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Residential relocation, school relocation and children's transport: The effect of the Great East Japan Earthquake and Tsunami 2011

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ABSTRACT

This research aims to explore the problems encountered by children as they travel to school in a Japanese city after the disruptions of the Great East Earthquake and Tsunami 2011. Disaster recovery constitutes: short-term rescue/relief; mid-term reconstruction (temporary settlement while rebuilding community); and long-term recovery (long-term settlement and disaster mitigation). This study focuses on the impact on children's travel in a longer-term perspective. Little research has been published on longer-term impacts of disasters on the community despite the rich literature on evacuation and short-term travel behavioural changes after natural disasters. A retrospective qualitative analysis of 73 student cases in Ishinomaki, Miyagi Prefecture, identified several critical and complex problems encountered during both the short- and long-term periods following the disaster. Student travel to school was compromised by: a) students being re-located to temporary residential accommodation a long way from their existing or new schools (compounded by limited transport services); b) post-disaster, school facilities had been destroyed or relocated, or were being used as temporary community shelters; and c) damage to road infrastructure, missing traffic signals/lights and debris that remained for a relatively long time after the disaster. The paper concludes with the policy implications for the different phases of recovery, and suggests directions for future research.

1. Introduction

There is a well-established body of practical planning literature on the convenient siting of schools in urban areas. Whilst site-specific considerations are paramount, a general principle is to conveniently locate a new school in relation to its student catchment. Standards include accessibility criteria such as maximum distances and upper limits on travel time, undesirable travel conditions (no footpaths, steep gradients, access through industrial areas), the crossing of busy traffic thoroughfares and dangerous intersections where pedestrian accidents are recorded as high [1]. Such standards have found their way into planning practice guidelines and planning texts such as the work by Chapin [2]. But what happens to these established patterns of access and to students once schools in an area are suddenly and violently disrupted by a natural disaster such as a devastating riverine flood, tsunami or an earthquake?

Many national governments are aware of the risks of natural disasters and have disaster management plans in place (see Section 5). The focus tends to be, for obvious reasons, on the urgency of coping with the immediate emergency: evacuations; rescue of civilians; and the short-term logistics of providing humanitarian relief. Planning and development of more resilient cities is one adaptation strategy to counter future threats [3]. Guidance on what to do in the longer term, once the flood waters have receded and the debris cleaned up, both in terms of the physical damage to infrastructure and the emotional damage to those affected, has received less attention. In the specific context of schools and the education of its pupils, what is the evidence surrounding the problems faced by students? What policy and planning advice is available to local authorities in coping with disasters during the longer-term recovery and re-construction phases?

We have found few previously published case studies that explore the specific problems of children's travel to school in a post-disaster community. The closest example is the comparison of short-term site sharing and shift sharing of schools in Christchurch, New Zealand, following the 2011 earthquake [4]. A large body of literature examines the social-psychological nature of the impact of natural disasters on children. This is beyond the scope of our investigations (for a systematic mapping review on the impact of flooding on mental health, see, [5]). Research by Phillips,

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Thomas, Fothergill and Blinn-Pike [6] has reviewed the impacts of disasters on children and touches on the problems of temporary housing, school location and transport problems. However, there is limited research exploring the transport demands associated with re-location to temporary housing in the mid- to long-term after a disaster. Surprisingly, there is no research in Japan on this topic.

Therefore, our research focuses on the problems of student travel to school (primary and secondary) in the devastated communities of North East Japan after the major earthquake and tsunami that occurred on 11 March 2011. The magnitude of the reconstruction effort has been on a scale unprecedented in Japanese history. This paper investigates the circumstances of the location of temporary housing, the access to school facilities after the disaster and the issues of travel to those facilities after the disaster, including damaged roads and the longer distances to schools. The emergency situation in the immediate aftermath of the disaster can be summarised as follows. Temporary housing was provided according to Japan's Disaster Relief Act. The tasks of building and sourcing temporary housing were assigned to the Governor of Miyagi Prefecture and financed by the national government. Communities of Ishinomaki city were seriously disrupted, where 3277 people lost their lives and 428 people are still officially missing (as of December 2015). Seventy percent of houses (53,742) were affected by the tsunami, of which 40% (22,357) were completely destroyed. Fifty thousand people were evacuated from their homes to 250 emergency shelters. Following protocols in the Disaster Countermeasure Basic Act of Japan, schools were used as evacuation centres. As of July 2011 (4 months after the disaster), 3892 people were staying in 75 evacuation centres, of which 32 were schools (primary, junior-high and high schools). The disruptions to school travel patterns were substantial given that the majority of Japanese students (98.3%) walk or cycle to school when they are located in their dedicated school district [7].

