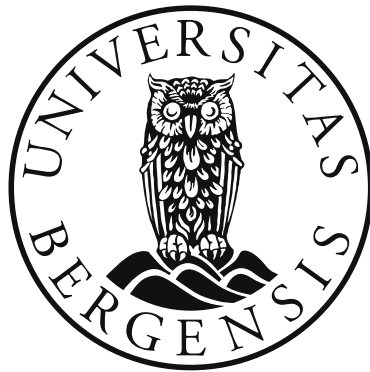


# Child health and child care of very young children in Bolivia, Colombia and Peru

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Thesis for the degree of philosophiae doctor (PhD)  
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## **Scientific environment**

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Main supervisor for the PhD project was Professor Maurice B. Mittelmark (PhD) and co-supervisor was Martín Valdivia (PhD).

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Helga Bjørnøy Urke

## Foreword

My first encounter with children in a highly socially vulnerable setting was as a volunteer in Uganda in 2004. I developed personal engagement for children in general, and for vulnerable children in particular. Seeing how social inequality manifested itself in health inequities, child health became an area of increasing interest to me, and ultimately led me to study public health and health promotion.

I first met with Latin America as an exchange student in Mexico City. Studies in Spanish language, Latin American history and culture, volunteer work and friendship with local people opened my eyes to a beautiful part of the world with despite its social challenges. This experience led me to pursue further studies in the context of Latin America. I wrote my master's thesis on the topic of child health in Peru. As a preparation, I worked a period as a volunteer in Huancavelica in the Peruvian Andes, the economically most deprived state in Peru at the time. This experience was invaluable to understand the context from which (parts of) my study sample was drawn. The topic of my master's thesis was the role of socioeconomic status for chronic malnutrition in children less than five years of age. Later, I carried out a qualitative field work in the state of Ayacucho in Peru, exploring mothers' opportunities for child care (1).

The focus of my PhD project has come about as a result of a combination of a strong personal engagement for child health and development, social justice, love for the Latin American region – and of course some coincidences. I am aware that I hold a set of normative perceptions about the social construction of child health, but keeping this awareness in mind throughout the research process I believe has helped in protecting the quality and validity of the research. I believe that this work provides important insights to the field of child care and child health promotion in low- and middle income settings, particularly in the selected study countries.

## Abstract

With the global progress in reduction of child mortality, an increasing concern for the health, development and well-being of the surviving child has emerged. It is estimated that 250 million children are not reaching their developmental potential in developing countries, due to among others malnutrition, inadequate care and exposure to violence. In addition, structural and other social aspects of the immediate family and wider community environment of the child exert influence on the possibility of realization of unique developmental potential.

The overall aim of this dissertation was, through various approaches, to assess variations in child health and child care by a range of social determinants at contextual and resource levels in the Latin American countries the Plurinational state of Bolivia, the Republic of Colombia and the Republic of Peru.

The dissertation is based on three papers using selected Demographic and Health Survey (DHS) data collected in Bolivia in 2008 (Paper III), Colombia in 2010 (Paper II-III) and Peru in the period 1991-2011 (five surveys) (Paper I-III).

The first paper was concerned with chronic malnutrition and overweight, two important markers of child health. The release of international child growth standards in 2006 called for updated trend estimates of child nutritional status. In addition, trend analyses that are sensitive to variations within a country are lacking. The aim of Paper I was to explore how prevalence of stunting and overweight, developed among children aged 0-59 months in Peru in the period 1991-2011. Over the study period, national trends in child stunting declined, whereas for overweight they were stable. Levels of stunting were highest in rural areas compared with urban, the Andean and Amazon compared with the Coastal region, among children of low-educated mothers compared with other education groups, and among children living in households in the poorest compared with higher wealth quintiles. The trend in male overweight rose in coastal areas and in the richest wealth quintile.

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Although child health and development are most often considered the ultimate outcomes of interest, determinants and the measurement of intermediary factors, e.g. the care a child receives, have been accentuated. The aims of Paper II were to explore the possibility of measuring nurturing child care comprehensively through an index, and assess to what extent maternal resource level factors are associated with overall child care in urban and rural contexts and for different age groups in Colombia. Higher levels of various maternal resources were significantly associated with higher levels of child care. Registration of the child in a development program, higher household wealth, higher maternal education and maternal decision latitude were generally significantly associated with better child care, but the effects varied depending on age and urban or rural place of residence. Maternal education and household wealth were most consistently associated with higher levels of care among older children and in the urban samples, whereas child registration in a child development program and maternal decision latitude were most consistently associated with better care in the rural samples.

The role of social determinants for health is widely studied for adults, and increasingly also for children, and often with focus on socioeconomic status (SES). Family characteristics of psychosocial character also affect the child's care environment. Theory and research suggest that aggression and conflict affect child health and development negatively. Research on the effect of intimate partner violence (IPV) on child physical health is however lacking, particularly in developing countries. The aim of Paper III was to explore to what extent maternal IPV was associated with child physical health in children aged 0-59 months in Bolivia, Colombia and Peru, when adjusting for appropriate child care practices and sociodemographic- and economic factors. Mothers who had experienced IPV ever (Peru) and in the past 12 months (Bolivia) had significantly higher odds for reporting illness signs the past 15 days for their children aged 0-59 months compared to mothers not having experienced IPV. No significant association between IPV and child illness signs was found in the sample from Colombia.

Based on the findings, it can be concluded that generalizing estimates of child health and care provision from national to sub-group levels can be misleading. The socio-



ecological approach to research on child care and health issues continues to be relevant. Through this study this approach facilitates the revelation of significant social and contextual differences in child care and child health. In this dissertation, the traditional social determinants, e.g. maternal education and household wealth, as well as less studied social factors, e.g. IPV, are generally associated with the child outcomes of interest. These findings imply that a combination of direct and indirect strategies to reduce negative consequences of social inequality on child care and child health can be fruitful. This dissertation with its focus on both child health *and* child care as outcomes contributes to, and expands the social determinants research on children.

*List of abbreviations*

CGDCP – Child Growth, Development and Care Program

CSDH – Commission on Social Determinants of Health

CTS – Conflict Tactics Scales

DHS – Demographic and Health Survey

FCI – Family Care Indicators

IPV – Intimate Partner Violence

IYCFI – Infant and Young Child Feeding Indicators

LAC – Latin America and the Caribbean

LMIC – Low and middle income countries

MAD – Minimum acceptable diet

MDD – Minimum dietary diversity

MMF – Minimum meal frequency

NC – Nurturing care

SDH – Social Determinants of Health

SES – Socioeconomic status

## List of publications

- Urke, H.B., Mittelmark, M.B., & Valdivia, M. (2014). Trends in stunting and overweight in Peruvian pre-schoolers from 1991 to 2011: findings from the Demographic and Health Surveys, *Public Health Nutrition*, 17(11), 2407-2418, <http://dx.doi.org/10.1017/S1368980014000275>
- Urke, H.B., Mittelmark, M.B., Matanda, D.J., & Amugsi, D. (2016). Nurturing Childcare Practices in Urban and Rural Settings: Findings from the Colombia 2010 Demographic and Health Survey (Submitted).
- Urke, H.B. & Mittelmark, M. (2015). Associations between intimate partner violence, childcare practices and infant health: findings from Demographic and Health Surveys in Bolivia, Colombia and Peru, *BMC Public Health*, Vol. 15:819, <http://dx.doi.org/10.1186/s12889-015-2144-0>

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# 1. Background

An estimated 250 million infants, toddlers and young children are not reaching their full developmental potential in developing countries (2). Among reasons for this are malnutrition, inadequate care and exposure to violence (3), all of which are foci in this dissertation. Children living and developing in disadvantaged contexts of poverty, poor child care and stimulation are at risk of suboptimal development which in turn jeopardizes later development, adult health, life quality and economic productivity (4, 5). Early childhood development is therefore emerging as a top international development priority, and is key to achieving the United Nations' Sustainable Development Goals for poverty, hunger, health, education, gender, water and sanitation and inequality (6).

Hence, the investments made in early childhood are estimated to be “the most powerful investment a country can make, with returns over the life course many times the amount of the original investment” (7, p.4). Such an investment involves ensuring early childhood environments that are healthy, supporting, nurturing and caring (8), and encompasses the immediate as well as the wider environment in which the child lives. Social and structural investments are therefore needed to reduce social inequalities that contribute to poor child health, e.g. through high-quality and accessible health care systems, safe and non-violent neighbourhoods, sanitation infrastructure, good quality housing, and food security (8). Because children depend on their caregivers for healthy and optimal development, investments are also needed to directly support primary caregivers in their capacity to provide the full range of essential care. This includes support for caregivers' economic, social, physical, and mental wellbeing (5, 8, 9).

The challenge of suboptimal child health is a complex social and biological phenomenon. In the early 1900s, the focus on health as holistic and the role of social factors for health gained attention (10). More recently, the comprehensive work by the WHO Commission on Social Determinants of Health (CSDH) argue that social

determinants of health should be at the forefront of health promotion and public health interest, also for children (8).

Against this backdrop, the overall aim of this dissertation was, through various approaches, to assess variations in child health and child care by a range of social determinants at contextual and resource levels in the Plurinational state of Bolivia (hereafter Bolivia), the Republic of Colombia (hereafter Colombia) and the Republic of Peru (hereafter Peru).

## 1.1 Child health promotion

This dissertation is positioned within the field of child health promotion, drawing on social determinants of health (SDH) research and social and behavioural epidemiology (11-13). Health promotion is “the process of enabling people to increase control over, and to improve, their health” (14, p.1). It emphasizes the importance of various social and environmental aspects for health, over and above the role of individual behaviour and the health sector (15, 16). According to health promotion thinking, child health promotion is a product of caregiver control and subsequent health promoting actions as well as supportive social and structural environments (17, 18). The acknowledgement of this is a core principle in health promotion (16). Although health promotion is action oriented, descriptive studies with focus on health promotion issues are essential to provide a knowledge base for effective action. The aim of this dissertation within the health promotion arena is to contribute to the descriptive knowledge base for better child health in Bolivia, Colombia and Peru.

Another core focus in health promotion concerns social inequity in health (16). When social differences in health exist because of political and other structural drivers that can be amended, they are to be considered unjust and avoidable (19). Such systematic differences in the distribution of health between groups of different social characteristics are termed social inequity in health (19), referring to social injustice in health (16).



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The Constitution of the WHO states that every human being has the right to the “highest attainable standard of health”, independent of e.g. social position (20, p.1). Knowing that child health generally varies by sociodemographic and -economic factors, there is cause for concern about the fulfilment of human rights, and from a human rights and social justice perspective, it is important to study child health in ways that can reveal such violations. Global, regional and even national estimates serve important purposes, but to understand the distribution and determinants of child health – a main aim of social epidemiology; and increase health equity – a main purpose of child health promotion, more fine-tuned analyses are needed (19). This has recently been put forth on the global health agenda with the evaluation of the millennium development goals (21, 22), and the formulation of the sustainable development goals (23). However, this is not a new position, and scholars have studied child health with a focus to disentangle national and regional or local health patterns (24-27). The present dissertation coheres with this tradition, by analysing trends in child nutritional status and determinants of child care by sociodemographic subgroups.

Social differences in health tend to follow a gradient, in which each higher step on the socioeconomic ladder is associated with better child health (8, 19, 28). The region of Latin America and the Caribbean (LAC) is the most unequal region in the world when it comes to income with country Gini coefficients ranging from .42 to .61 (2014 estimates) (29). The three study countries in this dissertation have high social inequality, with country Gini coefficients of inequality of 48.1 (Bolivia), 53.5 (Colombia), and 44.7 (Peru) in 2013 (30). Such inequality likely has negative impacts on child health (19). A study in Bolivia, Colombia, Ecuador and Peru found strong socioeconomic gradients of child stunting in all countries, and concluded that reduction in social inequality is key to come to grips with child stunting (31).

Furthermore, the CSDH argues that although a substantial amount of knowledge exists on social determinants of health, there is a need to understand the mechanisms of the social determinants (8). In research on social determinants of child health, one potential mechanism is that of care provision by primary and alternate caregivers and health personnel. The fourth principle in the Declaration on the Rights of the child states that “...special care shall be provided both to him and to his mother, including

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adequate pre-natal and post-natal care. The child shall have the right to adequate nutrition, housing, recreation and medical services.” (32). This underscores the importance of understanding the social determinants of care both to ensure fulfilment of the right to care, but also to understand care as a pathway to child health.

### **1.1.1 Child health in Latin America and the study countries**

Globally, child health has improved immensely the past 25 years both in terms of mortality (33) and child undernutrition (34). This positive development is also documented for the LAC region in which the under-five mortality rate declined from 54 per 1000 live births in 1990 to 18 per 1000 live births in 2015 (33). Further under-five chronic malnutrition prevalence decreased from 25 per cent in 1990 to 12 per cent in 2014, equivalent to a 52 per cent reduction (34). Under-five overweight prevalence, which has gained increasing attention due to the global obesity pandemic (35), remained stable at around 7 per cent in the same time period (34). Despite improvements in child health and nutrition in low- and middle income countries (LMIC) generally, and in the LAC region particularly, large challenges in securing children their right to health remain: an estimated 16,000 children under five years of age die every day. The majority of deaths are due to preventable causes (21). For example, child undernutrition was estimated responsible for 45 per cent of child deaths in 2011 (36).

In the countries specific to this dissertation, a similar, but more varied, child health picture to that presented for the LAC region as a whole seems to be true. Based on estimates from 2015, the infant mortality rates were 38 per 1,000 live births in Bolivia (33); 14 per 1,000 live births in Colombia (33); and 13 per 1,000 live births in Peru (33). These rates are dramatically lower than 20 and 30 years ago (33, 37-39). Section 1.2.1 provides more details on the child health indicators in Bolivia, Colombia and Peru relevant to this dissertation, and section 2.2 presents a general introduction to the three study countries of this dissertation.

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## 1.2 Conceptual overview and measuring

### 1.2.1 Child health

Infancy and early childhood is one, if not *the* most, important period in the life of a human being as it is the time when many foundations for future child and adult health and development are laid (7). As described by Halfon et al. (5), children differ from adults with respect to health according to “4Ds”, representing “developmental vulnerability, dependency, differential morbidity, and difference in demographics” (p.12). Developmental vulnerability refers to the plasticity of infants and young children involving sensitive and possible critical periods for development. Although the existence of critical periods is debated (40, 41), the time from pregnancy and through the first two to five years of life is considered sensitive (4). The period up to two years of age is particularly important for physical growth (42) and brain development (4, 43, 44).

#### *Child malnutrition*

Child nutritional status is a powerful indicator of the general health status of children at population level (45), and concerns both under- and overnutrition (36).

Undernutrition is a collective term for nutritional states involving energy, protein and/or micronutrient deficiencies. These deficiencies have different manifestations, and this dissertation is concerned with the most common type: chronic malnutrition – or stunting – which is reflected by low height for age (and sex) (46). Stunting is a manifestation of linear growth retardation which is caused by inadequate diet quality sometimes in combination with disease (47). It is not acute, but related to a range of severe health and development consequences like suboptimal cognitive development (48-50), suboptimal functioning of stress-sensitive systems (51), poor adult health (52), and lower human capital and income in adult life (49). Overnutrition describes a type of malnutrition involving excess energy intake. This is commonly known as overweight and obesity, often determined by weight-for-height (47).

The latest estimates for stunting for children aged 0-59 month from the countries included in this dissertation are 18 (Bolivia 2008) (53), 13 (Colombia 2010) (38) and

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15 (Peru 2014) per cent (37). Overweight estimates are less reliably available, but were 5 per cent in Colombia in 2010 (38), and 9 per cent in Peru in 2011 (as estimated in Paper I in this dissertation).

### **Measuring child malnutrition**

Malnutrition as defined above is assessed through anthropometric measurement (54). Although such assessments have been carried out for several decades (55), also in the Global South (56), the Millennium Development Goals sparked new energy and effort into assessing child nutritional status globally and nationally (21). However, internationally valid standards for determining child malnutrition have not been available until recently (57). Until 2006, the internationally recommended growth references were the NCHS/WHO growth reference curves. However, these standards were based on two different samples from the US population, which practiced infant feeding that deviated from WHO recommendations (58). Hence, the sample on which the standards were based was in several ways not representative of the populations often assessed in malnutrition studies in the Global South. Recognizing this limitation, WHO initiated a large scale multi-country study in 1994 to develop valid international standards, known as the WHO Multicentre Growth Reference Study (MGRS) (57). The study resulted in international standards for infant and child growth recommended for assessment of nutritional status on children aged 0-5 years (57). Compared to previous growth standards, the WHO standards give higher estimates for stunting and overweight (59, 60).

With the new WHO child growth standards released in 2006 (57), child growth can be assessed more validly worldwide. Time trend analyses are important to inform public policy makers about the developments in child malnutrition. To assess whether today's child nutritional status has improved or worsened, and by how much, time trend analyses have to be undertaken with calculations based on the new WHO standards for all relevant previous years/time points. Trend analyses using updated child growth standards are needed, and no detailed country analysis of trends in child malnutrition based on new standards exists in Peru.

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Furthermore, trend analyses of child nutritional status tend to focus on national estimates, not disclosing possible differences based on social or other differences. A criticism of the Millennium Development Goals efforts has been the focus on national improvement, and the lack of ambition in reaching the most vulnerable (61). Research on subgroup differences and intra-group differences is invaluable in understanding where vulnerability is greatest, and where efforts are particularly needed. One objective of this dissertation pertains to the assessment of time trends and prevalence estimates of child stunting and overweight nationally and by subgroups in Peru.

### *Child morbidity*

A child can be affected by a range of threats to its health. In spite of being easily preventable diseases, pneumonia and other acute respiratory infections, together with diarrhoea, are major causes of under-5 mortality globally (62). The latest DHS rounds from Bolivia (2008), Colombia (2010) and Peru (2014) report proportions of children aged 0-59 months with symptoms of illness during the two weeks prior to the survey. The proportion reporting symptoms of diarrhoea were 26 per cent for Bolivia (39), 13 per cent for Colombia (38), and 12 per cent for Peru (37). Equivalent proportions of children aged 0-59 months with reported symptoms of acute respiratory infections the two weeks prior to the survey were 20 per cent in Bolivia (39), 9 per cent in Colombia (38), and 17 per cent in Peru (37).

### **Measuring child morbidity**

To assess child morbidity, recall of morbidity symptoms is often used as a proxy (63). Common symptoms to ask for are diarrhoea, cough or difficult breathing, fever, ear problems, and other illness symptoms during the past one or two weeks prior to the survey (63). DHS includes this measure in their assessment of child health in most surveys, including those used as basis for this dissertation (37-39).

## **1.2.2 Child care**

In the sensitive period of infancy and early childhood, the second of the “4Ds” (5) – dependency – is salient, as the child is almost entirely dependent on an adult caregiver for the protection and promotion of health (5, 9). This protection and health promotion

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involves proper physical care, like nutritious food, proper health promotion and illness treatment; and psychological care, in form of cognitive stimulation and socioemotional care, which contribute to good physical and mental development (64). Conversely, inadequate care may result in poor health and subsequent suboptimal child development.

Care for children has been defined as “the behaviors and practices of caregivers (mothers, siblings, fathers and child care providers) that provide the food, health care, stimulation and emotional support necessary for children’s healthy growth and development” (65, p.133). This definition underscores the importance of considering several domains of caregiving when assessing the quality of child care. More recent conceptualisations of care for development have further advanced this comprehensive view on care with the concept *nurturing care* which encompasses “health, nutrition, security and safety, responsive caregiving, and early learning” (2, p.3).

As suggested by Bradley and Caldwell (66), care is both “here and now”-oriented, responding to immediate needs; *and* future-oriented, aiming to support and foster optimal development. Similarly, Zeitlin et al. (67) differentiate between compensatory and enhancing care, in which care practices that pertain to treatment are compensatory, and care practices that aim to nurture development are enhancing. Bradley and Caldwell (66) further suggest several regulatory tasks or functions of caregiver acts. The first function is *sustenance*. This type of caregiving function involves providing “adequate nutrients, shelter, and conditions for the maintenance of health” (66, p. 46) that are essential for survival and development. The second and third regulatory tasks of caregiving are *stimulation* and *support*. The function of stimulation is cognitive, psychomotor, and social development through provision of sensory data and varied experiences. A *supportive* environment contributes to a range of regulatory competencies, and involves e.g. a responsive caregiver, and social interaction between caregiver and child (66). To what extent these functions come into play might vary with the resources available to the caregiver.

Child care involves optimal use of resources and the “time, attention and support to meet the physical, mental and social needs of the growing child (...)” (68, p.3). Child

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care is provided in institutions as a formal care services, and informally by mothers, fathers, siblings, grandparents, etc. Hence, child caregiving is not necessarily the sole responsibility of the mother, although she is most often the primary caregiver of young children, but also that of the household and the wider community (68). This dissertation is mainly focused on the position of the mother in relation to the care provided to the child, and views care according to the above definition by Engle et al. (65).

In light of these descriptions of child care, it is evident that care is highly constituent involving several dimensions necessary for optimal child development. The term ‘constituent’ has importance in this dissertation such that it deserves closer examination here. A constituent factor has meaning in itself, but it has additional meaning in the context of the whole. For example, constituents of a musical composition are melody, harmony and rhythm. Each of these has meaning in isolation, but a composition has meaning as a result of all three constituents combined. As described below, particular child care practices can be considered in isolation, but they also have importance when considered together – constituent child care. According to the conceptualisation of nurturing care, all of its constituents interact and can contribute in a mutually reinforcing way to optimal development (2).

Child care has several purposes and draws on a range of personal, social, physical resources found in both the immediate and wider care environment. From the perspective of a caregiver, child care happens continuously and different care needs may occur simultaneously. Over the course of just a few hours, a caregiver may handle child feeding, hygiene, safety, cognitive and emotional stimulation, shelter, and security to name a few care aspects. Thus, for the primary caregiver, child care is more or less constant when with the child, and involves the continuous task of managing needs and resources in concert with other demands of family, work and communal life. Although child care can be considered both multidimensional and constituent, research on child care has tended to be fragmented (65, 66). This is a natural consequence of the expertise developed within separate care domains. Both in terms of determinants and consequences of care, psychologists tend to focus on cognitive and social-

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emotional development; nutritionists focus on child diet; public health experts focus on illness treatment and prevention, and so forth. This has its clear value as it is important to understand the phenomenology of different practices.

However, research strictly focused on single care practices for child health outcomes, might miss important interaction or confounder effects of other care practices. An example of this is the debated beneficial effect of breastfeeding for cognitive development which in some studies has been found to be causal (69), and in others to be largely explained by aspects of the care environment, like cognitive stimulation (70, 71).

Because child care is multidimensional, knowledge of single care practices is therefore indeed necessary, but not *sufficient* to understand the complexity of child health development. As argued by Ruel and Arimond (72), child health benefits might be conditional on a minimum level of child care practices – both within and across care domains. For example, a healthy diet is important, but if hygiene conditions are poor, health is jeopardized. Bradley and Caldwell (66), although mainly concerned with psychological development, also argue for a comprehensive approach to caregiving in which “the full range of inputs needed to sustain and promote *all* psychobiological systems” (p. 39) is included. Furthermore, a comprehensive approach to child care is in line with recommendations for maternal and child care program development calling for an integrated approach to increase effectiveness and quality (18, 64).

Even if the child care issues and practices just mentioned seem to cover broad territory, they are a sustainable delimitation with regard to the myriad of critical entry points for early childhood development and health promotion. Contemporary frameworks for policy and practice for early childhood development span the development period from before conception to school age, with child care including the issues mentioned above, but ranging as widely as from family planning to parental leave (73). Accordingly, in the section on measuring child care below, and in this dissertation generally, many aspects of care that are critical to early child development are not addressed. Rather, the scope is held to the care of infants and very young children, and the care practices of primary caregivers.



