An Integrated Framework for Child Poverty and Well-Being Measurement: Reconciling Theories

Mario Biggeri[1,2] · Jose Antonio Cuesta[3]

Abstract

Multidimensional child poverty (MDCP) and well-being measures are increasingly developed in the literature. Much more effort has gone to highlight the differences across measurement approaches than to stress the multiple conceptual and practical similarities across measures. We propose a new framework, the Integrated Framework for Child Poverty—IFCP—that combines three main conceptual approaches, the Capability Approach, Human Rights, and Basic Needs into an integrated bio-ecological framework. This integrated approach aims to bring more clarity about the concept and dynamics of multidimensional poverty and well-being and to disentangle causes from effects, outcomes from opportunities, dynamic from static elements, and observed from assumed behaviours. Moreover, the IFCP explains the MDCP dynamics that link the resources (goods and services), to child capabilities (opportunities) and achieved functionings (outcomes), and describes how these are mediated by the individual, social and environmental conversion factors as specified in the capability approach. Access to safe water is taken as a conceptual illustrative case, while the extended measurement of child poverty and well-being among Egyptian children ages 0 to 5 as an empirical example using IFCP. The proposed framework marks a step forward in understanding child poverty and well-being multidimensional linkages and suggesting desirable features and data requirements of MDCP and well-being measures.

Keywords Multidimensional child poverty · Measurement · Conceptual framework · Capability approach · Bio-ecological · WASH

JEL Classification I32 · J13 · D63

✉ Mario Biggeri
mario.biggeri@unifi.it

Jose Antonio Cuesta
jcuesta@worldbank.org

Extended author information available on the last page of the article

🖄 Springer

1 Introduction

Designing policies for ending child poverty and well-being requires first to understand its multiple dimensions and linkages and, second, being able to measure child poverty and well-being (Ben-Arieh 2008). The evidence base for interventions that successfully address the well-being of children is robust and growing (Cuesta et al. 2018 and World Bank 2016, for recent reviews). Arguably, however, capturing the multidimensionality of child poverty and well-being remains a challenge. Many have argued that this is mostly due to the lack of in-depth, comprehensive and multidisciplinary approaches to analyse child well-being, while others blame the inconsistent use of definitions, indicators and measures of well-being (Ben-Arieh and Frønes 2011, Hanafin and Brooks 2005, Minkkinen 2013, O'Hare and Gutierrez's 2012, Pollard and Lee 2003). Unsurprisingly, several multidimensional child poverty (MDCP) measurement methods and indices currently compete for the limelight and yet little is known about the magnitude of their discrepancies, what drives them, which measure is better positioned to inform country policy design or monitor globally with the new Sustainable Development Goals (SDGs). This is the case of ending multidimensional poverty across all individuals, including children—SDG 1—, but also of several other goals.[1] Comparisons usually refer to differences in conceptual underpinnings and statistical properties while, in practice, several recent literature on MDCP measurement concentrates on adding new dimensions to current measures based on data availability considerations rather than conceptual coherence (see, for instance, UNESCWA et al. 2017). It remains unclear whether adding dimensions will lead to improvements in the understanding of MDCP dynamics. A case in point, for instance, is using a home computer as a proxy for informational deprivation, regardless of the use of computer, access to the internet and nature of any information accessed (Chzhen et al. 2016). In addition, several measures do not focus exclusively on individual child outcomes. Instead, they count the number of children in—monetarily or multidimensionally—poor households even though little is explicitly said about the presumed intra-household allocation relationships.[2]

Many consider such shortcomings in measurement as a required compromise for pragmatic reasons, notably the lack of data. But these shortcomings—for example, failing to capture discrimination in the allocation of consumption within the household—have implications beyond measurement precision that can result into biases in drafting child well-being supporting policies. Addressing such concerns requires to first acknowledge the complexity of MDCP dynamics and, then, develop a comprehensive theoretical approach (Roelen et al. 2009, Fernandez 2011, lery et al. 2014).

---

[1] Among which ensuring all girls and boys have access to quality ECD—goal 4—; or eliminating all forms of violence, early and forced child marriage, FGM, trafficking and sexual exploitation for girls—goal 5¬¬—, to cite some examples. Other examples of explicit mention to children in SDGs include ending all forms of malnutrition for infants, under-5 children and adolescent girls—goal 2—; end preventable deaths of under-5 children—goal 3—; ensuring safe, affordable, accessible and sustainable transport system for all, explicitly including children —goal 11. See UN (2015).

[2] Only a few studies explicitly discuss the poverty and distributional impacts of intra-household allocation. They include Cuesta (2007), De Vreyer and Lambert (2018), Dunbar et al. (2013), Klasen and Lahoti (2015) and Mercier, Ngenzebuke and Vervimp (2015).

