In between the Everyday and the Invisible: Climate Change Perception and Adaptation among Filipino Children

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Abstract

Children are highly vulnerable to the negative impacts of climate change (IPCC 2014) not only because of their limited physical, emotional and mental capabilities, but also because of the overall socioeconomic conditions that they are exposed to. However, there has been little information as to how children themselves understand and cope with the impacts of climate change and how other stakeholders—the city government, school, and households—provide "protective" services to address their unique vulnerabilities and capacities.

This study looked into the wide spectrum of climate-related risks affectingchildren in three communities in Malolos City, Bulacan, Philippines. Specifically, it explored the aggravating impacts of climate change on the "everyday risks" faced by children and their corresponding coping mechanisms following Lazarus and Folkman's coping theory (1984). It then analyzed the measures being undertaken by the city, barangay, schools and families to protect children's welfare. Upon identification and discussion of attendant gaps and issues, the paper ended with a set of recommendations to strengthen the resilience ofchildren in the midst of a changing climate.

Primary qualitative data were collected through a series of focus group discussions and key informant interviews involving children, city and barangay officials, school teachers, and parents. Windshield surveys and non-obtrusive observation were also conducted in the study areas between September and October 2014. Secondary data were likewise culled from official documents provided by the Malolos City Government.

Keywords: Climate Change Adaptation/ Risk Perception/ Urban Children/ Philippines

Introduction

As reported in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), children are among the marginalized sectors that are highly vulnerable to the negative impacts of climate change (Oppenheimer et al., 2014), due primarily to their relatively limited physical, mental and emotional capabilities to cope with deprivation and stress. Their situation—and that of other health-compromised sectors—can be exacerbated by poor access to infrastructure and

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transportation, low incomes, limited assets, and dangerous location (Moser and Satterthwaite, 2009) affecting most notably their health, security and education.
This makes climate change highly discriminatory against those who have less capacity to adapt to the realities of changing temperature and precipitation patters, sea level rise, and extreme weather events. As pointed out by Bartlett (2008: 1), "events that might have little or no effect on children in high-income countries and communities can have critical implications for children in poverty." Indeed, the IPCC hasnoted that the coincidence of diseases and malnutrition in "areas of compound risk"[1] can have serious implications on the well-being of children. (Oppenheimer et al., 2014; Woodruff and McMichael, 2004)

The situation is aggravated by the fact that mainstream approaches and theoretical debates on disaster risk management tend to ignore the role of children and young people (Mitchell et al., 2009; Back et al. 2009; Peek, 2008).Current research tends to assume that children are passive victims of disasters with no substantive role to play in risk communication or disaster risk reduction planning (Ansell, 2005).

It is for this reason that in the Philippines, where about 45 percent of 5-17-year old children reside in urban communities (PSA, 2001), various organizations have started to look into the plight of Filipino children in the face of climate change. For instance, in the aftermath of Typhoon Yolanda which struck the country in November 2013, UNICEF conducted a five-day Youth Camp to raise awareness among children on climate change, disaster preparedness and how to care for the environment.[2]Child-centered disaster risk reduction is also now part of the program of work of many international non-government organizations operating in the Philippines, such as Save the Children, Oxfam, Christian Aid, and Plan International.

Yet despite growing anecdotal, project-based evidence on engaging children in various aspects of disaster risk management, an analytical understanding of how children view and respond to climate change risks remain nascent (Mitchell et al., 2009). This is particularly true and critical for the Philippines, which has a young demographic base and is highly susceptible to the impacts of climate change, ranking 4th worldwide in long-term climate risk index from 1995 to 2014 (Kreft et al., 2015).

This paper is a small contribution to fill this gap, using qualitative data from a case study on Malolos City commissioned by Save the Children - Philippines.[3]The study sought to understand the impacts of climate change on children and their corresponding perception and coping mechanisms. It then analyzed the adaptation measures being undertaken by the city, *barangay*, schools and families to boost the

[1]*The IPCC defines an area of compound risk as "a region where climate change-induced impacts in one sector affects other sectors in the same region, or a region where climate change impacts in different sectors are compounded, resulting in extreme or high-risk consequences." (Oppenheimer et al., 2014:1057)*

[2]*See, for example, "Empowering children and youth to be disaster-ready" in http://goo.gl/06VTMT.*

[3]*It must be noted that the findings reported herein do not reflect the position and opinion of Save the Children, but of the author only. The study is part of larger regional project on Climate Change Risks andResilience in Urban Childrenin Asia, available at http://pubs.iied.org/10738IIED.html*

adaptive capacity and resilience of the children. Upon identification and discussion of attendant gaps and issues, a set of recommendations were put forward to strengthen the resilience of urban children.

Methodology

Malolos City was preselected by Save the Children as the site of the study, which was conducted in parallel with other city-level case studies in Danang, Vietnam and Khulna, Bangladesh. Within Malolos, three communities (i.e. *barangays*) were chosen for in-depth investigation, namely, Bangkal, Longos and Pamarawan. These areas were selected on the basis of theirhaving a high concentration of children and regular exposure to flooding and other hydro-meteorological hazards.

Primary qualitative data were collected through a series of focus group discussions (FGDs) and key informant interviews (KIIs) involving children, city and *barangay* officials, school teachers, and parents. A total of eight FGDs and three group and individual interviews were undertaken involving 45 children and 38 adults. Among the children-participants identified and recommended by the *barangays*, 27 were males while 18 were females.

Non-obtrusive ocular surveys were also conducted between September and October 2014 as part of the research design to collect ground information and triangulate findings from the FGDs and KIIs. Figures were culled from existing official documents such as the city's latest Ecological Profile and draft Shelter Plan, among others. Secondary sources on Malolos and the three *barangays* were mostly limited to what the city government provided through informational brochures and the city government website.

The study is guided by a four-level child-centered view of climate change adaptation. As shown in Figure 1, the children are placed at the core of the concentric circle to indicatetheir level of coping and self-protection based on their own understanding of climate change.The level of adaptation expands across social institutions, from parents at the household level to community officials and school teachers to the city government.