This dissertation is focused on the most ubiquitous and fundamental form of care for children – the informal home- and community-based care – hopefully on offer every day of a child’s life, and every hour in a very young child’s life. To denote this type of care, the dissertation uses the term *child care*. Both *child care* and *childcare* are terms used interchangeably in the literature, but the latter is used mostly (although not consequently) to refer to formal care offered in social services institutions like day care, school and health services settings.

Social researchers have naturally been more interested in the effects of formal care on child development, perhaps with the exception of developmental psychologists, who focus on the role of the home environment on mental and social development.

Nutritional scientists have quite naturally been most focused on feeding, which is a home-based care behaviour. But informal care as an integrated foundation for child development has been understudied until recently, probably due in part to disciplinary in research and social service settings. Health promotion, as a newly emerging transdisciplinary field (at least in a historical perspective), is ideally situated to view and study the subject of child care in its multifaceted character, while the disciplinary sciences are focused on the important details of highly particular aspects of care.

### **Measuring child care**

The role of child care in health and development has been given increasing recognition and interest in research (74). However, the literature is still limited, a major reason being challenges of measuring child care (74). ‘Gold standard’ measures have been proven hard to develop, and therefore a scarcity exists of validated child care measures for many specific child care practices (63). However, due to the acknowledgement of the importance of care, efforts to develop standards and recommendations in several key care domains have been made, and care indicators for a variety of care practices have been tested and validated (63, 72). Hence, research both on particular care practices *and* child care as constituent is called for. Below follows a presentation of recommended child care practices and their application in research.

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### *Feeding practices*

Diet quality is an important influence on child growth and nutritional status (36, 75, 76). Adequate child nutrition should be age-specific to accommodate the rapid development of new-borns, infants, and young children (77). We currently have advanced knowledge about the nutritional needs of children, and the challenge is to ensure the fulfilment of all children's right to a quality diet. Research and monitoring of child diet is needed, especially in LMIC. Currently, the WHO Infant and Young Child Feeding Indicators (IYCFI) provide recommendations for minimum acceptable diets of children aged 6-23 months based on meal frequency and dietary diversity (77).

The WHO IYCFI of dietary diversity and minimum acceptable diet have been found to be associated with lower risk of underweight and stunting in a pooled sample of 14 low-income countries (78). However, a review found variable results in the ability of the WHO IYCFI to explain child nutritional status (79), and some have argued that the lack of predictive power by the WHO IYCFI may partially be explained by random within-person error caused by the short recall time (24 hours) (80, 81). It has also been argued that for the purposes of monitoring child diet practices, the WHO IYCFI are useful, but for the purpose of determining the association between child diet and growth, other indicators might be better (79, 81).

Feeding indexes have also been developed to assess child diet in research (27, 63, 82-84), with some finding that feeding indexes might perform better in predicting child length-for-age compared to the WHO IYCFI (84). Both child dietary diversity and meal frequency, which are components of the WHO IYCFI have, been used as count measures and validated (63).

### *Practices for the prevention and treatment of illness*

*Immunization.* The public and individual health effect of immunization is enormous (85, 86), and recent estimates indicate that close to 15.6 million deaths were prevented by measles vaccination between 2000 and 2013 (21). However, due to weak immunization routine systems, progress towards full immunization of children is delayed (21). Considering the large potential of vaccinations to prevent morbidity and mortality, and promote child health, continued monitoring and improvement of child

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immunization is needed, as well as increased understanding of predictors of immunization.

*Hygiene.* Studies of stool disposal and child diarrhoea have shown the significant risk of unsafe disposal (near the home) to incidence of diarrhoea (87). Quasi-experimental studies have also found disposal in any other way than open defecation to reduce incidence of diarrhoea and treatment seeking for diarrhoea in children below 5 years of age. (88). Concerning hand hygiene, Curtis et al. (87) recommended that priority should be given to promoting hand wash after being in contact with adult or child stools as this will likely be the most effective in eliminating infection risk. A review by Cairncross, Hunt (88) indicates that hand wash is effective in reduction of diarrhoea incidence and treatment seeking for diarrhoea in children below 5 years of age, specifically if soap is used.

*Intentions about seeking professional treatment and reported treatment seeking in case of child illness/symptoms of illness.* Timely and appropriate treatment seeking from professional health care facilities can prevent child morbidity and mortality (89-92). The Integrated Management of Childhood Illness IMCI (93) lists danger signs and illness symptoms that should be reacted to either by caregivers through treatment seeking, or by health professionals through proper diagnosis and treatment. The general danger signs are: the child is unable to drink or breastfeed, the child vomits everything he/she consumes, the child has had convulsions, and the child is lethargic or unconscious. Other illness symptoms to be alert to are cough or difficult breathing (including rapid breaths, chest indrawing, and stridor), diarrhoea, fever, and ear problems. In spite of defined guidelines, studies indicate that primary caregivers frequently do not identify illness signs and/or do not seek treatment due to lack of knowledge (94), or social, cultural (95, 96), geographic (92) or economic barriers (90, 94, 97). Very little research is conducted in Latin American settings, but a study from Ecuador concluded that counselling of caregivers could increase the proportion of appropriate treatment referrals of severely ill children (91).

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*Psychosocial caregiving*

The importance of psychosocial care for the physical, mental and social development of children is documented (98, 99). A range of ethnographic and observational studies in the anthropology field exists on aspects of psychosocial caregiving across the globe (100), and small scale studies of psychosocial interventions in LMIC settings also exist. However, the assessment of psychosocial care in large scale surveys in LMIC settings is scarce (72, 100, 101).

*Cognitive care.* The interaction between caregiver and child that stimulates children to “engage and understand the environment” (101, p.47) is related to cognitive care. Engagement in activities like reading, telling stories, naming and counting is example of cognitive interaction. Caregiver-child cognitive interaction has been documented to be associated with child development (102, 103). Despite this, few population based studies have examined caregiver-child cognitive interaction in less developed countries (72, 101).

*Social-emotional care.* This type of care facilitates the regulation of affect and emotions, and supports the social and emotional development of the child (101). Examples of activities that foster socioemotional development are singing, playing, and taking the child outside to ‘explore’ the wider environment together (101). Risk factors to healthy socioemotional development are inadequate care, e.g. leaving the child alone for a longer period of time, or in care of other young children; and violent disciplining of children (104), defined as either physical punishment or verbal aggression (threatening or shouting) (105). Violent disciplining is common practice in many contexts, and UNICEF estimates that three out of four children between two and 14 years of age have experienced this type of punishment (105). Severe physical violence against children is defined as hitting the child on the head, ears, or face, or hitting the child hard and repeatedly. It is estimated that 17 per cent of children in LMIC have experienced this type of disciplining (105).

The lack of survey studies on psychosocial child care in LMIC or developing contexts is mainly due to the lack of valid indicators of psychosocial care that can easily be included in surveys (72). The scientific discourse on what quality psychosocial care in

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early childhood constitutes has been dominated by western perspectives and do not necessarily coincide with norms and values of other contexts (40). Nevertheless, recent efforts to meet the need for psychosocial care indicators have been made by Kariger et al. (106) who developed the family care indicators (FCI). FCI are partially based on the HOME inventory, specifically for use in population surveys, and across cultural contexts. Using the FCI, Bornstein and Putnick (101) examined prevalence of cognitive and socioemotional care in 28 LMIC in Europe, Asia and Africa, and the relationship between these practices and country level GDP. They found variations in the maternal cognitive and socioemotional caregiving between countries, and GDP to be related to this caregiving (101). More studies applying the FCI and further validating the FCI against child development outcomes are called for (106).

#### *Measuring nurturing child care*

The WHO and UNICEF recommend family and community practices essential for child survival, growth and development (107). The Care Initiative aims to facilitate assessment, analysis and action towards improved care for child nutrition (108), and a recent series of seminal papers in the Lancet calls for an emphasis on *nurturing care* to promote early child development (2, 18, 109). Previous studies have indeed examined several single care practices from different care domains in one study (110, 111). However, as far as literature search reveals, research efforts combining more than two of the dimensions of child care in one measure are few.

Nevertheless, some effort has been made to conceptualise and measure child care across care domains (76, 112-115). Amugsi et al. (76) studied the relationship of a child care index including child diet practices and use of preventive health services to height-for-age z-scores among children aged 6-36 months. Adjusted analysis results showed a positive relationship between the child care index and height-for-age. Similarly, Ruel, Levin (113) found child care, measured through a diet and use of preventive health services index, to be a significant determinant of child height-for-age in Accra in Ghana. Ruel and Menon (82) explored the association between a composite feeding index and child nutritional status in five Latin American countries (including Bolivia, Colombia and Peru), and found this to be significantly associated with nutritional status. Although in line with a more comprehensive focus on child

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care, most of the studies with care indexes included only one or two domains of child care – namely child diet and use of preventive health services. Recently, the role of caregiver-child interaction in relation to cognitive and psychosocial stimulation has been elevated in promoting good child nutrition, and as an essential component in care for nutrition (64). Hence, the possibility of combining a broader aspect of child care practices in one measure needs exploration.

There are important advantages to a summary measure representing the extent and quality of nurturing child care. A summary index can facilitate the study of trends and the comparison populations and sociodemographic groups, it can capture a broad concept of health as no single indicator can do, and it may have greater ‘bottom line’ impact on policy-makers (116, 117). This is not to discount challenges in developing summary measures, including uncertainty about what indicators to include and exclude, how to define good and bad outcomes, possible averaging effects in which components of an index may have opposite trends, lack of data on a wide range of indicators, and uncertainty about what aggregation/weighting methods to use (116, 117).

However, it is important to acknowledge that especially in vulnerable or resource poor contexts, such as LMIC, providing children with optimal care in all domains can be a challenging task to achieve. Engle et al. (108) emphasize the risk of caregiver-blaming in cases of suboptimal child care. Parents throughout the world do what they think is best for their child, and they do this within the boundaries of their resources. Hence, the way child care is practiced, as well as the quality of the care varies across cultures and societies. This is due to multiple interactions of a variety of reasons like cultural and religious beliefs, access to and availability of key resources for care, knowledge, etc. (101).

From the above discussion, the complexity of measuring nurturing child care is evident. Yet the complexity is actually magnified many times when child care is conceptualized in a social-ecological frame. Early childhood development, and therefore early child care, is “a broad and complex field, covering multiple policy sectors, and diverse research traditions, but with the aspirations of constructing more

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inter-sectoral, and more integrated models of services delivery.” (6, p.4). Some, but by no means all, of this complexity is addressed in the next section on social determinants of health.

### **1.2.3 Social determinants of health**

The CSDH defines social determinants of health (SDH) as “the structural determinants and conditions of daily life” (8, p.1). Hence, social determinants encompass a broad selection of factors in the socioeconomic and political context, and are reflected through social class and material circumstances (CSDH, 2008). Halfon et al. (5) point to an expansion from the traditional restriction of SDH to socioeconomic determinants (income and education), to a broadened definition which also encompasses factors like household wealth and assets, health literacy, employment, the degree of autonomy, housing quality, race and ethnicity, and social capital. Furthermore, aspects of the immediate child environment, such as care quality and domestic and social violence, can also be considered social determinants of health (5).

Because of the specific emphasis on social determinants of child care in this dissertation, child care as a concept is addressed separately in section 1.2.2. This dissertation addresses specific social determinants broadly termed maternal resources (and stressors). Hence, the terms social determinants and maternal resources are used interchangeably throughout the dissertation. Due to their central role in the theoretical framework of this dissertation, maternal resources are elaborated on when addressing the Model of child care in section 1.3.1.

#### ***IPV as a maternal stressor***

WHO defines IPV as “any behaviour within an intimate relationship that causes physical, psychological or sexual harm to those in the relationship” (118). IPV can involve any or all of physical aggression, sexual coercion, psychological abuse, and controlling behaviour (119), and have detrimental mental (120, 121), physical (122), and social functioning (123) consequences for the victim.

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## Measuring IPV

The Revised Conflict Tactics Scale (CTS2) is the most widely used measure of IPV (124, 125), and is based on the Conflict Tactics Scales (CTS) for measuring family violence. The CTS are based on conflict theory and assumes human conflict as unavoidable, but using violence to resolve conflict as avoidable (126). The CTS2 has shown to have good construct validity (126) and test-retest reliability (127). Furthermore, a short form of the CTS2 has been developed to facilitate the assessment of IPV in survey research, and it has shown to have good validity (125).

## 1.3 Theoretical perspectives and conceptual framework

Theoretically, the explanatory frameworks on social determinants of health can be differentiated by the theorized casual direction in which three main perspectives have been proposed: social causation, health selection, and life course (5, 128, 129). These are not mutually exclusive, but contribute in a complementary way to the understanding of SDH, including child health (8). The social causation perspective views social or socioeconomic deprivation as the cause of poor child health and development (128-130). On the other hand, the social selection perspective argues that the association between social determinants (often studied as SES) and child health and development are due to individual characteristics and behaviours of parents (129, 130). Between the causation and selection perspectives, research is inconclusive, but generally lends stronger support for the causation perspective (128). Although some research finds support for the selection hypothesis, it cannot be considered the principal explanation for health disparities (8).

The life course perspective argues that both adult health and social status are partly a result of factors and experiences in early life (128, 131), and acknowledges both the importance of social antecedents and social consequences of poor child health (5). It sees poor child health and development not only as a result of social circumstances, but also as possibly predictive of future social status (43, 129) and suggests that health risks due to adverse social circumstances or events accumulate over the life course, starting in early life (5, 132). It further suggests that social determinants might exert



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stronger influence on health in specific developmental periods (133). Although this dissertation is focused on the correlates of child health, the short- and long-term consequences of poor child health as emphasized in the life course perspective are part of the rationale for the focus of the study.

Notably, the tendency of the social determinants of health research has been a focus on the relationship between social determinants and health, to a large extent ignoring the intervening mechanisms in this relationship (8, 128, 134). Many have argued for a more systematic approach, also within social epidemiology, in the attempt to understand the complexity of what determines child health through the means of conceptual and analytical frameworks (10, 135-137), and to particularly emphasize the role of care in this complexity (66, 74, 138). Ecological models and social behavioural epidemiology acknowledge the reciprocal relationships between different levels of influence (10, 139, 140).

### **1.3.1 The Model of child care**

The Model of child care (Figure 1) is the conceptual framework guiding this dissertation, and it predominantly falls within the social causation perspective. It is an ecological framework evolved from several previous similar frameworks (138, 141, 142). The main foundation of the model is the UNICEF Conceptual framework for Causes of Malnutrition and Death published in 1990 (141) (hereafter the UNICEF framework). This framework was developed as part of the UNICEF strategy for improved nutrition of children and women in developing countries, in which causes of survival, growth, development and nutritional status were suggested in a multilevel system (141).

The UNICEF framework was not proposed as predictive, but rather as a starting point for the development of more specific models based on particular contexts and foci (141). Although ‘care for children and mothers’ is defined as one of the underlying causes of survival, growth, and development in the UNICEF 1990 model, it was not extensively developed conceptually. In the years following the publication of the UNICEF framework, an increasing attention to care inspired further articulations of

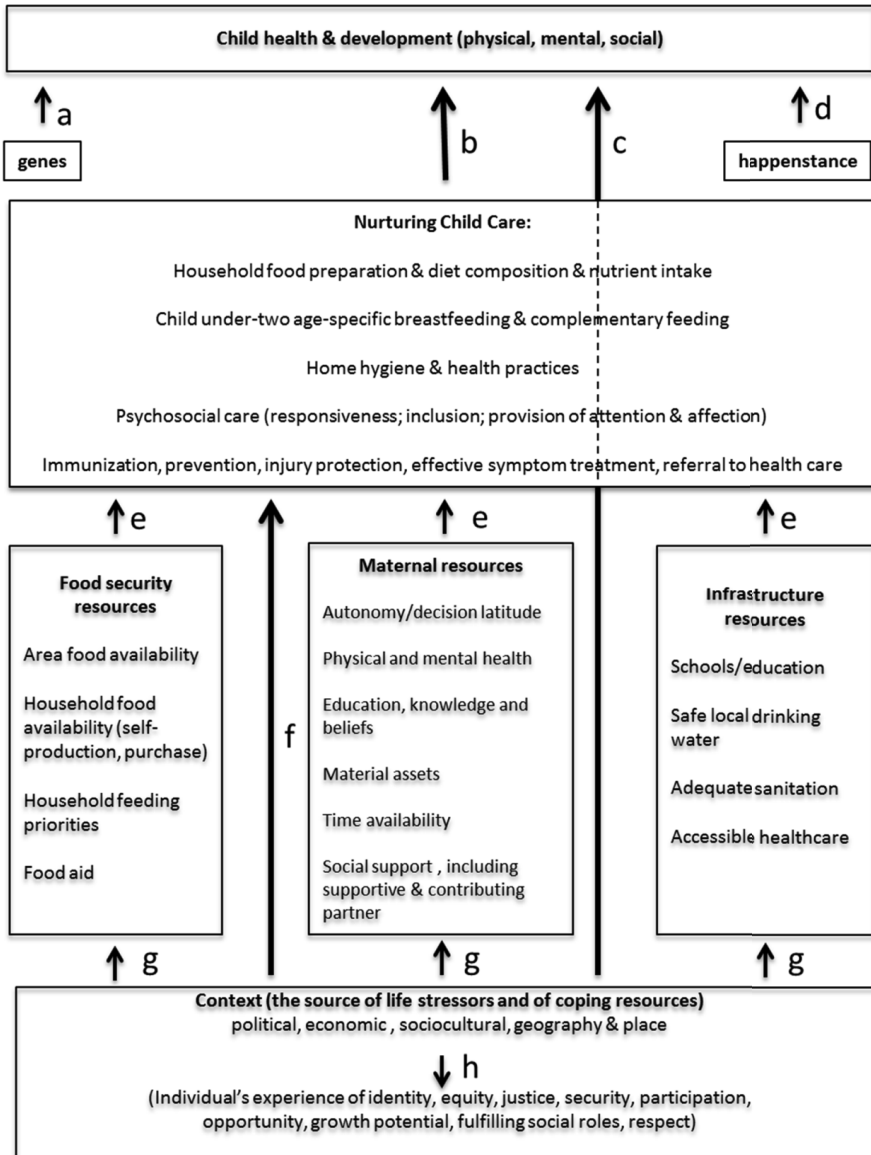
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the model. One example is the Extended UNICEF Model of Care (138) which is an articulation of the UNICEF framework intended to support the development of research measures to assess child care and feeding practices. Similar to the Model of child care used in this dissertation, it specified care practices as well as resources for care. Hence, the model in Figure 1 is a further articulation of a series of models, starting with the UNICEF framework, that were noteworthy for positioning child care as a critical factor underlying child health. All these versions share the same underlying structure emphasizing that care is an important mediator in the relationship between social determinants and child health (138, 141, 142).

The Model of child care reiterates and specifies the aspect of child care as a determinant of child health and development. It positions nurturing child care as the immediate influence on these child outcomes, and as a possible pathway between specific contextual and resource level factors, and child health. In line with the definitions of child care presented above, the Model of child care specifies several domains of care to help conceptualize child care and guide research. These domains are diet-related care, health- and illness-related care, and psychosocial care, which correspond to previous conceptualisations of care (2, 65, 66).

Successful caregiving also depends on the human and/or physical resources available to the caregiver, as emphasized by Engle et al. (108). The resources available in the community, in the household, and in the primary caregivers of the child, influence what specific care practices are carried out, and the quality of the care. The Model of child care differentiates between *food security resources*, *maternal resources*, and *health service/educational resources in the community* as important influences on child care. Due to lack of data, food security and infrastructure resources are not studied in this dissertation, and will therefore not be addressed further.

Figure 1. Model of child care



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### ***Maternal resources***

Maternal resources include biological, human, economic and social aspects of the life of the mother which can work to improve child care and child health. In the Model of child care, maternal resources comprise a range of factors that together influence the woman's position to care well for her child and influence child health. As pointed out by Heaton (143), a woman has several roles that each can have their specific impact on child health, e.g. the woman as a provider (related to her income/economic activity), the woman as a biological mother (related to her physical and mental health), and the woman as a caregiver (related to her knowledge and beliefs, time availability, autonomy and decision latitude). Following Heaton (143), the greater the access a woman has to various resources to apply in her different roles, the greater the chances for adequate care and subsequent good health for her children. In this dissertation, the role of the woman as *caregiver* is in focus.

### ***Autonomy/Decision latitude***

Although no single definition of autonomy exists, those that are commonly used are concerned with the ability to make decisions (144). Dyson and Moore (145) define autonomy as the "ability – technical, social, and psychological – to obtain information and to use it as the basis for making decisions about one's private concerns and those of one's intimates" (p.44). Having the possibility to take part in decisions concerning own, household and child matters is a central aspect of autonomy, and can be considered an important resource, positively affecting child care and child health (146). In the Model of child care, autonomy and decision latitude are listed at the same level, although decision latitude can be considered an *aspect* of autonomy (147). According to Kabeer (148), having a certain degree of decision-making power is central for agency which is one of three essential dimensions that facilitate empowerment (the other two being material, human, and social resources, and achievements of e.g. well-being). Although these concepts are distinct, they are to some degree treated in an overlapping way in the research literature. In this dissertation, the specific role of decision-making power as a manifestation of autonomy is addressed.

**Education, knowledge and beliefs**

The more knowledge a mother has, the better and more informed decisions she can make about care for herself and her family, and this in turn can have positive consequences for child health (149). Informal and formal education contributes to the knowledge and beliefs of a person (149). The informal knowledge about child care gained from family members, e.g. mothers and mothers-in-law, and the social network, might represent life-saving *or* life-threatening information in the context of the child care. Formal education can provide knowledge of general and specific character that can benefit care and health decisions (149, 150). Glewwe (151) suggests three pathways for the effect of maternal formal education and child health: increased health knowledge that can aid future childcare; general literacy and numeracy skills that can enable mothers in better care and the acquisition of more knowledge; and lastly, it can influence attitudes towards traditional beliefs concerning child care and health. Further, higher education is likely associated with better economic standing that through access to material assets can enable better care and subsequent health (150).

**Material assets**

Material assets in the immediate surroundings of a caregiving woman, like type of housing, tools, consumer goods, cooking utensils, transport means, etc., are likely to be resources that she and the family as a whole can draw on in the daily care for the child or children, and which ultimately affect health and development (130, 137, 152). The possession of and access to important assets can translate into production and development capacity in individuals that in turn can benefit child health. In LMIC contexts, assessment of material assets might provide important insights to the socioeconomic standing of households, as income and expenditure are not equally relevant in rural or economically poor contexts (153).

**Context**

The underlying factors influencing child care are at the contextual level. Political, cultural, geographical, and other contextual conditions can affect health directly or indirectly through influence on the possibilities parents have to prioritize and act as caregivers (66). As shown in the Model of child care, the political, economic,

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sociocultural, and geographic context is a source of life stressors and coping resources. Contextual factors also include (psycho)social stressors in the care environment, such as exposure to domestic violence (5, 132). This dissertation gives focus to selected contextual factors in varying degree across the three papers, but most salient are the role of place of residence (geographic region and urban-rural residence), access to child health programs, and exposure to IPV as a stressor in the care environment. These dimensions in relation to child care and child health will be elaborated on in section 1.4.2 below.

Many contextual characteristics in LMIC related to geography, economy and politics are reflected in the division of urban and rural places, in which rural areas often have less developed economy and infrastructure. However, the strong urbanization seen in e.g. Latin America, drives changes in these patterns, and underscores the importance of understanding the role of context for child health.

According to the Model of child care, IPV as a contextual stressor might affect maternal health (mental and physical), autonomy or decision making power, and her ability to make use of social support, and this in turn can have consequences for the care she provides (154). A woman abused by her husband might provide poorer care for her children, either because her space of action is limited by a controlling husband preventing her from going to e.g. health controls with her child (155), or because of physical injury or mental stress limiting her capacity to care for her child (155).

