Child Health During War and Disasters: Building Resilience

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ABSTRACT

Children face unique risks resulting from disasters and conflicts. Broadly, complex emergencies create new and augment existing health risks to children. Direct, conflict-related injuries and deaths – such as those resulting from exposure to chemical weapons and blast injuries – not only have immediate impact but also have long-term impacts on the health and wellbeing of children. Lapses in vaccination coverage, changes in vector patterns, and widespread malnutrition, contribute to new and re-emerging infectious diseases among children. Understanding risks resulting from disasters and conflicts is critical for implementing timely and appropriate public health programs to reduce the negative health effects on children.

Keywords: *Complex emergencies, Conflict, Public health*

BACKGROUND

Pediatric health concerns are ubiquitous across all settings but are exacerbated in disasters and conflicts. There are a range of considerations – infectious diseases, injuries, mental health impacts – that must be accounted for when assessing pediatric health outcomes in complex emergencies. Disasters and conflicts can limit or stop the provision of public health and clinical services, resulting in lapses in immunization coverage, impeded provision of other forms of preventative care [1], development of conditions prime for the spread of communicable diseases [2], and exacerbation of pre-existing or chronic conditions. Low levels of vaccination coverage, as well as high prevalences of acute malnutrition contribute to high levels of under-5 mortality, particularly for displaced children [3]. Further, poor nutrition status and associated stunting have a range of sequelae, including compromised immune function, impeded brain development and associated learning disabilities, and higher risk of chronic diseases such as metabolic syndromes later in life [4,5]. Physiological considerations such as higher risks of both short- and long-term injury-related morbidity and mortality are higher for children, due in-part to differences in metabolic rates, total blood volume, and skin permeability, compared to adults [6,7].

Adverse childhood experiences (ACEs), defined by the US Centers for Disease Control and Prevention simply as traumatic events experienced by individuals from birth to age 17 years, can have both acute and chronic negative impacts on the mental and physical wellbeing of individuals [8,9]. These effects can include, but are not limited, to the development of obesity [10], premature-onset of chronic diseases such as diabetes, cardiovascular disease and pulmonary diseases [11], and mental health conditions such as substance-use disorders, anxiety, and depression [12]. Timely and appropriate remediation efforts are needed to attenuate the negative health impacts of ACEs [13]. However, identifying and addressing ACEs is exceedingly difficult in conflict and disaster settings and is challenging even in highly resourced, stable settings [14]. Accessibility and logistical constraints in complex emergencies can impede the delivery of this aid, in effect amplifying the potential for negative downstream mental and physical health impacts.

The physiological and psychosocial principles that place children at comparatively higher risks for negative health outcomes are not unique to complex emergencies. However, these situations result in fewer resources – including, but not limited to, medical, social, and infrastructural supports – to attenuate the negative impacts of experiencing disaster or conflict events. Accordingly, it is important to consider the multitude of ways in which child health has been negatively impacted in complex emergencies. In the following sections, we discuss a few examples from recent conflicts and disasters.

CHALLENGES AND BARRIERS

Impact of Chemical Weapons

The Syrian Civil War officially started in March 2011,

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following widespread peaceful protests around the country against the regime of Syrian president Bashar al-Assad [15]. Chemical weapons – including the nerve agent sarin – were used by the Assad regime to deter opposition. The first suspected use of chemical weapons was reported in December 2012, but attacks have continued through 2023 [16].

Children face disproportionate impacts from exposure to chemical weapons. A retrospective case-cohort study assessing the effects of childhood exposure to chemical weapons on the prevalence of chronic disease among Iraqi Kurds found higher prevalences of chronic ocular, dermatological, respiratory, and nervous system conditions [17]. When exposed to chemical weapons, children become ill at a lower effective dose than adults, and their smaller bodies are less able to handle the stress placed on organ function and metabolism. Individuals exposed to organophosphates experience a range of negative mental health outcomes, including depression, post-traumatic stress disorder, and insomnia, among others [18-21]. Adverse childhood experiences – such as exposure to chemical warfare – have long-term effects on the mental health and wellbeing of children like those living in Syrian cities such as Ghouta, Douma, and Khan Shaykun which were targeted with organophosphates and chlorine gas.

Impact of Air Raids and Violent Deaths

Over 17% of the estimated 145 849 Syrian civilian deaths recorded in the Violation Documentation Center due to direct violence from 18 March 2011 through 31 December 2016, were children [22]. Aerial bombardment and shelling were the two leading causes of direct deaths for both male and female children. The proportion of children among all civilian deaths increased from under 10% in 2011 to nearly 25% of all civilian violent deaths in 2016. The high levels of direct civilian deaths – and pediatric deaths, in particular – are unfortunately not uncommon in warfare defined by air offenses. Roughly 67% of excess mortality in the Yemen Civil War was attributable to direct violence [23].

