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Reflections on measuring the soundness of the digital storytelling method applied to three Cape Flats vulnerable communities affected by drought, fire and flooding in Cape Town

Tsitsi Jane Mpofu-Mketwa^{a,*}, Amber Abrams^a, Gillian Frances Black^b

^a Future Water Institute, New Engineering Building, 1 Madiba Circle, Upper Campus, University of Cape Town, Cape Town, South Africa

^b Sustainable Livelihoods Foundation, 16 Ebor Road, Wynberg, Cape Town, South Africa

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ABSTRACT

Aligned to the Sendai framework, the *UKRI GCRF Water and Fire* research project aims to co-produce knowledge with residents of three vulnerable communities in the Cape Flats area of Cape Town to generate adaptive solutions that strengthen resilience against the environmental disasters of drought, flooding and fire outbreaks. To achieve this aim, the research team employed household surveys and participatory visual methods including digital storytelling (DST), community mapping and photovoice with residents of three affected communities. This paper focuses on validating the DST method used in the 'Water and Fire' project and interrogates how well the DST process conforms to six types of validity, namely, participatory, intersubjectivity, catalytic, contextual, ethical and empathic validity as guided by the International Collaboration for Participatory Health Research (ICPHR). Twenty-five digital stories on the overarching theme of resilience were produced by 25 Cape Flats residents.

We suggest that participatory validity was achieved through participants making decisions about the stories and details they wanted to share. Intersubjective validity was fostered by involving community advisory members in DST process design, through co-conceptualizing resilience with participants and by evaluating the DST experience. Catalytic validity was achieved when participants screened their digital stories in shared learning spaces to convey how they respond to and live with disasters at numerous community and policy engagement events. Contextual validity was met by exploring relevant environmental disasters affecting the Cape Flats communities. Ethical validity was attained by creating safe and supportive spaces, enabling dynamic informed consent and transferring ownership of the digital stories to the story tellers. Connecting participants through collective sharing of individual disaster experiences, lessons-learned and adaptive strategies fostered empathy.

We recommend complementing DST methods with other research methods like surveys, and focus group discussions, while evaluating the transformative potential of the DST process and stakeholder engagement events, to enable better catalytic validity. We advocate for collaborative and inclusive approaches with vulnerable communities alongside stakeholders and statutory bodies in multi-stakeholder engagement events. We conclude that digital stories are an effective and valid conduit for knowledge co-production with vulnerable communities in the context of climate change resilience as these methods create opportunities for affected communities to raise their concerns and share their experiences.

1. Introduction

Building community resilience against social impacts of climate change continues to be an aim of the Sustainable Development Goals (SDG) and remains a priority on the United Nations Development

Programme Agenda 2030 (United Nations, 2021; United Nations & Department of Economics and Social Affairs, 2015). Resilience can be defined as 'the ability of a system, community or society exposed to hazards to resist, absorb, accommodate and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions'

* Corresponding author.

E-mail addresses: tsitsi.mpofu-mketwa@uct.ac.za (T.J. Mpofu-Mketwa), amber.abrams@uct.ac.za (A. Abrams), gillian.black@livelihoods.org.za (G.F. Black).

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Acronyms

CAB	Community Advisory Board
CEW	Community Engagement Workshops
CM	Community Mapping
CoCT	City of Cape Town
DST	Digital Storytelling
NGO	Nongovernmental organisation
PV	Photovoice
POD	Points of distribution
SDG	Sustainable Development Goals
SLF	Sustainable Livelihoods Foundation
SHF	Sweet Home Farm
OH	Overcome Heights
UNSDRI	United Nations International Strategy for Disaster Strategy

(United Nations International Strategy for Disaster Strategy, (UNISDR) 2009:10). Specifically, SDG 11 aims to build sustainable cities and communities.

The sustainability of cities and communities partly depends on their ability to withstand environmental disasters, availability of resources and capability to organize themselves before, during and immediately after the disaster (UNISDR, 2009). Internationally, there is ongoing implementation of national adaptation plans that mitigate against climate change-induced floods and droughts (United Nations, Sustainable Development Goals Report, 2021), yet across the globe, cities are increasingly vulnerable to these extreme weather events. Structural inequalities, migration and Covid 19 exacerbate already unequal access to public services and resources (ibid; see also, Cirolia & Scheba, 2019). In South Africa, climate change-induced drought, flooding, and fires adversely impact informal settlements including peoples' livelihoods (Chersich et al., 2018). Therefore, creating inclusive and sustainable cities is crucial.

Cape Town's informal settlements are densely populated, haphazardly or completely unplanned and fraught with infrastructural deficiencies. Inadequate solid waste management, and poor maintenance of drains lead to flooding and other environmental risks (Cirolia & Scheba, 2019; Musungu; Musungu, Motala, & Smit, 2012; Sacks, 2014). Within the broad topic of resilience against environmental risks and disasters, a one-year digital storytelling (DST) project, which informs this paper, was undertaken as part of the UKRI GCRF *Water and Fire: Enhancing capacity and reducing risk through 15 'Best Bets' for transformative adaptation with vulnerable residents on the Cape Flats*, hereafter referred to as 'Water and Fire' project.

The objectives of the broader 'Water and Fire' project were to.

- 1) address three environmental hazards affecting three marginalized communities with the aim of enhancing local capacity to reduce disaster risk;
- 2) improve the well-being, resilience and livelihoods of three severely disaster-affected communities;
- 3) co-create alternative development pathways for sustainability by mobilising local knowledge and literacy through democratic participation and dialogue;
- 4) engage community-driven co-produced and creative processes to share information and build strategic resilience action on disaster risk reduction with risk-affected communities;
- 5) build an equitable framework for policy development and practice based on democratic mediating systems that foster trust and co-operation between state, civil society and affected residents;
- 6) sharing information and processes from research activities, to increase local capacity in other similarly affected areas of the Cape

Flats and South Africa while raising potential for scaled-up impact beyond the affected communities into national and international policy; and

- 7) support partnership building to co-develop disaster risk reduction solutions to water and fire hazards faced by communities/areas in the Cape Flats.

The rationale for undertaking the study was to advocate community-driven solutions and resilience action in response to three interrelated environmental disasters related to water and fire (flood, drought and fire). This paper explores how well the DST method that was applied met objective four (above) in successfully engaging community-driven, co-produced knowledge and creative processes. This objective also aimed to share information and build strategic resilience into action on disaster risk reduction with risk-affected areas.

Digital story telling is a participatory visual method (PVM) – part of a repertoire of creative techniques that includes the engagement of people in co-producing knowledge, drawn from their subjective world realities, to transform lives. Participatory methods are mutually reinforcing social learning processes between researchers and those being (and involved in) researched, with outcomes that can vary across a spectrum from personal therapy through participation to transforming national policy (Black et al., 2018; Spiegel, 2020). The advantage of these methods over prescriptive and more traditional approaches such as interview only methods lies in their empowering abilities by conscientizing people to innovate, problem solve and creates space for locally developed transformative strategies (Theron & Wetmore, 2009, p. pp155, p. 163; Black, Liedeman; Rykklief, 2020; Sitter et al., 2020).