In the complex social ecology of child health, IPV can act as a contextual psychosocial stressor in the care environment of the child (154). Young women early in their partnership/marriage, and pregnant women are at particular risk of IPV (156), and because young children (aged 0-5 years) spend a lot of time being close to their mother, they are also at risk of witnessing IPV (157). According to Repetti, Taylor (132), families characterized by violence and neglect are so-called “risky families” because these characteristics pose threats to the mental and physical health of their children. Rico et al. (158) argue that in order to understand the complexity of child health, the role of IPV as a contributing factor needs to be investigated.

The cultural context of the child and caregiver can also influence child care and health either positively or negatively through beliefs, values, myths, traditional customs and attitudes related to the role of the mother, family or child (159-162). Views of infants and children vary across time and place, and include notions of vulnerability, without ability to perceive or even as stupid, as small adults, etc. (100, 160, 163). The notion of the child in any specific cultural context will influence how it is treated and cared for. In the Latin American context, as in the rest of the world, a range of cultural beliefs and notions of the child and how it should be best cared for exist (159, 162). Moreover, cultural and social norms and expectations of the mother, the father and the family have been highlighted to understand social and family dynamics (161), which in turn can influence child care and health. The role of culture is not explicitly addressed in this dissertation, but the acknowledgement of its significance is.

## 1.4 Literature review

Below follows a critical review of the research literature relevant to concepts in the Model of child care and this dissertation. Acknowledging the importance of the range of social determinants of child care and child health, this dissertation is restricted to focusing predominantly on maternal resources – specifically maternal education, maternal decision latitude, and household wealth – and the contextual factors of urban/rural residence, geographic region, and IPV.

Empirical literature relevant to the dissertation was searched for through several databases available from the University of Bergen Library, such as PubMed, ProQuest, Web of Science, Psych Info and Google Scholar. Key words with synonyms or related terms were included in the searches. Examples of key words and synonyms for literature search on child nutritional status were *child nutrition*, *child stunting*, *child malnutrition*, *child nutritional status*, *child overweight*, and *child growth*. Furthermore, key journals and reference lists of relevant articles were examined. Several non-peer reviewed reports from governmental and non-governmental organizations were searched for through organizations' web sites. It should be noted that although these

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reports often hold high quality and rigor, they are not assessed for quality through peer-review like empirical articles in scientific journals.

### **1.4.1 Maternal resources for child care and child health**

#### *Autonomy and decision latitude*

The research literature on women's autonomy in the Global South is increasing, but the focus on its relationship to own reproductive health predominates, and other health outcomes are given less focus (144). Hence, despite theoretical postulations about the role of female decision-making power in child care and child health, the empirical literature is limited and with inconsistent findings (164, 165). Studies have found higher female decision-making power to be related to immunization (166), greater use of services in prenatal and postnatal care (167), more psychosocial stimulation (89), higher meal frequency (89), and more favourable breastfeeding practices (168). Others have found more inconsistent results that indicate that it is not necessarily the case that the higher female autonomy, the better the child care. Ziaei et al. (169) found that concerning complementary feeding to children below 3 years, women in the middle autonomy tercile performed better compared to both the lowest *and* the highest tercile. In the same study, women in the lowest autonomy tercile were more likely to exclusively breastfeed compared to the middle and highest tercile. Lower female autonomy might restrict movement outside the house and facilitate more time together with the child. Higher female autonomy may imply work and other responsibilities outside the home, resulting in less time for child care.

The benefits of female autonomy have also been shown to vary depending on the type of autonomy in question. Vikram et al. (170) found a positive association between having permission to seek health care and child immunization, and an inverse association between decision-making power concerning childhood illness and child immunization.

Whereas many studies define and operationalize decision-making power in terms of independent decision-making, many issues in the family and household might gain from joint decision-making among the woman and her partner or another significant



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person. When inverse associations between female autonomy and child care are found, it might reflect too much responsibility on the mother, and low involvement from e.g. the partner, and can have less favourable consequences for maternal- and child care (170, 171).

The role of female autonomy in child care and child health in LMIC settings is complex, and requires careful and nuanced examination (172). Of important consideration is the social, economic and cultural processes and contexts in which autonomy is studied, as emphasized by Osamor and Grady (144). According to findings by Kishor and Subaya (172) and Smith et al. (146), decision-making power plays out differently depending on geographic and social context. Hence, context specific studies are called for. A major limitation of the existing literature in this regard is the limited number of empirical studies from a Latin American context (166), and this context (cultural and social) might produce different patterns of autonomy compared with other regions (172). Furthermore, autonomy and decision-making power are operationalized in a multitude of ways, making comparison across studies difficult (166).

### *Education*

The formal education (hereafter education) of primary caregivers, particularly mothers, has been found to be a powerful determinant of child health in LMIC (150). It is estimated that the majority of the improvements in child nutritional status and survival the past 13 years can be attributed to improvements in women's status including, among other factors, maternal formal education (143). Similarly, it has been estimated that 51 per cent of the reduction in under-5 mortality between 1970 and 2008 could be attributed to an increase in women's education (173). Fuchs et al. (174) examined the relative impacts of maternal education and household wealth on infant survival and concluded that maternal education was a stronger determinant than household wealth. Moreover, higher maternal education is associated with better child nutritional status as measured by height/length-for-age in several studies (82, 151, 165, 175, 176), but not in others (177). Moreover, there are indications, that only a little education is better than no education for child nutritional status (82) and survival

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(178). With many countries' transition from under- to overweight challenges, the role of maternal education for child overweight is inconsistent in the literature with some finding inverse associations (179, 180), and others finding same-direction associations (181).

Even if knowledge on the association between social determinants and specific health outcomes is well documented, the mechanisms informing *how* the association works, are less understood (8, 150, 151, 182, 183). One likely, but less studied mechanism is the pathway of child care. Studies have documented the relationship of good child care to better child growth (76, 113, 184, 185). Recent research has been conducted with findings largely pointing to a favourable impact of maternal education on single child care practices, like aspects of child feeding (183, 186-189), immunization (170, 190), hygiene and handwashing practices (191-193), prompt timing of professional treatment seeking, timely and appropriate home treatment (94, 194), treatment seeking (97), compliance with follow-up of sick children (90, 195), and psychosocial care (130, 196). Research has also documented that even a few years of formal education can have positive impacts on many child care practices compared to no formal education (178). Significant interaction effects between maternal formal education and care practices on child growth have also been identified (113).

Although scant, a line of research exists concentrating on aspects of the totality of child care with more constituent operationalisations of care. Armar-Klemesu et al. (112) examined maternal and household factors in relation to care-specific indices for child feeding, preventive health seeking and hygiene. Findings showed that low maternal education was associated with poorer care in all three domains. Research has also indicated an effect of *community* maternal education on a comprehensive child well-being indicator (115).

In contrast to observed positive associations between maternal education and child care, some research has failed to find significant associations e.g. between maternal formal education and young child feeding practices (175), and professional care seeking (91).

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### *Material assets*

Material assets as a potentially important maternal resource for care and health is frequently measured with household wealth indexes (112), and shown to provide useful representations of economic position (197). Higher household wealth has been found to be favourable to a range of child health outcomes like survival (174, 198), nutritional status (113, 165, 176, 199, 200), malaria risk (201), and child morbidity (200), although multi-country studies have found variation between countries in the independent role of wealth on child mortality (198) and nutritional status (199).

The literature on the relationship of household wealth and child care practices is less developed, but studies have found higher household wealth to be positively associated with childhood immunization (170, 202), more positive child disciplining strategies and greater responsiveness (196), timely introduction of complementary diet and recommended complementary diet, but with *lower* likelihood of exclusively breastfeeding until six months (175). A study of determinants of various care indices found wealth to be a significant correlate of hygiene, but not feeding or preventive health indices (112).

To summarise the section, weaknesses of the existing literature on maternal resources and child care in LMIC settings include a narrow focus on single care practices, limiting the understanding of child care patterns. Further, aside from a few exemptions (115, 178) there is a lack of nationally representative samples including both urban and rural children and various social classes in the assessment of maternal resources for child care.

### **1.4.2 The role of context for child care and child health**

#### *Urban-rural and geographic context*

Urban-rural differences, generally in favour of urban residence, have been identified for several child health outcomes like mortality (203) and nutritional status (176, 204-206), and care outcomes like immunization coverage (202), prenatal and birthing care (206), complementary child feeding practices (206) and health- and treatment seeking behaviours (206). Similarly, child health differences have been found depending on

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geographic and/or administrative regions in which socioeconomically and underdeveloped regions have poorer child nutritional status (176, 207), and perform poorer on child care practices like immunization (202).

Explanations for these disparities are likely connected with differences in socioeconomic conditions (205), infrastructure development (205) and other social and cultural factors in urban and rural settings. Thus, merely examining urban-rural differences is not sufficient to understand child health and child care disparities. Context and resources work in an intertwined manner to influence both child care practices and child health. Previous studies have hypothesized that determinants of child nutritional status may be different in urban and rural contexts, but have not found strong support for this (206, 208). Rather, the level of determinants differed and partly explained urban-rural differences in child nutritional status (206, 208). Valdivia (209) studied the role of infrastructure development in Peru for child nutritional status, and found that the infrastructure development had a positive effect among urban children, but not rural children, and that the effect was stronger among children of less educated mothers. Further, Smith et al. (206) found urban-rural differences in the strength of the association between maternal education and child linear growth in LAC (and Sub-Saharan African) countries in which maternal education seemed to be more important in rural areas. This is in line with a comparative study by Urke et al. (176) that found maternal education and household wealth to be more strongly correlated with child stunting in the largely rural Andes of Peru compared with national estimates.

However, due to increasing urbanization and societal development, these urban/rural disparities are likely to fluctuate and result in different, but maybe equally serious health challenges (210). Studies have e.g. found large within-urban health disparities (204). As previous research indicates, to disentangle the role of urban-rural residence for child health and care, studies that examine social determinants of child care and child health within urban and rural contexts separately are warranted (206, 208, 209, 211, 212).

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### *IPV as a stressor in the care environment*

The sensitive nature of IPV makes it hard to quantify the number of children exposed. However, it is estimated that between 11.3 and 25.5 million children are exposed to domestic violence in the LAC region (213).

Research shows that children living in families with IPV are more likely to be victims of violence themselves (214). There is also the risk of accidentally being physically hurt in a violent conflict between parents (215). In addition, behavioural and biological mechanisms of IPV and child physical health are less well understood (216).

The amount of research conducted on the specific effect of IPV on child health is increasing, but largely focused on psychological consequences (217). Concerning mental health, there is consensus that IPV exposure increases the risk of several poor mental health outcomes in children (218-221). Conversely, child physical health consequences of exposure to IPV are less well understood, especially in LMIC contexts (158, 217, 222). A review study on the association between IPV and child physical health indicators with samples largely from developed countries concluded that there is great uncertainty about the relationship between IPV and child health, mainly due to limitations of scientific quality in the studies reviewed, such as small and purposive samples and lack of ability to control for possible confounders (217). In an attempt to mitigate some of the limitations in the literature, Rico et al. (158) examined the association of IPV and child mortality and child nutritional status in population-based samples from five countries in the Global South. The results were contrasting, with the strongest associations found in Kenya between physical IPV and under-2 mortality, and between any IPV and severe child stunting. Weaker associations were observed in Honduras and Malawi, but not in Egypt or Rwanda. The authors conclude that differences in relationships between IPV and child health outcomes might be due to contextual differences. Yount et al. (222) reviewed existing literature on the relationship between child exposure to domestic violence and growth in utero, and early child growth and nutritional status. They conclude that despite limitations in the literature, longitudinal studies have concluded with an inverse relationship between IPV and child nutritional status. More recently, a pooled analysis of the association between IPV and child growth and nutritional status in 29 LMIC

found a positive association between ever having experienced physical IPV and child stunting, and between ever having experienced sexual IPV and child stunting (223).

To summarise, the literature on IPV and child physical health outcomes is scarce, and characterized by several limitations. The majority of research is done on small samples, often drawn from shelters. Moreover, most studies are conducted in the Global North, particularly in the U.S., and few studies from Latin American settings exist. As pointed out by scholars (158, 161), contextual differences might play a role for the characteristics of IPV, as well as the relationship between IPV and child health. This underscores the importance of country-specific studies. Notably, IPV tends to be operationalized in a variety of ways, making cross-study comparisons difficult. Moreover, much of the research conducted did not include appropriate control variables, and even fewer examined pathways to explain any potential relationship between IPV and child health, like child care practices (217). Hence, the role of IPV in child health generally, and in the Latin American region specifically, is not well understood, and the topic warrants more research.

## 1.5 Research gaps summarised

Up to this point, several important research gaps have been identified; among them some are in focus in this dissertation:

- New international child growth call for updated trend estimates of child nutritional status.
- Trend analyses are needed that are sensitive to variations within sociodemographic sub-groups within national samples.
- Operationalization of child care according to a broad conceptualization is to a little extent explored.
- The totality of child care provision has rarely been studied in relation to social determinants.
- Conflict in the family – especially IPV – may negatively affect physical child health and development, yet research on this subject is lacking, particularly in developing countries.

## 1.6 Aims of the dissertation

The Model of child care has child health and development as its ultimate endpoint. The aim of Paper I was to explore how two manifestations of child health and development, namely prevalence of stunting and overweight, developed among children aged 0-59 months in Peru in the period 1991-2011. The paper presents 20-year trend analyses using updated international growth standards. The analyses were stratified by child sex and age, geographic region, urban/rural residence, maternal education level and household wealth quintiles.

Where Paper I focused on the endpoint in the Model of child care, Paper II aimed at exploring to what extent maternal resource level factors were associated with overall child care in urban and in rural contexts and for different age groups. The specific focus was on the role of maternal resources in the provision of recommended child care practices measured through a summary index of nurturing child care.

The aim of Paper III was to explore to what extent IPV as a contextual stressor in the care environment of the child was associated with child physical health in children aged 0-59 months in Bolivia, Colombia and Peru, when adjusting for appropriate child care practices and sociodemographic- and economic factors.



## 2. Materials and methods

### 2.1 Design, procedures and study population/sample

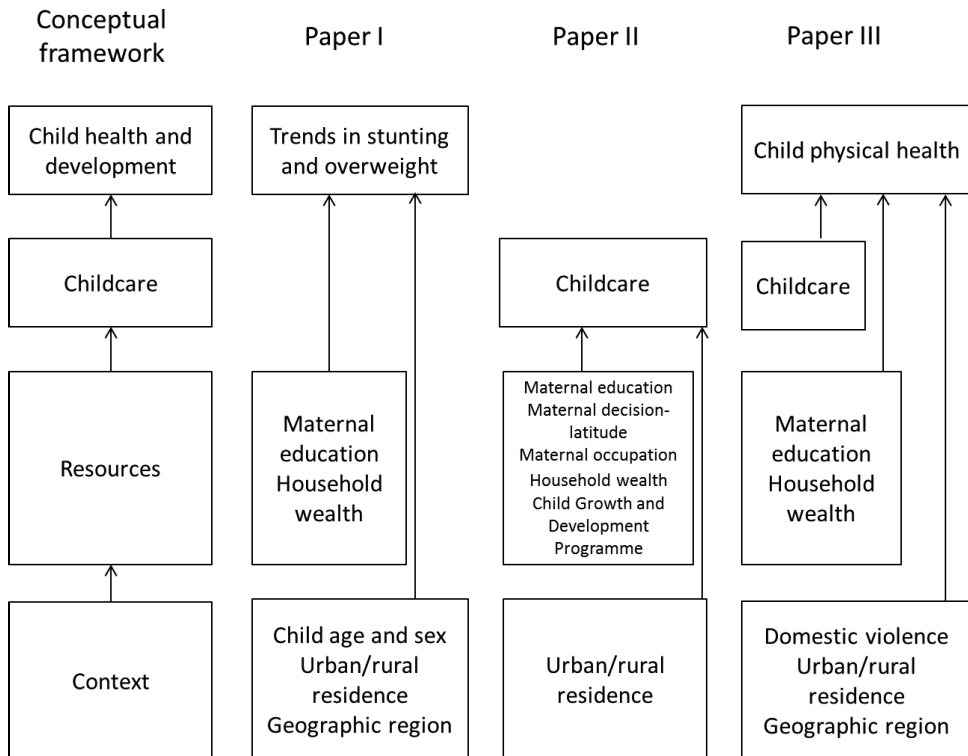
The dissertation is based on eight rounds of DHS collected in Peru (rounds 1991-92; 1996; 2000; 2007-08; 2011; and 2012), Bolivia (round 2008) and Colombia (round 2010) in the time period from 1991 to 2012 (See Table 1 for an overview of the study design). DHS are nationally representative household-based surveys conducted in more than 90 low- and middle income countries worldwide, collecting information pertaining to fertility, family planning, maternal and child health, gender, HIV/AIDS, malaria, and nutrition (224). The data collection is carried out through collaborations between governmental and non-governmental institutions with technical assistance provided by ICF Macro and the MEASURE DHS program (225).

To obtain nationally representative samples, DHS uses a stratified two-stage cluster sampling design with equal probability random selection. Based on a national master sample frame, the first stage is defining strata (domains) by regional and urban-rural characteristics. From each stratum, enumeration areas, commonly called clusters, are randomly selected with equal probability. From the clusters, households are systematically selected, and all household residents are enumerated. The head of the household is asked to complete a household questionnaire. All adult members of the household are asked to complete an individual questionnaire, and one woman in the age range 15-49 years is selected from each household as the main respondent and asked to complete a detailed individual questionnaire. Her living children below 59 months of age are selected for anthropometry measurement and questions about health and child care (226). The papers in this dissertation used a combination of data from the household, woman and child levels. In the course of the DHS history, the questionnaires were modified from survey round to survey round, and hence, the variable sets are not identical across years.

Table 1. Study design		1991		2000		2010		2012-->	
Bolivia					<b>DHS 2008 (PIII)</b> 13.02-25.06.2008* Women n=16,939 Study n=3586				
Colombia							<b>DHS 2010 (PII-III)</b> 14.11-18.12.2009/ 21.1.-14.11.2010* Women n=53 521 Study n= 5986 (PII); n=5955 (PIII)		
Peru	<b>DHS 1991-92 (PI)</b> 17.10.1991-07.03.1992* Women n=15 882 Study n=7999	<b>DHS 1996 (PI)</b> 07.07-30.11.1996 * Women n=31 241 Study n = 14877	<b>DHS 2000 (PI)</b> 17.07-22.11.2000* Women n=27 843 Study n=11 754	<b>DHS 2007-08 (PI)</b> 26.01-05.10.2007/ 19.02.-27.06.2008* Women n=22 558 Study n= 8232		<b>DHS 2010 (PII-III)</b> 14.11-18.12.2009/ 21.1.-14.11.2010* Women n=53 521 Study n= 5986 (PII); n=5955 (PIII)	<b>DHS 2011 (PI)</b> 03-12.2012* Women n=22 947 Study n=8186	<b>DHS 2012 (PIII)</b> 03-12.2012* Women n=23 888 Study n= 6260	
*Data collection dates									

Figure 2 below gives a schematic representation of the analytical focus of each paper. All three studies have cross-sectional designs. Paper I is a trend analysis with five time points. Paper II used data from Colombia DHS 2010, and Paper III used data from one time point from Bolivia DHS 2008, Colombia DHS 2010 and Peru DHS 2012.

Figure 2: Analytical framework



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## 2.2 The study setting

This dissertation includes studies from the countries of Bolivia, Colombia and Peru. The countries share similarities concerning geographic, economic and social characteristics. Geographically, they all cover parts of the Amazon jungle and Andes mountain range. The three countries are also, together with Ecuador, members of the Andean Community of Nations trade block which facilitates economic collaborations across and between countries (227). Bolivia is classified as a lower-middle income country, whereas Colombia and Peru are upper-middle income countries (228). All three countries share challenges of high social inequality that characterize the LAC region. Fortunately, substantial declines in inequality in Latin America have been documented the past decade (229), giving hope for further social improvement.

The LAC region is highly urban, with as much as 80 per cent of the total population living in urban areas (230), and the proportions are 68 per cent (231), 76 per cent (232), and 78 per cent (233) (2015 est.) in Bolivia, Colombia and Peru respectively. Further, all three countries are ethnically diverse (38, 234).

Bolivia has a population of 10 888 000 (2016 est.) (231) of which approximately 1 280 000 are below 5 years (235). It is a culturally and ethnically diverse country, with a significant proportion of Amerindians who speak native languages and keep culture and tradition alive (39). Bolivia is one of the least economically developed countries in the LAC region, but has experienced substantial declines in inequality and poverty the past decades, mainly due to growth in labour income for the poorest and pro-poor labour policies (39, 236).

Colombia has a population of 48,653,000 (2016 est.) (232), of which 4 502 000 are children below 5 years (237). Colombia has a solid national economy, but the poverty rate is still at 28 per cent, indicating challenges related to social adversity (232).

Economically, the country progressed slowly the last decade, but despite this made positive social and health progress (238). One of the greatest challenges of the country has been the ongoing internal violent conflicts, causing millions of displaced people and high rates of social violence (38).

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Peru has a population of 30,769,000 (2014 est.) (230) of which 2 924 000 are children below 5 years (239). Both poverty and social disparity constitute challenges in the country, especially among ethnic minorities and in the rural highlands (240). Political instability and violent conflicts in the 1990s put breaks on democratic, social and economic development, especially in rural areas. However, the past decade Peru has benefited from social and health developments, economic growth and reduction in social inequalities, and has been at the forefront in the work to achieve millennium development goals in maternal and child health (240).

## 2.3 Study samples

Paper I was based on child anthropometric data from children aged 0-59 months, as well as woman and household self-reported data from five rounds of data from Peru DHS in the period 1991-2011. Across all five rounds of data, a total of 56 168 children aged 0-59 months were eligible for anthropometric measurement. Four thousand six hundred and thirty cases were excluded from analysis due to missing data on height and/or weight (not measured, e.g. because the mother refused) or values considered out-of-range ( $Z$ -scores  $<-6.00$  and  $>+6.00$ ). The final samples for each analysis point were: 1991-92:  $n=7999$ ; 1996:  $n=14877$ ; 2000  $n=11754$ ; 2007-08;  $n=8232$ ; and 2011:  $n=8186$ .

Paper II was based on data from children aged 0-23 months, as well as self-reported woman and household data from Colombia DHS collected in 2010 ( $n=5986$ ) distributed across three age groups: 0-5 months ( $n=1357$ , missing 11%), 6-11 months ( $n=1623$ , missing 9%), and 12-23 months ( $n=3006$ , missing 8%).

Paper III was based on data from children aged 0-59 months, as well as self-reported woman and household data from Bolivia DHS, collected in 2008 ( $n=3586$ ); Colombia DHS, collected in 2010 ( $n=9955$ ); and Peru DHS ( $n=6260$ ), collected in 2012.

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## 2.4 Measures

Some measures are common to all three papers, whereas some are paper specific. All three Papers have different outcome measures (Paper I: child nutritional status; Paper II: child care practices; Paper III: signs of illness in child). Based on the conceptual framework (Figure 1), Figure 2 is an analytical framework showing what specific measures were used in this dissertation. With the exception of child height and weight data, and parts of the immunization data and wealth index components, all measures in this dissertation were based on women's self-report.

### 2.4.1 Child nutritional status (Paper I)

Child growth is commonly assessed using variables based on measures of height-for-age, weight-for-age, and weight-for-height *z*-scores (57). These scores can be used to determine linear growth retardation.