This paper proposes an integrated framework from which to try to capture, analyse, discuss and compare the complexity of MDCP and well-being dynamic phenomenon for policy and measurement purposes. This framework integrates well-known and broadly discussed conceptual approaches under a single umbrella framework following an 'inclusive strategy' (Qizilbash 2018). Those approaches are the Capability, Human Rights, and Basic Needs. The resulting integrated framework of child poverty, IFCP, brings together: first, the scope of multidimensional poverty with reference to the individual, household and local context; second, the complexity of poverty dynamics and well-being and linkages across such dimensions, including the drivers and consequences of poverty and well-being deprivations; and, third, the areas of influence of such linkages, that is, the macro, meso and micro dimensions from a bio-ecological framework perspective (Bronfenbrenner and Morris 1998, Minkkinen 2013).

This integrated approach tries to bring more clarity about the concept and dynamics of multidimensional poverty and well-being among children beyond being passive members of a poor household. In addition, through the integration of multiple concepts, observed differences across child poverty measures can be traced back to specific design choices such as the inclusion of proxies; the interchangeable use of drivers and impacts (or more generally causes and effects of child poverty and well-being); the inclusion of variables that act at different levels (micro vs. macro, for instance); and the omission of relevant drivers simply not observed (at the individual level) or unaccounted for (at the community level). In doing this, we depart from previous analyses focused on highlight differences across conceptual frameworks (see, as example, Hjelm et al. 2016).

This paper is organized as follows. Section 2 provides a succinct literature review on the conceptual and empirical progress made so far in terms of measuring MDCP. Section 3 articulates the extended framework resulting from the integration of capability, rights and basic needs approaches. Section 4 illustrates the conceptual framework to a child specific dimension's deprivation—lack of adequate access to water—and discusses the merits and challenges resulting from the implementation of this integrated framework. In section 5 the case of Egyptian children 0–5 years old -based on Egypt Demographic and Health Survey (EDHS) 2014 data- is presented as example. Section 6 concludes with final remarks.

2 What Do the Current Multidimensional Child Poverty Measures Tell us?

Tsui (2002), Atkinson (2003) and Bourguignon and Chakravarty (2003) pioneering work sparked a growing literature on measuring multidimensional poverty and well-being, which now includes among its most influential works, Alkire (2014), Alkire and Foster (2011), Alkire and Santos (2013), Alkire et al. (2016), Atkinson (2015), Chakravarty, Deutsch and Silber (2008), CONEVAL (2009), Deutsch and Silber (2005), Duclos et al. (2006), Klasen and Lahoti (2016), and Massoumi and Lugo (2008). This work has encouraged academics to move into frontline policy making and advocacy, with Mexico and Colombia adopting official MDP measures and monitoring their progress (CONEVAL 2009 and Government of Colombia 2014). The UN Human

Development Reports now ranking over 100 countries in 2010 and 2014 based on their estimated MPIs (Multidimensional Poverty Index).

The specific measurement of MDCP has run parallel to the measurement of multidimensional poverty. Gordon et al. (2003) first developed a child specific multidimensional poverty measurement methodology at the request of UNICEF, known as the "Bristol approach". That study measured the MDCP for 46 developing countries. It anchored MDCP to the notions of deprivation of basic human needs and child rights and defined absolute child poverty as deprivation in terms of food, safe drinking water, sanitation facilities, health, shelter, education and information. These are the basic needs agreed upon internationally in the 1995 UN World Summit on Social Development in Copenhagen (UN 1995: 57), which are in turn drawn from the Convention on the Rights of the Child (UN 1989). Counting the number of children suffering from these deprivations by establishing the severe poverty line renders a deprivation headcount rate for countries (Gordon et al. 2003).

Subsequent studies operationalizing the MDCP from the child rights perspective include Roelen, Gassmann and de Neubourg (2010) in Vietnam and Roche (2013) in Bangladesh. Building from these works, the UNICEF Office of Research developed its own MDCP measure based on child rights in the domains of child survival, development, protection and participation. Deprivations defined over the environment and pollution, lack of cultural activities, violence at school, voice, or child labour exploration are also included when data permit. The ensuing measure, the Multiple Overlapping Deprivation Analysis (MODA) focuses on the type and number of deprivations experienced *simultaneously* by each child, rather than on the proportion of children deprived in each dimension respectively. It takes the child as unit of analysis, not the household. It distinguishes between the needs of children of different ages, rendering a life-cycle view to child poverty. And it treats deprivation of income poverty as separate from other well-being dimensions (see de Neubourg et al. 2012, Milliano de and Handa 2014, Chzhen and de Neubourg 2014). More recent versions of MODA (such as Hjelm et al. 2016, Chzhen et al. 2016, Chzhen and Ferrone 2017, de Milliano and Plavgo 2017) borrow from the Alkire-Foster methodology to incorporate measurement of poverty depth and decomposibity of poverty incidence by subgroup. MODA has been now implemented in more than 40 countries and, regionally, across Sub-Saharan Africa (de Milliano and Plavgo 2017), the European Union (Chzhen et al. 2016), the Arab Region (UNESCWA et al. 2017) and Eastern Europe and Central Asia (UNICEF 2017a).

