



A macro-level approach to assess the early developmental vulnerabilities of children in Australia: A local government area-based analysis

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ABSTRACT

The spatial impact of socioeconomic determinants on the macro-level early developmental vulnerability of children was analyzed in this paper using Local Government Areas (LGAs) as samples. Five domains of developmental outcomes: physical, social, emotional, language and cognitive, and communication have been addressed as ordinal outcomes, and fitted by the proportional odds model. Areas with a high percentage of low-income, welfare dependent and single parent families significantly increased the proportion of vulnerable children in all five domains. Other factors that significantly affect some aspects of developmental vulnerability in children are participation of women in the labor market, availability of home Internet and unemployment rate in the locality. The macro-level results match with previous micro-level assessments showing the relationship between household socioeconomic features and childhood vulnerability.

1. Introduction

The effect of socioeconomic heterogeneity in various geographical locations of Australia on children is an important issue as social structures are increasingly complex (Mohanty, Edvardsson, Abello, & Eldridge, 2016; Murray & Skull, 2005). Early perception of social and economic determinants facilitates the understanding of early vulnerability of children and identify the vulnerable sections of the society (Marmot, Allen, Bell, Bloomer, & Goldblatt, 2012). This, in turn, also allows policy makers to invest in the most vulnerable domains. This paper focuses on the five developmental domains of children: physical, social, emotional, language and cognitive, and communication. By taking into account the literature that assesses the relationship between household socioeconomic features and childhood vulnerability (Chen & Paterson, 2006), this paper focuses on the macro-level Local Government Area (LGA) analysis to assess the macro-level relation between the domains of children's vulnerability and the socioeconomic condition of Australian families. Furthermore, we provide a brief overview of the most vulnerable LGAs; those that require attention from policy makers.

1.1. Literature gap

Several factors influence the early development of a child: poverty, parenting complexity, abuse and neglect, hostile environment and

violent community (Brinkman et al., 2013; Gewirtz & Edleson, 2007; Margolin, 2005; Schneider & Phares, 2005). Children's exposure to violence or the effect of a toxic neighborhood may cause emotional damage and behavioral disorders, which can affect their perception of surroundings and restrict moral development (Antunes & Ahlin, 2014; Margolin & Gordis, 2000). The micro-level effect of violence or family instability on children is a regularly discussed issue (Fabricius & Luecken, 2007; Nicolotti, El-Sheikh, & Whitson, 2003). However, macro-level area based analysis on children's vulnerability has been less frequently examined (Kershaw, Forer, Irwin, Hertzman, & Lapointe, 2007). There exists a literature gap on the macro-level relationship between childhood vulnerability and the neighborhood's socioeconomic effect. This study fitted the LGAs of Australia as samples for the assessment.

1.2. Various forms of vulnerability

There are disparities in several areas of children's development, most of which become evident early in a child's life. According to the Australian Bureau of Statistics (ABS) in a survey undertaken in 2009, 3.4% of children aged 0–4 years and 8.8% of those aged 5–14 years have exhibited some forms of disability (Australian Government, 2009). The effect of *physical* activity on the mental health of children and adolescents is less discussed compared to that of adults (Whitelaw,

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Teuton, Swift, & Scobie, 2010). It is estimated that 6% of early life physical clumsiness, ignored by most parents and doctors, results in serious psychological stress that interferes with long-term academic performance and social integration (Hamilton, 2002). In a review, Biddle and Asare (2011) concluded that lack of physical activity or sedentary screen time is related to poorer mental health. Similar importance should be given to early development of *social competence*, which allows the child to interact with others and further continue to thrive in a social world (Baker, Fenning, & Crnic, 2011; Denham et al., 2003). The contribution of macro-level neighborhood on these physical and social vulnerabilities is analyzed in this study.

Linguistic and cognitive as well as communication vulnerabilities are common in children who are exposed to neighborhood violence (Aisenberg & Herrenkohl, 2008; Fowler, Tompsett, Braciszewski, Jacques-Tiura, & Baltes, 2009; Kershaw et al., 2007). Children with concomitant prevalence of *language* deficits exhibit antisocial behavior 10 times higher than that of the general population (Benner, Nelson, & Epstein, 2002). The early (by ages 4 to 6) emergence of the gap between *cognitive* and non-cognitive skills are due to family environment and low-income status, which persist throughout adolescence (Heckman, 2006; Krueger, Friedman, & Heckman, 2003). Lack of self-worth and negative self-esteem is common in children with difficult family life (Jones & Prinz, 2005; Neff & McGehee, 2010). Moreover, there are substantial achievement gaps between children from high-income and low-income families at primary schools, which widen over time and contribute to serious disparities in learning abilities, educational attainment, and long-term employment potential (Hanushek & Woessmann, 2008; Ryan, Fauth, & Brooks-Gunn, 2006). An assessment of the LGAs in Australia will reveal the effect of specific locations on children's vulnerabilities.