Digital stories take the form of digital narratives where 'life stories are reconstructed using a combination of text, images, narration and music edited together using a computer' (Ferrer et al., 2021:91). These short videos are based on personal stories that are (re) constructed and edited using minimum technology, often with a small group of people in a workshop setting (Sitter et al., 2020; Sykes & Gachago, 2018). Central to conducting digital story workshops is the Freirean concept of critical conscientization through participants' dialogue, reflection, action and collaborative effort (Freire, 2000). By providing space for group dialogue, DST methods enable participants to express the meaning behind their creative art and reflect critically on relevant events of their visual stories (Lambert, 2013; Sitter et al., 2020). DST processes can foster collaborative spaces for community capacity building, provide outlets for catharsis and voicing sensitive experiences which are difficult to express in formal interviews and focus group discussion (Trefry-Goately, Moletsane, de Oliveira, Seeley & Lessells, 2021; Lambert, 2013; Wheeler, 2020).

Storytelling for example is crucial for educating the public and activating social responses and collective action on issues relating to global climate challenges, environmental protection, ecological concerns and sustainable development (Csesznek, 2021; Gladwin, 2020). Furthermore, in vulnerable communities, storytelling fosters resilience against complex urban challenges such as global economic downturns, flooding due to extreme weather events and destructive wildfires (Goldstein et al., 2015). Despite the benefits, DST methods tends to be labour intensive, requiring training of participants and assertive facilitation skills to disrupt negative group dynamics and interactions. Like any group research activity, there are inherent risks, challenges,¹ and power imbalances in group interactions that require facilitators' mediation to foster inclusive participation. Therefore, validating a DST process is a useful reflexive exercise that helps to ensure consistent

¹ For example, some participants may dominate and suppress the voices of others, or some members may be shy to participate in group discussions. When addressing sensitive topics, stigma and discrimination may arise alongside invasion of privacy, loss of confidentiality, psychological trauma, embarrassment and stereotyping (Trefry-Goately et al. 2021).

facilitation of the method across research projects. Additionally, as community engaged research and intervention, for example, now relies more on media literacy and novel methodologies such as digital narratives linked to advances in digital media and technology, it is crucial to consider the ethics of digital forms of storytelling in relation to ownership and control of visual outputs (Ferrer et al., 2021; Black et al., 2018), as well as the ethical considerations in the creation and dissemination of digital narratives (Ferrer et al., 2021).

The ICPHR (2013) framework offers useful guidelines in relation to types of validity that are pertinent to participatory methodologies aimed at achieving social change in vulnerable communities. Whilst our study was not purely a health study, we elected to use the ICPHR (2013) framework because of the framework's record of use worldwide not as a method *per se* but as an approach or paradigm. According to ICPHR (2013:4–5) the framework is an approach that does not necessarily need to be limited to health-related inquiry only, because 'participation is the deciding principle' to this approach. ICPHR suggest that other fields such as welfare professions and education can use the framework in collaboration with multiple stakeholders such as members of civil society, and academic researchers. Applying the ICPHR (2013) to our study was appropriate because the framework aligns with the study's objectives. The ICPHR (2013) framework guidelines state that the framework is applicable to studies that seek to achieve collective knowledge co-creation with local communities, empowerment, transformation, wellbeing of affected communities and address the social determinants of health (See also, Mosavel et al., 2018; Wright et al., 2018), hence we did not need to adapt the framework for the assessment of our project.

Our paper focuses on validating the DST method used in the 'Water and Fire' project to ascertain how well the DST process conforms to six types of validity, namely, participatory, intersubjectivity, catalytic, contextual, ethical and empathic validity following the ICPHR (2013) framework. In applying the ICPHR (2013) framework and validity criteria, we were cognizant of epistemological justice and discourses that legitimise forms of knowledge whilst rendering others invalid. Writing about generating knowledge that counts as valid in local community development interventions, Eyben (2015), warned against treating people as subjects but rather as citizens with a political voice. Development practitioners should prioritise local contexts and values that shape development initiatives above top-down interventions (ibid). The 'Water and Fire' research team drew on the notion, and from experience in practice, that storytelling accompanied by creative art helps to strengthen understanding about the depth and complexity of social experiences and gives voice to marginalized people whose perspectives can be silenced by dominant and exclusionary narratives in the media and political domains (Treffrey-Goatley, de Lange, Molotsane, Mkhize & Masinga, 2018; Wheeler, 2020). For example, Gladwin (2020), reported on the power of digital storytelling in disseminating information and DST's potential for mobilising social and environmental actions. The ICPHR (2013) framework helped to ascertain whether the DST method employed in the 'Water and Fire' project co-produced knowledge that was valid for community residents affected by extreme weather events.

Babbie and Mouton suggest that the term validity refers to "the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration" while providing an opportunity to "test the soundness of the methods" (2007:122–123). Validity is crucial for researchers to gauge the quality of a research process and its ability to foster empowerment and creative knowledge production, but validity testing is often missing in DST literature (Sitter et al., 2020, p. 1; Harper & Gubrium, 2017). Because visual methods are employed as complementary to other knowledge forms, Sitter et al. (2020) suggest that validity criteria for DST processes should ascertain other research activities involved. For example, triangulating with other data, methods, sources, and community engagement to offer more understanding of a complex world. However, assessing the validity of

visual methods should not pursue absolute certain knowledge but rather, validity assessments should demonstrate a reflexive and rigorous analysis of the motives behind interpretations, processes of constructing social and cultural meanings, language and texts (Spencer, 2011). Spencer's concept of validation of the research processes, rather than a more typical empirical association to validity, is useful because validation measures the quality of skillful interweaving of visual images with ethnographic and socio-historical phenomenon under inquiry (ibid).

As we applied the ICPHR framework retrospectively, we did not plan the DST method with this framework in mind, but rather, we followed the example of Sitter et al. (2020) who applied the framework to their DST method that explored the treatment experiences of breast cancer patients. We aim to learn from our experience and inform best practice. First, we outline the DST method used before analyzing the method using the ICPHR (2013) framework criteria. We then provide a summary of lessons learned from our efforts to validate the DST method according to these criteria. We conclude with recommendations for achieving validity when using DST as research method with participants living in vulnerable communities.

1.1. Research context

DST workshops were facilitated with residents of socio-economically disadvantaged communities of the Cape Flats to address environmental disasters affecting each respective site; water shortages in Delft, fire outbreaks in Overcome Heights (OH) and flooding in Sweet Home Farm (SHF). We chose these three marginalized communities because each research site has endured extreme experiences with these weather events. Poor service delivery in these communities exacerbates vulnerability to floods, drought and fire. In addition, existent relations established through the Sustainable Livelihoods Foundation (SLF), a project research partner, made entry into these areas easier than if there had been no previous interactions. The researchers employed three PVM methods, DST, community mapping (CM) and Photovoice (PV) to co-produce knowledge with selected residents of the three participating communities.

The research sites were chosen based on the water shortages experienced in the Western Cape from 2015 to 2018 referred to locally and internationally as a 'water crisis' (Matikinca et al., 2020), that disproportionately affected low-income households as they could not afford the increasing water rates and restrictions (Millington & Scheba, 2021; Matikinca et al., 2020). Delft was one of the Cape Flats communities that experienced water cut-offs imposed by the City of Cape Town in its attempts to reduce water usage and save water (Matikinca et al., 2020).

Delft is a township established in 1989 and located 30 km northeast of Cape Town, predominantly inhabited by peoples with limited socio-economic resources. Delft has an approximate population of 152 030 according to the Stats SA 2011 census comprising mostly of Coloured and Black people² (Statistics South Africa, 2011; Wheeler, 2018). The inequitable water rationing that began during the water crisis has continued, in some cases, further deepening pre-existing inequalities.