The longer-term issues may be summarised as follows. The number of children who commuted to primary/junior-high school from temporary housing was about 1500 amongst whom 1100 children went to school outside their designated school district (as of March 2012 [8]). Of course, many parents/custodians wish their child(ren) to return to school as soon as possible after a catastrophe as a sign of a return to normality that might reduce post-traumatic stress disorders but in these particular circumstances, due to the loss of and damage to homes, the necessity to stay in the shelters for long periods, hindered this aspiration. The factors associated with children's travel are: a) school facilities were destroyed, or were used for shelter; b) school facilities were damaged and reopened but were shared with other schools or shelters; c) there were difficulties in reaching school/relocated school facilities from temporary housing because of the extra distances involved, coupled with the limited availability of public transport services or school transport; and d) there was limited availability of housing and employment leading to uncertainty in identifying suitable residential locations for long-term resettlement [6].

The methodology of this research is a semi-structured interview survey of affected families conducted by the lead author investigating 73 narratives of children in both urban areas and the fishing villages surrounding Ishinomaki city. It builds on previous research that has investigated the post-disaster transport arrangements by 16 semi-structured interviews with local council representatives and community groups, supplemented by a residents' questionnaire (687 responses were collected) that surveyed travel behaviour in the post-disaster phases [9]. The interviews were conducted at the homes of children or in public facilities during July 2014, with permission from parents (or carers), and the children themselves if they were aged 12 or more. The majority of children who were asked to be interviewed expressed no hesitation in talking of their experiences.

The significance of the findings from this research is that it advances the understanding of the complexity of relocation after a disaster, with particular reference to school travel, but there are limitations to the study. Notably, the perceptions of school teachers are not recorded because our primary focus was the perceptions of children and the community. A wider survey of all residents' relocation patterns and their travel mode choices has yet to be conducted. Furthermore, the impact of all of these disruptions on students' academic progress, and on students' physical and mental health, are outside of the scope of this research.

The organisation of the paper is as follows. First, we review the literature on children's travel to school, noting, at the same time the reasons why researchers and policy makers are interested in this topic. The next section explains our methodology: the selection of Ishinomaki as a case study area; the problem investigated; survey design and data collection; and a descriptive overview of the survey participants. The fourth section describes the results of the qualitative survey and the three themes that are distilled from the interviews: changes in residential location; changes in school location; and the transport issues around damage to infrastructure and inadequate public transport services. The final substantive section synthesises the issues that we have interpreted from the qualitative survey and suggests some areas of potential policy reform in Japan. These suggestions may also have international relevance for disaster management.

2. A review of research on children's travel

2.1. Research into children's travel in general

A fundamental question to ask is why would researchers be interested in conducting research into children's travel patterns to schools when it has been established that during the post-second world war era planning authorities in developing nations, and also in many developing economies, have done a professional job in locating schools in population catchments even with the demographic change in areas over time? Locating schools in population catchment areas means that children can walk or cycle to the closest school. And this is related to a fair allocation of resources in the urban system (equity in school location and school quality so that parents do not consider sending their children to school a long way away for a better education). This follows the pioneering work of Harvey [10].

A paper by Hine [11] has briefly reviewed the themes of "school transport research" and provided an explanation for this interest by the transport research and policy community. They are: the impact of growing levels of car ownership and the use of the motor vehicle on patterns of travel behaviour: the impact of motorisation on the amount of walking amongst the population; and the degree to which children have independent mobility. This has led researchers to focus on multiple policy issues such as: health (e.g. obesity, neighbourhood safety and pedestrian road traffic accidents); the economy and the environment (e.g. road traffic congestion); and personal development (e.g. enhancement of spatial and social knowledge amongst children). More recently, research efforts on children's travel patterns have been made to identify factors that reinforce active commuting to school [7,12,13] that counter some of the constraints imposed by parents on independent travel by their children [14–16]. Clearly, a research gap is the travel patterns of children in a post-disaster context.

Whilst Hine [11] refers to the shift from travel to health in children's transport research it is worth commenting briefly on why researchers were interested in school travel under the old paradigm. To do this, we draw on our collective experience as having conducted research into school travel since the early 1970 s