1.3. Australian context

Early detection of vulnerability as well as children and their families' cultural integration with the health system is necessary. Fantuzzo, McWayne, and Bulotsky (2003) claimed that the mental health system's inability to engage the most vulnerable groups of children and their families may lie with the provision of incongruent services that lack cultural sensitivity. The development of children requires understanding of their cultural adaptations which improves the intervention service delivered (Griner & Smith, 2006; Peek & Stough, 2010; Spencer, 2013). Considering the multicultural diversity in Australia (28.2% of the population born overseas and 3% Indigenous Australians), it is a challenge to understand whether these micro-level (household based) vulnerabilities are present in macro-level (location wise) paradigms. These information should assist in allocating government aid and investments accordingly (Australian Government, 2011; Australian Government, 2015). The Australian government has focused on ensuring the wellbeing of every child through prioritizing the policing and statutory role of the State and Territory Governments (Australian Government, 2008). 41.2% of the total health expenditure in Australia was contributed by the federal government and 26.6% by the state, territory and local governments in 2013–14; which demonstrates the responsibility of federal policy makers and their need to understand child development at the macro-level (Australian Government: AIHW, 2015; Brinkman et al., 2012).

2. Material and methods

2.1. Data details

The Australian Early Development Census (AEDC) collects data regarding early childhood development outcomes for Australia and this paper has applied their 2012 data set. 289,973 Australian children were sampled in their first year of full-time school during 2012 (Government, 2015). The data from the AEDC provide snapshots of children's

development parameters in one locality at the time when they start school, across five disciplines of early childhood development: physical health and wellbeing; social competence; emotional maturity; language and cognitive skills (schools-based); and communication skills and general knowledge. The data was accessed from the Public Health Information Development Unit (PHIDU) located at Torrens University Australia (Public Health Information Development Unit (PHIDU), 2009). AEDC domain scores are calculated on the basis of 104 developmental questions for each child, completed by their teachers (Australian Government, 2016a). Domain scores are represented by a number between 0 and 10 where a higher domain score indicates a higher level of development. AEDC results are reported as proportions of children who are 'developmentally on track', 'developmentally at risk', and 'developmentally vulnerable', based on cut-offs for each domain. The domain cut-off is created based on the data from all survey participants and released for various geographical locations (like LGAs). It particularly takes into account the age variations in the population of children in their first year of schooling, which varied in age from just under five to over six years. The details of domain score calculations are the intellectual property of McMaster University in Canada (Australian Government, 2016a).

Another relevant feature developed by the Australian Bureau of Statistics (ABS) is the Socio-Economic Indexes for Areas (SEIFA), a scale that ranks areas in Australia according to relative socioeconomic advantage and disadvantage based on five-yearly census results (Pink, 2011). This study used the SEIFA 2011 from the 2011 census. Among the four indexes of SEIFA, we applied the Index of Relative Socio-Economic Disadvantage (IRSD) as a crosschecking measurement tool for evaluating the consistency of our results from AEDC with ABS. IRSD is a numerical score allocated to a geographical location, where a low score indicates a high proportion of relatively disadvantaged people in that area. This scale is constructed by applying principal component analysis (PCA) on demographic criteria like family income, employment status, marital status of parents, education, and occupational skills. These are some of the components that constitute socioeconomic diversity in Australia (Bowden & Doughney, 2010; McMillan, Beavis, & Jones, 2009; Turrell, Hewitt, Patterson, & Oldenburg, 2003).

2.2. Vulnerability illustration

The Australian version of the 'Early Development Instrument' provides information regarding five vulnerable domains as mentioned before (Australian Government, 2015). *Physical health and wellbeing* are measured by a child's health status, independence, and readiness for school each day. *Social competence* is determined by his/her capability of mingling in a group and playing alongside other children with similar temperament. A child's ability to concentrate, to help others and to demonstrate self-confidence are considered as his/her *emotional maturity*. Literacy and numeracy are marked as *language and cognitive skills*. *Communication skills* are demonstrated by a child's capability in telling stories, communicating with adults and children, and articulating by himself/herself.

2.3. Variables

The outcome variables considered for the study are the five parameters of development vulnerability: physical, social, emotional, language and cognitive, and communication. The proportion of 'developmentally vulnerable' (from AEDC) children in an LGA was considered for each vulnerability domain and they were trisected proportionately: low, moderate and high, as it would provide better model fitness and easier interpretation. All the LGAs were ranked based on the proportion of vulnerable children from five categories living in the areas. Then these areas were trisected into three categories: low, moderate and high vulnerable areas for each domain, which were the outcome variables. The covariates fitted in the models were the proportion of low-income

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