Established in 2005, OH informal settlement is located in the South Peninsula of Cape Town. The demographic composition of OH comprises of a population of 18 498 coloured, black South Africans and migrants of African descent (Schneiderman et al., 2020). Informal dwellings are less than 30 cm apart in some places and are characterized by limited access to water and sanitation, underserved roads and illegal electricity connections (Schneiderman et al., 2020). The social and ecological contexts of the three research sites align with social psychologists' assertions that in South Africa recurrent and widespread

² These racial classifications are legacies of apartheid's racial classification systems which assigned essentialized identities, they are still used in the post-Apartheid context as methods of self-identification (Schneiderman, Thanjan, Naidoo, Jensen, Anderson, Mentoor, Noredien, Noredien, Piri, 2020).

occurrence of risk and hazards engender cumulative and debilitating disaster impacts that affect livelihoods, health and quality of life (Schneidermann et al., 2020; Twigg et al., 2017; Theron, 2016). For example, in OH, a runaway fire ravaged more than 100 dwellings in the informal settlement in 2018 (Chiguvare, 2018; Schneiderman et al., 2020).

SHF is an informal settlement located in Philippi East on the outskirts of Cape Town. The area was originally agricultural land and then used as a dumping site before being inhabited by informal settlement residents. It was established in 1992 and is now occupied by a population of approximately 17 000 people because of expanding urbanization and housing demands (Sacks, 2014). The racial composition is made up of 79,8% Black South Africans who are predominantly isiXhosa-speaking and 17,3% Coloured South Africans (Waddell, 2016). SHF residents are affected by flooding caused by annual heavy winter rains and poorly drained land causing adverse impacts on the residents (Musungu, Motala & Smit, 2012). Further information about the three research settings is given in Appendix A.

Residents of these three settings participated in the DST workshops and took the opportunity to describe their personal experiences of drought (Delft), fire (OH) and flooding (SHF), including how they navigated, or tried to navigate these crises. (Whilst there are seven tables referred in text, only Tables 1, 2 and 3 appears in text below, the rest of the tables are presented as appendices).

2. Theory: importance of validity criteria in digital storytelling

The validity of the DST method applied in the ‘Water and Fire’ project can be measured by drawing on the ICPHR’s (2013) six types of validity, namely, participatory, intersubjectivity, catalytic, contextual, ethical and empathic validity (Sitter et al., 2020; Wright et al., 2018).

2.1. Participatory validity

Participatory Validity refers to the “*extent to which stakeholders take an active part in the research process to the fullest extent possible*” (ICPHR, 2013:20). Literature on participatory research with marginalized communities warns against superficial involvement or excluding participants altogether in important decisions affecting their social problems (Spiegel, 2020; Theron & Wetmore, 2009, p. pp155). Participation of people who are beneficiaries of development is crucial to foster human growth, self-reliance, empowerment, sustainability, creativity and capacity amongst other social development goals (Theron & Wetmore, 2009, p. pp155; Babbie & Mouton, 2001).

2.2. Intersubjective validity

Intersubjective validity refers to the “*extent to which the research is viewed as being credible and meaningful by the stakeholders from a*

Table 1
Sociodemographic details of workshop participants.

	Overcome Heights	Delft	Sweet Home Farm	Total
Gender				
Women	6	5	7	18
Men	2	3	2	7
				25
Age range				
22-62				
Language				
IsiXhosa ^a	4	3	9	16
Afrikaans		1		1
Bilingual (English and Afrikaans)	4	4		8

^a In all the DST workshop sessions, a translator was present to support isiXhosa- and Afrikaans speaking participants.

Table 2
Summary of key activities in the 5-day creative workshops.

Day	Activities
Day 1	Inception workshop recap Reviewing broad project objectives Gaining consent for participation in the 5-day workshop Introducing participants to the DST method Co-conceptualizing resilience Practicing creative writing techniques and developing outlines of story scripts
Day 2	Refining stories through story circles ^a Developing storyboards through image making, drawing, painting, collages from magazine cut-outs, model clay making and photography. Further developing images to align with story scripts Applying key elements of a good story including characters, action, logical structure, arousing interest, true personal story etc Tutorial on using Apple iPad/tablets ^b
Day 3	Refining story scripts Storyboarding and expanding image libraries Practicing story telling with image library in a floor gallery exercise
Day 4	Finalizing scripts Finalizing image libraries Scanning hard copy images with iPads and saving them in camera roll Rehearsing story telling
Day 5	Refining quality of scanned hard copy images to ensure quality resolution and uploading them to the iPad devices. Recording stories on iPad tables Screening the stories for the participants and facilitators Celebrating accomplishments

^a Story circles served as feedback processes. Participants recited their developing story narratives to the whole workshop group (seated together in a circle) and received feedback from their peers and the facilitators to ensure that key story elements were present and to strengthen their stories accordingly.

^b We used Sonic Pics, an Apple video making app that creates short videos through a combination of scanned images and recorded audio.

variety of perspectives” (ICPHR, 2013, p. 20). In their study with breast cancer patients, Sitter et al. (2020) emphasized the importance of involving a patient collaborator with lived experiences of breast cancer in guiding all research stages including recruitment of participants, knowledge translation and selecting screening locations. Collaborating with those affected by the phenomena under inquiry and community engagement is crucial for enhancing the credibility and meaningfulness of research. Participants are active critical thinkers capable of interpreting their situations and generating emergent understandings that inform interventions (Treffry-Goatley et al., 2018).

2.3. Catalytic validity

The extent to which the *research is useful in terms of presenting new possibilities for social action* (ICPHR, 2013, p. 20) is encapsulated in catalytic validity. Creating a relational and enabling environment where marginalized people feel safe, trusting, included, encouraged, mutually connected and form a group identity is necessary for claiming voices and influence (Treffry-Goatley et al., 2018). Catalytic validity requires participants to appraise their experiences and reconstruct their stories, shifting from individual construction of the issues to a realization of interconnectedness across core areas of seemingly separate experiences (Sitter et al., 2020).

2.4. Contextual validity

Contextual validity refers to the extent to which the “*research relates to the local situation*” (ICPHR, 2013, p. 20). For example, DST participants’ narratives of water shortage, fire or flooding events were drawn from personal experiences in their homes or within their communities. Thus, it is crucial for researchers to consider the relevance of stories, knowledge and recommendations generated in the lives of those directly connected to the DST topic (Sitter et al., 2020).

Table 3

Summary of key findings demonstrating how the DST process addressed the validity criteria.