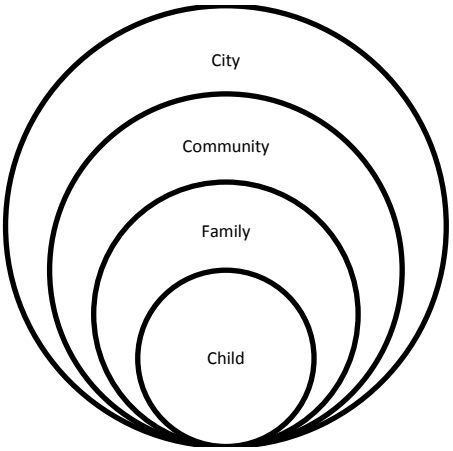

Figure 1. A four-level framework for child-centric adaptation to climate change.

Review of Literature

Children and climate change

Climate change affects children in many ways. These impacts may be categorized into primary and secondary as suggested by UNICEF (2011). Primary impacts may be seen in the form of injury from disaster events and incidence of infectious, vector and water-borne diseases as a direct result of precipitation and temperature changes. It can also be indirect in the form of rising food prices and escalation of conflicts over scarce natural resources. Secondary impacts, on the other hand, would involve lifestyle and behavioral changes, migration and new livelihood practices normally outside the control of children.

As shown in Table 1, changes in precipitation patters, temperature and sea level all have substantive effects on the socio-physical environments of children. Extreme weather events associated with climate change, such as floods, droughts, typhoons, heat and cold waves, and coastal storms and storm surges, have equally disruptive consequences on their lives, often leading to disproportionate loss of lives (Mirza, 2003).[4]In many developing countries, children comprise a big bulk of the death toll from disasters (Wisner, 2006).

In the long run, climate change hassignificant implications on children's health, safety, protection, education, play and recreation and social development (Chatterjee, 2015). In South Asia and sub-Saharan Africa, for instance, the expected decrease in crop yields by 2050 is expected to stunt malnutrition reduction efforts in the said regions even if economic growth is taken into account. (Lloyd et al., 2011) Children are likewise threatened by the increase in waterborne (Woodruff and McMichael, 2004) and vector-borne diseases due to rising temperatures (Van Lieshout et al., 2004; Rogers and Randolph, 2000), as well as by respiratory illnesses caused by indoor consumption of biomass fuels (Emmelin and Wall, 2007) and other climatic factors (Hashimoto et al., 2004).[5] In the context of urban areas in low- and middle-income countries, child mortality in informal settlements has been linked to extreme temperatures (Egondi et al., 2012, as reported in Revi et al., 2014) Outside of health and nutrition, children also suffer from the immediate and long-term human security impacts of displacement and migration due to climate change-related disasters, not to mention loss of livelihoods and eventual breakdown of economic structures in highly vulnerable areas. (UNICEF, 2008)

It must be noted that some children's groups are more vulnerable than others. Generally, children who are from poor families are at higher risk than their relatively well-off counterparts (Bartlett, 2008) due to limited access to infrastructure and services (Moser and Satterthwaite, 2009) that can boost their adaptive capacity. It has

[4]*It has been reported that as much as eighty-five percent of deaths during disastersare women and children (CRED, 2000).*

[5]*See also Sheffield, P.E. and P.J. Landrigan, 2011; Watt and Chamberlain, 2011; and Ebi and Paulson, 2010.*

been pointed out that among children, migrant children, children living in informal settlements, children living and working on the streets, child laborers and children with disabilities are the most vulnerable to climate change impacts (Chatterjee, 2015).

Climate risk perception and coping

Generally, there is a prevailing notion that children are simply passive victims of disasters that need protection from adults (Ansell, 2005). Empirical evidence, however, suggests that they can be effective partners in communicating risks, making decisions for reducing disaster risks, and even in other aspects of disaster risk management (Peek, 2008).

Key to tapping children as partners for disaster risk reduction particularly in the context of climate change is to understand first how they perceive the impacts of climate change in their localities. In a participatory action research conducted by Tanner (2010) in a Philippine community, risk perception was found to be related to gender and age differences. For example, "extreme weather" figured more prominently among children than adults as it directly affects their schooling and playtime. Global environmental problems were also observed more predominantly among children, primarily due to lessons that they learn in school.

It has been said that there are generally two coping strategies among children, namely, emotion-focused and problem-focused coping, which affect their well-being. The former aims to get rid of negative emotions or stressors such as through denial, avoidance and distancing; while the latter involves confronting the problem head-on by looking for information in order to form one's own understanding of the situation (Lazarus and Folkman, 1984).

Recently, a third approach has been proposed: meaning-focused coping (Folkman, 2008). It is also emotion-based but instead of removing negative feelings, it emphasizes "positive re-appraisal… finding meaning and benefits in a difficult situation, revising goals, and turning to spiritual beliefs" (Ojala, 2013: 2193). The relationship between these strategies and well-being has been found to vary across different contexts (Clarke, 2006; Folkman, 2008; Hallis and Slone, 1999; Landis et al., 2007; Ojala, 2012b), although it has been observed that children are less likely to employ problem-focused coping than adults (Ryan-Wenger, 1992).

Table 1. Impacts of climate change on children

Exposures due to projected change in climate	Consequences for children's socio-physical environments in cities	Implications for children's health	Implications for children's safety, protection, education, play and recreation, and social development
Warm spell/ heat waves	■ Increased heat island effect ■ Declining urban air quality ■ Water shortage ■ Decreased water quality ■ Power outages	■ Heatstroke ■ Asthma and allergic disease, bronchitis ■ Renal disorders from heat-related dehydration ■ Water-borne and food-borne diseases: diarrhoea, malaria, dengue, cholera	■ Children living and working on the streets are most vulnerable to heat stresses ■ Children working in factories without proper ventilation and cooling for long hours are subjected to multiple health hazards
Heavy rainfall events Intense tropical cyclone	■ Flooding, strong winds and landslides ■ Disruption of public water supply and sewer systems, and adverse effect on quality of surface and groundwater ■ Damage and losses to physical assets and infrastructure: houses, public facilities and utilities ■ Disruption of transport, commerce and economic activities ■ Withdrawal of risk coverage in vulnerable areas by private insurers ■ Potential for population migrations	■ Drowning, injuries; ■ Ingestion of contaminated water leading to communicable water-borne and water-washed diseases: diarrhoea, cholera, hepatitis, leptospirosis ■ Post-traumatic stress disorder (PTSD) in populations displaced through natural disasters, which is often manifest in children through increased bedwetting and aggression	■ Young girls and boys are at highest risk of flood-related fatality ■ No safe play spaces ■ Children living in unsafe housing in informal settlements without proper drainage are at most risk from non-communicable and communicable diseases and injuries ■ More children out of school due to illnesses ■ Poor children likely to drop out of school and engage in paid work to augment family income ■ Separation from families including due to death of family members, migrating on their own, child trafficking ■ Migrant children are more vulnerable: least likely to attend school; more exposed to violence; typically unreached by child protection services

