

EFFECTS OF INEQUALITY, FAMILY
INVESTMENT AND EARLY
CHILDHOOD INTERVENTIONS ON
CHILDREN COGNITIVE AND SOCIO-
EMOTIONAL WELLBEING IN
INDONESIA

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Thesis submitted in fulfilment of the requirement for the degree
of Doctor of Philosophy

July 2016

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Thesis summary

Background

Understanding inequality in children's health and development is important because effects of disadvantage early in life may contribute to health disparities throughout life. Evidence shows that children who live in poorer families tend to have poorer cognitive outcomes and higher risk of behavioural problems compared to their peers from non-poor families. In low and middle income countries, children from poor families are more likely to be exposed to a multitude of risk factors that compromise healthy child development including lack of access to safe drinking water and improved sanitation, lack of access to health and education services, as well as inadequate learning environment at home. Whilst parental investment in children's health and development often relies on resources that are available at home, effective interventions may protect children from negative consequences of living in poverty and increase investment in children's health and development.

Aims

The overall aim of this thesis is to investigate inequalities in cognitive function and socio-emotional well-being among Indonesian children, and how early childhood interventions might reduce these inequalities. The specific research questions are as follows:

1. What is the magnitude of socioeconomic inequality in Indonesian children's cognitive function in 2000 and 2007? What factors contribute to the inequality? Does

the inequality in children's cognitive functioning change between 2000 and 2007 and what factors contribute to the change in inequality?

2. What is the effect of household per capita expenditure on Indonesian children cognitive function and does a cash transfer intervention increase cognitive function scores?

3. What is the association of poverty at ages 0-7 and poverty at 7-14 with children's cognitive function at 7-14 years? What is the direct effect of poverty at 0-7 years on cognitive function at 7-14 years, and is this effect mediated through poverty at 7-14 and through school attendance and aspects of the child's home environment?

4. What is the relative and combined effect of different hypothetical interventions such as improving standard of living through provision of piped water and improved sanitation, maternal mental health and a parenting program on children's school readiness and socio-emotional wellbeing in Indonesia?

Methods

This thesis used data from the Indonesian Family Life Survey (IFLS) and the Early Childhood Education and Development (ECED) project. IFLS was used in studies 1-3, where the study participants consisted of two cohorts who were recruited for cognitive testing, comprising children aged 7-14 in 2000 (born between 1993 and 1986) and children aged 7-14 in 2007 (born between 2000 and 1993). In study 4, data from the ECED was used. Herein, the study participants included children aged 4 in 2009 and followed up at ages 5 and 8. This thesis used a range of statistical approaches to answer the aims of this thesis including the relative concentration index, decomposition of concentration index, Oaxaca-type decomposition of change, an inverse probability of

treatment weight of a marginal structural model, conventional regression analysis, decomposition analysis (direct and indirect effects) and parametric g-formula. Multiple imputation analysis was also performed where applicable.

Results

In the first study, there were substantial reductions in inequality in children's cognitive function between 2000 and 2007, but the burden of poor cognitive function was still higher among the disadvantaged. In both 2000 and 2007, household per capita expenditure was the largest single contributor to inequality in children's cognitive function. However, improvements in maternal education, access to improved sanitation and household per capita expenditure were the main contributors to reductions in inequality in children's cognitive function from 2000 to 2007.

In study two, greater household per capita expenditure was associated with higher cognitive function but the effect size was small. Based on simulations of a hypothetical cash transfer intervention, an additional US\$ 6-10/month of cash transfer for children from the poorest households in 2000 increased the mean cognitive function score by 6% but there was no overall effect of cash transfers at the total population level.

In the third study, being exposed to poverty was associated with poor cognitive function score at any age, however, there was no evidence that being exposed to poverty at 0-7 had a larger effect on cognitive function than poverty at 7-14 years. From decomposition analysis, poverty at 0-7 had a larger direct effect on children's cognitive function at 7-14 years than the effect of poverty at 0-7 that was mediated through poverty, school attendance and aspects of the child's home environment at 7-14 years. Moreover, the effect of poverty at 0-7 on cognitive function at 7-14 years was

largely mediated through pathways involving child's home environment, school attendance and poverty at 7-14 than the mediated effect through poverty at 7-14 alone.

From the final study, providing access to piped water as the main drinking water source, improved sanitation, maternal mental health and a parenting education program had positive effects on children's school readiness and socio-emotional wellbeing in rural Indonesia. Intervention that combined multiple programs had a larger effect than any single intervention. In this study, a combination of provision of piped drinking water, improved sanitation, maternal mental health and a parenting education program is likely yield the largest effect, however, most of the effect was driven by provision of piped drinking water and improved sanitation.