Participatory Validity	
Participants made their own decisions about specific personal stories and details shared in their story narratives in response to the DST prompt questions asked in Tables 4, 5 and 6 of appendices B, C and D. Individuals simultaneously created their own images using an art medium of their choice (drawing, painting, photography, magazine cut-outs or model making) and basic video-making app on an Apple iPad. We used a low-tech approach to enable participants to be hands-on and involved in video-making.	
Despite the DST workshops being held during the Covid-19 pandemic in 2020 and 2021, the communication barriers caused by wearing masks and social distancing during workshop activities did not significantly interfere with the running of the workshop or the production of the stories.	
Intersubjective validity	
The local CAB members were involved in different stages of the DST process such as recruiting participants, assisting in the workshops as co-facilitators and translating thereby enhancing the credibility and meaningfulness of research.	
Prior to developing their digital stories, the research team co-conceptualised the term ‘resilience’ with participants to surface their perspective of the concept in their own words, as shaped by their experiences.	
The OH participants initially narrated their personal stories by focusing on their own and community members immediate responses to fire outbreaks without incorporating the resilience theme in the stories. This resulted in action-packed but limited stories devoid of information about adaptive lessons, values, resources and support systems required to mitigate fire disasters. By running a refresher session, we revisited the meaning of resilience and ensured that participants understood the concept and could incorporate their own expanded definition into their stories. Eventually, participants expressed their understanding of resilience as lessons learned during the environmental disasters, the availability of resources, strategies for prevention and disaster preparedness.	
The evaluative component of the DST design was also crucial in enhancing intersubjective validity as participants were given an opportunity to assess their experience and effectiveness of the DST method. Below are the key themes from the evaluation responses gathered at the five-day workshop and consent workshops.	
Expectations from the DST workshop experience (5-day workshop)	Evaluation of DST workshop experience (Consent workshop)
Delft	
Gaining knowledge and skills	Lessons learned
Empowerment and learning something to contribute back to their communities.	Learning different ways of saving water, how to write stories, creative, art and making short films.
Learning new skills like story writing.	Reflection on experiences of the DST workshops
Hopes and fears	Felt happy, proud and a sense of accomplishment for their creative productions.
Mixed emotions about what to expect from the workshops.	
OH	
Gaining knowledge and skills	Lessons learned
Managing fire outbreaks.	Gained knowledge about dealing with fire.
Producing good stories.	Learned a lot from the workshops.
Learning intervention strategies of managing fire outbreaks to share with their communities.	Felt prepared to educate the community about fire extinguishing strategies
Hopes and Fears	Reflection on experiences of the DST workshops
Mixed emotions about what to expect from the workshops.	Felt prepared to educate the community about fire extinguishing strategies.
	Fears of the project failing to address fire-outbreak problems.
	Pain of revisiting their stories of fire.
SHF	
Gaining knowledge and skills	Lessons learned
Script writing, public speaking and communication.	Story writing skills, caring for others, teamwork in the workshops and togetherness in managing floods.
Getting useful information for job seeking.	Learned how other community members manage flooding.
Learning how to manage flooding.	
Assistance in improving flood circumstances in the community.	
Hopes and fears	Reflections on experiences of the DST workshops

Table 3 (continued)

Mixed feelings about what to expect from the workshops.	Felt shocked, surprised and stressed after watching DST films and revisiting their hardships.
Fears of failing to write good stories.	Felt happy about participating in workshops and watching their digital stories.
Hoped for having fun and experiencing a friendly and open workshop environment.	
Across all research sites, participants evaluated the DST process as having taught them something about managing water shortages, flooding or fire from fellow participants. Other lessons learned included story writing, public speaking and skills in making short videos. One participant from Sweet Home Farm summarized her experience as follows:	
<i>“It was worth it [taking part in DST] because I have learnt a lot mostly about flooding, and that there are a lot of community members who have also gone through flooding I have learnt that if you are telling a story there are things that you must do”</i> (Sihle, Participant from SHF)	
Catalytic validity	
Multiple participants reported that they had gained new knowledge about responding to water shortages, fire or flooding as indicated above. For example, at a project meeting with the OH participants held four months after the DST workshop, a male participant reported that he presented fire disaster management lessons learned from the DST workshops at his community meeting, thereby teaching other community members about managing fire-outbreaks.	
The digital stories were screened and presented alongside community maps and photovoice images at the community and policy engagement events held at OH, SHF and Delft. The CoCT officials from different infrastructural departments, local ward councilors, representatives from civil society organizations, universities and community residents attended the events. At these events participants and other community members shared their personal experiences of fire, flooding and drought drawn from the digital stories. The CoCT representatives provided information for accessing expedited emergency rescue services, such as contact details of key emergency people in firefighting, solid waste management, disaster risk management services recovery, rebuilding, implementing awareness campaigns and neighborhood watch for crime protection and safety after disasters.	
Contextual validity	
The DST themes of water shortage, fire or flooding events that participants had personally experienced in their home or within their community were pertinent to the local contexts. Community residents and stakeholders who work in local contexts (for example government departments or NGOs) suggested community-led solutions to environmental disasters that would be of benefit to the affected research sites.	
At the inception workshop, the research team explained the broad aims and objectives of the ‘Water and Fire’ project, enabling participants from each community to gain a deeper understanding of the different research settings and topics, and the multi-stakeholder context in which the research was being conducted.	
As indicated in Tables 4, 5 and 6 in appendices B, C and D the questions that prompted the digital stories for the three research sites were framed to capture the common overarching theme of resilience in different research sites. However, there were contextual differences in experiences of the water and fire disasters.	
Ethical validity	
Consent to participate in programme activities was granted when participants signed consent forms prior to DST programme activities. Participants verbally consented to audio, video recording and photograph taking during the workshop sessions.	
The facilitators informed participants of available counselling services from a local NGO should they feel distressed because of the workshop given the sensitive nature of disaster experiences.	
The DST workshops were held during the Covid-19 pandemic. The research team managed the health risks by complying to government lockdown restrictions, ensuring adherence to Covid-19 safety precautions, sanitizing regularly before and during workshop attendance, wearing masks. The room that the workshop was held in was spacious and well ventilated and allowed for social distance to be maintained. A register was taken at the beginning of each workshop day to document attendance and contact details and record the presence of symptoms. Any participant or member of the research team who was showing any symptoms of Covid-19 was asked to stay at home and encouraged to report to a doctor for medical advice. Participants and facilitators were cooperative with practicing safety precautions to prevent infections.	
Emphatic validity	
During the workshops, participants’ shared experiences engendered a sense of compassion and identifying with others.	
We addressed negative interaction in SHF when we observed competitive tendencies and criticisms of a participant who wanted to narrate her story in a certain isiXhosa dialect that her younger peers perceived as too outdated. By steering the group in a	

(continued on next page)

Table 3 (continued)

<p>positive direction, the research team pointed out the need for cooperation and support as opposed to harmful competition. Participants responded positively to the mediation and supported each other in creative art, story narratives and other DST workshop activities thereafter.</p> <p>Despite this incident at SHF, at all the DST workshops, participants mostly demonstrated that they had developed group cohesion and expressed more awareness of each other's situations with supportive sentiments after hearing each other's personal stories and experiences. For example, one participant stated: <i>'I felt better when I listened to other people telling their stories, I saw that my situation was better than theirs. I leaned that when people assist each other, hardships become easier to manage'</i> (Khetlwe^a, Sweet Home Farm DST).</p>

^a Pseudonym.

2.5. Ethical validity

Ethical validity considers to the “*extent to which research outcomes and the changes exerted on people by the research are sound and just*” (ICPHR, 2013, p. 20). Research outcomes includes decisions made by the DST participants about how their stories can be shared. The participatory nature of digital storytelling positions participants as co-producers of knowledge who should always be credited as authors and owners of their work (Treffry-Goatley et al., 2021). Researchers using DST methods should give participants an opportunity to consider informed consent for the use of their visual outputs at multiple stages (dynamic consent) particularly in relation to how, where and with who the visual outputs are shared (Black et al. 2018, p. 30; Treffry-Goatley et al., 2021). Other relevant ethical principles include doing no harm, protecting participants' safety and wellbeing (Lambert, 2018:141), addressing anonymity and risks arising from being identifiable in the resulting visual media, thus causing repercussions for individuals and or communities (Black et al., 2018; Treffry-Goatley, 2021).

