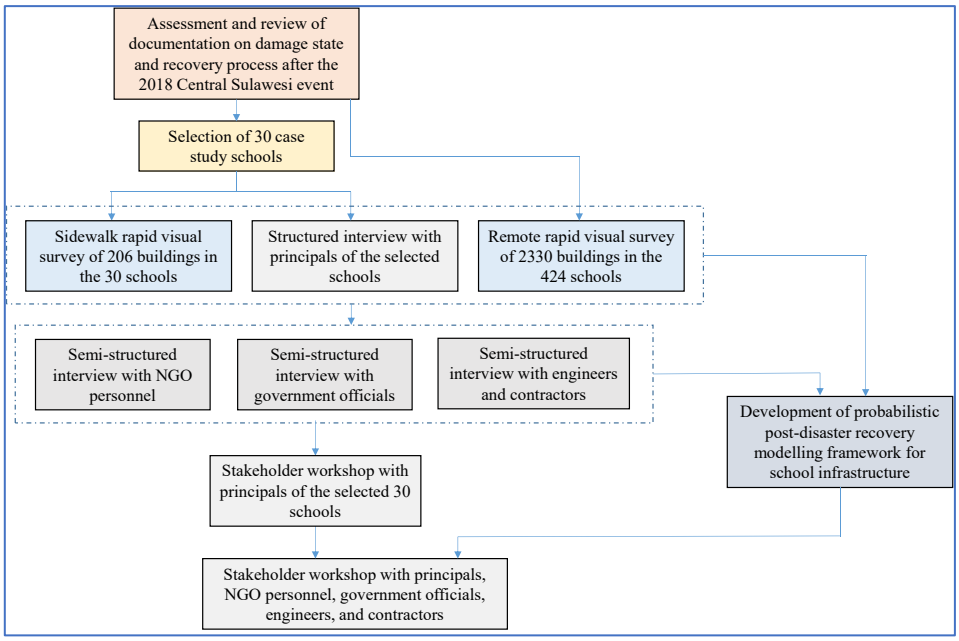


Figure 14. Flowchart of work and stakeholder engagement conducted

Outcome 1: Remote sensing, combined with targeted physical, visual screening can be used to *understand the vulnerability to natural hazards of portfolios of schools*

Rapid sidewalk screening (RVS) is a quick way of assessing a building's vulnerability based on visual inspection of its structural and non-structural systems. However, despite being rapid, RVS requires significant resources in terms of time and people to conduct surveys of large numbers of schools. In our work we have proven that due to schools being of similar construction (typical government designs are similar for schools), it is possible to collect data on school vulnerability to natural hazards using remotely collected data, such as census data or data collected from google street view, facebook and other social media. However, the remotely collected data cannot tell the full story, and needs verification with targeted rapid, visual surveys of a portion of the schools on the ground.

In the case of this project, remote screening was conducted for 424 schools in Palu, Sigi, and Donggala. This data was verified by conducting rapid sidewalk visual screening (RVS) for 30 schools, picked to represent different school types across the region. The methodology and tools for RVS are published in Opabola et al. (2022) and the database of schools developed is available here: doi.org/10.5281/zenodo.6583119.

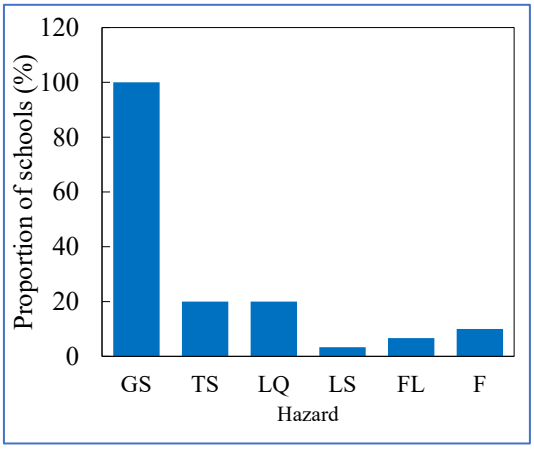
We highlight the importance of ground-based RVS in revealing particular issues related to design and maintenance of the buildings that cannot be identified from remote assessment. For example, during the RVS of the 30 schools, we identified corroded reinforcement and delaminated concrete in several school buildings. This highlights that several school infrastructures are ageing and, if not maintained and repaired, may become more vulnerable to damage from natural hazards. Also, due to poor design and construction quality, under earthquakes several buildings would be prone to out-of-plane failure of masonry infills, shear failure in captive columns, and collapse of poorly anchored roof trusses.