Drought	■ Increased water demand put stress on water resources; declining water quality ■ Land degradation with lower agricultural yields and increased risk of food shortages; dust storms ■ Potential for population migration from rural to urban areas	■ Malnutrition ■ Diseases related to poor hygiene and inadequate sanitation as water sources get depleted: diarrhoea, scabies, conjunctivitis, trachoma ■ Pneumonia, measles	■ Forced migration occurs due to water stress and food shortage ■ Internally displaced persons typically seek refuge in marginalised urban areas and in urban poor settlements ■ Increased resource conflict exposes children to violence; girls and women especially vulnerable ■ Increase in cost of food leading families to adopt adverse coping strategies such as removing children from school, selling assets, and compelling children to work
Extreme high sea level	■ Permanent erosion and submersion of land; cost of coastal protection versus costs of land use relocation ■ Decreased groundwater availability because of saline incursion into aquifers ■ Increased effects of tropical cyclones and storm surges, particularly coastal flooding ■ Loss of property, enterprises, livelihoods; damage to buildings from rising water ■ Potential for population migration	■ Increased risk of deaths and injuries by drowning in floods ■ Physical and mental trauma ■ Highest health risks from salinisation of water supplies; long-term developmental implications for children ■ Diseases related to poor hygiene and inadequate sanitation as water sources get depleted ■ Water-borne, water-washed and food-borne diseases	■ Influx of displaced refugee children in cities ■ Loss of habitat, loss of sense of belonging to place, loss of favourite places and friendship and social networks, loss of cultural identity, loss of play and recreation opportunities ■ Disruption of children's everyday routines, healthcare and school attendance ■ Increasing vulnerability for children in poverty, migrant children, girls in poverty; reduction in protection

Source: Chatterjee, 2015.

In the context of climate threats, studies on how children view climate change is rather limited. Ojala (2012a, 2012b) reported denial-like coping strategies among children, as well as meaning-focused coping. Among Swedish adolescents and 12-year old age-groups, those who de-emphasized the seriousness of climate change (i.e.

emotion-focused coping) were found to be less likely to feel a high degree of environmental efficacy and demonstrate pro-environmental behavior (Ojala, 2012b; Ojala, 2013).

In contrast, in the same study among 12-year olds, it has been found that those were engaged in problem-focused and/or meaning-focused coping were more likely to report "high levels of environmental efficacy, pro-environmental behavior, optimism concerning climate change, and a sense of purpose" (Ojala, 2012b, as cited in EERB, 2013:8). However, there coping mechanisms were also observed to have contrasting effects on children: those who were pre-disposed to problem-solving were more likely to report negative feelings such as depression and anxiety; while those who resorted to meaning-focusing coping were more likely to experience life satisfaction and general positive effect.

Results and Discussion

Disaster risk profile of Malolos City

Malolos Cityis located in the Central Luzon region and shares territorial boundaries with different municipalities from all directions except in the south where it faces Manila Bay. Due to its geographic location, topography and climatic conditions, it is exposed to a number of hydrometeorological and geophysical hazards, including typhoons, storm surges, earthquakes, floods, and tsunamis.

Between 2006 and 2009, records from the Bulacan Provincial Disaster Risk Reduction and Management Office (PDRRMO) show that the province was visited by ten (10) major typhoons, leaving a death toll of 45 people. In September 2011, it was hit by Typhoon Pedring which flooded 23 barangays for almost a month, displacing 9,633 people and causing damage to 227 residential units and five school buildings.It was hit again by another strong storm in July 2014 (Typhoon Glenda), although the damage has not been as extensive as in the case of Typhoon Pedring.

The city is also highly susceptible to flooding. Its gently sloping terrain of 2.17% makes certain areas prone to inundation. Continuous heavy rainfall, typhoons, high tide, storm surges and dam water releases have been the causes of flooding in the city. Excessive run-off brought on by heavy rains and storms can easily cause water overflow in any of the city's 11 major rivers and 15 creeks, affecting surrounding communities.Additionally, coastal barangays, which are naturally low-lying, are particularly prone to a type of flooding that is caused by high tides from Manila Bay.

Fire is another hazard that Maolos faces. It can be triggered by human negligence or as a secondary hazard from earthquake or a result of extreme heat (e.g. grass fires) Between 2010 and 2012, the Bureau of Fire Protection- Office of the City Fire Marshall of Malolos reported 316 fire incidents affecting buildings and other structures with an estimated cost of damages amounting P27 Million.

Children in Malolos are not only vulnerable to climatic hazards, but also to the so-called "everyday risks" associated with urban poverty. These "everyday risks" aggravate the vulnerability of the poor sectors of the city.

As of 2011, a total of 2,410 households with 10,932 members have been classified as poor in Malolos. This accounts for about 5 percent of the total population, if based on 2010 census data. Among the poor, 22 percent are in the selected study sites—Bangkal, Longos and Pamarawan—comprising of 507 households with 2,429 members. The biggest number of urban poor is in Bangkal, a relocation site where 1,730 people live below the poverty line. (Table 2)

Table 2.Number of urban poor in Malolos,2011

Barangay	Households	Persons
Bangkal	352	1,730
Longos	51	226
Pamarawan	104	473
Sub-total	507	2,429
Rest of Malolos	1,903	8,503
Total	2,410	10,932

Source: MCG, Draft Local Shelter Plan 2014-2021

Lastly, the city's Disaster Risk Management (DRM) plan considers human health and diseases as a threat to the safety and resilience of the people. Diseases that may turn into epidemics are being monitored by designated rural health units (RHUs) in each barangay. In its Climate Change Action Plan 2014-2019, it was noted that the increase in temperature and precipitation can lead to increased incidence of communicable diseases; respiratory illnesses due to degraded air quality; and increased incidence of vector-borne diseases (e.g. dengue, malaria, leptospirosis, etc.). The city further acknowledges that health concerns like sanitation and malnutrition increase in times of disasters such as floods. This may lead to disease outbreaks in evacuation centers due to the close proximity of large numbers of people and the difficulty in maintaining safe and clean sanitation.