In Paper I two measures of child nutritional status were used: chronic malnutrition and overweight. Chronic malnutrition was operationalized as stunted/not stunted and based on height-for-age *z*-scores. Following WHO Child Growth Standards for international use (57), chronic malnutrition is determined when height-for-age *z*-scores are less than 2 SD below the median of the reference population. Overweight is established when weight-for-height *z*-scores are more than 2 SD above the median of the reference population. *Z*-scores and prevalence of stunting and overweight were calculated using a publicly available syntax file provided by the WHO (241). Values beyond +/- 6 SD are to be considered extreme, and were excluded according to recommendations by the WHO. Following DHS protocols for anthropometric measurements of children (242) special training in anthropometric data collection was given to personnel with such responsibility before each data collection. Supine length was measured for children aged 0-23 months, and standing height was measured for children aged 24-59 months using the Shorr height board. Weight was measured using digital scales (242).

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## 2.4.2 Child care (Paper II-III)

A range of single child care variables were included in Papers II and III. In addition, in Paper II, a nurturing care index (NC) was constructed based on a selection of the single child care variables.

### *Care related to diet*

#### **Infant and Young Child Feeding Indicators (IYCFI) (Paper II-III)**

Child diet was assessed based on the WHO IYCFI recommended for monitoring child diet (77). For infants aged 0-5 months, exclusive breastfeeding was assessed asking the mother whether the infant in the age group 0-5 months was currently breastfed, and whether the infant had received any other liquids or foods the past 24 hours. The combination of this information was the basis for the variable *exclusively breastfed* with values '0' indicating *not exclusively breastfed*, and '1' indicating *exclusively breastfed*. For children aged 6-23 months WHO has developed a measure of minimum acceptable diet (MAD). The measure is composed of recommendations for a minimum number of meals per day – minimum meal frequency (MMF), and a minimum number of food groups per day – minimum dietary diversity (MDD). The minimum number of food groups recommended depends on whether the child continues to be breastfed, and on its age. Details about the recommended food groups are found elsewhere (77). Both MMF and MDD were dichotomous with values '0' indicating *child not provided minimum number of meals recommended* (MMF) or *child not provided minimum dietary diversity recommended* (MDD) and '1' indicating *child provided minimum number of meals recommended* (MMF), and *child provided minimum dietary diversity recommended* (MDD). In Paper II the individual items measuring MMF and MDD were included as part of the NC. Paper III combined the MMF and MDD measures to the MAD measure as defined by the WHO IYCFI and used this as a measure of child diet.

### *Care related to prevention and treatment of illness*

#### **Immunization (Paper II-III)**

An immunization coverage variable was constructed based on the vaccinations a child had received at the time of the interview. Information about vaccinations received was

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taken from the child's health card, or from self-reports by the respondent/mother. A child was considered fully immunized if it was on track with the country specific vaccination scheme for his/her age. All three countries of Peru, Bolivia and Colombia have vaccination schemes in accordance with WHO recommendations (39, 243-245). These recommendations involve children receiving BCG at birth, one dose of POLIO at birth: BCG and Hepatitis B; at two, four and six months of age: Polio, DTP, Rotavirus, Hepatitis B and Haemophilus influenza B; at 12 months Triple viral and Yellow fever; at 18 months DTP and Polio, at five years DTP, Polio and Triple viral. The immunization variable was dichotomized with values '0' and '1' for the respective categories *on track* and *not on track* with the national vaccination scheme in Bolivia (Paper III), Colombia (Paper II-III) and Peru (Paper III).

### **Hygiene-related practices (Paper II-III)**

Two proxies for safe hygiene were used in this dissertation: habits on hand wash and safe disposal of child faeces. In Paper II, a single question about hand wash after cleaning the baby was used as a hygiene measure. In Paper III, different hand wash variables were available for different countries: none in Bolivia; one in Colombia (as in Paper II); and six in Peru. For the Peru analyses in Paper III, hand wash after using the toilet, after changing diapers, before preparing meals, before serving food, before eating, and before feeding child were included. All hand wash variables were binary with values '0' and '1' for the respective response categories *normally do not wash hands* and *normally wash hands*.

A dichotomous variable assessing way of disposing of child stools was constructed according to recommendations by UNICEF and WHO with values '0' and '1' for the respective response categories *safe* or *unsafe*. These recommendations defines safe disposal as putting or rinsing stools into a sanitation facility (246).

### **Home treatment of illness (Paper II)**

In Paper II, three questions assessed how the respondent handled child illness in the home if the child had signs of illness the past 15 days. The questions were if the child had been given any type of oral rehydration therapy, whether the child had been offered the same as, more than, or less than normal to drink or to eat. The items were



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dichotomized with values ‘0’ and ‘1’ for the respective response categories *offered the same as or more than normal* and *less than normal*.

### **Intentions about treatment seeking (Paper II-III)**

Paper II and Paper III included several questions about the respondent’s intentions to seek professional treatment in case of a range of illness signs:

diarrhoea/fever/vomiting, short rapid breathing, cough or difficulty breathing, child eats or drinks very little (Paper II only), and child does not/cannot breastfeed/drink (Paper II only). The items were dichotomized with values ‘0’ and ‘1’ for the respective response categories *no* and *yes*.

### **Care related to psychosocial stimulation**

#### **Cognitive stimulation and socioemotional care (Paper II)**

The 2010 round of the Colombia DHS collected information on a selection of the FCI instrument (106) which measures aspects of cognitive and socioemotional care in the family. Paper II included the following variables as measures of cognitive stimulation: adult participation the past seven days in a) reading, and b) storytelling.

Socioemotional care was measured with the following variables: adult participation the past seven days in a) singing with/for the child, b) playing with the child, and c) going outside with the child with values ‘0’ and ‘1’ for the respective response categories *yes* and *no*.

#### **Alternative care and disciplining strategy (Paper II-III)**

Following the FCI (106), adequate alternate care was operationalized as not leaving the child alone or in the care of a child below 10 years for more than one hour the past week. Kariger et al. (106) defines proper child disciplining as ‘more positive than negative strategies’, in which positive refers to non-aggressive strategies, and negative refers to physical violence and verbal aggression. Although a range of questions about child punishment is available in the data, no validation concerning whether they measure ‘positive’ or ‘negative’ punishment strategies are available. For this reason, it was decided to be conservative, and include severe physical punishment as the strategy that is most uniformly considered negative. The variable was a dichotomous variable reflecting punishment of child by mother and/or father with or without severe physical

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violence. Severe physical violence was operationalized by two questions asking whether the father punished the child by beating it on the body (Bolivia and Peru)/hitting with objects (Colombia) and whether the mother punished the child by beating it on the body (Bolivia and Peru)/hitting with objects (Colombia). In Paper II, the values were ‘0’ indicating *severe physical punishment* and ‘1’, indicating *no severe physical punishment*. In Paper III, the variable was reverse coded for analysis purposes.

### ***Nurturing child care (NC) (Paper II)***

Age-specific NC indexes were constructed based on the care practices described above and in Paper II. The NC included items related to *feeding*: exclusive breastfeeding (0-5 months), MDD and MMF (6-11 and 12-23 months); *health*: immunization, hygiene practices and intentions to seek professional treatment; and *psychosocial care*: cognitive and socioemotional care domains. Each care practice was coded ‘0’ for *recommended practice not carried out* and ‘1’ for *recommended practice carried out*. Categorical Principal Component analysis was undertaken to assess potential underlying care dimensions, but no distinct multidimensionality or strong inter-correlations between variables were identified. The underlying model of NC, posits that the components are of separate and equal importance to child health. Hence, the scores for each practice were summed to create the NC with each equally weighted with a value of 1, and used in analyses as a continuous variable.

### **2.4.3 Child illness (Paper III)**

A large proportion of child mortality is due to preventable infectious diseases such as diarrhoea, and pneumonia (62). These conditions are indicators of child health. In population-based survey research, professional diagnosis of child diseases is resource demanding, and seldom done. Instead, if appropriate questions are asked, information based on self-report can give indications of the general prevalence of certain symptoms and conditions at a population level. This is the approach taken by several large scale surveys, including DHS. Paper III used signs of illness in children the past

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15 days as its outcome measure. A sum score of reported illness signs the past 15 days was computed including the following six illness signs: diarrhoea; blood in stools in case of diarrhoea; fever; cough; short and rapid breaths in case of cough; problems in the chest or running nose in case of cough. The sum score was further collapsed into a dichotomous variable with values ‘0’ and ‘1’ for the respective response categories *no signs* and *one or more signs*.

#### **2.4.4 Maternal resources**

##### ***Maternal level education (Paper I-III)***

Maternal education was self-reported across six given categories, and further collapsed into the following five categories for Paper I and III: *no education, incomplete primary education, complete primary education, incomplete secondary education, and complete secondary or higher education*, and three categories for Paper II: *no education or primary education, incomplete secondary education, and complete secondary or higher education*. The collapsing was necessary in order to ensure an acceptable number of respondents in each group for analyses.

##### ***Maternal decision latitude (Paper II)***

Maternal decision latitude was measured with a sum score of seven items with seven response categories asking about who in the household has the final say in decisions on personal and household matters (own healthcare, large household purchases, daily household purchases, visits to family and friends, food to be cooked each day, own studies, and having sex). The single items were further dichotomized with values ‘0’ and ‘1’ for the respective response categories *involved in decision making alone or together with someone else*, and *not involved in decision making*. All dichotomous items were combined in a sum score. Cronbach’s alpha for the decision latitude scale was .76 ( $M = 12.31$ ,  $SD = 1.86$ ). This sum score was further categorized into involvement in decision making on 0-4, 5-6 and 7 issues.

##### ***Maternal occupation (Paper II)***

Assessment of maternal occupation was based on a pre-constructed variable with nine response categories: *not working (outside of home), fishery/forestry/agriculture, other*

*manual work, other work, sales, public/social services, director/administrator/supervisor, and professional/technical.* For the sake of ease of interpretation and category sample size, these were further recoded and collapsed into the following five categories: *not working outside the home, agriculture or other manual work, sales, service work, and professional/administrative work.*

### ***Household wealth (Paper I- III)***

Household wealth was measured through the DHS Wealth Index (247). The Wealth Index is based on questions about possession of a range of household assets, e.g. bike, car, radio etc., features of the housing, e.g. floor, wall, and roof material, household facilities, e.g. sanitation and water. A detailed explanation of the assets and features included, and the construction of the Wealth Index can be found elsewhere (247). In all papers the Wealth Index was categorized into wealth quintiles. Additionally, in Paper II, the Wealth Index was used as a continuous measure in regression analyses.

### ***Household sanitation facilities (Paper III)***

A separate measure of household sanitation facilities was used for descriptive and bivariate analyses in Paper III. The measure was a combination of types of sources of drinking water and types of toilet facilities, coded '0' and '1' classified as *improved* or *unimproved* following WHO and UNICEF recommendations (246).

## **2.4.5 Contextual variables**

### ***Place of residence (Paper I-III) and geographic region (Paper I, III)***

Place of residence of the household (Paper I-III) was classified as *urban* or *rural* according to criteria determined by DHS for each country in the sampling procedure (226). To assess geographic region, a preconstructed variable was used (Paper I, III). Geographic region was categorized based on location of the households in administrative *departamentos*. The geographic region variables consisted of three categories for Peru and Bolivia: *Coastal, Andean, and Amazon basin* (Peru), and *Llano, Altiplano, and Valle* (Bolivia). The categories for Colombia were *Pacífica, Bogotá, Oriental, Caribbean, Amazonas-Orinoquía, and Central for Colombia*. In Paper II, inclusion of child registration in a national child development program in

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Colombia (248) – the Child Growth, Development and Care Program (CGDCP) – was included, with values ‘0’ and ‘1’ representing the respective responses *no* and *yes*.

Intimate partner violence (IPV) (Paper III) was measured with a modified version of the Straus’ Conflict Tactics Scale specifically developed for DHS (156). The IPV DHS module consists of a series of questions about the experience of acts of emotional, physical and sexual violence against the respondent by current or former partner. Paper III analysed IPV by current partner *ever* (Bolivia, Colombia and Peru) and *in the past 12 months* (Colombia and Peru). The availability of items varied between country data, but the inclusion of similar items across country samples was strived for. A list of items included in the IPV measures in the three countries is found in Appendix A. Cronbach’s alpha for the scale for the samples was .85 ( $M = 1.26$ ,  $SD = 2.11$ ) in the Bolivia sample, .72 ( $M = 0.93$ ,  $SD = 1.54$ ) in the Colombia sample, and .84 ( $M = 0.68$ ,  $SD = 1.65$ ) in the Peru sample. The scales were dichotomized into values of ‘0’ denoting *not experienced any type of violence*, and ‘1’ denoting *having experienced one or more acts of violence*.

#### **2.4.6 Sociodemographic variables**

Analyses included a selection of sociodemographic variables as stratification variables (Paper I-II) or control measures (Paper II-III). These were child sex (male/female), child age in months (Paper I-III), maternal age in months (Paper II-III), maternal parity (Paper II) and household crowding (Paper III). Child age was determined in two ways: through asking 1) about what day, month and year the child was born, and 2) how many years the child was at the time of the interview. In this dissertation child age in months was further categorized to be used as basis for stratification in Paper I and II. The age categories were 0-5, 6-11, 12-23, 24-35, 36-47, and 48-59 months. The latter three categories were only included in Paper I. In Paper III, child age was used as continuous measure.

Number of children ever born to mother was dichotomized with values ‘0’ representing *three or more children* and ‘1’ representing *less than three children*. The measure was included as a control variable in Paper II. Number of persons residing in

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the household was used to measure household crowding and included as a control variable in Paper III. Number of children below five years of age residing in the household was included as a control variable in Paper III.

## 2.5 Statistical analyses

Descriptive statistics for all three papers were conducted, assessing variable distributions and bivariate associations between main independent variables, control variables and outcomes of interest.

In Paper I, trends over time of child stunting and overweight were assessed using logistic regression analyses, examining stunting and overweight prevalence *v.* time as represented by five data collection points (1991, 1996, 2000, 2007-08, and 2011). All analyses were stratified by child sex, child age, urban-rural residence, geographic region, maternal formal education, and household wealth index quintile. Statistical significance of trends was estimated using the Wald  $F$  statistic at the  $p < .05$ -level.

In Papers II and III, cross-tabulations were used to assess bivariate relationships of main independent and outcome variables. Significance of the relationships of 2x2 cross tabulations were tested using the Wald  $F$  statistic. For cross tabulations with variables of more than two categories, standardized residuals  $> 2$  indicated a statistically significant difference between observed and expected cell counts.

In Paper II, Categorical Principal Components analysis was carried out to assess dimensionality in the care items, before constructing a composite measure (NC). Further, independent samples t-tests and one-way independent ANOVA were carried out for the assessment of difference in distribution in NC between sociodemographic variables. Multiple GLM analyses were conducted to assess the age-specific associations between maternal resources and NC, adjusting for sociodemographic variables. Moderation analyses were conducted testing for two-way interactions between maternal resource variables.

In Paper III, multiple binary logistic regression analysis was used to test the relationship between IPV and signs of illness, adjusting for a range of possible

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confounders. Moderation analyses were conducted testing for two-way interactions between IPV and contextual and IPV and child care variables.

All cross tabulations and regression analyses in all three papers were adjusted for sampling design effects using the complex samples function of SPSS. The design effect adjustment takes into account sampling effects in strata, clusters as well as sampling weights. All analyses were performed in IBM SPSS Statistics (Paper I and II: v 24.0; Paper III: v 22.0).

In Paper I and III, missing data on participants was handled by pair-wise deletion, and in Paper II, by list-wise deletion. Neither of these approaches are considered optimal, and can introduce loss of statistical power and bias in results (249). However, the percentage of missing data was small in all paper samples. Hence, the loss of cases due to list-wise deletion in Paper II was small, and the consequences for estimates likely minor (249).

### **2.5.1 Generalisability, reliability and validity**

The DHS data is based on national sampling frames and collected to be nationally representative (226). The DHS sampling and data collection procedures were followed for the data included in this dissertation (38, 39, 245, 250-254).

The use of large, nationally representative samples to study the research problems of this dissertation facilitates robust estimates and stronger grounds for generalization to the wider population of women aged 15-49 years and children aged 0-59 months.

However, a few exemptions to the sampling procedures need mentioning. Two of the DHS rounds in this dissertation had limitations in coverage due to conditions outside the control of DHS. First, the Peru DHS 1991-92 round had to exclude sixty-six of non-metropolitan districts due to difficult access or social violence (252). Second, in the Colombia DHS 2010 instances of public disorder and/or insecurity forced the substitution of data collection sites for some rural sites, as well some municipalities (38). As discussed in Paper I, contexts experiencing social violence are often more vulnerable in terms of food insecurity, health care and other social services (119), and

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exclusion of these areas could possibly lead to underestimation of child care and health appraisals.

A thorough quality assessment of the DHS data spanning the period 1993-2003 (255) concluded that the level of item nonresponse was as low as below two per cent for most health variables in most of the DHS surveys. One explanation for the high response rate is the systematic work by DHS to develop response alternatives that fit with the reality of as many cases as possible (255). Further, analyses of the patterns of missing in DHS have concluded that the missing is not significantly related to interviewer visits (255), strengthening the confidence in the quality of data collection.

Another concern regarding generalizability is the validity and reliability of measures. As described, the measures in this dissertation for which it is relevant, have been properly tested for validity and reliability in previous studies with acceptable results. Further, child nutritional status was measured objectively through anthropometric techniques by trained personnel, facilitating valid estimations of nutritional status. Hence, overall it is reasonable that the results from this study can be generalized to the wider population of interest.

### **2.5.2 Ethical considerations**

DHS follows stringent standards for ethical data collection regarding protection of participants (256). The Peru, Bolivia and Colombia DHS study protocols are approved by the ICF Macro Institutional Review Board and national review boards. Informed consent was obtained from all participants before data collection, and anonymity assured before, during and after data collection (38, 39, 245, 250, 252-254). DHS follows WHO recommendations for ethical collection of data on domestic violence (156). The data sets are publicly available through application to the Measure DHS program, and no further ethical clearance for use is needed (257).

Yet research ethics have a much wider range of concerns than just meeting the requirements of informed consent and the formal protection of human subjects. Below, I take up some of the ethics issues that seem quite important to consider in connection with the research reported in this dissertation.



*High response rates*

The DHS is well known for its high respondent and item response rates in near all its surveys (255). The surveys included in this dissertation had average household and woman response rates of between 92 and 99 per cent (38, 39, 245, 250-254), which are substantially higher than similar population-based surveys in developed countries (258).

The high response rates in DHS are a substantial advantage in statistical perspectives, but also raise questions concerning the cause of this exceptional will by people to participate. A probable major cause of the high response rates is the approach of face-to-face interviews which is found to provide the highest response rates compared with other approaches (259). However, several studies from low-income settings have found study participation in low-income settings to be related to poor understanding of possibilities of withdrawal (260); misunderstanding about purpose of, and personal gain from participation (261); and fear of compromised care if deciding to withdraw from clinical studies (262). A review comparing the issues of degree of voluntary participation and quality of informed consent between studies in developing vs. developed countries concluded that in developing countries, participants express lower degrees of voluntary participation (263). The DHS approach of visiting households for data collection might increase response rates due to a feeling of participation obligation because of the mere presence of the interviewer in their home. Additionally, issues like those found in the just mentioned studies might also apply, particularly in low-income and low literacy settings. Considering the scale of data collection by the DHS, this ethical issue is of importance.

### 3. Results

In the following, a summary of the most important findings in the three papers is presented. More detailed reporting of the results is found in the respective papers.

#### 3.1 Paper I

The aim of Paper I was to explore how two markers of child health and development, namely prevalence of stunting and overweight, developed among children aged 0-59 months in Peru in the period 1991-2011. The paper is based on a trend analysis using the most recent international growth standards. The analyses were stratified by sex, WHO-recommended age groups, geographic region, urban-rural residence, maternal education level and household wealth quintiles.

At a national level, stunting among children aged 0-59 months decreased from 37 per cent in 1991-92 to 19 per cent in 2011. Nearly all subgroups analysed had similar declining trends in stunting, the only exceptions being the age groups 0-5 months and 6-11 months for which the prevalence were stable across the time points.

The steepness of the decline varied significantly between subgroups: child stunting in urban households had a significantly steeper decline compared to child stunting in rural households. Similar patterns were observed also for the Coastal and Amazon region compared to the Andean region; and in the highest maternal education group compared to lower maternal education groups.

National trends in overweight among children aged 0-59 months were stable at around 10 per cent across the time points. However, analyses of subgroups showed both increasing and declining trends: overweight increased among male children in the Coastal region, and among male children in the highest wealth quintile. Overweight declined among female children aged 24-35 months, rural male and female children, in both the Amazon region and the Andean region, in the incomplete secondary education group and the incomplete primary education group. The study reveals that in Peru, child stunting is declining in all studied sociodemographic and economic groups.

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Overweight was largely stable, but increasing in some and decreasing in some sociodemographic- and economic groups.

### 3.2 Paper II

Paper II aimed at exploring how resource level factors relate to care level factors. The specific focus was on the role maternal resources play in the provision of recommended child care, measured as an age-specific care index (NC), in urban and rural samples.

Mean NC score increased with higher child age. Independent samples *t*-tests and one-way independent ANOVA analyses identified significant variation in NC score between categories in all sociodemographic sub-groups except child sex and maternal age.

Age-specific regression analyses found positive regression coefficients for the relationship between maternal education, maternal decision latitude, household wealth, and child registration in the CGDCP and NC, but the effects varied with age and place of residence.

In the urban 0-5 month sample, child registration in the CGDCP compared to no registration, and higher household wealth were significantly associated with higher NC level. Further, maternal occupation in sales, service, and the professional/administrative sector were significantly correlated with higher NC scores compared with no maternal work outside the home. Similar results for CGDCP registration and household wealth were found in the 12-23 months age groups, in addition to higher NC levels in the incomplete secondary and the complete secondary or higher education groups compared with the no or primary education group. In the 6-11 month sample, only higher maternal decision latitude and complete secondary or higher education compared to no or primary education were associated with higher NC scores.

In the rural samples, child registration in the Growth, Development and Care Program compared to no registration and higher maternal decision latitude were significantly

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associated with higher NC levels in all age groups. In addition, in the 6-11 and 12-23 month samples, household wealth was also associated with higher NC levels.

### 3.3 Paper III

The aim of Paper III was to explore to what extent IPV against the mother is associated with physical health in children aged 0-59 months in Bolivia, Colombia and Peru, when adjusting for appropriate child care practices and sociodemographic- and economic factors.

Approximately half of the children in the sample were reported to have shown selected signs of illness the past 15 days: 50 per cent in Bolivia, 55 per cent in Colombia and 46 per cent in Peru. IPV prevalence the past 12 months was 39 per cent in both Bolivia and Colombia, and 23 per cent in Peru. Information about the mother ever experiencing IPV was available for Colombia and Peru only, and the prevalence was 46 per cent in Colombia and 41 per cent in Peru.

Regression analyses showed that mothers who had experienced IPV the past 12 months (Bolivia) and ever with current partner (Peru) had an adjusted 1.37 (95% CI 1.14-1.63 in Bolivia) and 1.49 (95% CI 1.26-1.77 in Peru) times higher odds for reporting illness signs in their children aged 0-59 months the past 15 days compared to mothers not having experienced IPV. No significant association between IPV and child illness signs was found in the sample from Colombia. Colombian children who were reported to be punished by means of severe physical violence had an adjusted 1.18 (95% CI 1.03-1.35) times higher odds for also having shown signs of illness the past 15 days (as reported by their mother), whereas no difference in likelihood for illness were observed in Bolivia and Peru for severe physical punishment.

## 4. Discussion

### 4.1 Summary and discussion of main findings

This dissertation aimed to study various social resources and stressors for child health and child care, and in different degrees, taking into account variations in place of residence and child age and sex. Specifically, group-specific trends in child nutritional status and the role of maternal education, decision latitude, household wealth for childcare; and IPV for child health were in focus. Overall, the results of the dissertation culminate in two general themes: 1) that child health and child care provision vary with a range of social factors like maternal education, household wealth and IPV, and 2) that the social determinant relationships vary depending on contextual and child characteristics. The specific main findings can be summarized in the points below.