Recommendations:

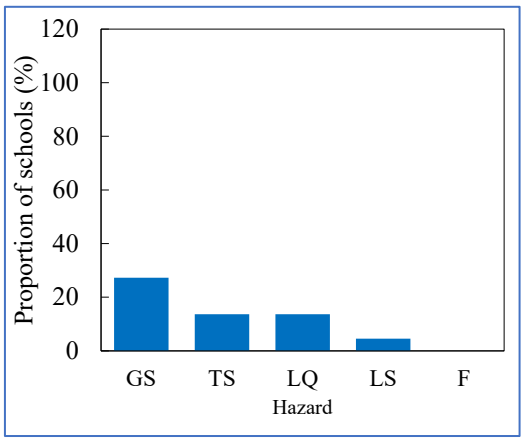
1. School databases be assembled for Indonesia through remote assessment combined with targeted RVS to understand school infrastructure vulnerability to natural hazards.
2. The regular repair and maintenance of school facilities should be regulated and enforced to maintain their strength and functionality under normal conditions and improve their performance under natural hazards.

Outcome 2: Schools should be *better prepared for evacuation* in the case of natural hazards

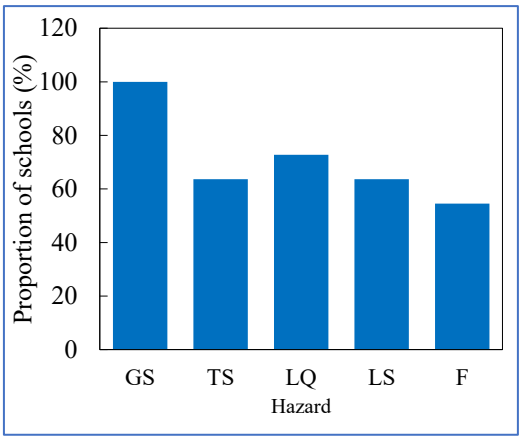
Semi-structured interviews were conducted with the principals of the 30 schools in Palu, Sigi, and Donggala to understand the link between the resilience level of the education system in the community and the disaster preparedness level for different hazards in place prior to the disaster. Figures 15 provides a graphical representation of the collated information on preparedness. Figure 15a shows that all the schools have experienced at least one hazard within the last 10 years. Despite this, Figure 15b shows that only 20% of the schools conduct frequent emergency drills (defined as minimum of one drill per school term). Also, although the majority of the schools have evacuation maps (Figure 15c), only very few have survival kits (Figure 15d). The lack of survival kits is of concern as it means that the majority of the schools do not have the capacity to provide first-aid assistance for student casualties in the event. Figure 15 suggests that the resilience level of the schools may have been impacted by the poor preparedness level. The school principals identified time and financial constraints as the key deterring factors to carrying out routine school preparedness drills.



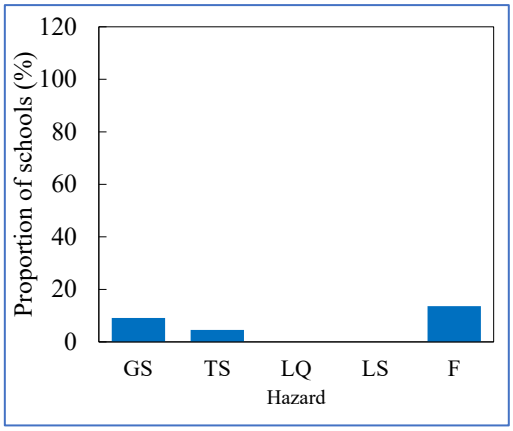
(a) Hazard history in the last 10 years



b. Schools conducting frequent drills



c. Schools with evacuation maps



d. Schools with survival kits

Figure 15. Key information on the hazard history and preparedness actions in schools (GS – ground shaking, TS – tsunami, LQ – liquefaction, LS – landslides, FL – flood, F – fire)