Among the disaster risks faced by the city, flooding is considered to be the most serious, as it regularly take place in costal and other low-lying areas of the city. However, it is seen more as a developmental problem, rather than directly related to climate change. According to most of the interviewed city officials and community members—adults and children alike—although the flood events in Malolos have been induced by natural hazards and processes such as typhoons, storm surges, and high tides, these are believed to have been triggered primarily by the consequences of human decision and action (e.g. clogged drainage system, improper solid waste disposal, encroachment of structures and silted waterways).

The situation is expected to get worse as the impacts of climate change create more stresses on the urban system. There is already a burgeoning water crisis in the selected study areas, while the demand for energy, proper drainage and sewerage and other urban infrastructure and services continues to grow in magnitude and complexity.

Among those who receive the brunt of slow-onset and sudden disasters are children, especially children of poor families. In Bangkal, a relocation site, livelihood opportunities are very limited, limiting the capacity of poor families to invest in better housing, education and healthcare. This has led to some children needing to work after school, if not drop from school altogether, just so they could help their family eke out a living.

In the course of their work, children had to face some challenges. They reported the risk of getting hit by cars when they pass by major roads and highways as they have to sell their products from house to house, from one community to the next. They also have to endure the sweltering heat which causes them headache. According to them, this has worsened over the years, although fortunately, they have yet to hear of a co-worker child who completely passed out due to the heat. Typhoons and floods also get in the way of their work, forcing them to stay indoors and result in loss of potential income.

Children with disabilities were also believed to have been affected by climate change impacts. For children with disabilities, parents were generally concerned with the day-to-day safety and security issues. The common aggravating factor to the condition of children with disabilities is the worsening heat. Parents believe that because of changes in the weather and the increasing temperature, children get sick easily.

Climate risk perception and adaptation of Malolos children

Children's knowledge about the impacts of climate change and other hazards come from mass media such as television, radio and newspapers. They also learn from their teachers, especially in science subjects, but this appears to be dependent on the knowledge, interest and personal advocacy of the teacher. When pressed for their understanding of climate change, the schoolchildren had different ideas but were mostly spot-on in relating it to changes in the climate, as manifested in the form of El Nino and super typhoons. Some mistakenly related it to earthquakes, tsunami and volcanic eruption as well, indicating the level of consciousness of the children when it comes to disasters in general.

To the children, it is clear that the floods are not only caused by the climate change-induced heavy rain and typhoons, but also by the clogging of drainage and waterways in nearby creeks, canals and rivers. Flooding is a regular occurrence in Bangkal and Pamarawan but for different reasons. Children in these areas have already adapted to the situation by doing what they can but they also lamented the government's insufficient support to alleviate the problem. The children cited the following activities as their contributions in light of the risks that they face:

- Proper disposal and segregation of wastes
- Tree planting at school and in own backyard
- Recycling of old materials
- Non-burning of wastes
- Cleaning of immediate surroundings

Moreover, older children (14-17 years old) help their families in times of typhoons, floods, and strong rains. They know that when it starts to rain hard, they have to help carry and put important belongings on top of the bed or any higher part of the house in anticipation of floods. However, many of them, especially working children, reported helplessness and exasperation in performing micro-level interventions with little corresponding support from the community to alleviate the situation in the long-run. This lends support to the findings of Ojala (2012b) in the case of Swedish children.

In the fishing community of Pamarawan, members of the YDC believe that the changing weather patterns contribute to the reduction in number, if not extinction, of certain fishes and other sea creatures. There is a feeling that while they can do little things for now to alleviate their situation in the island, chances are the young people will eventually look for ways to find greener pastures and leave the island, a form of meaning-focused coping that looks to better conditions in the future.

The older children particularly in Pamarawan were also able to link climate change to increasing severity of typhoons and the new "normal" of unpredictable and shifting weather conditions. According to them, the sources of these changes are anthropogenic, particularly by the way people are polluting earth's water and air.

Sudden-onset large disasters

The recurrence of typhoons and floods in the study areas have made the children aware of the danger that such hazards bring. Between the two, however, typhoons have been singled out by them as more terrifying because of the strong winds that it usually comes with. The sight of roofs being blown away, trees being uprooted, and "tidal waves surging inland" (i.e. storm surge) are some of the vivid images they think of when there is a strong typhoon. With these in mind, they normally stay indoors on their own discretion, with or without the advice of older members of the family.

For working children, street vending also becomes impossible and dangerous in the event of a typhoon or flood. The same is true for older family members (e.g. parents) who are daily wage earners. Taken together, this loss in potential income severely affects the capacity of the family to bounce back from the disaster or at least return to normalcy. In areas where the water takes days or even weeks and months to subside, the problem becomes very serious, as the loss of income and other resources exacerbates everyday risks related to poverty.

Moreover, classes are also suspended normally a day or some hours before landfall. This affects the regular school calendar in many of the inundated school districts. In the case of Longos, they had to allot for make-up classes even on Saturdays and Sundays to make up for cancelled classes. Sometimes, such as what happened in 2009, 2012, and 2013, floodwater went inside the classrooms, reaching as high as about 1 meter from the ground. In last year's flood disaster, floodwater only became passable after one week in Longos. In Bangkal, floods were only up to ankle-level, but the problem has been the long time it takes for the water to recede.