Conclusions

This thesis provides some evidence to fill the knowledge gap on inequalities in children's cognitive and socio-emotional wellbeing in Indonesia. It has also attempted to generate evidence that is relevant for policy intervention that may help to reduce these inequalities. Providing early childhood intervention that combined multiple programs is likely to have the largest effect. More importantly, the early childhood intervention in Indonesia should start with providing greater access to piped drinking water and improved sanitation.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other institution and affirms that to the best of my knowledge, the thesis contains no material previously published or written by another person, except where due reference is made in the text of thesis. In addition, I certify that no part of this work will, in the future be used in a submission for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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Signed

Amelia Maika (Candidate)

Date: 8 July 2016

Publications contributing to this thesis

1. Maika A, Mittinty MN, Brinkman S, Harper S, Satriawan E, Lynch, J. Changes in Socioeconomic Inequality in Indonesian Children's Cognitive Function from 2000 to 2007: A Decomposition Analysis. PLOS ONE 2013 8(10): e78809. doi:10.1371/journal.pone.0078809
2. Maika A, Mittinty NM, Brinkman S, Lynch J. Effect on child cognitive function of increasing household expenditure in Indonesia: application of a marginal structural model and simulation of a cash transfer programme. Int. J. Epidemiology (2015) 44(1):218-228.
3. Maika A, Mittinty NM, Brinkman S, Lynch J. Associations of early and later childhood poverty with child cognitive function in Indonesia: Effect decomposition in the presence of exposure-induced mediator-outcome confounding. *American Journal of Epidemiology* (in press).

Conference presentation arising from this thesis

1. Maika A, Brinkman S, Pradhan M, Satriawan E, Adaptation of the Early Development Instrument in Indonesia, The 2012 Biennial Meeting, The International Society for the Study of Behavioural Development, 8th – 12th July 2012, Edmonton, Alberta, Canada.
2. Maika A, Mittinty, N Murthy, Brinkman S, Harper S, Satriawan E, Lynch J. Changes in Socioeconomic Inequality in Indonesian Children's Cognitive Function from 2000 to 2007: A Decomposition Analysis. The 7th Annual Faculty of Health Postgraduate Research Conference. University of Adelaide, 29th August 2013, Adelaide, Australia. Received the award for the winner from the School of Population Health.
3. Maika A, Mittinty N Murthy., Brinkman S., Harper S, Satriawan E, Lynch J. Changes in Socioeconomic Inequality in Indonesian Children's Cognitive Function from 2000 to 2007: A Decomposition Analysis. The 2013 State Population Health Conference, 26th October 2013, Adelaide, Australia. Received special mention for poster presentation.
4. Maika A, Mittinty N Murthy, Brinkman S, Lynch J. Effect Decomposition in the Presence of Exposure-Induced Mediator-Outcome Confounding : An Application for Estimating Effects of Early and Later Childhood Poverty on Child Cognitive Function in Indonesia. Young Statisticians Conference 2015, 5th – 6th February 2015, Adelaide, Australia.

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5. Maika A, Mittinty N Murthy, Brinkman S, Lynch J. Effects of Maternal Mental Health on Child Cognitive and Behavioural Outcomes in Indonesia: An Application of a Marginal Structural Model. The Australian Development Census 2015 National Conference, 18th -20th February 2015, Glenelg, South Australia.

Acknowledgements

In the name of *Allah*, the Beneficent, the Merciful.

I would sincerely thank to the following people for their guidance, support and encouragement throughout my PhD.

“What is the expected my PhD outcomes would be if I did not have John Lynch, Murthy Mittinty and Sally Brinkman as my supervisors and mentors”. It has been my privilege to work closely with the highly respected people in the field.

My husband Boedhi Adhitya for being there all the way.

My daughter Anindya, you are my true inspiration.

To my family, Ibu-Bapak, Mamah-Bapak, my sisters and their families

To my wonderful PhD fellows and friends, Angela Gialamas, Maoyi Xu, and Kerri Beckman – for all the highs and lows. We did it!

BetterStart research group, Lisa, Cathy, Alyssa, Rhiannon, Megan, Shiau, Veronica. You guys are genuinely wonderful people and my role models in research.

School of Public Health, University of Adelaide, and Faculty of Social and Political Science, Gadjah Mada University.

Abbreviations

CCT	Conditional Cash Transfer
CDE	Controlled Direct Effect
DE	Direct Effect
ECED	Early Childhood Education and Development
GEE	General Estimating Equation
HICs	High Income Countries
IE	Indirect Effect
IFLS	Indonesian Family Life Survey
IPTW	Inverse Probability of Treatment Weights
IPW	Inverse Probability of Weights
LMICs	Lower and Middle Income Countries
MAR	Missing at Random
MCAR	Missing Completely at Random
MICE	Multiple Imputation by Chained Equation
MSM	Marginal Structural Model
NDE	Natural Direct Effect
NIE	Natural Direct Effect
NMAR	Not Missing Not at Random
OECD	Organization for Economic Cooperation and Development
PCE	Per Capita Expenditure
PKH	Program Keluarga Harapan
RCI	Relative Concentration Index
RCT	Randomized Controlled Trial
SD INPRES	Sekolah Dasar Instruksi Presiden (Presidential Instruction on Primary School program)
SW	Stabilized Weight
TCE	Total Causal Effect
UNICEF	United Nations Children's Fund
WHO	World Health Organization