2.6. Empathic validity

Attending to empathic validity requires understanding the “*extent to which the research has increased empathy among participants*” (ICPHR:20), or engendered greater understanding and compassion (Sitter et al., 2020, p. 2). As participants work together in creative art and storytelling, the thoughts, feelings and support they share foster group cohesion which can be beneficial for physical and psychological wellbeing (Sykes & Gachago, 2018; Wheeler, 2018). Facilitators should therefore foster relationships, strengthen group capacity and build trust among DST participants (Sitter et al., 2020; Treffry-Goatley et al., 2021).

3. Methods

3.1. Prior research activities

For each research setting, the storytelling workshop was preceded by research activities that informed the research questions which underpinned the DST process. These activities comprised participatory community engagement workshops (CEW) that were held separately at each site and telephonic household surveys. Residents of the three research sites, (Delft: n = 26; Overcome Heights: n = 33; Sweet Home Farm n = 24) attended the CEWs. Attendees included two Community Advisory Board (CAB) members that were known to the research team and had attended the ‘Water and Fire’ project at its inception. The CAB comprised of key community members who acted as liaisons between the research team and each of the three research sites. The members lived in the communities, and some already had positions in community leadership committees and neighborhood watch committees. They were selected based on their willingness to act in the role, including educating the research team on local community values and dynamics that may impact the research. The CAB members also assisted with recruitment of community residents who were willing to participate in the study as co-researchers.

The CEWs aimed to introduce the project to the participating communities, review the overarching research objectives with attendees and modify the objectives in response to audience input. Participatory processes frame research subjects as co-owners of knowledge production (Babbie & Mouton, 2007), hence research objectives were translated into local language and visual imagery to ensure more accessibility among the attending community members. The aims and objectives were transcribed into infographic booklets which were made accessible in English, isiXhosa and Afrikaans to facilitate understanding of the project goals among members of the participating communities and other non-academic audiences. Fig. 1 below shows a page of the infographic booklet that informed community members about the role of the DST method thus contextualising the broader research project. These written and visual translations sought to reduce social and communicative distance between researchers and research participants and create more equal and democratic processes (Theron & Wetmore, 2009, p. pp155).

Shortly after the CEWs, telephonic surveys were conducted with 600 community members (200 persons from each research site). Structured and semi-structured questions were asked to understand broadly, how residents of the three research settings experienced climate change and extreme weather induced water shortage, fire outbreaks and flooding, and to elucidate some of the coping or support mechanisms that were employed to navigate these disaster events. Data (i.e., themes) from the telephonic surveys informed the DST questions. The methods and findings of the telephonic household surveys are described in Ncube et al. (forthcoming).³

3.2. Participant recruitment

The CEWs and telephonic surveys helped the research team to forge relationships with community members and recruit participants for the DST workshops. The research team invited eight to ten participants from each site, based on their interest in the objectives of the ‘Water and Fire’ project and a desire to participate in the storytelling workshops. Given the sensitive nature of sharing personal experiences and emotional vulnerability linked to revisiting disaster hardships in DST group settings (Sykes & Gachago, 2018), care was taken to recruit participants who knew at least one other person in the group.

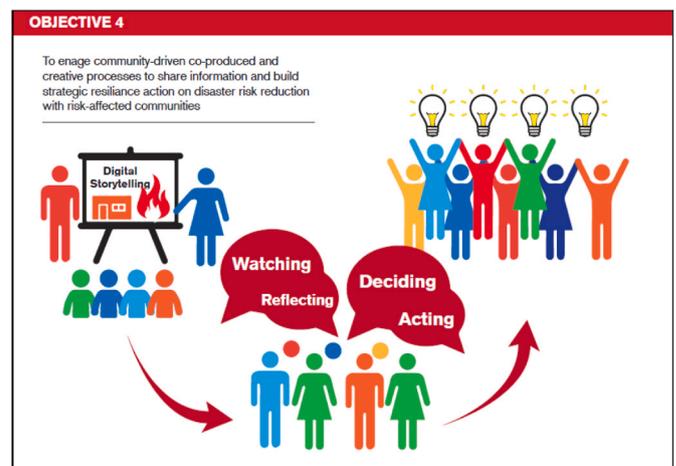


Fig. 1. A sample page of the ‘Water and Fire’ infographics booklet (Objective 4). The design of these booklets was finalized in consultation with the community members who attended the CEWs held at the start of the research project.

³ Colour to be used in print.

In November 2020, the research team conducted DST workshops with participants from Delft, followed by OH in March 2021 and SHF in September 2021, with a total of twenty-five participants (18 women and seven men). [Table 2](#) provides more sociodemographic details of participants.

The above sociodemographics shaped the intersecting variables that influenced the storytelling process. Local CAB members were present in all DST workshops. CAB members were included with the intention of creating a safe and supportive environment for the participants and to provide translations when vernacular language was used.

3.3. The DST workshop process

As described elsewhere ([Black & Chambers, 2019](#)) the DST method followed a Story-Led approach and comprised three main elements: i) an inception meeting, ii) a 5-day creative workshop iii) video editing iv) a consent workshop.

The inception workshop served to re-familiarize DST participants with the aims and objectives of the ‘Water and Fire’ project and foreground the topics of drought, fire or flooding depending on the research site. A digital story produced through a previous DST process facilitated by members of the research team for another (unrelated) project was shown to participants for a clearer understanding of the elements of a completed digital story. The demonstrative digital story topics were carefully chosen to not resemble fire, drought and flooding experiences to avoid unduly influencing the participants’ stories.

The 5-day creative workshop focused on co-producing the digital stories by developing spoken and written story narratives accompanied by creative image making. The research team also asked participants baseline questions about their goals and expectations for attending the DST workshop as a basis for evaluating their DST experience at the end of the workshops. All the stories told in isiXhosa or Afrikaans were translated into English. The story titles in the digital stories were chosen by the individual storytellers during the creative workshop.

Participants involvement included checking the quality of their images and sequencing of images in the storyboard development on their ipads. English subtitles were added to all digital stories by a professional videographer who worked with the support of a translator when required. The videographer also checked technical aspects of the stories which included assessing them for the presence of echoing or background noise and the synchrony of the subtitles with narratives and images. Where it was necessary to improve the quality of the sound, the videographer asked participants to re-record their story narratives. The videographer did not interfere with the content of the story narratives or the visual imagery. After the videographer had completed the technical assessment, the stories were shown back to the participants to ensure that they gave their approval for the changes.

3.3.1. Ethical considerations

To manage the risks of infection during Covid-19, we followed safety precautions of sanitizing, enforcing the wearing of masks, managing social distance, checking temperatures during morning registration. We elaborate on Covid-19 risk management below. The facilitators discussed possible implications for identification with the participants early in the process so that they were informed about including their own photographs in their films. Most participants still elected to include photographs of themselves in their stories. Later at the consent workshop we read the visual outputs release consent forms to participants line by line in English with isiXhosa and Afrikaans translations. We gave copies of isiXhosa forms to participants to read in-depth at their own pace. Whilst the ‘Water and Fire’ research team assured participants of using their visual outputs for no other purposes than research, they warned participants of the limitations arising once the stories became publicly available. Hence the research team would be unable to control how others may reuse the story. To that effect a disclaimer notification would appear on all research outputs featuring their story, indicating

that the story may not be reproduced without prior consent, however the research team could not guarantee that others will always request consent to reuse the story.