As in many other areas in the country, there are no indoor playgrounds in Malolos. Playtime is restricted indoors, if possible at all, depending on dwelling structure and conditions. City officials also claimed that they have been very active in stopping children from playing in flood waters during the rainy seson. School grounds can also serve as evacuation areas for those who get stranded by floodwater. This was the case in 2012 when a family was forced to stay in the elevated stage of Longos Elementary School as water rose up to about 1 meter from the ground.

While younger children are generally safe by staying indoors in times of typhoons and floods, some teenagers (i.e. aged 15-17 years old) had to take over certain responsibilities to ensure the safety of the family. They reported helping in securing the roofs to make sure that these will not get blown away easily by strong winds. They also help in cleaning up canals or manually removing stagnant water off the streets in the aftermath of a typhoon or flood. These pose health and physical risks to the children, although none of the children interviewed reported having suffered from or heard of accidents under such circumstances.

The children's experience in evacuation due to sudden onset disasters like typhoons and floods also leaves an imprint on their consciousness. They had mixed feelings from being scared to sad to having a difficult time adjusting to the rationed food, limited space, and generally chaotic environment in many temporary shelters. This applies to the children in Longos, but not to Bangkal who have yet to experience evacuation.
Although non-climatic in origin, some parents from Bangkal fear earthquakes more than typhoons and floods. This is because Bangkal itself is a reclaimed area, a former farmland, hence, the soil is believed to be soft or prone to liquefaction.

Slow-onset disasters

Drought has not been reported as a major issue by the city officials, community members, and parents interviewed. This is probably because many of them do not rely on farming as a main source of livelihood, Malolos being an urbanized area.

Saltwater intrusion, however, has been a major headache for many Malolos residents who participated in the FGDs. Piped water is available in the study areas, but the water is mostly not potable. They complained that the water smells, is salty, and sometimes murky, so they had to resort to buying distilled water from filling stations. This problem, apparently, has been going on for many years already.

Water stress was also felt in schools where there is no drinking water available for children. In Longos and Bangkal, children usually bring their own water to school.

Moreover, in Pamarawan, some children also believe that constant weather changes contribute to the death of fishes, seashells and other sea creatures, affecting the community's main livelihood. The loss or reduction in number of certain species has been affirmed by the parents who reported that fishes such as "balay" and "bilakong" are no longer available in the area since around the 1990s. Unlike the children,

however, they attribute this to the dumping of wastes in the ocean and the use of commercial feeds in nearby privately-owned fish pens.

Heightened everyday hazards

In Bangkal and Pamarawan, children lamented how everything needs to be purchased, even drinking water and firewood, unlike before in their community along the railway. And worst, there are no immediate livelihood opportunities for their parents as they are quite far from the construction projects and factories in the city center.

These circumstances have forced some of the children to supplement family income by plying food products usually after school (i.e. after lunch) under the sweltering heat of the sun. One child said that sometimes it becomes extraordinarily hot that her head begins to ache. In such cases, she simply tries to take a rest under a shade until the headache becomes bearable. There were also stories about children passing out as a result of heat stroke, although these are not too many.

To cool down the heat, many children frequent the so-called "patubigan" –-a 1-meter wide irrigation canal that stretches along the main road of Bangkal. They use it as their mini-swimming pool especially during summer. The water quality exposes them to skin-related health risks, not to mention that it poses serious risks to drowning and other swimming-related accidents.

Children also lamented how the design of residences in Bangkal, which puts houses right next to each other, and the lack of trees contribute to urban heat. They also attribute the former to more frequent squabbles among neighbors, a common serious concern mentioned by all children from the area.

In Pamarawan, members of the Youth Development Council echoed the observation that it has gotten hotter in recent years. They attributed this primarily to the decrease in number of trees as a consequence of land reclamation projects. They also believe that typhoons are much stronger now, creating much stronger storm surges and destroying their pre-stationed fish nets.

As already mentioned, working children are also exposed to occasional bullying as they sell their goods within and outside their community. In Bangkal, there are also petty "crimes" like children throwing stones at unsuspecting peers at night for no apparent reason.

In Pamarawan, flooding due to high tide is a regular occurrence. It can be from ankle-deep to as high as 1 foot, although it could get worst if the tidal flood coincides with a typhoon or just strong winds (i.e. storm surge). Unlike in Bangkal and Longos, however, the flood water does not stay longer than 3 hours. Under "normal" tidal flooding, classes are not suspended so children have to wade through the water just to reach the school. The children believe though that the water is getting deeper these days, as if the "land is sinking."
In the island community of Pamarawan, other security concerns of the children are the areas where there are no lights at night (e.g. bridge, dike area). Another important

issue for children is the rise of early pregnancy and drug addiction in their communities, and this is common in both Bangkal and Pamarawan. According to the barangay officials in Pamarawan, unwanted pregnancies happen even among high school students, as a result of lack of better or more productive activities outside the school system.

Health-related climate risks

Dengue, diarrhea, and respiratory problems are believed to be increasing, according to the interviewed city officials, parents and community members. They are aware that stagnant water can cause dengue outbreaks and that hotter weather can trigger asthma attacks and similar health concerns. Given this, they believe, for instance, that fumigation is not effective anymore; rather, what is needed is a thorough and regular clean-up of everyone's backyards.

For instance, at least one parent also reported that due to the unpredictability or changing weather patterns—i.e. alternating hot and cold—her asthmatic child has been having more frequent attacks. Others also relayed that they had to rely on air conditioning and electric fans more often just so to keep their children from getting sick.

Moreover, the parents and pupils are acutely aware of the diseases that one can get from wading through dirty flood waters. They are also aware of how stagnant water can serve as fertile breeding grounds for dengue- and malaria-carrying mosquitoes, although for the people of Pamarawan, there is a widely-held misconception in Pamarawan that they are free from the threat of dengue simply because dengue-carrying mosquitoes do not breed in saltwater—which is the main cause of inland flooding in the community. In Longos, there is stagnant water at the back of the classroom of Grade One students, which has long been a major concern not only of the pupils and teachers, but also of the principal. The water comes from the wastewater generated from the households adjacent to the school.

In Pamarawan, the temperature has affected children's playtime. For instance, whereas before they could still play outdoor basketball until around 12 noon, but now, they could no longer do it due to the extreme heat. In Longos Elementary School, the rooms are already equipped with 4-6 electric fans but these are still not enough, with children complaining about the sweltering heat inside the classroom.