Outcome 2 : School should be *better prepared for evacuation* in case of natural hazards (continued)

A workshop was conducted with 20 of the school principals to promote the use of survival kits, to show them how to develop an evacuation plan for their school and to install appropriate signage for evacuation. The workshop also promoted the training of teachers and students in evacuation protocols, and consideration of students with disabilities in the formation of evacuation plans. A follow up assessment of the efficacy of this workshop in changing evacuation preparedness in schools is underway.

Recommendations:

1. School principals must dedicate a proportion of their School operational funds to emergency management.
2. Schools must have an evacuation plan and protocol that considers the possibility of different natural hazards and the needs of students and staff with disabilities. This should be reviewed regularly and school management should include teachers as well as school parent commitees in this process.
3. Each school should have survival kits, an evacuation map and should install appropriate signage to facilitate evacuation in the case of natural hazards.
4. Local government must insist on frequent drills in schools, and school management must report their drills to a government agency.
    a. All staff in schools must participate in regular evacuation training and drills, and teachers must be given responsibility for evacuation of students.
    b. Students must also participate in regular evacuation drills, and schools must communicate with parents and guardians about evacuation protocols and where to meet their children after a natural hazard event.
5. There is a need to efficiently infuse modules on disaster preparedness into the school curriculum.

Outcome 3: Faster and better school recovery can be achieved post-disaster through the implementation of *regulation, targeted funding and inclusive communication*

Interviews were conducted with government officials, engineers, NGOs and contractors to gather information on recovery delays and the stakeholders' perspectives on the success and challenges of implementing build-back better strategies in schools.

In total, two government and six NGO officials, four engineers, and two contractors were interviewed. These interviews were semi-structured, and the questions sought to understand: (a) the timeline of response and recovery activities; (b) the approach used in choosing the type and number of schools; (c) the challenges and success of the tender process; (d) which steps in the recovery process caused significant delay; and (e) the financial aspect of the recovery. The interviews highlighted the technical, socio-political, cultural, and environmental challenges in school reconstruction projects in Central Sulawesi. Key issues mentioned by the stakeholders are presented in Figure 3.

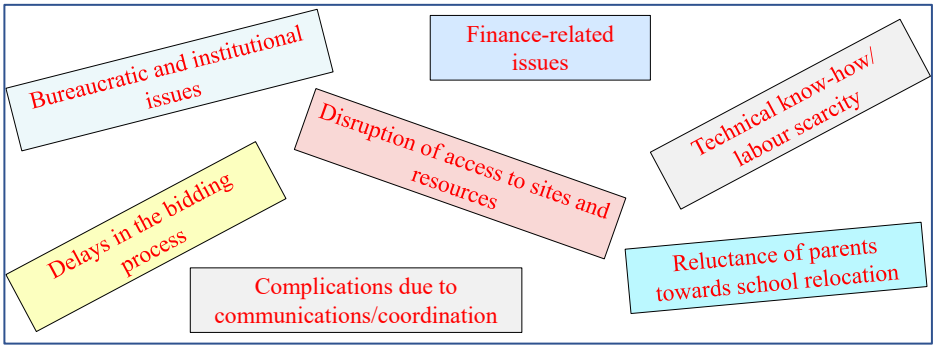


Figure 16. Common keywords from stakeholder engagement

The findings from the interviews were discussed and validated at a stakeholder workshop. This workshop was structured as a focus group discussion, allowing each participant to provide their perspectives on each question. The workshop participants include four NGO officials, four government officials, eight civil engineers and building contractors, five school principals, and 15 university academics.