Acknowledgement slides that gave recognition to the participants as authors, project funders and partners were included in the digital stories.

The overarching structure and specific content details of the 5-day creative workshops in each site are shown in [Table 3](#).

A half-day consent workshop was held in each research setting approximately 10 days after the conclusion of the 5-day creative process. The consent workshop entailed collectively reviewing the edited versions of the digital stories with participants prior to discussing individual consent. The research team requested individual consent for sharing their stories with various stakeholders including fellow community residents and those of other communities, development organizations, researchers, local, national and international government representatives and on social media platforms (Whatsapp, Facebook and Twitter), video sharing websites such as [Youtube.com](#) and Vimeo, and the project website ([waterandfire.info](#)). During the consent discussions, the research team explained the implications and possible risks of sharing the stories in these different ways.

Overall, the research team followed a multi-stage or ‘dynamic consent’ approach ([Black et al., 2018](#)) which allowed the participants to answer ‘yes’ or ‘no’ with regards to their stories being shown to the distinct stakeholder groups, or over the social media platforms, mentioned above. [Fig. 3](#) demonstrates the multiple stages followed in the processes of requesting consent.

The storytellers were also given the open-ended option to change their minds about how their stories could or could not be shared and given the contact details of research team members for this purpose. The research team conducted a second evaluation with the DST participants to assess participants’ experiences of the DST process. The DST participants were informed of and invited to participate in further research activities in the ‘Water and Fire’ project.

3.3.2. Delft

At the half-day inception workshop in Delft, participants were asked to: (a) think back to the 2018 water crisis when the local government asked Capetonians to be ‘water wise’⁴ and reflect on ways they considered themselves to have been ‘water wise’ at that time, (b) what they thought would have happened in Delft if the threatened ‘Day Zero’⁵ had arrived. [Appendix B, Table 4](#) shows additional questions that were explored with the Delft DST participants during the 5-day workshops.

3.3.3. Overcome Heights

The structure and sequence of the inception workshop, 5-day creative workshop and consent workshop held with the OH participants were essentially the same as that followed with the Delft participants. However, the questions that guided the OH process focused on the research topic of fire outbreaks. At the inception workshop, participants were asked: a) What are the most important things that you learned from the fire experience in your home/neighborhood/community? b) Drawing from the learning that you have just been discussing, if a fire were to happen again tomorrow, what would you do differently as compared to your previous experience? [Appendix C, Table 5](#) shows additional questions that were explored with the Overcome Heights DST participants during the 5-day creative workshop.

⁴ Water wise strategies of reducing water consumption e.g., less flushing of toilets, laundry, taking shorter time when showering etc.

⁵ According to Millington, N & Scheba, S. 2020, the City of Cape Town (CoCT) predicted the 13th of May 2018 as ‘Day Zero’ i.e., the day on which the City’s dam levels would reach 13.5% and citywide water rationing through specified points of distribution (PODs) would have to be implemented.

3.3.4. Sweet Home Farm

As above, in SHF, the structure of programme activities was like that of Delft and OH. The questions that guided the SHF DST method focused on the research topic of flooding. At the half-day inception workshop in Delft, participants were asked: a) What are the most important lessons that you have learnt from your experience with flooding in SHF? b) If you knew that today it was going to rain very heavily tonight, and there was going to be bad flooding, how would you prepare for it? What would you do? Appendix D, Table 6 shows additional questions that were explored with the SHF DST participants during the 5-day creative workshop.

Between April and June 2022, community co-researchers presented a selection of digital stories, community maps and photographs at community and policy-engagement events held in the vicinity of each research site. The groups of participants who had created the visual outputs democratically decided which of the stories, maps and photographs would be shown at these events and which members of the group would present them. Six digital stories were shown in total (two at each research site). This collective decision-making process was facilitated by the research team during preparatory workshops held prior to the community and policy-engagement events. The participants selected stories that they deemed best reflected their experiences of the environmental disasters and the theme of resilience by highlighting the key problems they faced and solutions that held promise. Fig. 2 is a diagrammatic representation of the research activities with the community co-researchers.

3.3.5. Data analysis

To validate the DST method, we asked the following questions under each type of validity criteria to ascertain the extent to which these types of validity were achieved.

3.3.5.1. Participatory validity. To what extent did the method allow participants to be ‘hands on’ and enable them to make autonomous decisions about the choices of personal stories told, the art media and language used to tell their stories? We also sought to understand the extent to which the community advisory members took part in the different stages of the research process?

3.3.5.2. Intersubjective validity. To what extent can the research be viewed as being both credible and meaningful by the stakeholders? How did the DST participants frame their meaning of resilience? We also asked the DST participants evaluative questions to assess their

experience of the DST process as follows.

3.4. Evaluation questions

3.4.1. Expectations from the DST workshop experience (5-day workshop)

- 1) Imagine it is the end of the workshop, what is one thing that would mean spending five days with us worth it for you?
- 2) What would make the workshop a failure for you?

3.4.2. Evaluation of DST workshop experience (consent workshop)

Think back at the beginning of the 5-day workshop when you expressed your hopes, fears and expectations about the workshop, reflect on how you experienced the workshop in terms of those hopes, fears and expectations.

3.4.2.1. Catalytic validity. To what extent did the research present new possibilities for social action? To what extent did the participants move from an individual construction of their disaster experiences and concerns to a recognition of collective interconnectedness in their experiences?

3.4.2.2. Contextual validity. To what extent was the research topic connected to the local needs and setting? To what extent were the stories relevant to the lives of other community members who are directly connected to the topic of inquiry? To what extent were the recommendations and knowledge translation efforts relevant to the lives of the participants?

3.4.2.3. Ethical validity. What is our ethical responsibility in protecting participants from harm during the DST workshops in relation to revising their painful experiences? To what extent was the local experience and knowledge being treated as valued contributions to the research design and outcomes? What is our ethical responsibility in screening digital stories? Were the outcomes produced in a sound and just manner?

3.4.2.4. Empathic validity. To what extent did the research transform the emotional dispositions of people in the form of greater understanding and compassion?

Based on the above validity assessment questions we found the following results.

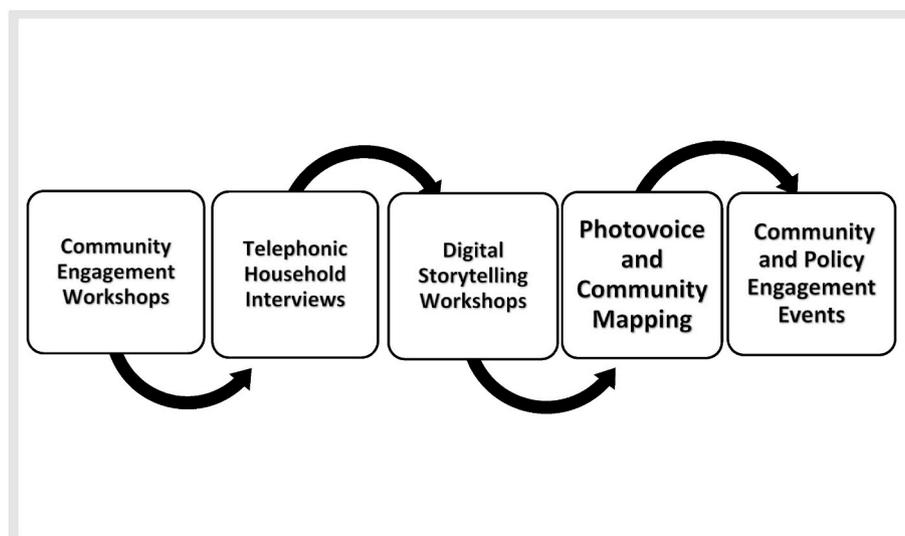


Fig. 2. Sequence of research activities conducted with Cape Flats community co-researchers.