Parents further added that the weather changes have led to children getting sicklier than before, such as colds and cough. Also, walking through floodwaters has been pointed out by the parents as the reason for skin diseases among their children.

Other "small disasters"

Fires are few and far between in Malolos. In Bangkal, the children could recall only one incident this year—a fire that gutted two houses but fortunately did not hurt anyone. It apparently was caused by a candle, as it happened during a brownout.

In Longos, children talked about a neighbor's house which accidentally caught fire due to an electrical accident. There were also reports of grassfires at the onset of summer in 2014, March to April, but these were easily contained by the community. In Pamarawan, at least one house was gutted by fire but this was a long time ago.

In Bangkal and Pamarawan, the children reported at least one house in their community which collapsed without any apparent reason. According to what they have heard, it was due to shallow and soft foundations. In both incidents, no one was hurt.

Other concerns in the study areas include lightning accidents and petty crimes like neighbor squabbles. Traffic accidents were not reported to be very prevalent in all communities, since the communities are not located in the city center or along major thoroughfares. Nevertheless, it is seen as a grave concern especially by the parents from Pamarawan and Bangkal, where the roads are very narrow.

Adaptation services for children

In response to the challenges posed by climate change and disaster risks in general, the City Government of Malolos has started to adopt key policies and plans laying down the framework for climate change adaptation-disaster risk reduction (CCA-DRR) in the short- to medium-term. These include the city's Disaster Risk Reduction and Management Plan; Local Climate Change Action Plan (LCCAP), 2014-2019; Disaster Operations Manual; Contingency Plan for Flood; and Contingency Plan for Earthquake. The city is also currently in the process of updating its Comprehensive Land Use Plan to be more sensitive to climate change and disaster risks. A Local Shelter Plan 2014-2021 is likewise being finalized, as part of the government's efforts to integrate climate change adaptation and risk reduction in land use and development planning.

A number of programs, projects and activities has been indicated in the city's LCCAPaddressing temperature increase, flooding, sea level rise, and typhoons. These include interventions in health, agriculture, water and water resources, environment, and coastal areas amounting to Php513 million between 2014 and 2019. More than 90 percent of those were allotted for environmental and coastal PPAs.

Table 2. General CCA-DRR measures to address flooding

Structural	Non-structural
• Declogging of drainage system • Relocation of Informal settlers • Riprapping of waterways • Continuous dredging of waterways • Upgrading/construction of drainage system • Construction of dikes/levees in coastal barangays • Improvement of water level gauge	• Creation of DRRERD • Functionality of DRRMCs • Implementation of Waste management laws/ordinances • Trainings and seminars on proper waste disposal • Creation of irrigation Task Force for activation when the need arises; • Implementation of existing related laws and ordinances • Updating of CLUP/Zoning ordinances

Source: MCG, Contingency Plan for Flood

Moreover, the city government has put in place the necessary organizational structure and institutional coordination mechanisms to deal with disasters, as provided for in RA 10121, otherwise known as the Philippines' Disaster Risk Reduction and Management Act of 2010. CCA-DRR activities have been funded through the city's Local Disaster Risk Reduction and Management Fund (LDRRMF), General Fund, and MOOE under the City Administrator's office. In relation to flooding, the city's CCA-DRR measures are listed in Table 2.

At the community level, there is little awareness among most children on CCA-DRR measures being undertaken by the government, whether at the city or barangay level. They have known of the government's response in times of disasters such as typhoons and floods, especially in the context of relief distribution. However, many of them have neither heard of nor participated in a government activity that deals with enhancing the capacity of their community prior to a disaster.

Main problem common among the study sites is lack of livelihood opportunities once the children becomes legally eligible to join the workforce. In Pamarawan, those who don't get engaged in fishing will have to explore other options abroad or in Metro Manila, depleting the potential social capital of the community. In Longos, inadequate educational qualification is generally considered to be the main barrier to landing a good and stable job. The ongoing "brain-and-labor drain" will eventually have significant impact on the level of resiliency of the community vis-à-vis disasters and climate change.

In terms of structural interventions, children from Pamarawan were aware of the dikes that have been constructed by the barangay with support from the city government. This has proven to be effective as artificial barriers during storm surges. However, the children perceive that in recent years, infrastructure projects are more concentrated on the establishment or repair of basketball courts rather than on the expansion or strengthening of dikes.

Children have heard of climate change from school, particularly in their science subject, although they could vaguely recall the specific details about why it is happening. Many of them usually attribute it to the cutting of trees, and do not automatically relate the phenomenon to the severity of typhoons and floods. It was also found out that the extent of how climate change and disasters are taught at school depends largely on the knowledge, interest and personal advocacy of the teacher.

In Longos Elementary School, climate change is being taught at least in Grades 5 and 6 in certain subjects. In social science and history class, it is part of the news sharing segment especially when there are typhoons elsewhere in the Philippines, while in Science, it is part of the lesson on carbon cycle. Climate change per se is not in the textbook; the decision to teach it is purely based on the interest of the teacher. Most of the materials that they use are sourced through the Internet and old DVD videos (which were unfortunately flooded last year). Floods, along with earthquakes and volcanoes, are discussed in the textbooks prescribed by the government as natural hazards, with nary a mention of its relation to climate change.

Earthquake and fire drills are also regularly conducted in all schools, as part of a nationwide program for disaster preparedness. These exercises are normally headed by the principal and teachers, with all students required to participate.

In terms of training, the teachers—and community officers—said that they have attended at least one seminar related to disaster risk management but not specifically on climate change adaptation and mitigation. It was four years ago (2010) and at that time, the teachers recalled that the discussions then were too broad, with no localized or contextual application. At best, they were taught about first aid and rescue, and nothing more. A local school also sponsored a one-time screening/seminar on climate change for teachers but that was it. There has been no program on climate change from the barangay either.

Beyond teaching, there have been efforts to "climate-proof" the school buildings. In anticipation of more frequent flooding, new buildings in Longos Elementary School were now elevated higher than the older structures; while in Bangkal, the school grounds are practically flood-free, not to mention that the buildings themselves are multi-level.