We kickstarted the workshop with a series of presentations from the WP3 research team that introduced the stakeholders to the outputs of our research work and previous stakeholder engagement. We also had two academics from Tadulako University share their experiences on the post-2018 Palu earthquake recovery process. Subsequently, a set of guiding high-level questions was posed to the stakeholders. The questions were structured so that each stakeholder could discuss fundamental problems they personally faced, and the entire group could brainstorm solutions.

The general discussions were grouped into (a) effective recovery and building back better in marginalised communities; (b) understanding the vulnerabilities, risks, and uncertainties associated with disaster risk management; (c) ensuring post-disaster education continuity; and (d) understanding capacity for self-organisation, social connectedness, and empowerment. More information can be found in Opabola et al. (2023).

Outcome 3: Faster and better school recovery can be achieved post-disaster through the implementation of *regulation, targeted funding and inclusive communication* (continued)

In general, all participants agreed that recovery is not "business-as-usual" for the government, NGOs, and the entire community. Hence, it is counterproductive to rely on business-as-usual governance and policies. The influence of socio-cultural factors on recovery cannot be underestimated. There is evidence of socio-cultural factors superseding technical factors in the recovery process. An example of this is the case of a school located in the designated tsunami red zone (ZRB4), where post-disaster intervention has stalled due to the school management's unwillingness to relocate.

Recommendations:

Table 1 summarises the challenges identified through this research and the recommendations for effective preparedness and recovery management in schools. We note that these recommendations were developed together with stakeholders present at the WP3 workshop. Hence, the local context in these recommendations makes them very valuable to the government.

Table 1 – Identified challenges and recommendations for effective recovery management in schools

	Problem Category	Description	Recommendations
	Short term recovery of education		
1	Lack of sufficient temporary learning centres	Schools relied on insufficient temporary tents to enable education continuity. Apart from space congestion, students had to deal with poor ventilation, heat, rain, and wind during school hours. WASH facilities were also lacking.	Appropriate numbers of temporary learning centres and WASH facilities should be allocated within the emergency fund (e.g. the so-called 'on call' budget in the National/Provincial/District Disaster Management Agency) in case of a disaster occurs in high-risk areas.
2	Funding for schools post-disaster	Schools were not prioritised for immediate response. Instead of waiting for government or other stakeholders' help, schools adopted their operational funds (dana BOS) to conduct faster reconstruction. However, schools without such funds had delayed recovery.	The government needs to prioritise schools in early response funding mechanisms to ensure rapid education recovery.

Enabling faster and better reconstruction			
3	Delays in the bidding and procurement process (planning phase)	The highly bureaucratic and hierarchical system embedded into the bidding and procurement processes results in delays in starting projects.	The government must introduce a streamlined bureaucratic process for building approvals in a post-disaster setting.
3	Delays in construction	Significant construction delays due to lack of qualified workforce, inadequate materials, and machinery. In certain cases, some contractors were handling multiple projects simultaneously.	Skills training of workforce is needed and mechanised construction should be encouraged; Regulations should be introduced to limit the number of projects that a contractor can manage simultaneously.
4	Poor quality of construction	Lack of site inspection process; no quality control checks.	Local universities can aid with quality control tests on materials. Training of supervisory staff. Fines/sanctions should be applied to poor construction processes.
5	Problems with scalability	The modular construction technology adopted in Indonesia was originally designed for residential buildings. A number of school reconstruction projects have, however, adopted this technology without appropriate design checks. Hence, these schools may not exactly conform to the 'build back better' principles	The government must ensure approved design specifications for modular school buildings to ensure the reinforcement detailings are code-conforming.
6	Problems with relocation projects	Land acquisition issues and the unwillingness of schools to relocate from hazard-prone regions.	The government should invest in raising community awareness of the high risk of life to children when schools are located in hazardous areas.
7	Transportation of construction material to remote areas	Transportation of construction materials to remote areas was a big challenge. Precast panels for modular structures could not be transported to remote areas.	The government should incorporate transportation logistics in recovery planning. There needs to be effective planning before precast construction can occur in remote areas.