- Using the most recent WHO child growth standards, time trend analyses of child stunting and child overweight in children aged 0-59 months showed that nationally, stunting prevalence has declined significantly and steadily from 1991 to 2011, and overweight prevalence has remained stable.
- Time trend analyses of stunting in children aged 0-59 months stratified by subgroups showed large differences within groups with respect to a) level of stunting, and b) intensity of decline generally, favouring high maternal education groups, high household wealth groups, and urban groups.
- It was feasible to construct a comprehensive child care index in accordance with a broad conceptualization of child care.
- Maternal education, household wealth, maternal decision latitude, child registration in the CGDCP were all significantly and independently associated with child care measured comprehensively, but the effect of each variable varied depending on place of residence and child age.
- Mothers having experienced IPV had higher likelihood of having had a child with one or more illness signs, after adjusting for sociodemographic and –

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economic and child care factors compared to mothers not having experienced this is. This was true for the samples from Bolivia and Peru, but not for Colombia.

- In adjusted analyses in the Colombia sample, children of mothers reporting severe physical child punishment had higher likelihood of being reported to have had one or more illness signs in the course of the two weeks prior to the survey.

This study has contributed to social determinants research on child care and health in novel ways by its focus on under researched topics like trends by sub groups, a comprehensive conceptualization and operationalization of child care, and IPV and child physical health. The development of a child care index is a novel contribution to the child care literature and a potentially useful way to assess child care across time and space, as well as a foundation for further development of valid child care measures in survey research.

In the following, the main findings will be discussed across the three papers in light of previous research and the conceptual framework and relevant theoretical perspectives. In section 4.2 central strengths and limitations pertaining to the papers are discussed, and in sections 4.3 and 4.4 implications for policy and future research are addressed respectively.

#### **4.1.1 Sub-group differences in prevalence and trends of child nutritional status – possible explanations**

In Paper I we examined time trends of two important markers of child health – stunting and overweight. The declining national trend in stunting is most welcome, and in line with similar studies and estimates in the LAC region as a whole (34, 264), indicating a positive development when it comes to chronic child malnutrition. The stable prevalence of child overweight observed in Peru over the time period is also generally in line with other studies in the LAC region that have found stable trends in

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child 0-59 month overweight, but with slightly lower prevalences of around 7 per cent (265, 266).

Studies have indicated that the LAC region is not uniform in terms of to what degree countries have entered the current epidemiologic transitions with e.g. overweight and obesity as major health challenges (267). Peru has been characterized as ‘slow’ in this respect (267) with e.g. high infant mortality rates and underweight prevalence, but more diverse patterns of so-called western health challenges. Hence, the national trend patterns trigger the question of what drivers lie behind it.

According to Krieger (10), the core question social epidemiology seeks to answer is “who and what drives current and changing patterns of social inequalities in health?” (10, p.672). The improvements in child stunting found in Paper I might in part be caused by the economic growth experienced in Peru the past decades both nationally (268), and regionally (269). Several social political efforts have also been initiated over the recent years in the region and in Peru, but their success in child health improvement is debated (209, 270-274). The global joint efforts to improve child survival and health might have contributed positively in the LAC region, at least at national levels. A recent study of the progress in reproductive, maternal neonatal and child health in Peru conclude that the combination of political will and strategies, economic development and societal participation is a recipe for success (240). Although not explicitly studied in this dissertation, the declining trends in child stunting might at least partly be attributed to these efforts.

However, the distribution of the effect of the global and national efforts has been debated, and the Millennium Development Goals have, as previously mentioned, been criticized for the lack of focus in reaching the ‘hardest to reach’ by an overemphasis on national progress (22). An important aim of Paper I was to assess time trends in child malnutrition by subgroups. Considering the striking contrasts in malnutrition *levels* and *steepness of slope*, particularly for child stunting, across and within subgroups, this approach is clearly of value in providing a more nuanced picture of trends in child nutritional status. As expected, the pattern generally favoured urban residents, coastal residents and high maternal education groups, which generally aligns

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with existing cross-sectional studies on social determinants of child nutritional status (31). For example, despite declining stunting trends in all education subgroups, the highest 2011 stunting estimates were for children of mothers with no education, and were twenty (males) and twenty-three (females) times that of the WHO reference group. Similarly, levels of stunting varied significantly between household wealth quintiles with approximately 7 per cent and 60 per cent in the richest and the poorest quintiles respectively in 1991, and equivalent estimates of 2 per cent and 43 per cent in 2011. The average 2011 estimate for children aged 0-59 months was 19 per cent, compared to 51 and 57 per cent for males and females respectively in the no education subgroup. Furthermore, the results showed that the slopes for time trends in child stunting varied significantly by maternal education group, favouring the highest maternal education group. The gross level difference in low vs. high social groups certainly underscores the challenge of social inequality in child stunting in Peru.

Although not as clear, child overweight also showed similar differences with higher levels in the coastal region and in higher wealth quintile groups, likely a reflection of changes in activity and diet patterns due to more purchasing power and access to high-calorie/fat foods in these areas. Even if this result coincides with some patterns of the nutrition transition seen in other LMICs where higher SES groups demonstrate more overweight, increasingly overweight is a problem in low-income segments (275), similar to what is found in western contexts (183). The child overweight picture in Paper I is not necessarily dramatic, but it indicates emerging national and subnational future trends, and to a certain extent reflects global trends. The overweight and obesity pandemic in the adult population globally additionally warns us of what children are facing in a life course perspective.

The epidemiology of populations is changing in rhythm with the constant change of society, and the global nutrition transition is a reflection of a range of societal developments in urbanization and economy that lead to activity, dietary, and food systems changes (276, 277). What is not changing is the vulnerability of children, and their need for constant protection against these potentially adverse changes.

Indications of sensitive (and even critical) periods in children less than five years for establishing patterns that regulate energy balance underscore the importance of early



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intervention (278), and the continuous monitoring of child health outcomes like nutritional status to inform policy of where efforts must be placed.

In sum, these findings of subgroup differences contribute importantly to the literature on trend analyses in child nutritional status generally (264, 265), as well as in Peru specifically, by moving beyond national averages and demonstrating the value of examining trends by social subgroup belonging. This approach to child malnutrition trend analysis has been taken in a few previous studies (24, 26), but not in Peru as we are aware of.

#### **4.1.2 Child care as focus in child well-being research**

This dissertation has the proximal child environment as a main focus through an emphasis on maternal resources and childcare. This is not a new field of research, as the role of e.g. care for child health and development was acknowledged decades back (65, 141). However, only recently has the emphasis been substantial, both in research and on the global action agenda, on supporting families in nurturing care to ensure child development in LMIC (2, 17, 18, 64, 109). Hence, not only the monitoring of child health outcomes, but also of care outcomes is of value for understanding current and prospects for child well-being and development. As argued in Paper II, the construction of child well-being and childcare indexes can result in tools with potential applicability to monitor how children are faring across time with respect to care reception. National strategies for health and care improvement in LMIC are often dictated by global strategies, interests, priorities and partnerships (279, 280). The continuous monitoring and evaluation of implementation processes and outcomes of strategies are necessary to assess positive, as well as potentially negative outcomes.

A study examining development over three DHS surveys in Kenya from 2003 to 2014 found increases in reported health facility-based child care practices, but decreases in some reported home-based care practices (281). Interpreted within the political and social priorities in the country, the improvements in facility-based care might reflect a success of systematic work in the public health sector. However, this might come at a cost of no improvement, or even worsening of home-based care. The constant

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development of society, in its various directions, requires the constant monitoring of the complexity of social influence on child health and its determinants.

Related to assessment of child care and child development, is the operationalization and validation of these concepts. Although several widely used child development scales exist, no universally measure of child development is presently agreed upon. Also, what constitutes good child care and how to construct the measures are subject to debate, and hence the development of valid care measures is not straightforward (63). There is to a certain extent consensus about what essential care children need for a healthy development. However, what the care *looks like* in practice, varies with cultural and social contexts (40). In this dissertation, we leaned on some internationally recommended care practices, like immunization coverage and feeding indicators. Other care practices are more controversial, like adult-child psychosocial interaction, for which practices vary widely by culture (100). Although such practices for psychosocial care might be endorsed from e.g. a western developmental perspective, it is necessary to be cautious in drawing conclusions about inadequate psychosocial stimulation in absence of specific practices in a given context. The FCI are indeed validated across several cultural contexts in the global south, but have only been validated against a child development outcome in one study in Bangladesh (106).

#### **4.1.3 The role of maternal resource level factors for child health and child care**

Maternal resources are stressed by several scholars to be of significant or even essential importance to child care and child health (65, 282). This dissertation identified subgroup differences in child health and child care at the maternal resource level of the Model of child care. The factors investigated at this level in the dissertation were primarily related to maternal education (Paper I-III); maternal decision latitude (Paper II); and household wealth (Paper I-III).

The role of maternal education as a resource for the various child outcomes (child nutritional status; child care; and child illness signs) was investigated through stratification in Paper I, as main independent variable in Paper II, and as control variable in Paper III.

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Maternal education was identified as a potentially important determinant of child stunting and child care provision. As already addressed, stunting prevalence and trend pattern varied with maternal education group, indicating maternal education's role as a correlate, or even determinant, of child nutritional status. In Paper II, the higher education groups demonstrated significantly higher levels of child care for infants 6-11 and children aged 12-23 months of age compared to children of mothers in the no/primary education groups, but for urban children only. This is consistent with previous research studying the role of maternal education for child care by child care indexes (112, 115, 184) and individual practices (90, 94, 170, 175, 186-189, 191, 192, 196, 283). Maternal education level has also been found to be positively associated with time spent doing care activities which can be taken as support for higher maternal education as favourable to child care (110).

The maternal education-child care relationship was only observed in the urban samples. As suggested previously suggested (205, 283), this might be due to how contexts differ in facilitating such educational or other social effects. For example, in rural areas where access to services, infrastructure, food diversity etc. is often comparatively lower than in urban areas, mothers with higher education might to a lesser degree be able to make use of their human capital to the benefit of the child. Previous studies using care indexes are largely based on either urban or rural samples. However, a multilevel analysis of various SES indicators and child care indexes found that community context (measured as community education and wealth) significantly predicted child care and well-being in Colombia, indicating that place of residence is important to child care, over and above family level SES (115). More studies of both urban and rural samples are called for to better understand differences between and within different contexts.

In Paper III, maternal education was not identified as a correlate of child illness signs. This is somewhat surprising as the maternal education - child health relationship repeatedly has been confirmed for several health outcomes (151, 176, 200). However, maternal education has demonstrated inconsistent associations with child illness (284, 285), depending on the symptom or illness in questions with reporting bias as a suggested potential explanation in which mothers with more education might be better

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at identifying illness signs with varying degrees of severity (285). In Paper III, a broad illness variable was used, and if maternal education plays different roles for the reporting of different illness signs (e.g. positive for diarrhoea and negative for respiratory illness signs), they might cancel each other out, resulting in insignificant effects. This suggests that more fine-tuned analyses when examining the role of social indicators for health are needed. However, this was not the main aim of Paper III, which only included SES measures as control variables. Furthermore, significant interaction effects of maternal education and household wealth on diarrhoea have been identified, indicating that education alone might be insufficient in preventing child illness (285).

Maternal autonomy has been suggested as an important resource for maternal and child health and care (146). In Paper II, maternal decision latitude, a proxy for autonomy, was found to significantly contribute to the variation in child care in all groups, except the urban 0-5 and 12-23 month group. This further supports previous literature finding similar positive associations with single care practices like immunization (166), use of pre- and postnatal care (167) and breastfeeding (168). However, as discussed in the literature review, the knowledge about the role of maternal decision latitude is inconclusive, finding that its determinants and effect can vary by geographic, social and cultural context (146, 147, 172). By examining the role of maternal decision latitude in urban and rural contexts as well as by age groups, Paper II contributes to a more nuanced picture of role of maternal decision latitude in child care.

Household wealth played a significant role for child care and health, but in varying degrees across the three papers. Household wealth as a subgroup in trend analyses of child malnutrition identified large differences in prevalence between wealth quintiles across the time period. In Paper II higher wealth was significantly associated with higher child care in all groups except the urban 6-11 and the rural 0-5 month age group, showing the importance of physical capital in ensuring overall child care. This is also in line with previous research on less comprehensive indexes (112). Notably, Armar-Klemesu et al. (112) did not find household SES to be associated with a child feeding index, but with two indexes measuring preventive health seeking and hygiene

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practices. This indicates, contrary to their finding on maternal education, that wealth does not necessarily play the same role for all types of care. This was also indicated by the care-specific analyses in Paper II, where household wealth did not play an equal (or significant) role across the care domains. In Paper III, children in lower wealth quintile households were at increased risk of illness in the Peru and Colombia samples. Together, the results of the papers add to the understanding of the role of household wealth as important for both long-term (chronic malnutrition) and short-term (illness signs) child health problems, as well as to the provision of important care.

In sum, maternal resources play different roles for the child outcomes across the three papers. Some relationships varied by urban-rural residence, country sample, and child age. This highlights the need to study social determinants of care and health in context. This dissertation included different contextual variables, e.g. urban-rural residence. However, other contexts would likely be equally interesting and important, such as cultural context, economic context, or geographic context.

#### **4.1.4 Domestic violence as a contextual psychosocial stressor**

The findings of Paper III indicate a weak, but persistent association between IPV against the mother and child illness signs in Bolivia and Peru, but not Colombia. In this dissertation, using the Model of child care, we positioned IPV as a context level factor, representing a psychosocial stressor in the care environment of the child. Our findings partly confirmed the general association as we postulated it in the framework. However, explanations for these findings might be more fruitfully discussed in a framework explicitly developed for this purpose. Repetti et al. (132) suggest changes in the stress-responsive biological regulatory systems as a pathway of IPV to health: repeatedly experiencing stressful events like IPV and severe physical punishment can cause abnormal activity in physiological functioning, which can lead to among others immune deficiencies, inhibited growth, and cognitive impairment (286). The existing literature suggests accumulative adverse health effects which have greatest manifestations in adult life, but it cannot be ruled out that such effects will also to a greater or lesser extent be reflected in child health. As discussed in the section 1.4.2 on IPV, very few studies have examined physical health outcomes in relation to IPV and

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child physical punishment, and the literature that does exist is inconclusive (217). The findings in Paper III of both significant and insignificant effects of IPV on child illness depending on country sample are hence in line with the mixed findings in the previous research.

Another pathway is through neglect or poor care in which women who are abused might be mentally and/or physically impaired from carrying out necessary care for their children, or limited in their space of action by controlling partners (155), which in turn adversely affects child health. A previous study from Colombia, found that almost 30 per cent of women reporting IPV also reported having to seek professional health care as a consequence (156). Both the injuries themselves, and the time and effort spent to get treatment might jeopardize child care provision.

On the other hand, abused mothers might try to compensate for the potentially negative exposure to the child by making sure the child's other needs are covered. Some support for this exists in the literature (287). Very few of previous studies have taken into account the role of care in the relationship between IPV and child health (an exempt is Karamagi et al. (288)), or studied the relationship of IPV and care outcomes (217). Paper III contributed meaningfully to this research gap by including a range of care practices in the adjusted models. However, these did not contribute in explaining variations in illness signs. This was somewhat surprising, as the carry-out of various care practices have been found to correlate with better child health (87, 88).

Although significant effects of IPV and severe physical punishment were observed in the samples, they were of small magnitude, and the explained variance for the model was very low. This indicates that other factors than IPV and severe physical punishment are much more important in explaining variation in child illness signs in these samples. Nevertheless, although small, the potentially adverse physical health effect of exposure to violence should not be discarded. As emphasized by the life course perspective of Halfon et al. (5), health is a developmental process in which “multiple risk and protective factors combine across time to influence developmental health trajectories in childhood and long-term disease outcomes” (p.14). This is also in line with the risky family framework of Repetti et al. (132). In Paper III, close to 40

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per cent of mothers in Bolivia and Colombia and 20 per cent of mothers in Peru reported experiencing some type of IPV during the course of the 12 months prior to the survey, and 16 (Bolivia), 23 (Colombia) and 32 (Peru) per cent of mothers reported severe physical punishment of their child. Depending on the intensity of exposure (which we could not estimate with our data), these rather high prevalences of domestic violence imply that as worst case scenario, a relatively large proportion of children are potentially at risk of future health adversities because of risky psychosocial care environments.

#### **4.1.5 Cumulative, pathway and interaction effects of social indicators on child health and child care**

As proposed by the Model of child care, variation in child health is best conceived of as a complex process of factors at several levels. Although independent effects of maternal education, household wealth, maternal decision latitude, urban-rural residence etc., are important to single out, potential cumulative, pathway and interaction effects might provide even more information about variation in child care and child health. By cumulative effects is meant “the accumulation of positive and negative effects over the life course, influencing health and development based on duration and intensity of exposure to these risk factors” (43, p.628). Evidence for such effects requires longitudinal study designs, and was hence outside the scope of this dissertation.

As theorized, IPV could work on child health through poor care, and this pathway was planned tested in Paper III. However, due to the lack of association between the various care items and child illness, this was abandoned. In Paper II and Paper III interaction effects were included between the main independent variables in question (between maternal resources in Paper II and between IPV and resources and care variables in Paper III). However, no significant interactions were identified in either paper. In Paper I, malnutrition trends were only assessed by subgroups, but it is likely that belonging to more than one of the subgroups could alter the observed trend patterns for the single subgroups.

The Model of child care is silent about the ways in which the resources interact or relate to each other, both within each type of resource, and also between types of resources. There are many ways in which these resources might influence each other, and work in a synergistic way to affect child care and health. Further developments of the Model of child care might have this as a specific focus.

In sum, it is clear that a variety of social resources are important for child care and health, but that the effects vary both by type of resource; type of outcome; and between different age groups and contexts. In accordance with the Model of child care, and other similar frameworks, child health and child care are associated with the proximal family sphere of the child and supported by the general living conditions of the family. This dissertation supports and underscores the importance of providing structural support to families to promote child care and health, and subsequent child thriving.

Yet, the present focus on the role of families in providing care to their infants and very young children represents a serious delimitation of the wide array of practices and policies that are considered essential if real progress on early childhood development is to be realized, as the Sustainable Development Goals envision (6, 73). This delimitation is both strength and weakness in the present work. As a research project, having a clear and narrow focus is essential. As a contribution to the dialogue on early childhood development, the narrow research focus oversimplifies an extraordinarily complex challenge. This conundrum seems unavoidable.

## 4.2 Methodological considerations

### *Methodological strengths and contributions of the study*

The most salient methodological strengths of this dissertation pertain to the data used, as DHS data is considered to be of very high quality (43, 255). Further, the use of large, nationally representative samples to study the research problems facilitates robust estimates and stronger grounds for generalization to the wider population of interest.



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Second, a wide array of variables relevant to the topic of child health and child care is available in the DHS, allowing the inclusion and thorough examination of the topics of the dissertation. Examples are several detailed measures of socioeconomic status, like the well-known DHS measure of household wealth – the Wealth Index. This index has been used in numerous studies across the developing world, and has been adopted as standard measure in the UNICEF MICS survey (289). It has been subject to a range of quality assessments, and found to be a valid measure of economic status (247), and even superior to other economic measures, like expenditure measures (247, 290).

Another high quality measure is IPV. DHS has included a specially adapted version of the CTS (156) developed by Straus (124), which is a comprehensive measure of experiencing a range of different violence, including controlling behaviour; psychological, physical and sexual violence. Although criticized for not being sensitive to severity, whether the violence was related to self-defence or not, or what meaning the violence had to each respondent, all of which can affect how the respondent experienced the violence (291), it is a comprehensive measure that can provide valid information about the occurrence of IPV and is useful for comparison between studies.

The wide selection of child care measures, particularly in the Colombia DHS facilitated a comprehensive assessment of child care across all care domains as laid out in the Model of child care. Particularly novel is the inclusion of validated family care indicators which aim to assess the psychosocial care environment (106), and which is hardly assessed in large surveys in the Latin American context. The development of a child care index, shown to be close to normally distributed across child ages (0-23 months) and urban-rural contexts is a novel methodological contribution of this dissertation.

The investigation of determinants of child care through (individual and) composite measures in the LMIC also represent a methodological contribution to the field of child care and SDH research which has previously been called for (72, 112-114).

Furthermore, the use of stratification in Paper I and II can be considered a methodological contribution, as it gives indications of the variations in nutrition

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trends, and care provision, as well as differences in the determinant-care relationship depending on context. The study contributes to the call for nuanced research focusing on intra-urban and intra-rural inequalities in child wellbeing.

In Paper I, child stunting and overweight were assessed based on the updated WHO growth standards (57), which was still not widely practiced in the research literature at the time of publication.

### *Methodological limitations*

Limitations pertaining to the three papers have been discussed in each paper. In the following, cross-cutting limitations are noted.

#### *Measurement*

Error in survey research exists when obtained values from data collection deviate from the true values in the population from which the sample is drawn (259). Measurement error can happen because of mistakes made by the data collector or by inaccurate reporting by the respondent (259). To minimize interviewer measurement error, all DHS questionnaires are standardized, but adapted to each country, and developed over years of survey research experience to obtain high data quality.

The data collected in DHS and used in this dissertation, is largely based on self-report by women residing in the household (exceptions being weight and height data, and child vaccination data), and is hence subject to respondent measurement error (259). This error can be related to among others recall bias, social desirability bias, and respondent fatigue (292). The face-to-face interview approach of DHS has both advantages and disadvantages compared to other modes of surveys, with comparatively high risk of social desirability bias and unwillingness to reveal delicate information, both low risk of recall bias and cognitive burden on respondents (292). Particularly relevant in this respect is the collection of data on topics considered sensitive, such as the measures of IPV used in Paper III. Tourangeau and Yan (293) found in their review that respondents misreport on sensitive topics to escape embarrassment when data is collected by an interviewer, and to avoid any negative consequences. However, DHS reports that all field workers collecting data on IPV are

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given special training both with regards to establishing confidence and to how questions should be asked, and to ensure complete privacy during the interview (156).

The DHS collects anthropometric data through objective measurements of height and weight of all surviving children born in the five years prior to the survey (255). DHS makes substantial efforts to ensure the quality of these measurements by training field staff for the work, and in all of the survey rounds used in Paper I, special training in anthropometric data collection was given to field staff (245, 250, 252-254). Central to the quality work is to minimize the number of children who are not measured, and minimize misclassification of height, weight and age. The response rates of anthropometric measurements in DHS are considered high, even if lower compared to other child health indicators in the survey (255). The total response rate for anthropometric measures in Paper I was 91.2 per cent, and can be considered acceptable. Nevertheless, an evaluation of DHS surveys from 1993-2003 found that the Peru 1996 and Peru 2000 surveys were disproportionally more likely to classify children as “not present”, “refused”, and “mother refused”, compared with the other evaluated surveys (255). An analysis of the response rates and pattern of reasons for no measurement found little variation across surveys. This indicates that the missing data is an expression of expected rates of missing in this type of data material. Examining the missing distribution across sociodemographic variables, a few variations were observed, with urban, high educated mothers and poorer households had more missing on child anthropometrics. However, due to the relatively low rate of missing which does not vary significantly across years, there is reason to be confident that the missing did not severely affect estimates.

*Bias associated with selection of only last born compared to all children under 5*

Across papers, only the last-born child was selected for analyses, because many of the relevant care and health indicators are only collected for the lastborn child five years prior to the survey. As pointed out by Rutstein (294), the analysis of only the lastborn child might cause biased estimates since health and care outcomes might differ for last-born, compared to non-lastborn, compared to all children under 5, due to for example less time for care for non-lastborn etc.

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### *Confounding, mediation, causality*

The use of cross-sectional data in this dissertation implies that no causal conclusions can be drawn as to whether e.g. maternal education *causes* provision of higher levels of child care (Paper II) or experiences of IPV *causes* child illness (Paper III).