In terms of emergency response capacity, there are several early warning systems for flood strategically located throughout the city. These include rain gauges, weather station, water level marker, and other improvised warning signals installed in different areas of the city. In collaboration with other partners, one siren has been stationed in Pamarawan while zone leaders in other communitieshave a roving tricycle patrol

equipped with siren and megaphones as a means of informing the populace of impending hazards.IEC materials are also distributed to inform the public on what to do and what systems and procedures to be followed in case of emergencies.

In Bangkal, there is a health center where residents can go to. Children, however, complained that the center does not even have medicines to simple health concerns such as boils. In Longos and Pamawarawan, they do not have a hazard map but the barangay officials claim to know which areas are vulnerable to flooding.

Also in Bangkal, some of the parents mentioned that disasters in general have not been discussed at the community level. There are no household plans as well. Because of this, they do not know exactly where to go or what to do in the event of extreme flooding, for instance.

During typhoons and major flooding, the major concern, especially in the island community of Pamarawan, is food. As an island barangay that is reachable only by boat, relief goods are not easy to come by. The restoration of services is also problematic. For instance, because of their location, they are one of the firsts to be affected and among the last to be serviced when electricity is cut off.

The children have received training in schools on first aid and evacuation protocols as part of the annual earthquake and fire drills. However, these have been specific on earthquakes and fire. In Pamarawan, external organizations such as the Bulacan State University and Philippine Red Cross also came to provide orientation training and seminar on first aid.

Another important concern raised by the barangay officials from Pamarawan is the absence of a fire truck in the community. What they have is just a portable fire hose that is already old and no longer in use.

At the household level, the parents and community members interviewed understand climate change primarily in the context of changing weather patterns. Other than this, they do not necessarily equate events like floods and typhoons as related to climate change. Floods, especially, are seen generally as a product of new villages or subdivisions with improper drainage and sewage systems in the area. As such, it is closely related to planning and solid waste problems.

As to climate change per se, they see it as a consequence of pollution from industries and cars. They believe that since it seems nothing can be done anymore to stop the climate from changing, then they have no choice but to adapt to the changes and leave everything else to God, a form of meaning-focused coping strategy identified by Folkman (2008).

The resilience of families seems to be influenced by their socio-economic circumstances. Most poor families, particularly the migrants in Bangkal, do not have any preparedness kit, not even a simple flash light that they can use in case of a brownout. This is particularly important especially since electricity is not usually available at the height of and immediately after a major typhoon. In the relatively

better off community of Longos, children reported that their parents prepare a preparedness kit before they go to evacuation areas if necessary, like what happened in 2013 when monsoon rains submerged a large portion of Bulacan province including Malolos. The kit typically contains medicines and other first aid paraphernalia, some clothes, canned goods, and a flash light.

However, the ability to bounce back can also be aided by external factors. For instance, the strength of informal social ties among neighbors in a community can be very valuable in getting back on one's feet. This is the case of the parents from Pamarawan who shared that life is easier there because they help each other even on day-to-day hardships. This is attributed to the fact that they know each other for so long already, which unfortunately is not the case in Bangkal where most of the residents have just moved in to the community five years or so ago.

In the context of increasing temperature, the children reported that they have to use fans or electric fans more and more when indoors. Sometimes, they could see the roof or pavement emitting some kind of smoke due to extreme heat. In such cases, they reputedly pour the area with water to cool down. Parents share the same idea, believing that "summer" is now longer than before, and that even when it rains, it is still hot.

The interviewed parents said they have not heard of any program or activity on climate change that is catered specifically to children. However, those from Pamarawan said that they have attended at least on one occasion a seminar as arranged by the city government. Climate change was also tackled in one of the parent's catechism classes. In general, it can be said that what they know about the impacts of climate change is based on what they have heard from mass media.

Conclusions and Recommendations

The study has found out that Malolos is not only vulnerable to large-impact climatic risks (e.g. major storms and massive flooding), but also to the so-called "invisible" risks. In disaster studies, "invisible" risks are associated with so-called extensive risks: events with low or moderate intensity that are highly localized in nature but have debilitating cumulative impacts over time. Extensive risk is often associated with poverty, urbanization and environmental degradation. (UNISDR, 2009) By their nature,these small-scale events are not usually treated as disasters; hence, their impacts are generally underestimated, if reported at all. To Wisner and Gaillard (2009), these events fall under the category of "neglected disasters."

Moreover, not a few children and their families were also exposed to so-called "everyday" hazards. These are the daily living struggles of people which can be a combination of economic, food security, health and education issues, as in the case of youth from Madagascar (Biskupska, 2014), and may result in premature death or injury (Bull-Kamanga et al, 2003). In the case of Malolos, certain children were unduly placed in constant threat from harm primarily because of the need to eke out a living even in precarious situations (e.g. under extreme heat or in the middle of a storm). Aside from poverty, everyday hazards can also be exacerbated by the

topographical characteristics of the area where the children reside, such as in the case of Pamarawan. These vulnerability becomes even more pronounced in times of disasters wherein poor households who subsist on daily wages are deprived of the means to get by and survive, making it even more difficult for them to bounce back. This lends support to the assertion that interventions for climate change adaptation, or disaster risk reduction for that matter, should not be divorced from socio-economic realities of vulnerable sectors (Wisner et al., 2003).

Among those who receive the brunt of these disasters are children, especially children of poor families, children with disabilities, school children, and working children. It affects their safety and security, as much as it disrupts opportunities for learning and playing whether at school or in the community. Emotion-focused coping that hinges on denial or distancing does not seem to be prominent among the children.

As in other studies (Ojala, 2012b, 2013), many of them were instead predisposed to problem-focused coping as they try to cope with the impacts of climate change in their immediate environment. This can be partially explained by their view that climate change impacts are local in nature. The older children from Palawan also exhibited meaning-focused coping as many chose to look on the brighter side, highlighting their positive contributions and the strong social capital in the coast community.

In the face of challenges posed by climate change, different levels of adaptation have been adopted by the city government, communities and schools, households and children themselves, informed largely by their own understanding of climate change. Many of these, however, were found lacking as they do not explicitly and meaningfully address the perspectives and needs of children.