8	Legal issues	All rehabilitation and reconstruction process was controlled by the law Presidential Instruction Number 10 of 2018 concerning Acceleration of Post-Earthquake and Tsunami Rehabilitation and Reconstruction in Central Sulawesi Province and Other Affected Areas, which expired in 2020. Hence, the reconstruction process post 2020 is now based on the instruction of the loaner or funder (e.g. the World Bank).	Local governments need to be in a position to establish a law that can control the rehabilitation and reconstruction process after the expiration of the Presidential law
9	Dealing with debris	Many debris from demolished buildings could not be cleared as there were insufficient disposal sites. In some cases, there were no funds to deal with the disposal.	A plan should be established for promoting the use of recycled aggregates and other debris from demolished buildings in the reconstruction of new roads and buildings.
Improving capacity for self-organisation			
10	Lack of inclusiveness/local content	The local communities feel disappointed that the bidding process favours contractors from other regions of Indonesia who do not have local knowledge. Moreover, these contractors subcontract works to local contractors in a poorly managed process.	There has to be a mechanism to ensure local contractors have the opportunity to contribute to their own communities. Suggestions to overcome this is to suggest local government set the restriction rules to involve local contractors from the very beginning of the construction plan, design, and works.

11	Disaster management	There has been an effort to strengthen the capacity of local government in terms of self-reliance and self-organisation in anticipating future disasters, for instance, by training the responsible staff for certain positions in the disaster management agency. However, after several months, the persons were often rotated into another new office position or even moved to another department or ministry. This results in discontinuation and unsustainable competent human resources.	The government should have continuity plans tailored for disaster management agencies to ensure there are no knowledge/experience gaps within the agencies at any time. Also, the government needs to adopt simple post-disaster response frameworks/policies and ensure stakeholders at all levels are well-informed about these policies.
12	Lack of funding	The funding allocation for socialisation and dissemination of disaster risk to the community has always been minimal, and it fails to effectively implement the programs sustainably	The government should impose budget allocation in Municipality/District government annual budgeting plan for community socialisation and dissemination of disaster risk.
	Improving the structural safety of school buildings		
13	Poor information to school principals	School principals are not aware of the risk and vulnerabilities of their schools. They do not have the support and guidance from experts.	The government needs to take serious action to provide support to school administrators/managers on how to identify vulnerable structures in advance of natural hazards.
14	Ageing infrastructure	Evidence of spalled concrete cover and corroded bars in school buildings.	While enormous efforts have been devoted to new structures, the government needs to pay attention to their ageing school infrastructure. Adequate retrofit or replacement of these ageing school buildings can prevent future disasters.

Implications and recommendations

1. The regular repair and maintenance of school facilities should be regulated and enforced to maintain their strength and functionality under normal conditions and improve their performance in the face of natural hazards
2. School principals must dedicate a proportion of their School operational funds to emergency management
3. Schools must have an evacuation plan and protocol that considers the possibility of different natural hazards and the needs of students and staff with disabilities. This should be reviewed regularly and school management should include teachers as well as school parent commitees in this process
4. Each school should have survival kits, an evacuation map and should install appropriate signage to facilitate evacuation in the case of natural hazards
5. The government needs to prioritise schools in early response funding mechanisms to ensure rapid education recovery
6. The government must ensure approved design specifications for modular school buildings to ensure the reinforcement detailings are code-conforming

References

Caetano, K. A. D. S., Ferreira, I. M., Mariotto, L. G., Vidal, C. L., Neufeld, C. B., & dos Reis, A. C. (2019). Choir singing as an activity to manage anxiety and temporomandibular disorders: Reports from a Brazilian sample. *Psychology of Music*, *47*(1), 96-108.