Theoretically, the *direction* of this relationship can be argued sensible, but the nature of the data and design of the study cannot confirm this theoretical path. Furthermore, even if theoretically, the direction is sound, and supported by significant associations in the empirical results, residual confounding cannot be ruled out. The data used in this dissertation was not collected specifically to answer the research questions of the three papers, and hence data does not exist for all possible variables that would have been prudent to include. These issues are well known with respect to cross-sectional study signs, and particularly in secondary analyses.

For example, in Paper II and Paper III, it would have been especially relevant to assess the role of maternal mental health and social support as these are suggested as important maternal resources for caregiving and child health (Fig 1). However, these measures were not available in the data sets.

### *Seasonality*

The role of seasonality in the estimates of nutritional status (Paper I) and illness signs (Paper III) was not controlled for, and hence, it is possible that estimates of these outcomes have some degree of inaccuracy. An assessment of this issue in relation to illness signs was conducted by Pullum (255) for DHS surveys from 1993-2003. This assessment found some survey estimates, including Bolivia DHS 2003/04 and Peru DHS 2000, to likely be affected by this, but only for cough. Similarly, analyses of the Peru Continuous Survey Experiment/Measure + (295) which does allow for assessment of seasonal variations in child health, showed that of illness signs, cough varied the most with season, with similar patterns across the three years of 2004, 2005 and 2006 examined from January to September (with a minimum in February and a maximum in May and June). In Paper III, the child illness variable was constructed as a combination of several illness signs, and hence a potential season effect will be present, if only for one component of the child illness variable.

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### *Treatment of variables*

As discussed in section 1.6 on measuring care, some care practices, like hygiene behaviours and caregiver-child interaction are ideally measured through observation (63, 72). However, the nature of the data did not allow this, as the DHS is not specifically designed to assess child care in its most comprehensive way, and the ideal way of data collection would be very resources demanding (72). Smaller scale studies are better suited to include such data. Although not perfect, studies based on large-scale surveys, like the DHS, are important supplements to smaller scale studies, and the Colombia DHS 2010 includes some of the presently best available questions to assess care practices through surveys (63).

As discussed in Paper II, the construction of the NC with equal weighting should be discussed. Categorical Principal Component's analysis was conducted with the aim of assessing dimensionality and the possibility of constructing an index using weights from the analysis. The practices included in the analysis were however weakly inter-related, and there was no indication of multidimensionality (or unidimensionality). The decision to summarize the practices in spite of this was based on the theoretical rationale that practicing more, rather than fewer of the practices should be considered beneficial to child care. Assigning equal weights to each practice is ambiguous, but without a specific health outcome in mind, it was considered the most prudent approach for this study. Further, an index similar to the NC oversimplifies the extremely complex nature of child care. At the worst, opposite time trends in the prevalence of specific components of an index could cancel out and lead to unreliable and invalid assumptions about overall trends in care. It was beyond the scope of this study to investigate these and other challenges to developing quality indexes, but these issues should have priority in future research.

### *Few data points in trend analysis*

The more data points, the more accurate estimates of trends. Paper I included five time points to estimate trends in child nutritional status. Ideally, more time points would have been preferred, but the analysis included all time points available at the time of analysis. The Peru Continuous survey started in 2004 and could have facilitated

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inclusion of more time points, but to strive for as equal time spans as possible *between* time points, only five data points were selected.

#### *Choice of statistical analyses*

In Paper I, trend analysis stratified by subgroups was chosen, above a multivariate approach, to facilitate public health policy information. A limitation of this approach is the lack of information about possible independent effects in adjusted models, like what is provided in a multivariate analysis. However, the stratified approach could facilitate estimations by particular subgroups that would have gone missing in a multivariate approach, and further informs about the relevance of tailoring public health policies to specific groups.

### 4.3 Implications for child health promotion

Findings in all three papers raise issues that are relevant to health promotion policy and practice, and indicate that children's right to care and health is compromised by social factors in their immediate surroundings, but that there are differential associations between different social factors and child outcomes. This identification suggests support for the argument of eco-social epidemiology, that health – in this case child nutritional status, child illness, and child care – cannot be understood without knowledge about the “history and individual and societal ways of living” (10, p.694), measured in this dissertation through time trends, social determinants and care. The findings further imply that policies and practice *must* target social inequality through general and specific approaches to ensure children their right to health.

Two general approaches to tackling social determinants of health prevail: the direct and indirect approaches (5). The direct approach involves developing policies to tackle the social determinants themselves. In light of the findings of this dissertation, systematic work to increase e.g. the general education level among girls would be one policy step that would likely improve child care and child health and development, as previously suggested (174). However, in rural areas, this might not be sufficient as seen from the analyses of the rural sample in Paper II, and in similar studies (285). Other structural efforts pertaining to general and equal access to services could be

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more efficient direct approaches. The indirect approach involves efforts to mitigate the negative effect social adversity has on child health, e.g. through targeting more proximal determinants of health by way of prevention programs or improving health systems etc. (5). Currently, integrated interventions and programs to ensure child development are emerging on the global agenda (2, 18, 109). Paper II found the universal CGDC programme to be consistently associated with provision of child care across child age and urban-rural place of residence (except 6-11 months in the urban sample), over and above other social factors. Although no causal conclusions can be drawn, it can indicate the utility of such programs as indirect approaches that, if carefully developed and implemented, can mitigate the negative effects of social inequality on child outcomes.

Concerning the development of theory, this study is one of few to use the Model of child care as guiding conceptual framework. The present study has contributed to its further development through for example the comprehensive conceptualization and operationalization of child care. The feasibility of the construction of the comprehensive child care index suggests that conceptually, child care can be considered in terms of its constituent nature, and that the Model of child care facilitates for such thinking. As such, this dissertation hopefully inspires further development and use of care measures in survey research across diverse contexts, and with a critical view on western assumptions of optimal care.

#### 4.4 Suggestions for future research

This dissertation was based on nationally representative surveys which are excellent starting points for assessing child health and its correlates. To better understand social determinants of child care and health, stronger and a greater diversity in study designs are called for. Smaller and much more frequent cross-sectional surveys are needed to facilitate more accurate trend analyses of child health and care. This dissertation further highlights the importance of sub-group analyses, and future research would benefit from more small area and sub-group analyses of social determinants of child care and health.

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Longitudinal data could facilitate a firmer assessment of cause-effect relationships between the various social determinants and child care and health, and could contribute empirically to development of the various social determinants perspectives. Observational studies could assess certain care behaviours more accurately (72). Qualitative studies using e.g. in-depth interviews with mothers could help identify barriers and enablers of child health promotion in specific contexts providing valuable deep knowledge to inform e.g. survey design. Additionally, positive deviance research, which has as the main aim to identify and understand how some caregivers, families, or communities do particularly well in child care and health, despite adverse circumstances. This was not possible with the data at hand as positive deviance studies are best based on observation and in depth knowledge about specific communities to identify potential positive deviants (296).

The findings in this dissertation can be interpreted in a multilevel conceptualization of influences on child health. The social ecological approach calls for the inclusion of factors at multiple levels in the same study. However, few studies in child health have taken advantage of statistical techniques to study full pathways, examining mechanisms of social determinants of child health. More studies using such approaches would increase the understanding of the social ecological complexity of child health.

Considering the important role of care for health, and to further advance the knowledge on child care in LMIC, a specific focus on the measuring of child care is needed. Fortunately, DHS has increasingly added care measures to their questionnaires over the past years. Based on this dissertation and recommendations in the literature (63, 65), an even broader range of measures including psychosocial aspects of care could be made standard, such as the full FCI developed by Kariger et al. (106). This would also facilitate for a more extensive assessment of its cross-cultural validity.

A broader line of research on psychosocial mechanisms of child care and health, e.g. mothers' attitudes and beliefs about care in specific LMIC settings, would also increase understanding and knowledge that could inform development of effective



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interventions. The DHS would be a promising platform for such studies if relevant data on these aspects were collected.

## 5. Conclusion

This study examined various social determinants' role in child health and care across time and in different 'spaces' or contexts. Based on the findings, it can be concluded that generalizing child health and care provision status from national to sub-group level can be misleading. The socio-ecological approach to research on child care and health issues continues to be relevant, as it through this study facilitates the revelation of significant social and contextual differences in child care and child health. Because past and present child malnutrition levels vary with sociodemographic and –economic groups, policies to reduce child malnutrition must take subgroup belonging into account. The DHS data is of great value in assessing time trends and correlates of child health, but its battery of child care questions should be expanded and further validated to facilitate more thorough analyses of trends and correlates of child care in more of the DHS countries. The traditional social determinants such as maternal education and household wealth are generally associated with child outcomes, as well as less studied factors like IPV and registration in universal child programs. This finding implies that a combination of direct and indirect strategies to reduce negative consequences of social inequality on child care and child health can be fruitful. The study contributes to social determinants research on children with its focus on both child health *and* child care as outcomes, and developing a comprehensive child care measure for assessment of child care provision LMIC settings. The dissertation draws attention to the importance of considering child care as much more central in public health research on children in the global south, and underscores the need to improve the extent and quality of data on child care. Survey research should add child care measurement as a priority. Various approaches to conceptualizing child care and its measurements and analysis need to be developed, tested and critically compared.

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## References

1. Urke H, Mittelmark M, Bull T. Child diet and healthy growth in the context of rural poverty in the Peruvian Andes: What influences primary caregivers' opportunities and choices? *Glob Health Promot.* 2013;20(5):5-13.
2. Black M, Walker S, Fernald L, Andersen C, DiGirolamo A, McCoy D, et al. Early childhood development coming of age: science through the life course. *Lancet.* 2017; 389(10064):77-90.
3. Walker S, Wachs T, Gardner J, Lozoff B, Wasserman G, Pollitt E, et al. Child development: risk factors for adverse outcomes in developing countries. *Lancet.* 2007;369(9556):145-57.
4. Cunha F, Heckman J, Lochner L, Masterov D. Interpreting the evidence on life cycle skill formation. Cambridge, MA: National Bureau of Economic Research; 2005. Available from <http://www.nber.org/papers/w11331>.
5. Halfon N, Larson K, Russ S. Why social determinants? *Healthcare Quarterly.* 2010;14(S):9-19.
6. Woodhead M. Early Childhood Development in the SDGs. Oxford, UK: Young Lives ODID; 2016. Available from <https://www.gov.uk/dfid-research-outputs/early-childhood-development-in-the-sdgs>.
7. ECDKN. *Early child development: a powerful equalizer*. Final report on the Early Child Development Knowledge Network of the Commission on Social Determinants of Health. Geneva: World Health Organization; 2007. Available from [http://www.who.int/social\\_determinants/resources/ecd\\_kn\\_report\\_07\\_2007.pdf](http://www.who.int/social_determinants/resources/ecd_kn_report_07_2007.pdf)
8. CSDH. Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. Geneva: WHO; 2008. Available from [http://www.who.int/social\\_determinants/thecommission/finalreport/en/](http://www.who.int/social_determinants/thecommission/finalreport/en/).
9. Britto PR, Ulkuer N. Child Development in Developing Countries: Child Rights and Policy Implications. *Child Dev.* 2012;83(1):92-103.
10. Krieger N. Theories for social epidemiology in the 21st century: an ecosocial perspective. *Int J Epidemiol.* 2001;30(4):668-77.
11. Krieger N. Got Theory? On the 21st c. CE Rise of Explicit use of Epidemiologic Theories of Disease Distribution: A Review and Ecosocial Analysis. *Curr Epidemiol Rep.* 2014;1(1):45-56.
12. Kaplan GA. What's wrong with social epidemiology, and how can we make it better? *Epidemiol Rev.* 2004;26(1):124-35.
13. Raymond JS. Behavioral epidemiology: the science of health promotion. *Health Promot Int.* 1989;4(4):281-86.
14. WHO. Ottawa Charter for Health Promotion. First International Conference on Health Promotion; Ottawa, Canada: WHO; 1986. Available from <http://www.who.int/healthpromotion/conferences/previous/ottawa/en/>.
15. WHO. Health Promotion: World Health Organization; 2016. Available from [http://www.who.int/topics/health\\_promotion/en/](http://www.who.int/topics/health_promotion/en/).
16. Green J, Tones K. *Health Promotion Planning and Strategies*. 2nd ed. London: SAGE Publications Ltd; 2010.
17. de Mello DF, Henrique NCP, Pancieri L, Veríssimo MLÓR, Tonete VLP, Malone M. Child safety from the perspective of essential needs. *Rev Lat Am Enfermagem.* 2014;22(4):604-10.

18. Britto PR, Lye SJ, Yousafzai AK, Matthews SG, Vaivada T, Perez-Escamilla R, et al. Nurturing care: promoting early childhood development. *Lancet*. 2017;389(10064):91-102.
19. Marmot M, Friel S, Houweling TAJ, Taylor S. Closing the gap in a generation: health equity through action on the social determinants of health. *Lancet*. 2008;372(9650):1661-69.
20. WHO. Constitution of the World Health Organization. 2006. Available from [http://www.who.int/governance/eb/who\\_constitution\\_en.pdf](http://www.who.int/governance/eb/who_constitution_en.pdf).
21. UN. The Millennium Development Goals Report 2015. New York: UN; 2015. Available from [http://www.un.org/millenniumgoals/2015\\_MDG\\_Report/pdf/MDG%202015%20Summary%20web\\_english.pdf](http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20Summary%20web_english.pdf).
22. Fehling M, Nelson BD, Venkatapuram S. Limitations of the Millennium Development Goals: a literature review. *Glob Public Health*. 2013;8(10):1109-22.
23. UN. Sustainable Development Goals: UN; 2015 [Retrieved 08.01.2017]. Available from: <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>.
24. Matanda DJ, Mittelmark MB, Kigaru DMD. Child undernutrition in Kenya: trend analyses from 1993 to 2008-09. *BMC Pediatr*. 2014;14(5). DOI: 10.1186/1471-2431-14-5.
25. Matanda DJ, Mittelmark MB, Kigaru DMD. Breast-, complementary- and bottle-feeding practices in Kenya: Stagnant trends were experienced from 1998 to 2009. *Nutr Res*. 2014;34(6):507-17.
26. Amugsi DA, Mittelmark MB, Lartey A. An analysis of socio-demographic patterns in child malnutrition trends using Ghana demographic and health survey data in the period 1993-2008. *BMC Public Health*. 2013;13(960). DOI: 10.1186/1471-2458-13-960.
27. Amugsi DA, Mittelmark MB, Lartey A. Dietary Diversity is a Predictor of Acute Malnutrition in Rural but Not in Urban Settings: Evidence from Ghana. *Br J Med Med Res*. 2014;4(25):4310-24.
28. Chen E, Matthews KA, Boyce WT. Socioeconomic Differences in Children's Health: How and Why Do These Relationships Change With Age? *Psychol Bull*. 2002;128(2):295-329.
29. World Bank. LAC Equity Lab. Inequality in 2014. Gini coefficient: The World Bank; 2016. [Accessed 10.02. 2017]. Available from <http://www.worldbank.org/en/topic/poverty/lac-equity-lab1/overview>.
30. World Bank. GINI index (World Bank estimate): World Bank; 2016 [Accessed 30.08. 2016]. Available from : <http://data.worldbank.org/indicator/SI.POV.GINI>.
31. Larrea C, Freire W. Social inequality and child malnutrition in four Andean countries. *Rev Panam Salud Publica*. 2002;11(5-6):356-64.
32. UN General Assembly, Declaration of the Rights of the Child, 20 November 1959, A/RES/1386(XIV). [Accessed 12.12.2016]. Available from <http://www.refworld.org/docid/3ae6b38e3.html>.
33. You D, Hug L, Ejdemyr S, Beise J, Idele P. Levels and Trends in Child Mortality: Report 2015. New York: UNICEF; 2015. Available from [http://www.who.int/maternal\\_child\\_adolescent/documents/levels\\_trends\\_child\\_mortality\\_2015/en/](http://www.who.int/maternal_child_adolescent/documents/levels_trends_child_mortality_2015/en/).
34. UNICEF. Levels and trends in child malnutrition. UNICEF - WHO - World Bank group: Joint child malnutrition estimates. New York: UNICEF; 2015. [Accessed 16.11.2016]. Available from <http://www.who.int/nutgrowthdb/estimates/en/>.
35. Filozof C, Gonzalez C, Sereday M, Mazza C, Braguinsky. Obesity prevalence and trends in Latin-American countries. *Obes Rev*. 2001;2(2):99-106.
36. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, de Onis M, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet*. 2013;382(9890):427-51.

37. INEI. Perú Encuesta Demográfica y de Salud Familiar - ENDES 2014. Nacional y Departamental. Lima, Perú: Instituto Nacional de Estadística e Informática; 2015.
38. Ojeda G, Ordóñez M, Ochoa LH. Encuesta Nacional de Demografía y Salud 2010. Bogotá, Colombia: Profamilia; 2011.
39. Coa R, Ochoa LH. Bolivia Encuesta Nacional de Demografía y Salud 2008. La Paz, Bolivia: Ministerio de Salud y Deportes; 2009.
40. Woodhead M. Changing perspectives on early childhood: theory, research and policy. *International Journal of Equity and Innovation in Early Childhood*. 2006;4(2):1-43.
41. Bruer J. *The Myth of the First Three Years: a new understanding of early brain development and lifelong learning*. New York, NY: Free Press; 2002.
42. Victora CG, de Onis M, Hallal PC, Blössner M, Shrimpton R. Worldwide Timing of Growth Faltering: Revisiting Implications for Interventions. *Pediatrics*. 2010;125(3):e473-80.
43. Maggi S, Irwin LJ, Siddiqi A, Hertzman C. The social determinants of early child development: An overview. *J Paediatr Child Health*. 2010;46(11):627-35.
44. Dawson G, Ashman SB, Carver LJ. The role of early experience in shaping behavioral and brain development and its implications for social policy. *Dev Psychopathol*. 2000;12(4):695-712.
45. Blössner M, de Onis M. Malnutrition: quantifying the health impact at national and local levels. *Environmental Burden of Diseases Series*. Geneva: World Health Organization; 2005. Available from [http://www.who.int/nutgrowthdb/publications/quantifying\\_health\\_impact/en/](http://www.who.int/nutgrowthdb/publications/quantifying_health_impact/en/).
46. Black RE, Allen LH, Bhutta ZA, Caulfield LE, De Onis M, Ezzati M, et al. Maternal and child undernutrition: global and regional exposures and health consequences. *Lancet*. 2008;371(9608):243-60.
47. WHO. WHO Global Database on Child Growth and Malnutrition. Geneva: World Health Organization; 1997. [Accessed 04.010.2016]. Available from <http://www.who.int/nutgrowthdb/en/>.
48. Grantham-McGregor S, Cheung YB, Cueto S, Glewwe P, Richter L, Strupp B, et al. Developmental potential in the first 5 years for children in developing countries. *Lancet*. 2007;369(9555):60-70.
49. Victora CG, Adair L, Fall C, Hallal PC, Martorell R, Richter L, et al. Maternal and child undernutrition: consequences for adult health and human capital. *Lancet*. 2008;26(371):340-57.
50. Crookston BT, Schott W, Cueto S, Dearden KA, Engle PL, Georgiadis A, et al. Postinfancy growth, schooling, and cognitive achievement: Young Lives. *Am J Clin Nutr*. 2013;98(6):1555-63.
51. Fernald LC, Grantham-McGregor SM. Growth Retardation Is Associated with Changes in the Stress Response System and Behavior in School-Aged Jamaican Children. *J Nutr*. 2002;132(12):3674-9.
52. Adair LS, Fall CHD, Osmond C, Stein AD, Martorell R, Ramirez-Zea M, et al. Associations of linear growth and relative weight gain during early life with adult health and human capital in countries of low and middle income: findings from five birth cohort studies. *Lancet*. 2013;382(9891):525-34.
53. UNICEF. *The state of the world's children 2016. A fair chance for every child*. New York, NY, USA: United Nations Children's Fund; 2016. ISBN: 978-92-806-4838-6. Available from <https://www.unicef.org/sowc2016/>.
54. WHO. WHO Expert Committee on Physical Status: the Use and Interpretation of Anthropometry: report of a WHO expert committee. Geneva: World Health Organization; 1995. Available from [http://www.who.int/childgrowth/publications/physical\\_status/en/](http://www.who.int/childgrowth/publications/physical_status/en/).

- 
55. Waterlow JC. Classification and Definition of Protein-Calorie Malnutrition. *Br Med J*. 1972;3(5826):566-9.
  56. Shrimpton R, Victora CG, De Onis M, Lima RC, Blössner M, Clugston G. Worldwide Timing of Growth Faltering: Implications for Nutritional Interventions. *Pediatrics*. 2001;107(5):e75-81.
  57. WHO Multicentre Growth Reference Study Group. WHO Child Growth Standards: Length / height for age, weight for age, weight for length, weight for height and body mass index for age: methods and development. Geneva: World Health Organization; 2006. Available from [http://www.who.int/childgrowth/standards/technical\\_report/en/](http://www.who.int/childgrowth/standards/technical_report/en/).
  58. de Onis M, Habicht JP. Anthropometric reference data for international use: recommendations from a World Health Organization Expert Committee. *Am J Clin Nutr*. 1996;64(4):650-8.
  59. Nichols EK, Nichols JS, Selwyn BJ, Coello-Gomez C, Parkerson GR, Brown EL, et al. Implications of the WHO Child Growth Standards in rural Honduras. *Public Health Nutr*. 2012;15(6):1015-22.
  60. de Onis M, Garza C, Onyango AW, Borghi E. Comparison of the WHO Child Growth Standards and the CDC 2000 Growth Charts. *J Nutr*. 2007;137(1):144-8.
  61. UNICEF. Progress for Children. Beyond Averages: Learning from the MDGs. New York: UNICEF; 2015. Available from [https://www.unicef.org/publications/index\\_82231.html](https://www.unicef.org/publications/index_82231.html).
  62. Liu L, Hogan D, Perin J, Rudan I, Lawn JE, Cousens S, et al. Global, regional, and national causes of child mortality in 2000-13, with projections to inform post-2015 priorities: an updated systematic analysis. *Lancet*. 2015;385(9966):430-40.
  63. Frongillo EA, Tofail F, Hamadani JD, Warren AM, Mehrin SF. Measures and indicators for assessing impact of interventions integrating nutrition, health, and early child development. *Ann N Y Acad Sci*. 2014;1308:68-88. DOI:10.1111/nyas.12319.
  64. Engle PL, Black MM, Behrmen JR, Cabral de Mello M, Gertler PJ, Kapiriri L, et al. Strategies to avoid the loss of developmental potential in more than 200 million children in the developing world. *Lancet*. 2007;369(9557):229-2242.
  65. Engle PL, Bentley M, Pelto G. The role of care in nutrition programmes: current research and a research agenda. *Proc Nutr Soc*. 2000;59(01):25-35.
  66. Bradley RH, Caldwell BM. Caregiving and the Regulation of Child Growth and Development: Describing Proximal Aspects of Caregiving Systems. *Dev Rev*. 1995;15(1):38-85.
  67. Zeitlin M, Houser R, Johnson F. Active maternal feeding and nutrition status of 8-20 months old Mexican children. Kansas City, USA: Society for Research in Child Development; 1989.
  68. Longhurst R, Tomkins A. The Role of Care in Nutrition - A Neglected Essential Ingredient. UN System Standing Committee on Nutrition News; 1995. Available from <http://www.nzdl.org/gsdldmod?e=d-00000-00---off-0fml2.2--00-0----0-10-0---0---0direct-10---4-----0-11--11-en-50---20-about---00-0-1-00---4-4---0-0-11-11-0utfZz-8-00-10&cl=CL3.65&d=HASHa5c9f81b5c02db2f2b81b9.3.3&gt=1>.
  69. Horta BL, Loret de Mola C, Victora CG. Breastfeeding and intelligence: a systematic review and meta-analysis. *Acta Pædiatrics*. 2015;104(S467):14-9.
  70. Gibbs BG, Forste R. Breastfeeding, Parenting, and Early Cognitive Development. *The J Pediatr*. 2014;164(3):487-93.
  71. Zhou SJ, Baghurst P, Gibson RA, Makrides M. Home environment, not duration of breast-feeding, predicts intelligence quotient of children at four years. *Nutrition*. 2007;23(3):236-41.