In light of the foregoing, the following recommendations are put forward to further strengthen the adaptive capacity of Malolos and ultimately protect the welfare of children from the impacts of climate change:

Confronting"invisible risks"

Tidal flooding has become a way of life for children and families who live in the coastal communities of Malolos such as Pamarawan. On the other hand, children from Bangkal face perennial inland flooding due to poor drainage system in the area. This confirms findings from the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), which noted, among others, that inland flooding is one of the major threats to children and other marginalized sectors in large, low-income informal settlements who have limited means to cope and adapt to the challenges of extreme precipitation.

While there is excess water runoff on one hand, there is also a growing water stress in Malolos on the other. Two out of the three areas covered in the study exhibited signs of saline intrusion into the water distribution system. Changing rainfall patterns and high possibility of drought will have serious impacts on the agricultural productivity of the city. The same is true for the continuing acidification of ocean water which is

beginning to affect the economic resilience of fishing communities. Given the looming water shortage, the government's plan to provide more shallow tube wells and construct additional water sources should be supported, especially in schools where children spend most of their time during the day.

These recurring, low-impact events are generally considered to be "invisible risks" as they do not get to be included in disaster assessments conducted by the government. However, studies have also shown that in the long-run these "neglected disasters" actually cost more and have more lasting impacts on communities than one-time, large-scale events such as a major earthquake or an Ondoy-type of storm.

The children have been doing their part in living with these so-called extensive risks through problem-focused and meaning-focused coping, but it has also lead to anxiety and feelings of hopelessness among children. While they have adapted to its impacts through years of accumulated knowledge and experience, the government both at the barangay and city levels should intensify their DRR/CCA efforts and start looking taking into account the needs and potential of children in these areas beyond mere tokenism. For one, climate risk parameters must be thoroughly integrated in the design, upgrade and repair of drainage and sewage systems, as well as road networks.

Children with disabilities and their families face compounded difficulties in times of floods, typhoons and other disasters. Special considerations and a concrete action plan must be given attention to improve availability of and access to critical facilities, including schools, clinics, and evacuation centers, among others. Parents and guardians must also heighten their awareness and improve their skills to take care of children with disabilities before, during and after disaster events.

Tackling "everyday hazards"

Poverty has forced the families of many children to continue to live in the same risky locations that are susceptible to recurring, small-impact flooding. Other children had to eke out a living as street peddlers under dangerous conditions in order to help the family survive on a daily basis. While there were only few cases of working children covered in the study, their number should not be any reason for neglect.

It goes without saying that socio-economic resilience should be addressed to protect the welfare of children vis-à-vis disaster risks and the impacts of climate change. Sustainable livelihood options and entrepreneurship opportunities must be explored and be made-accessible to strengthen the ability of families to adapt to a changing climate and recover from the effects of a disaster.

It must be noted that in the face of food insecurity, the urban poor usually resorts to coping strategies that have adverse impacts health implications especially on women and children. (Cohen and Garrett, 2010) The current LCCAP of Malolos has already identified the needed budget for its socio-economic interventions, although it is not yet clear where the funds will come from. Social capital at the community level must also be promoted and strengthened.

Another "everyday hazard" that confronts children and mothers is the issue of health. Being exposed to constant flooding, vector-borne diseases are expected to escalate, especially with a changing climate. Efforts must be intensified to eliminate breeding grounds of dengue- and malaria-carrying mosquitoes.

Respiratory problems due to changing weather conditions and extreme heat must also be given a second look to prepare for worst case scenarios in the future, especially as it relates to housing conditions (Bartlett, 2008). Information and Education Campaigns (IEC) at the community and household levels must be sustained, along with capability building/training to improve epidemic preparedness and health-related response mechanism. The IPCC has reported that the most effective vulnerability reduction measures for health in the short term are improvements in basic public health measures such as the provision of secure essential health care services for children. (IPCC, 2014)

Tapping children as partners

In all these, it is of paramount importance to view children not merely as beneficiaries of CCA-DRR programs and projects, but more importantly as partners in various stages of the project or activity cycle. As pointed out in Tanner (2010), children can play an important role in all aspects of DRR/CCA, from risk analysis to risk communication to mobilization and actual implementation of risk reduction measures. Children's insights on climate change and disaster risks provide a unique perspective in planning based on their own knowledge and experience of specific hazards in the community. Also, with proper training, they can be good communicators given their own understanding of climate change and its impacts. Community-based youth development councils can also be tapped to explore the potential contributions of children in the monitoring and evaluation of CCA-DRR interventions. Children and youth, after all, have the right to participate in determining their safety and security.

The continuous mainstreaming of CCA-DRR in schools and the school curricula must be vigorously supported. The educational system stands to be a good and credible source of learning on climate change for the children. Climate change and disaster education is currently based only on the interest, knowledge, available resources and personal advocacy of teachers. Likewise, educational materials must be provided to support these interim initiatives at the local level.

Lastly, while the current CCA- and DRR-related plans of the city, such as the Local Disaster Risk Reduction and Management Plan (LDRRMP), Contingency Plans for Flood and Earthquake, Local Shelter Plan, and LCCAP, takes into account the need of vulnerable groups and communities, they do not explicitly give due attention to the needs and potential role of children in CCA-DRR. A more detailed analysis and integration of children's issues and strengths will be valuable to ensure that children's rights and welfare are protected in an era of a changing climate.

Acknowledgement

This study is part of a regional research project on Climate Change Risks and Resilience in Urban Children in Asia, covering Bangladesh, Vietnam and the Philippines. The project was commissioned by Save the Children and the International Institute for Environment and Development, with funding support from the Rockefeller Foundation's Asian Cities Climate Change Resilience Network. The author wishes to acknowledge the administrative support and technical inputs provided by Save the Children-Philippines in the conduct of the study, particularly, Ms. Rowena Alvarez, Mr. William Azucena, and Mr. Jonard Velasco. He is also thankful to the able help of students assistants from the University of the Philippines-National College of Public Administration and Governance, namely, Marielle Antonio, Luigi Montevirgen, Carl Garcia, Sabrina Tan, and Robert Espanola.

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