Garfias Royo, M., Parrott, E., Pacheco, E., Ahmed, I., Meilianda, E., Kumala, I., Oktari, R. S., Joffe, H., & Parikh, P. (2022). A Structured Review of Emotional Barriers to WASH Provision for Schoolgirls Post-Disaster. *Sustainability*, *14*(4), 1–20. https://doi.org/https://doi.org/10.3390/su14042471

Hobfoll, S. E., Watson, P., Bell, C. C., Bryant, R. A., Brymer, M. J., Friedman, M. J., ... & Ursano, R. J. (2007). Five essential elements of immediate and mid–term mass trauma intervention: Empirical evidence. *Psychiatry*, *70*(4), 283-315.

Oduor, C., Alexander, K. T., Oruko, K., Nyothach, E., Mason, L., Odhiambo, F. O., Vulule, J., Laserson, K. F., & Phillips-Howard, P. A. (2015). Schoolgirls' experiences of changing and disposal of menstrual hygiene items and inferences for WASH in schools. *Waterlines*, *34*(4), 397–411. https://doi.org/10.3362/1756-3488.2015.037

Opabola, E.A., Galasso, C., Rossetto, T., Nurdin, S., Idris, Y., Aljawhari, K. and Rusydy, I., 2022. A mixed-mode data collection approach for building inventory development: Application to school buildings in Central Sulawesi, Indonesia. *Earthquake Spectra*, *38*(4), pp.2901-2921.

Opabola, E.A., Galasso, C., Rossetto, T., Meilianda, E., Idris, Y. and Nurdin, S., 2023. Investing in disaster preparedness and effective recovery of school physical infrastructure. *International Journal of Disaster Risk Reduction*, *90*, p.103623.

Pacheco, E. M., Bisaga, I., Oktari, R. S., Parikh, P., & Joffe, H. (2021). Integrating psycho-social and WASH school interventions to build disaster resilience. *International Journal of Disaster Risk Reduction*, *65*(August), 102520. https://doi.org/10.1016/j.ijdrr.2021.102520

Pacheco, E. M., Parrott, E., Oktari, R.S. & Joffe, H. (2022). How schools can aid children's resilience in disaster settings: the contribution of place attachment, sense of place and social representations theories. *Frontiers in psychology*, 13.

Paluck, E. L., Shepherd, H., & Aronow, P. M. (2016). Changing climates of conflict: A social network experiment in 56 schools. *Proceedings of the National Academy of Sciences*, *113*(3), 566-571.

Pearce, E., Launay, J., & Dunbar, R. I. (2015). The ice-breaker effect: Singing mediates fast social bonding. *Royal Society open science*, *2*(10), 150221.

Pearce, E., Launay, J., Machin, A., & Dunbar, R. I. (2016). Is group singing special? Health, well-being and social bonds in community-based adult education classes. *Journal of community & applied social psychology*, *26*(6), 518-533.

Sanal, A. M., & Gorsev, S. (2014). Psychological and physiological effects of singing in a choir. *Psychology of Music*, *42*(3), 420-429.

Sommer, M., Schmitt, M., & Clatworthy, D. (2017). *Menstrual Hygiene Management (MHM) Into Humanitarian Response: The Full Guide*. https://reliefweb.int/report/world/toolkit-integrating-menstrual-hygiene-management-mhm-humanitarian-response

Sutton, S. A., Paton, D., Buergelt, P., Meilianda, E., & Sagala, S. (2020). What's in a name?"Smong" and the sustaining of risk communication and DRR behaviours as evocation fades. *International Journal of Disaster Risk Reduction*, *44*, 101408.

UNICEF, WaterAid, & WSUP. (2018). *Female-Friendly Public and Community Toilets: A Guide for Planners and Decision Makers*. https://washmatters.wateraid.org/female-friendly-toilets

van der Gaag, N. (2013). *Because I am a Girl: The State of the World's Girls 2013 – In Double Jeopardy: Adolescent Girls and Disasters*. New Internationalist Publications ltd. https://plan-international.org/publications/the-state-of-the-worlds-girls-2013-adolescent-girls-and-disasters/

Weinstein, D., Launay, J., Pearce, E., Dunbar, R. I., & Stewart, L. (2016). Singing and social bonding: changes in connectivity and pain threshold as a function of group size. *Evolution and Human Behavior*, *37*(2), 152-158.