- 
72. Ruel M, Arimond M. *Measuring Childcare Practices. Approaches, Indicators, and Implications for Programs*. Washington, D.C.: IFPRI; 2003.
  73. Woodhead M. *Early Childhood Development. Delivering inter-sectoral politics, programmes and services in low-resource settings*. Oxford: Health & Education Advice & Resource Team (HEART); 2014. Available from <http://oro.open.ac.uk/41552/>.
  74. Arimond M, Ruel M. *Assessing care: Progress towards the measurement of selected childcare and feeding practices, and implications for programs*. Washington, D.C.: IFPRI; 2001.
  75. Ruel MT, Harris J, Cunningham K. *Diet Quality in Developing Countries*. In: Preedy VR, Hunter L, Patel VB, editors. *Diet Quality An Evidence-Based Approach*. Nutrition and Health. 2. New York: Humana Press; 2013.
  76. Amugsi DA, Mittelmark MB, Lartey A, Matanda DJ, Urke HB. Influence of childcare practices on nutritional status of Ghanaian children: a regression analysis of the Ghana Demographic and Health Surveys. *BMJ Open*. 2014;4:e005340.DOI:10.1136/bmjopen-2014-005340.
  77. WHO. *Indicators for assessing infant and young child feeding practices. Part I: Definitions*. Geneva: WHO; 2008. Available from [http://www.who.int/maternal\\_child\\_adolescent/documents/9789241596664/en/](http://www.who.int/maternal_child_adolescent/documents/9789241596664/en/).
  78. Marriott BP, White A, Hadden L, Davies JC, Wallingford JC. World Health Organization (WHO) infant and young child feeding indicators: associations with growth measures in 14 low-income countries. *Matern Child Nutr*. 2012;8(3):354-70.
  79. Jones AD, Ickes SB, Smith LE, Mbuya MNN, Chasekwa B, Heidkamp RA, et al. World Health Organization infant and young child feeding indicators and their associations with child anthropometry: a synthesis of recent findings. *Matern Child Nutr*. 2014;10(1):1-17.
  80. Thorne-Lyman A, Spiegelman D, Fawzi WW. Is the strenght of association between indicators of dietary quality and the nutritional status of children being underestimated? *Matern Child Nutr*. 2014;10(1):159-60.
  81. Jones AD, Mbuya MNN, Ickes SB, Heidkamp RA, Smith LE, Chasekwa B, et al. Reply to Correspondence: is the strenght of association between indicators of dietary quality and the nutritional status of children being underestimated? *Matern Child Nutr*. 2014;10(1):161-2.
  82. Ruel MT, Menon P. Child feeding practices are associated with child nutritional status in Latin America: innovative uses of the demographic and health surveys. *J Nutr*. 2002;132(6):1180-87.
  83. Garg A, Chadha R. Index for Measuring the Quality of Complementary Feeding Practices in Rural India. *J Health, Popul Nutr*. 2009;27(6):763-71.
  84. Reinbott A, Kuchenbecker J, Herrmann J, Jordan I, Muehlhoff E, Kevanna O, et al. A child feeding index is superior to WHO IYCF indicators in explaining length-for-age Z-scores of young children in rural Cambodia. *Paediatr Int Child Health*. 2015;35(2):124-34.
  85. WHO. *Global Vaccine Action Plan. Monitoring, Evaluation & Accountability. Secretariat Annual Report 2015*. Geneva: WHO; 2015. Available from [http://www.who.int/immunization/global\\_vaccine\\_action\\_plan/en/](http://www.who.int/immunization/global_vaccine_action_plan/en/).
  86. Jones G, Steketee RW, Black RE, Bhutta ZA, Morris S, Bellagio Child Survival Study Group. How many deaths can we prevent this year? *Lancet*. 2003;362(9377):65-71.
  87. Curtis V, Cairncross S, Yonli R. Review: Domestic hygiene and diarrhoea - pinpointing the problem. *Trop Med Int Health*. 2000;5(1):22-32.
  88. Cairncross S, Hunt C, Boisson S, Bostoen K, Curtis V, Fung ICH, et al. Water, sanitation and hygiene for the prevention of diarrhoea. *Int J Epidemiol*. 2010;39(s1):i193-205.

- 
89. Peter R, Kumar KA. Mothers' caregiving resources and practices for children under 5 years in the slums of Hyderabad, India: a cross-sectional study. *WHO South East Asia Journal of Public Health*. 2014;3(3-4):254-65.
  90. Paranhos VD, Pina JC, de Mello DF. Integrated Management of Childhood Illness with the Focus on Caregivers: an Integrative Literature Review. *Rev La Am Enfermagem*. 2011;19(1):203-11.
  91. Kalter HD, Salgado R, Moulton LH, Nieto P, Contreras A, Egas ML, et al. Factors constraining adherence to referral advice for severely ill children managed by the Integrated Management of Childhood Illness approach in Imbabura Province, Ecuador. *Acta Pædiatrica*. 2003;92(1):103-10.
  92. Källander K, Hildenwall H, Waiswa P, Galinwango E, Peterson S, Pariyo G. Delayed care seeking for fatal pneumonia in children aged under five years in Uganda: a case-series study. *Bull World Health Organ*. 2008;86(5):332-8.
  93. WHO and UNICEF. Handbook: IMCI Integrated Management of Childhood Illness. Geneva: WHO and UNICEF; 2005. Available from [http://www.who.int/maternal\\_child\\_adolescent/documents/9241546441/en/](http://www.who.int/maternal_child_adolescent/documents/9241546441/en/).
  94. Sreeramareddy CT, Shankar RP, Sreekumaran BV, Subba SH, Joshi HS, Ramachandran U. Care seeking behaviour for childhood illness - a questionnaire survey in western Nepal. *BMC Int Health Hum Rights*. 2006;6(7). DOI: 10.1186/1472-698X-6-7.
  95. Dongre AR, Deshmukh PR, Garg BS. Perception and Health Care Seeking About Newborn Danger Signs Among Mothers in Rural Wardha. *Indian J Pediatr*. 2008;75(4):325-9.
  96. Syed U, Khadka N, Khan A, Wall S. Care-seeking practices in South Asia: using formative research to design program interventions to save newborn lives. *J Perinatol*. 2008;28:S9-S13. DOI:10.1038/jp.2008.165.
  97. Ogunlesi TA, Olanrewaju DM. Socio-demographic Factors and Appropriate Health Care-seeking Behavior for Childhood Illnesses. *J Trop Pediatr*. 2010;56(6):379-85.
  98. Landry SH, Smith KE, Swank PR. The importance of parenting during early childhood for school-age development. *Dev Neuropsychol*. 2003;24(2-3):559-92.
  99. Smith KE, Landry SH, Swank PR. The Role of Early Maternal Responsiveness in Supporting School-Aged Cognitive Development for Children Who Vary in Birth Status. *Pediatrics*. 2006;117(5):1608-17.
  100. Lancy DF. Accounting for Variability in Mother-Child Play. *Am Anthropol*. 2007;109(2):273-84.
  101. Bornstein MH, Putnick DL. Cognitive and Socioemotional Caregiving in Developing Countries. *Child Dev*. 2012;83(1):46-61.
  102. Warsito O, Khomsan A, Hernawati N, Anwar F. Relationship between nutritional status, psychosocial stimulation and cognitive development in preschool children in Indonesia. *Nutr Res Pract*. 2012;6(5):451-7.
  103. Wells G. *The Meaning Makers: Children Learning Language and Using Language to Learn*. First ed. Portsmouth, NH: Heineman Educational Books Inc.; 1986.
  104. Britto PMR, Engle PL, Super CM. *Handbook of Early Childhood Development Research and its Impact on Global Policy*. New York: Oxford University Press; 2013.
  105. UNICEF. *Child Disciplinary Practices at Home. Evidence from a Range of Low- and Middle-Income Countries*. New York: UNICEF; 2010. Available from [https://www.unicef.org/protection/Child\\_Disciplinary\\_Practices\\_at\\_Home.pdf](https://www.unicef.org/protection/Child_Disciplinary_Practices_at_Home.pdf).
  106. Kariger P, Frongillo EA, Engle PL, Britto PMR, Sywulka SM, Menon P. Indicators of Family Care for Development for Use in Multicountry Surveys. *J Health Popul Nutr*. 2012;30(4):472-86.



107. Hill Z, Kirkwood B, Edmond K. Family and community practices that promote child survival, growth and development. A review of the evidence. Geneva: WHO; 2004. Available from [http://www.who.int/maternal\\_child\\_adolescent/documents/9241591501/en/](http://www.who.int/maternal_child_adolescent/documents/9241591501/en/).
108. Engle PL, Lhotská L, Armstrong H. The Care Initiative: Assessment, Analysis and Action to Improve Care for Nutrition. New York: UNICEF; 1997.
109. Richter L, Daelmans B, Lombardi J, Heymann J, Boo FL, Behrman JR, et al. Investing in the foundation of sustainable development: pathways to scale up for early child development. *Lancet*. 2016;389(10064):103-18.
110. Kamau-Thuita F, Omwega AM, Muita JWG. Child care practices and nutritional status of children aged 0-2 years in Thika, Kenya. *East Afr Med J*. 2002;79(10):524-9.
111. Kulwa KB, Kinabo JLD, Modest B. Constraints on food child-care practices and nutritional status in urban Dar-es-Salaam, Tanzania. *Food Nutr Bull*. 2006;27(3):236-44.
112. Armar-Klimesu M, Ruel MT, Maxwell DG, Levin CE, Morris SS. Poor Maternal Schooling Is the Main Constraint to Good Child Care Practices in Accra. *J Nutr*. 2000;130(6):1597-607.
113. Ruel MT, Levin CE, Armar-Klimesu M, Maxwell D. Good Care Practices Can Mitigate the Negative Effects of Poverty and Low Maternal Schooling on Children's Nutritional Status: Evidence from Accra. *World Dev*. 1999;27(11):1993-2009.
114. Osorio AM, Bolancé C, Alcañiz M. Measuring Intermediary Determinants of Early Childhood Health: A Composite Index Comparing Colombian Departments. *Child Indic Res*. 2013;6(2):297-319.
115. Osorio AM, Bolancé C, Madise N. Community socioeconomic context and its influence on intermediary determinants of child health: Evidence from Colombia. *J Biosoc Sci*. 2015;47(1):1-27.
116. O'Hare WP, Gutierrez F. The Use of Domains in Constructing a Comprehensive Composite Index of Child Well-Being. *Child Indicator Research*. 2012;5(4):609-29.
117. Ben-Arieh A. Indicators and Indices of Children's Well-being: towards a more policy-oriented perspective. *Eur J Educ*. 2008;43(1):37-50.
118. WHO. Understanding and addressing violence against women. Intimate partner violence. WHO; 2012. [Accessed 18.10.2016]. Available from [http://www.who.int/reproductivehealth/topics/violence/vaw\\_series/en/](http://www.who.int/reproductivehealth/topics/violence/vaw_series/en/).
119. Krug EG, Dahlberg LL, Mercy JA, Zwi AB, Lozano R. World report on violence and health. Geneva: WHO; 2002. Available from [http://www.who.int/violence\\_injury\\_prevention/violence/world\\_report/en/](http://www.who.int/violence_injury_prevention/violence/world_report/en/).
120. Vizcarra B, Hassan F, Hunter WM, Muñoz SR, Ramiro L, De Paula CS. Partner violence as a risk factor for mental health among women from communities in the Philippines, Egypt, Chile, and India. *Inj Control Saf Promot*. 2004;11(2):125-9.
121. Ellsberg M, Heise L, Peña R, Agurto S, Winkvist A. Researching Domestic Violence Against Women: Methodological and Ethical Considerations. *Stud Fam Plann*. 2001;32(1):1-16.
122. Ellsberg M, Jansen HAFM, Heise L, Watts CH, García-Moreno C. Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: an observational study. *Lancet*. 2008;371(9619):1165-72.
123. McCaw B, Golding JM, Farley M, Minkoff JR. Domestic Violence and Abuse, Health Status, and Social Functioning. *Women Health*. 2007;45(2):1-23.
124. Straus M. Measuring intrafamily conflict and violence. The conflict tactics (CT) scales. *J Marriage Fam*. 1979;41(1):75-88.
125. Straus M, Douglas EM. A Short Form of the Revised Conflict Tactics Scales, and Typologies for Severity and Mutuality. *Violence Vict*. 2004;19(5):507-20.

- 
126. Straus MA, Hamby SL, Boney-McCoy S, Sugarman DB. The Revised Conflict Tactics Scales (CTS2). *Journal of Family Issues*. 1996;17(3):283-316.
  127. Vega EM, O'Leary DK. Test-Retest Reliability of the Revised Conflict Tactics Scales (CTS2). *J Fam Viol*. 2007;22(8):703-8.
  128. Marmot M, Ryff CD, Bumpass LL, Shipley M, Marks NF. Social inequalities in health: Next questions and converging evidence. *Soc Sci Med*. 1997;44(6):901-10.
  129. Conger RD, Donnellan MB. An Interactionist Perspective on the Socioeconomic COntext of Human Development. *Annu Rev Psychol*. 2007;58:175-99.
  130. Bornstein MH, Bradley RH. *Socioeconomic Status, Parenting, and Child Development*. New York, NY, USA: Routledge; 2012.
  131. Poulton R, Caspi A, Milne BJ, Thomson WM, Taylor A, Sears MR, et al. Association between children's experience of socioeconomic disadvantage and adult health: a life-course study. *Lancet*. 2002;360(9346):1640-45.
  132. Repetti RL, Taylor SE, Seeman TE. Risky Families: Family Social Environments and the Mental and Physical Health of Offspring. *Psychol Bull*. 2002;128(2):330-66.
  133. Chen E. Why Socioeconomic Status Affects the Health of Children. A Psychosocial Perspective. *Curr Dir Psychol Sci*. 2004;13(3):112-5.
  134. Krieger N. Proximal, Distal, and the Politics of Causation: What's level Got to Do With it? *Government, Politics, and Law*. 2008;98(2):221-30.
  135. Victora CG, Huttly SR, Fuchs SC, Olinto MTA. The Role of Conceptual Frameworks in Epidemiological Analysis: A Hierarchical Approach. *Int J Epidemiol*. 1997;26(1):224-7.
  136. Berkman LF, Kawachi I. *Social Epidemiology*. New York: Oxford University Press, Inc.; 2000.
  137. Mosley WH, Chen LC. An Analytical Framework for the Study of Child Survival in Developing Countries. *Popul Dev Rev*. 1984;10(S):25-45.
  138. Engle PL, Menon P, Haddad L. *Care and Nutrition. Concepts and Measurements*. Washington, D.C.: IFPRI; 1997.
  139. Bronfenbrenner U. Ecology of the Family as a Context for Human Development Research Perspectives. *Dev Psychol*. 1986;22(6):723-42.
  140. Grzywacz JG, Fuqua J. The Social Ecology of Health: Leverage Points and Linkages. *Behav Med*. 2000;26(3):101-15.
  141. UNICEF. Strategy for improved nutrition of children and women in developing countries. A UNICEF Policy Review. New York: UNICEF 1990.
  142. Smith LC, Haddad LJ. Explaining child malnutrition in developing countries: A cross-country analysis. Washington D.C.: IFPRI; 2000.
  143. Heaton TB. Are Improvements in Child Health Due to Increasing Status of Women in Developing Nations? *Biodemography Soc Biol*. 2015;61(3):252-65.
  144. Osamor PE, Grady C. Women's autonomy in health care decision-making in developing countries: a synthesis of the literature. *Int J Womens Health*. 2016;8:191-202. DOI: 10.2147/IJWH.S105483.
  145. Dyson T, Moore M. On Kinship Structure, Female Autonomy, and Demographic Behavior in India. *Popul Dev Rev*. 1983;9(1):35-60.
  146. Smith L, Ramakrishnan U, Ndiaye A, Haddad L, Martorell R. *The Importance of Women's Status for Child Nutrition in Developing Countries*. Washington D.C.: IFPRI; 2003.
  147. Heaton TB, Huntsman TJ, Flake DF. The effects of status on women's autonomy in Bolivia, Peru, and Nicaragua. *Popul Res Policy Rev*. 2005;24(3):283-300.
  148. Kabeer N. Resources, Agency, Achievements: Reflections on the Measurement of Women's Empowerment. *Dev Change*. 1999;30(3):435-64.
  149. Barrera A. The role of maternal schooling and its interaction with public health programs in child health production. *J Dev Econ*. 1990;32(1):69-91.

- 
150. Cleland JG, Van Ginneken JK. Maternal education and child survival in developing countries: The search for pathways of influence. *Soc Sci Med.* 1988;27(12):1357-68.
  151. Glewwe P. Why does mother's schooling raise child health in developing countries? Evidence from Morocco. *J Hum Resour.* 1999;34(1):124-59.
  152. Bradley RH, Putnick DL. Housing Quality and Access to Material and Learning Resources Within the Home Environment in Developing Countries. *Child Dev.* 2012;83(1):76-91.
  153. Narayan D, Patel R, Schafft K, Rademacher A, Koch-Schulte S. Can Anyone Hear Us? Voices From 47 Countries. Washington D.C.: World Bank; 2000. Available from <http://siteresources.worldbank.org/INTPOVERTY/Resources/335642-1124115102975/1555199-1124115187705/vol1.pdf>.
  154. Levendosky AA, Graham-Bermann SA. Behavioral Observations of Parenting in Battered Women. *J Fam Psychol.* 2000;14(1):80-94.
  155. Engle PL, Menon P, Haddad L. Care and Nutrition: Concepts and Measurement. *World Dev.* 1999;27(8):1309-37.
  156. Kishor S, Johnson K. Profiling Domestic Violence - A Multi-Country Study. Calverton, Maryland: ORC Macro 2004. Available from <http://dhsprogram.com/pubs/pdf/od31/od31.pdf>.
  157. Fantuzzo J, Boruch R, Beriama A, Atkins M, Marcus S. Domestic Violence and Children: Prevalence and Risk in Five Major U.S. Cities. *J Am Acad Child Adolesc Psychiatry.* 1997;36(1):116-22.
  158. Rico E, Fenn B, Abramsky T, Watts C. Associations between maternal experiences of intimate partner violence and child nutrition and mortality: findings from Demographic and Health Surveys in Egypt, Honduras, Kenya, Malawi and Rwanda. *J Epidemiol Community Health.* 2011;65:360-7. DOI: 10.1136/jech.2008.081810.
  159. Rodríguez FM, Santos CQ, Talani JO, Tovar MFR. Prácticas y creencias culturales acerca del cuidado de niños menores de un año en un grupo de madres de Chocantá, Colombia. *Revista Colombiana de Enfermería.* 2014;9(9):77-87.
  160. Panez R, Silva G, Panez MS. El Emprendimiento Infantil en los Andes. Un modelo de promoción de capacidades para niños de 0 a 3 años. Lima: Panez & Silva Consultores, Bernard von Leer Foundation and Fundación Strømme; 2007.
  161. Flake DF, Forste R. Fighting Families: Family Characteristics Associated with Domestic Violence in Five Latin American Countries. *J Fam Violence.* 2006;21(1):19-29.
  162. Gallardo-Lizarazo MP. Conductas, actitudes y prácticas de la madre o cuidador en el manejo de la enfermedad diarreica aguda en menores de cinco años. *Revista Ciencia y Cuidado.* 2015;12(2):39-56.
  163. Lancy DF. *The Anthropology of Childhood. Cherubs, Chattel, Changelings.* Second edition. Cambridge, United Kingdom: Cambridge University Press; 2015.
  164. Brunson EK, Shell-Duncan B, Steele M. Women's autonomy and its relationship to children's nutrition among the Rendille of northern Kenya. *Am J Hum Biol.* 2008;21(1):55-64.
  165. Frost MB, Forste R, Haas DW. Maternal education and child nutritional status in Bolivia: finding the links. *Soc Sci Med.* 2005;60(2):395-407.
  166. Thorpe S, VanderEnde K, Peters C, Bardin L, Yount KM. The Influence of Women's Empowerment on Child Immunization Coverage in Low, Lower-Middle, and Upper-Middle Income Countries: A Systematic Review of the Literature. *Matern Child Health J.* 2016;20(1):172-86.
  167. Mistry R, Galal O, Lu M. "Women's autonomy and pregnancy care in rural India: A contextual analysis". *Soc Sci Med.* 2009;69(6):926-33.

- 
168. Shroff MR, Griffiths PL, Suchindran C, Nagalla B, Vazir S, Bentley ME. Does maternal autonomy influence feeding practices and infant growth in rural India? *Soc Sci Med*. 2011;73(3):447-55.
169. Ziaei S, Contreras M, Blandón EZ, Persson LÅ, Hjern A, Ekström EC. Women's autonomy and social support and their associations with infant and young child feeding and nutritional status: community-based survey in rural Nicaragua. *Public Health Nutr*. 2014;18(11):1979-90.
170. Vikram K, Vanneman R, Desai S. Linkages between maternal education and childhood immunization in India. *Soc Sci Med*. 2012;75(2):331-9.
171. Thapa DK, Niehof A. Women's autonomy and husbands' involvement in maternal health care in Nepal. *Soc Sci Med*. 2013;93. DOI: 10.1016/j.socscimed.2013.06.003.
172. Kishor S, Subaiya L. *Understanding Women's Empowerment: A Comparative Analysis of Demographic and Health Surveys (DHS) Data*. Calverton, Maryland, USA: Macro International Inc.; 2008. Available from <http://dhsprogram.com/publications/publication-cr20-comparative-reports.cfm>.
173. Gakidou E, Cowling K, Lozano R, Murray CJL. Increased educational attainment and its effect on child mortality in 175 countries between 1970 and 2009: a systematic analysis. *Lancet*. 2010;376(9745):959-74.
174. Fuchs R, Pamuk ER, Lutz W. Education or wealth: which matters more for reducing child mortality in developing countries? *Vienna Yearb Popul Res*. 2010;8:175-99. DOI: 10.1553/populationyearbook2010s175.
175. Ickes SB, Hurst TE, Flax VL. Maternal Literacy, Facility Birth, and Education Are Positively Associated with Better Infant and Young Child Feeding Practices and Nutritional Status among Ugandan Children. *J Nutr*. 2015;145(11):2578-86..
176. Urke HB, Bull T, Mittelmark MB. Socioeconomic status and chronic child malnutrition: wealth and maternal education matter more in the Peruvian Andes than nationally. *Nutr Res*. 2011;31(10):741-7.
177. Gaviria AU, del Mar Palau MM. Nutrición y salud infantil en Colombia: determinantes y alternativas de política. *Coyuntura Económica*. 2006;37(2):33-63.
178. Basu AM, Stephenson R. Low levels of maternal education and the proximate determinants of childhood mortality: a little learning is not a dangerous thing. *Soc Sci Med*. 2005;60(9):2011-23.
179. Danielzik S, Czerwinski-Mast M, Langnäse K, Dilba B, Müller MJ. Parental overweight, socioeconomic status and high birth weight are the major determinants of overweight and obesity in 5-7 y-old children: baseline data of the Kiel Obesity Prevention Study (KOPS). *Int J Obes*. 2004;28:1494-502. DOI: 10.1038/sj.ijo.0802756.
180. Fernald LC, Neufeld LM. Overweight with concurrent stunting in very young children from rural Mexico: prevalence and associated factors. *Eur J Clin Nutr*. 2007;61:623-32. DOI: 10.1038/sj.ejcn.1602558.
181. Gewa CA. Childhood overweight and obesity among Kenyan pre-school children: association with maternal and early child nutritional factors. *Public Health Nutr*. 2009;13(4):496-503.
182. LeVine RA, LeVine SE, Schnell B. "Improve the Women": Mass Schooling, Female Literacy, and Worldwide Social Change. *Harv Educ Rev*. 2001;71(1):1-51.
183. Gibbs BG, Forste R. Socioeconomic status, infant feeding practice and early childhood obesity. *Pediatr Obes*. 2014;9(2):135-46.
184. Nti CA, Lartey A. Influence of care practices on nutritional status of Ghanaian children. *Nutr Res Pract*. 2008;2(2):93-9.
185. Nti CA, Lartey A. Effect of caregiver feeding behaviours on child nutritional status in rural Ghana. *Int J Consum Stud*. 2007;31(3):303-9.