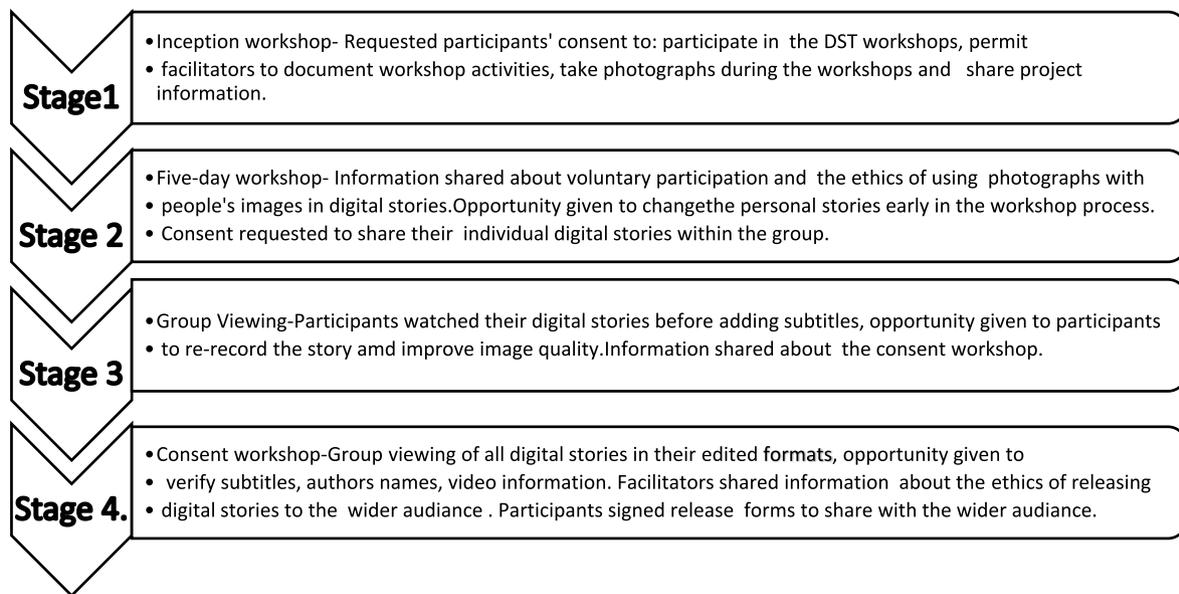


Fig. 3. Stages of the dynamic consent process.

4. Results

Table 3 presents the results drawn from the analysis of the DST method.

5. Discussion

The purpose of this paper was to contribute to discussions on the design and validity of the DST method by unpacking how the method was used in 'Water and Fire' project, including analysis of how the method conformed to six validity criteria: participatory, intersubjectivity, catalytic, contextual, ethical and empathic validity. In this section we reflect on our key points of learning and suggest how they can best inform practice in the design and implementation of DST methods as part of a research process.

In assessing participatory validity, we observed how participation can be strengthened by detailed planning in relation to participant recruitment, workshop programme activities and other logistics. We learned that using more complex technology would have limited participation by requiring more facilitator intervention and reducing a sense of ownership of their digital stories (Black et al., 2018:29). For this project, an added consideration linked to participation included extensive risk assessments in the context of the Covid-19 pandemic, while mobilising and recruiting participants from the research sites.

The main challenge we encountered in achieving participatory validity related to gender imbalances in the workshops as only seven men were included in the total of 25 participants. Given the crucial role of men in rebuilding after disasters participation of more men may have offered additional insights in the DST workshops. Men's attendance in research work in vulnerable communities has previously been reported to be poor because of practical barriers, for example, the time of workshops often coincides with other commitments; at the same time, local constructions of masculinity may contribute to poor local engagement (Treffry-Goatley et al. 2021).

In our assessment of intersubjective validity and the inclusion of multiple stakeholder perspectives, we found that it is crucial to foreground the key concepts guiding the DST process when designing DST methods and workshops. Involving CAB members in the design of the DST workshops, enabling participants to conceptualize resilience from their subjective experiences and evaluating participants' opinions of the DST process enhanced intersubjective validity.

We learned from the OH focus group experience that initially, the story narratives were devoid of the resilience theme. To address this research challenge, we took remedial action by running a refresher session, we were more cautious when facilitating subsequent workshops with SHF participants by exploring the concept of resilience more in-depth during initial workshops. Through collective discussions, participants and facilitators became more attuned to each other's ideas of resilience and thus a more intersubjective understanding of this key concept was achieved. Our role in mediating as researchers in the OH storytelling process, presented an ethical complexity akin to that experienced by some DST facilitators in the South Asia Hub of the Pathways of Women's Empowerment Research Programme Consortium (Worcester, 2012). While the rules of engagement in DST require participants to tell "short stories focused on one's precise moments in one's life" (Worcester, 2012, p. 95), some participants shared lengthy stories during a workshop, creating a mediation dilemma. Facilitators had to decide whether to ask the participants to stop sharing, thereby inhibiting participation or to let them continue which risked running out of time for other participants and keeping workshop completion schedules (Worcester, 2012). In our OH DST workshop, we felt the need to intervene by expanding the participants' narratives to include the theme of resilience because as Worcester (2012:96) argue, 'framing DST as a site of co-creative production can address how the narrative parameters are set up in the workshop according to intent and purpose'. Thus, researcher mediation in script development is sometimes needed as part of the DST process.

The DST research team reflected and acknowledged the contested nature of the resilience concept in theory, and in practice because of its associations with neoliberal, individualist, adaptive discourses that excludes government and institutional accountability (Johnson & Blackburn, 2014; Spiegel, 2020). Care was taken to incorporate less individualistic connotations of resilience by broadening the concept to include collective and systemic structures that shape participants' responses to disasters, while remaining true to the DST method which purposively asks participants to narrate personal stories about one of their own lived experiences. By keeping questions open ended, participants were able to draw on other role players, stakeholders and their external and structural environments such as disaster emergency services, the community, the CoCT and beyond, to shed light on their individual (and sometimes collective) strategies.

Screening visual outputs at community engagement events has the

potential to generate empathy that may stir policymakers to take supportive actions to aid the plight of marginalized people (Shahrokh & Wheeler, 2014). Opportunities to build more collaborative social action to reduce the impact of environmental disasters were created from a series of three community and policy engagement events held in the vicinity of each participating community where participants screened their stories to diverse audiences. Inclusion of other participatory visual methods, including PV and CM helped to promote capacity building and community social action by imparting increased knowledge, skills and fostering individual and collective agency in addressing complex real-world problems (Black et al., 2018; Harper & Gubrium, 2017). In this way, the DSTs were not stand alone, but superimposed as a part of a toolbox of methods aimed at giving a more complete picture versus any single method.