Among Syrians treated for injuries in a Turkish medical facility, children were more likely to have head trauma following blasts, compared to adults who were more likely to have injuries to the torso and limbs [24]. Trauma resulted in vascular injuries at higher rates than other war-related injuries, accounting for over 60% of pediatric deaths following blasts from incendiary explosive device and suicide bombings in Pakistan [25]. In a retrospective cohort study comparing the circumstances causing and clinical presentation of burns among Syrian and Turkish pediatric burn patients, Syrian children were more likely to have fire- and blast-related burns, burns covering a greater percentage of their bodies, more intensive clinical management, and higher rates of burn-related fatalities when compared to Turkish pediatric burn patients [26]. Broadly, children are more likely than adults to have high-mortality burn injuries, and the complex nature of clinical management, reconstruction, and rehabilitation require vast medical resources that are often not available in conflict settings [27].

Beyond detrimental physical health effects, air raids and resulting blasts have negative mental health impacts for survivors. Children in Northern Ireland who were exposed to bombings were much more likely to experience post-traumatic stress disorder than their peers [28]. In a 2022 report by Save the Children, at least 80% of children in Gaza experienced symptoms of present traumatic stress syndrome due to the blockade and recurrent bombings of the Gaza Strip [29]. European countries receiving Ukrainian refugees were encouraged to develop proactive psychiatric interventions for displaced children and their families to foster resilience and address pediatric developmental needs [30].

Lapses in Vaccination Coverage and Vaccine Preventable Diseases (VPDs)

Violence, instability, and natural hazards contribute to the spread of early-childhood, vaccine-preventable and logistically manageable diseases globally. The destabilization of the Syrian health system, as well as inaccessibility and security concerns throughout the country, resulted in limited capacity for supplemental and expanded immunization programming. From January 2015 through June 2019, there were nearly ten times as many clinically suspected measles cases (n = 30241) in Syria than were recorded for the entire country in the first decade of the 21st century (n = 3193) [31]. Similarly, in 2019, the Democratic Republic of the Congo reported record numbers of measles cases after large cohorts went unvaccinated due to insecurity, limited resources, flood-drought cycles, and a concurrent Ebola outbreak [32]. Yemen, which has been in a civil war since 2014 and experienced recurrent disasters from heavy rainfall and flooding, has recorded outbreaks of measles [33,34], cholera [35–38], and diphtheria [39,40].

Malnutrition

Malnutrition contributes to the risk of infectious diseases. For example, in India, districts with a higher percentage of underweight children were more likely to have endemic malaria [41]. In areas experiencing recurrent flooding in South Sudan, malnutrition and a fertile environment for mosquitoes to breed contributed to high levels of malaria among children [42]. Other studies have found differing

relationships between malnutrition and malaria [43]. For example, a study in the Western Brazilian Amazon that found the relationship between malaria and nutritional status differed by age, where, in some cases, undernourished children had comparatively lower risk of malaria [44]. Poor nutritional status can also complicate the clinical management of infectious diseases. Nigerian children with severe acute malnutrition (SAM) under five years of age were more likely to require longer clinical management of cholera than children without SAM [45]. Both maternal-fetal and pediatric under- and malnutrition can contribute to vitamin A and zinc deficiencies that result in compromised immune function, placing children at higher risk of severe clinical manifestations of early childhood diseases such as measles [46].

WAY FORWARD

Climate-related disasters are increasing in both frequency and severity, and geopolitical instability is affecting millions globally. Both of these circumstances create precarious environments for children around the world. In many scenarios, there are known interventions or actions that can attenuate the negative health impacts of disaster and conflict exposure on children. For example, timely linkage to mental health supports for children experiencing violence can help proactively manage stress responses and reduce the longitudinal development of more severe and persistent mental health disorders. However, the implementation and uptake of such interventions continues to be wrought with challenges. Similarly, we know that on-schedule immunization coverage greatly reduces the burden of early childhood, vaccine-preventable diseases. Again, the operationali-zation of expanded and supplemental immunization activities in disaster and conflict settings faces numerous challenges ranging from physical inaccessibility to cold chain management.

Public health balances individual and population-level health outcomes to better understand how risks operate, as well as their resulting impacts and the potential mechanisms for risk reduction. As public health practitioners, we must focus on building resilience in the face of increasingly complex environments. This requires engagement with and understanding of the persistent challenges experienced in the implementation and adoption of known risk reduction practices and post-disaster interventions. If we define resilience as "the capacity of a system to adapt successfully to challenges that threaten the function, survival, or future development of the system" [47], we have the obligation to identify population needs, listen to the experiences and perceptions of affected populations, and provide tangible supports.

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