- 
186. Guldan GS, Zeitlin MF, Beiser AS, Super CM, Gershoff SN, Datta S. Maternal education and child feeding practices in rural Bangladesh. *Soc Sci Med.* 1993;36(7):925-35.
  187. Jones AD. The production diversity of subsistence farms in the Bolivian Andes is associated with the quality of child feeding practices as measured by a validated summary feeding index. *Public Health Nutr.* 2015;18(2):329-42.
  188. Mallard SR, Houghton LA, Filteau S, Mullen A, Nieuwelink J, Chisenga M, et al. Dietary Diversity at 6 Months of Age is Associated with Subsequent Growth and Mediates the Effect of Maternal Education on Infant Growth in Urban Zambia. *J Nutr.* 2014;144(11):1818-25.
  189. Nguyen PH, Avula R, Ruel MT, Kuntal KS, Ali D, Tran LM, et al. Maternal and Child Dietary Diversity are Associated in Bangladesh, Vietnam, and Ethiopia. *J Nutr.* 2013;143(7):1176-83.
  190. Bbaale E. Factors Influencing Childhood Immunization in Uganda. *J Health Popul Nutr.* 2013;31(1):118-29.
  191. Schmidt WP, Aunger R, Coombes Y, Maina PM, Matiko CN, Biran A, et al. Determinants of handwashing practices in Kenya: the role of media exposure, poverty and infrastructure. *Trop Med Int Health.* 2009;14(12):1534-41.
  192. Scott BE, Lawson DW, Curtis V. Hard to handle: understanding mothers' handwashing behaviour in Ghana. *Health Policy Plan.* 2007;22(4):216-24.
  193. Begum HA, Moneesha SS, Sayem AM. Child Care Hygiene Practices of Women Migrating From Rural to Urban Areas of Bangladesh. *Asia Pac J Public Health.* 2011;25(4):345-55.
  194. Webb AL, Ramakrishnan U, Stein AD, Sellen DW, Merchant M, Martorell R. Greater years of maternal schooling and higher scores on academic achievement tests are independently associated with improved management of child diarrhea by rural Guatemalan Mothers. *Matern Child Health J.* 2009;14(5):799-806.
  195. Al Fadil SM, Alrahman SHA, Cousens S, Bustreo F, Shadoul A, Farhoud S, et al. Integrated Management of Childhood Illnesses strategy: compliance with referral and follow-up recommendations in Gezira State, Sudan. *Bull World Health Organ.* 2003;81(10):708-16.
  196. Bradley RH, Corwyn RF. Caring for children around the world: A view from HOME. *Int J Behav Dev.* 2005;29(6):468-78.
  197. Filmer D, Scott K. Assessing Asset Indices. *Demography.* 2012;49(1):359-92.
  198. Pamuk ER, Fuchs R, Lutz W. Comparing Relative Effects of Education and Economic Resources on Infant Mortality in Developing Countries. *Popul Dev Rev.* 2011;37(4):637-64.
  199. Boyle MH, Racine Y, Georgiades K, Snelling D, Hong S, Omariba W, et al. The influence of economic development level, household wealth and maternal education on child health in the developing world. *Soc Sci Med.* 2006;63(8):2242-54.
  200. Fotso JC, Kuate-Defo B. Socioeconomic inequalities in early childhood malnutrition and morbidity: modification of the household-level effects by the community SES. *Health Place.* 2005;11(3):205-25.
  201. Siri JG. Independent Associations of Maternal Education and Household Wealth with Malaria Risk in Children. *Ecol Soc.* 2014;19(1):33-49.
  202. Pande RP, Yazbeck AS. What's in a country average? Wealth, gender, and regional inequalities in immunization in India. *Soc Sci Med.* 2003;57(11):2075-88.
  203. Sastry N. What explains rural-urban differentials in child mortality in Brazil? *Soc Sci Med.* 1997;44(7):989-1002.
  204. Fotso JC. Child health inequities in developing countries: differences across urban and rural areas. *Int J Equity Health.* 2006;5(9). DOI: 10.1186/1475-9276-5-9.
  205. Fox K, Heaton T. Child Nutritional Status by Rural/Urban Residence: A Cross-National Analysis. *J Rural Health.* 2012;28(4):380-91.

- 
206. Smith LC, Ruel MT, Ndiaye A. Why is child malnutrition lower in urban than in rural areas? Evidence from 36 developing countries. *World Dev.* 2005;33(8):1285-305.
  207. Morales R, Aguilar AM, Calzadilla A. Geography and culture matter for malnutrition in Bolivia. *Econ Hum Biol.* 2004;2(3):373-89.
  208. Garrett J, Ruel MT. Are Determinants of Rural and Urban Food Security and Nutritional Status Different? Some Insights from Mozambique. *World Dev.* 1999;27(11):1955-75.
  209. Valdivia M. Poverty, health infrastructure and the nutrition of Peruvian children. *Econ Hum Biol.* 2004;2(3):489-510.
  210. Kelles A, Adair L. Offspring consume a more obesogenic diet than mothers in response to changing socioeconomic status and urbanization in Cebu, Philippines. *Int J Behav Nutr Phys Act.* 2009;6(47). DOI: 10.1186/1479-5868-6-47.
  211. Timar D. Comparing Obesity Trends in Rural Versus Urban Peru from 1991 to 2005. Thesis, Georgia State University, 2009. [http://scholarworks.gsu.edu/iph\\_theses/119](http://scholarworks.gsu.edu/iph_theses/119).
  212. Vakis R, Rigolini J, Lucchetti L. Left Behind. Chronic poverty in Latin America and the Caribbean. Washington D.C.: World Bank; 2015. Available from <http://documents.worldbank.org/curated/en/763871468272038024/Left-behind-chronic-poverty-in-Latin-America-and-the-Caribbean-overview>.
  213. UNICEF. Behind Closed Doors. The Impact of Domestic Violence on Children. New York: UNICEF Child Protection Section; 2006. Available from <https://www.unicef.org/media/files/BehindClosedDoors.pdf>.
  214. Holt S, Buckley H, Whelan S. The impact of exposure to domestic violence on children and young people: A review of the literature. *Child Abuse Negl.* 2008;32(8):797-810.
  215. Bair-Merritt MH. Intimate Partner Violence. *Pediatr Rev.* 2010;31(4):145-50.
  216. Sobkoviak R, Yount KM, Halim N. Domestic violence and child nutrition in Liberia. *Soc Sci Med.* 2012;74(2):103-11.
  217. Bair-Merritt MH, Blackstone M, Feudtner C. Physical Health Outcomes of Childhood Exposure to Intimate Partner Violence: A Systematic Review. *Pediatrics.* 2006;117(2):e278-e91.
  218. Ellonen N, Piispa M, Peltonen K, Oranen M. Exposure to Parental Violence and Outcomes of Child Psychosocial Adjustment. *Violence Vict.* 2013;28(1):3-15.
  219. Meltzer H, Doos L, Vostanis P, Ford T, Goodman R. The mental health of children who witness domestic violence. *Child Fam Soc Work.* 2009;14(4):491-501.
  220. Kitzmann KM, Gaylord NK, Holt AR, Kenny ED. Child Witnesses to Domestic Violence: A Meta-Analytic Review. *J Consult Clin Psychol.* 2003;71(2):339-52.
  221. Wood SL, Sommers MS. Consequences of intimate partner violence on child witnesses: A systematic review of the literature. *J Child Adolesc Psychiatr Nurs.* 2011;24(4):223-36.
  222. Yount KM, DiGirolamo AM, Ramakrishnan U. Impacts of domestic violence on child growth and nutrition: A conceptual review of the pathways of influence. *Soc Sci Med.* 2011;72(9):1534-54.
  223. Chai J, Fink G, Kaaya S, Danaei G, Fawzi W, Ezzati M, et al. Association between intimate partner violence and poor child growth: results from 42 demographic and health surveys. *Bull World Health Organ.* 2016;94:331-9. DOI: 10.2471/BLT.15.152462.
  224. DHS. Who We Are: The DHS Program; 2016 [Accessed 09.10.2016]. Available from: <http://dhsprogram.com/Who-We-Are/About-Us.cfm>.
  225. DHS. Survey Process: The DHS Program; 2016 [Accessed 13.10.2016]. Available from: <http://dhsprogram.com/What-We-Do/Survey-Process.cfm>.
  226. ICF. Demographic and Health Survey Sampling and Household Listing Manual. Calverton, Maryland, U.S.A.: Measure DHS; 2012.

- 
227. CAN. Somos Comunidad Andina. Lima, Perú: CAN; 2010 [Accessed 15.09.2016]. Available from: <http://www.comunidadandina.org/>.
228. World Bank. World Bank list of economies (July 2016): The World Bank; 2016 [Accessed 21.11.2016]. Available from: <http://go.worldbank.org/47F97HK2P0>.
229. Lustig N, López-Calva LF, Ortiz J, E. The Decline in Inequality in Latin America: How Much, Since When and Why. Tulane University; 2011.
230. UN. World Urbanization Prospects: The 2014 Revision, Highlights. New York: United Nations, Departments of Economic and Social Affairs, Population Division; 2014.
231. UN. Country profile Bolivia (Plurinational State of). UNdata. A world of information: United Nations Statistics Division; 2017 [Accessed 11.01.2017]. Available from: [http://data.un.org/CountryProfile.aspx?crName=Bolivia%20\(Plurinational%20State%20of\)](http://data.un.org/CountryProfile.aspx?crName=Bolivia%20(Plurinational%20State%20of)).
232. UN. Country profile Colombia. UNdata. A world of information: United Nations Statistics Division; 2017 [11.01.2017]. Available from: <http://data.un.org/CountryProfile.aspx?crName=Colombia>.
233. UN. Country Profile Peru. UNdata. A world of information: United Nations Statistics Division; 2017 [Accessed 12.01.2017]. Available from: <http://data.un.org/CountryProfile.aspx?crName=Peru>.
234. ECLAC. Guaranteeing indigenous people's rights in Latin America. Progress in the past decade and remaining challenges. Santiago, Chile: ECLAC; 2014. Available from <http://www.cepal.org/en/publications/guaranteeing-indigenous-peoples-rights-latin-america-progress-past-decade-and-remaining>.
235. UNICEF. UNICEF Data Bolivia (Plurinational state of). UNICEF; 2017 [Accessed 13.01.2017]. Available from: <https://data.unicef.org/country/bol/>.
236. Vargas JPM, Garriga S. Explaining Inequality and Poverty Reduction in Bolivia. IMF; 2015.
237. UNICEF. UNICEF Data Colombia. UNICEF; 2017 [Accessed 13.01.2017]. Available from: <https://data.unicef.org/country/col/>.
238. Gaviria A. Cambio social en Colombia durante la segunda mitad del siglo xx. Bogotá, D.C., Colombia: Universidad de los Andes; 2010.
239. UNICEF. UNICEF Data Peru. UNICEF; 2017 UNICEF; 2017 [Accessed 13.01.2017]. Available from: <https://data.unicef.org/country/per/>.
240. Huicho L, Segura ER, Huayanay-Espinoza CA, Niño de Guzman J, Restrepo-Méndez MC, Tam Y, et al. Child health and nutrition in Peru within and antipoverty political agenda: a Countdown to 2015 country case study. *Lancet Glob Health*. 2016;4(6):e414-26.
241. WHO. A macro/programme for calculating the z-scores and prevalences for DHS individual flat files. Geneva: WHO Department of Nutrition for Health and Development; 2006.
242. ICF. Measure DHS Biomarker Field Manual. Calverton, Maryland, U.S.A.: ICF International; 2012. Available from [http://www.dhsprogram.com/pubs/pdf/DHSM7/DHS6\\_Biomarker\\_Manual\\_9Jan2012.pdf](http://www.dhsprogram.com/pubs/pdf/DHSM7/DHS6_Biomarker_Manual_9Jan2012.pdf).
243. WHO. Summary of WHO Position Papers - Recommended Routine Immunizations for Children. WHO; 2015. [Accessed 09.10.2016]. Available from [http://www.who.int/immunization/policy/immunization\\_tables/en/](http://www.who.int/immunization/policy/immunization_tables/en/).
244. Ministerio de Salud y Protección Social. Programa Ampliado de Inmunizaciones (PAI) 2016 [Accessed 09.10.2016]. Available from <https://www.minsalud.gov.co/salud/publica/Vacunacion/Paginas/pai.aspx>.
245. INEI. Perú Encuesta Demográfica y de Salud Familiar 2011. Lima, Perú: INEI; 2012.
246. WHO, UNICEF. Core Questions on Drinking-Water and Sanitation for Household Surveys. Geneva, Switzerland: WHO and UNICEF ;2006. Available from

- [http://www.who.int/water\\_sanitation\\_health/monitoring/oms\\_brochure\\_core\\_questionsfinal24608.pdf](http://www.who.int/water_sanitation_health/monitoring/oms_brochure_core_questionsfinal24608.pdf).
247. Rutstein SO, Johnson K. The DHS Wealth Index. Calverton, Maryland USA: ORC Macro; 2004. Available from <http://www.dhsprogram.com/publications/publication-cr6-comparative-reports.cfm>.
248. Padilla AJ, Trujillo JC. An impact assessment of the Child Growth, Development and Care Program in the Caribbean Region of Colombia. *Cad Saude Publica*. 2015;31(10):2099-109.
249. Graham JW. Missing Data Analysis: Making It Work in the Real World. *Annu Rev Psychol*. 2009;60:549-76. DOI: 10.1146/annurec.psych.58.110405.085530.
250. INEI. PERÚ Encuesta Demográfica y de Salud Familiar 2007-2008 Informe Principal. Lima, Peru; 2009.
251. INEI. Perú Encuesta Demográfica y de Salud Familiar 2012. Lima, Perú: Instituto Nacional de Estadística e Informática; 2013.
252. Padilla A, Ochoa L, Marckwardt A. PERÚ Encuesta Demográfica y de Salud Familiar 1991/1992. Lima, Peru; 1992.
253. Reyes J, Ochoa LH. PERÚ Encuesta Demográfica y de Salud Familiar 1996. Lima, Peru; 1997.
254. Reyes J, Ochoa LH. PERÚ Encuesta Demográfica y de Salud Familiar 2000. Lima, Peru: Instituto Nacional de Estadística e Informática/ Macro International/Measure DHS+; 2001.
255. Pullum T. An Assessment of the Quality of Data on Health and Nutrition in the DHS Surveys, 1993-2003. Methodological Reports No. 6. Calverton, Maryland, USA: Macro International Inc.; 2008. Available from <http://dhsprogram.com/publications/publication-mr6-methodological-reports.cfm>.
256. DHS. Protecting the Privacy of DHS Survey Respondents. DHS Program; 2016 [Accessed 05.12.2016]. Available from <http://dhsprogram.com/What-We-Do/Protecting-the-Privacy-of-DHS-Survey-Respondents.cfm>.
257. DHS. Access Instructions: DHS Program; 2016 [Accessed 08.12.2016]. Available from: <http://dhsprogram.com/data/Access-Instructions.cfm>.
258. ESS. ESS7 - 2014 Documentation report. The ESS data archive. Norwegian Centre for Research Data; 2014 [Accessed 02.12.2016]. Available from <http://www.europeansocialsurvey.org/data/download.html?r=7>.
259. Neuman WL. *Social Research Methods: Qualitative and Quantitative Approaches*. 7th ed. Essex: Pearson Education Limited; 2014.
260. Kiguba R, Kutyabami P, Kiwuwa S, Katabira E, Sewankambo NK. Assessing the quality of informed consent in a resource-limited setting: A cross-sectional study. *BMC Med Ethics*. 2012;13(21). DOI: 10.1186/1472-6939-13-21.
261. Hill Z, Tawiah-Agyemang C, Odei-Danso S, Kirkwood B. Informed consent in Ghana: what do participants really understand? *J Med Ethics*. 2006;34(1):48-53.
262. Karim QA, Karim SSA, Coovadia HM, Susser M. Informed Consent for HIV Testing in a South African Hospital: Is It Truly Informed and Truly Voluntary? *Am J Public Health*. 1998;88(4):637-40.
263. Mandava A, Pace C, Campbell B, Emanuel E, Grady C. The quality of informed consent: mapping the landscape. A review of empirical data from developing and developed countries. *J Med Ethics*. 2012;38(6):356-65.
264. de Onis M, Blössner M, Borghi E. Prevalence and trends of stunting among pre-school children, 1990-2020. *Public Health Nutr*. 2011;15(1):142-8.
265. de Onis M, Blössner M, Borghi E. Global prevalence and trends of overweight and obesity among preschool children. *Am J Clin Nutr*. 2010;92(5):1257-64.



- 
266. Rivera JA, de Cossio TG, Perdraza LS, Aburto TC, Sánchez TG, Martorell R. Childhood and adolescent overweight and obesity in Latin America: a systematic review. *Lancet*. 2014;2(4):321-32.
267. Bacallao J. Epidemiologic and demographic transition: A typology of Latin American and Caribbean Countries. In: Peña M, Bacallao J, editors. *Obesity and Poverty A new Public Health Challenge*. Scientific Publication. Washington, D.C.: Pan American Health Organization; 2000.
268. Pritchett L, Summers LH. Wealthier is Healthier. *J Hum Res*. 1996;31(4):841-68.
269. Yamada G. Growth, Employment, and Internal Migration. Peru, 2003-2007. Universidad del Pacífico; 2010. Available from [https://mpr.ub.uni-muenchen.de/22067/1/MPRA\\_paper\\_22067.pdf](https://mpr.ub.uni-muenchen.de/22067/1/MPRA_paper_22067.pdf).
270. Acosta AM. Analysing Success in the Fight against Malnutrition in Peru. Brighton: Insitute of Development Studies; 2011. Available from <http://onlinelibrary.wiley.com/doi/10.1111/j.2040-0209.2011.00367.x/pdf>.
271. Yamada G, Castro JF. Poverty, inequality, and social policies in Peru: As poor as it gets. *The Peruvian Growth Puzzle*; Center for International Development, Harvard University: Centro de Investigación de la Universidad del Pacífico; 2012.
272. Stifel D, Alderman H. The "Glass of Milk" Subsidy Program and Malnutrition in Peru. Washington D.C.: World Bank; 2003. Available from <http://elibrary.worldbank.org/doi/abs/10.1596/1813-9450-3089>.
273. Gajate GG, Inurritegui MM. El impacto de los programas alimentarios sobre el nivel de nutrición infantil: una aproximación a partir de la metodología del "*Propensity Score Matching*". Lima: GRADE; 2002.
274. Perova E, Vakis R. Welfare impacts of the "Juntos" Program in Peru: Evidence from a non-experimental evaluation. Washington D.C.: World Bank; 2009. Available from [http://www.juntos.gob.pe/modulos/mod\\_legal/archivos/Evaluacion\\_Cuasi-Experimental1.pdf](http://www.juntos.gob.pe/modulos/mod_legal/archivos/Evaluacion_Cuasi-Experimental1.pdf).
275. Rivera JA, Barquera S, González.Cossío T, Olaíz G, Sepúlveda J. Nutrition Transition in Mexico and Other Latin American Countries. *Nutr Rev*. 2004;62(7):149-57.
276. Popkin B, Adair L, SW N. Global nutrition transition and the pandemic of obesity in developing countries. *Nutr Rev*. 2012;70(1):3-21.
277. Popkin BM. The Nutrition Transition in Low-Income Countries: An Emerging Crisis. *Nutr Rev*. 2014;52(9):285-98.
278. Bruce KD, Hanson MA. The Developmental Origins, Mechanisms, and Implications of Metabolic Syndrome. *J Nutr*. 2010;140(3):648-52.
279. Corbin JH, Mittelmark MB, Lie GT. Mapping synergy and antagonism in North-South partnerships for health: a case study of the Tanzanian women's NGO KIWAKUKKI. *Health Promot Int*. 2013;28(1):51-60.
280. Mawdsley E, Townsend JG, Porter G, Oakley P. Knowledge, Power and Development Agendas: NGOs North and South. Oxford: INTRAC; 2002.
281. Matanda DJ, Urke HB, Mittelmark MB. Changes in Optimal Childcare Practices in Kenya: Insights from the 2003, 2008-9 and 2014 Demographic and Health Surveys. *PLoS One*. 2016;11(8):e0161221.
282. Behrman J, Skoufias E. Correlates and determinants of child anthropometrics in Latin America: background and overview of the symposium. *Econ Hum Biol*. 2004;2(3):335-51.
283. Desai S, Alva S. Maternal education and child health: Is there a strong causal relationship? *Demography*. 1998;35(1):71-81.
284. Bicego GT, Boerma JT. Maternal education and child survival: a comparative analysis of DHS data. *Soc Sci Med*. 1993;36(9):1207-27.

- 
285. Hatt LE, Waters HR. Determinants of child morbidity in Latin America: A pooled analysis of interactions between parental education and economic status. *Soc Sci Med*. 2006;62(2):375-86.
  286. Chrousos G, Gold P. The concepts of stress and stress system disorders: Overview of physical and behavioral homeostasis. *J Am Med Assoc*. 1992;267(9):1244-52.
  287. Levendosky AA, Lynch SM, Graham-Bermann SA. Mothers' perceptions of the impact of woman abuse on their parenting. *Violence Against Women*. 2000;6(3):248-72.
  288. Karamagi CAS, Tumwine JK, Tylleskar T, Heggenhougen K. Intimate partner violence and infant morbidity: evidence of an association from a population-based study in eastern Uganda in 2003. *BMC Pediatr*. 2007;7(34). DOI: 10.1186/1471-2431-7-34.
  289. Rutstein SO. The DHS Wealth Index: Approaches for Rural and Urban Areas. USAID; 2008. Available from <http://www.dhsprogram.com/pubs/pdf/WP60/WP60.pdf>.
  290. Filmer D, Pritchett LH. Estimating wealth effects without expenditure data - or tears: an application to educational enrollments in states of India. *Demography*. 2001;38(1):115-32.
  291. McHugh MC, Frieze IH. Intimate Partner Violence. *New Directions*. *Ann N Y Acad Sci*. 2006;1087:121-41.
  292. Bowling A. Mode of questionnaire administration can have serious effects on data quality. *J Public Health*. 2005;27(3):281-91.
  293. Tourangeau R, Yan T. Sensitive Questions in Surveys. *Psychol Bull*. 2007;133(5):859-83.
  294. Rutstein SO. Potential Bias and Selectivity in Analyses of Children Born in the Past Five Years Using DHS Data. Rockville, Maryland, USA: ICF International; 2014. Available from <https://dhsprogram.com/publications/publication-MR14-Methodological-Reports.cfm>.
  295. Becker S, Pullum T. External Evaluation of the Peru Continuous Survey Experiment. Washington D.C.: USAID; 2007.
  296. Zeitlin M, Ghassemi H, Mansour M. Positive Deviance in Child Nutrition - with emphasis on Psychosocial and Behavioural Aspects and Implications for Development. Tokyo: Japan: The United Nations University; 1990. Available from <http://www.positivedeviance.org/pdf/publication%20nutrition/1990%20zeitlin%20posdev.pdf>