The participants' appraisals of their DST experiences as having taught them adaptive lessons of managing water and fire disasters in their families and communities, demonstrates potential for transformative adaptation against disasters and catalytic validity. Thus, the DST workshops provided an enabling learning environment as participants transferred knowledge gained in workshops to the broader community. We hope that the DSTs created through our research will catalyze some of these groups to action. Sustaining the lessons learned and applying them to participants' communities is a prerogative of the development sector to foster training and capacity development (Black et al., 2018).

A limitation in achieving catalytic validity relates to the tendency by DST participants to frame resilience in individualized terms and emphasizing their own responsibility in bearing the burden of rebuilding after the disasters at the exclusion of statutory bodies. In relation to informality problems in South African townships, Ciro and Scheba, (2019:607) warns against "inward looking" lens that focus on everyday micro-scale grassroots solutions of city problems at the expense of interconnected, multi-scalar urban processes and structural factors.

There is also a limitation of sustainable catalysis in the long-term interventions and relationships between the community and policy makers (Shahrokh & Wheeler, 2014). Drawing on ICPHR (2013) framework to assess validity in participatory research; Brito et al. (2018), analysed nine participatory and community health-oriented research projects in Portuguese-Speaking countries (Angola, Brazil, Cape Verde and Portugal). The projects sought to improve, amongst other things, youth violence, adolescence pregnancy, community night-life safety and environmental risks affecting fishermen. Brito et al. (2018) found that, overall, while the nine projects demonstrated conformity to all types of validity criteria, catalytic validity was the least adhered to. Brito et al. (2018) attributed the lack of conformity to catalytic validity possibly due to the short-term nature of the studies which were mostly collaborative and academic, hindering new intervention. This brings to the fore, the importance of ensuring transformative action in participatory research by building sustainable partnerships with vulnerable communities and other relevant stakeholders ((Mosavel, Winship & Ahmed, 2018). Overall, screening digital stories at community and policy engagement events created spaces for participants to voice their concerns and create possibilities for social action.

Contextual validity was achieved by posing DST questions to elicit responses to context-specific strategies and resilience actions in responding to drought, fire-outbreaks and flooding disasters that are prevalent in the local community settings. The research team encountered a grounding moment when formulating DST prompt questions; on reflection they became mindful of how differently environmental hazards can be experienced in seemingly similar contexts and paid attention to phrasing questions in ways that accommodated finer nuances to generate findings that better reflect local communities. Recognizing DST participants as knowledge co-producers by keeping them informed about the broader research project in relation to the local context helped to inform participants about the purpose and value of the DST method and created a sense of ownership of the DST processes.

Household experiences of water shortages explored with the Delft focus group were city-wide, however, not all households in SHF and OH directly experienced flooding and fire in their homes. At OH and SHF inception workshops, the facilitators learned that whilst some participants experienced these events in their homes, others had only witnessed them in the community. The facilitators phrased prompt questions accordingly to capture contextual differences even within the same community. Contextual validity was therefore ensured by designing DST questions as an iterative process to respond to local experiences of disasters.

Regarding the ethics of the DST method, the research team acknowledged and communicated the ethical dilemma posed by including photographs in digital stories leading to participants making informed decisions. Potential harms of identity and exposure in DST are debated amongst scholars (Treffry-Goatley et al., 2021; Sykes & Gachago, 2018). On the one hand, proponents of anonymity argue for protecting participants especially when potential risk of identity exposure is great as in sensitive topics like HIV/AIDS, crime, violence, racism and substance abuse (Gubrium et al., 2014; Sykes & Gachago, 2018; Treffry-Goatley et al., 2021). On the other hand, critics of anonymity question whether hiding participants' identity is always in their best interest. Researcher's decisions about naming participants should consider both participants' potential risk and impact on reporting results (Treffry-Goatley et al., 2021). In our project, the participants decided whether to include their first name in their digital story following a multi-stage consent discussion with participants. We respected DST participants as authors of their work alongside Gubrium et al., (2014) who emphasise that wherever possible authors of digital stories should be credited as authors of their work and owners of their digital story.

Our team learned an important lesson in fostering sound and socially just research outcomes and protecting participants in relation to creating safe learning spaces. While DST methods are well known for appropriateness in addressing sensitive topics, it is important to take steps to avoid re-traumatization and revictimization (Treffry-Goatley et al. 2018; Gubrium et al., 2014). By providing a safe and supportive environment as well as gaining consent for participating in DST activities and release of visual output, the research team believe they made efforts to meet ethical validity.

We learned that empathic validity can be achieved by increasing participants' sense of group identity, nurturing positive interpersonal relations and encouraging participants to support each other in the workshop environment. In assessing the capacity of DST workshops to increase empathy and group solidarity among participants negative group dynamics that interfere with group cohesion sometimes occur in DST workshops due to power struggles, cultural and gender norms that promote domination of certain groups over others (Treffry-Goatley et al., 2021). Sitter et al., (2020) emphasized the crucial role of building active listening in the DST design, arguing that, "the act of listening to a digital story is located within social, cultural and historical contexts" and thus involves subjective interpretation of others' stories to make sense of their own world. The DST method used in the 'Water and Fire' project built in this process of listening. For example, the story circles and story screenings that were included in the workshop activities provided an opportunity for participants to listen and verbally respond in a supportive manner to the stories of fellow participants whilst fostering group empathy. For this reason, it is suggested that the DSTs met the empathic validity criteria.

6. Conclusion

Participatory validity in our DST method was strengthened by promoting a 'hands on' approach in workshops and enabling autonomous decisions in constructing story narratives. We recommend using low technology devices and giving participants autonomy to decide on use of creative art media. Involving CAB members in all stages of the DST process, co-conceptualization of the key terms with participants and

evaluating participants experiences of the DST method enhanced intersubjectivity validity. We recommend involving community collaborators and clarifying key concepts that guide the DST theme as vulnerable communities experience the lived realities implicated in academic concepts.

Contextual validity was enhanced by exploring local experiences of three environmental disasters. When framing DST questions, we realized the importance of drawing out finer nuances of experiences of specific disaster at familial, community and geographical levels to cater for seemingly similar research contexts. To facilitate catalytic validity, we suggest community engagement with multiple key stakeholders to promote social action and dialogue about disaster experiences. As participants cannot make decisions about the appropriate and preferred audiences for their stories at the outset, it is vital to follow a multi-staged and dynamic consent approach. This gives participants time to think through their options and flexibility to change their consent preferences. To foster empathic validity, we suggest that DST facilitators mediate by monitoring group interactions and watch for obstructive dynamics such as competitive tendencies and dominant voices. Limitations in our DST method pertained to gender imbalances, participants being inward looking in framing resilience and the risks of running the workshops during Covid-19 pandemic. Overall, the 'Water and Fire' project demonstrated compliance to the ICPHR (2013) framework of six types of validity criteria.

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CRedit authorship contribution statement

Tsitsi Jane Mpfu-Mketwa: Conceptualization, Methodology, Validation, Investigation, Formal analysis, Writing – original draft. **Amber Abrams:** Writing – review & editing. **Gillian Frances Black:** Methodology, Investigation, Writing – review & editing, Supervision, Project administration.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssaho.2023.100407>.

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