Other studies of MDCP have not followed either the child rights-based approach, such as Trani et al. (2013), or the emphasis on overlapping deprivations, such as Bradshaw et al. (2007), Bradshaw and Richardson (2009), OECD (2009), Save the Children (2008), UNICEF Office of Research (2013). The former follows an MPI-like capability approach that considers deprivations—conceptualized as lack of freedom to do and be what the children themselves value—beyond child rights exclusively, which includes health, care and love, material deprivation, food security, social inclusion, education, freedom from economic and non-economic exploitation, shelter and the environment, autonomy, and mobility (see for instance Trani et al. 2013). The latter constructs and analyses macro-level dashboard indices of child well-being derived from multiple data sources. The implication is that these indicators can more comprehensively monitor deprivations at the national level, although they cannot determine the

extent of overlap of such deprivations (Hjelm et al. 2016, World Bank 2017). In addition, the Alkire-Foster's MPI is a multidimensional poverty index that counts the number of children in households defined as multidimensional poor, although some recent efforts attempt to sharpen the focus on children such as Trani et al. (2013) in Afghanistan and Alkire et al. (2016) in Bhutan. In contrast, CONEVAL's approach to multidimensional poverty does not distinguish measurement across the life-cycle (although it reports the number of children in multidimensional poor households).

A few studies have compared these measures. Conclusions from such comparisons range from a general convergence of measures (Ferreira and Lugo 2013; Dotter and Klasen 2014; UNICEF 2017b) to emphasising what purportedly are large differences (Hjelm et al. 2016, Karpati and de Neubourg 2017). Thus, Karpati and de Neubourg (2017) provide the most comprehensive conceptual comparison across indices. The study compares four MDCP measures for 17 different features. The review emphasises two significant differences that divide measures into different categories: the unit of analysis employed (whether individuals or households); and the method of aggregating dimensions and, ultimately, setting weights and thresholds. These differences have consequences on how measures capture life-cycle, age-group, and gender differences; the extent to which deprivations overlap and correlate to one another; the sensitive of indices to multiple poverty deprivations; and the implications—depending on their respective assumptions—for what may be happening within the household.

Beyond these conceptual comparisons, empirical comparisons are rare. In fact, there are only two comparisons that assess differences in empirical estimates of MDCP across measures. Evans and Abdurazakov (2018) and Hjelm et al. (2016) both agree that the MODA application provides higher multidimensional poverty measures than the MPI. MODA is more sensitive to gender-related deprivations since it captures individual deprivations more aptly than the MPI, which is a household-based index. By the same token, the equal weight given to individual and household defined deprivations implies that the latter have a larger impact in MODA than MPI as, by construction, they assign a larger weight than the MPI. However, these findings cannot be considered conclusive. Helm et al. (2016)'s analysis focuses only on four countries, while Evans and Abdurazakov's analysis concentrates on very specific distributions of deprivations; one with an underlying deprivation rate of 50%; and the other two with 20 and 80% deprivation rates, respectively. Similarly, Helm et al. (2016) is silent on the reason why one country—Mali— has a higher estimate of MPI than MODA, while the opposite is true for the other three countries (Cambodia, Ghana and Mongolia). In the case of Evans and Abdurazakov (2018) their simulation exercise only partially includes the complexity of the interlinkages and correlations across deprivations.

These comparisons might have overlooked or failed to stress two salient issues: the unit of analysis and the dynamic or changing nature of child poverty. Conceptually, individual child outcomes are best for capturing the quality of life and level of deprivation of the child (Domínguez-Serrano and del Moral 2018). But despite the large consensus on the need to consider the individual child as the unit of concern, measures exclusively focusing on individual outcomes are rarely applied in practice (Biggeri, et al. 2009; Trani et al. 2013). This is mostly because of data availability but also reflects that some services affecting child well-being are indivisible goods or services (for example, sanitation or electricity, see Vijaia, Lahoti and Swaminathan 2014). Furthermore, even when developing mixed individual-household based indices,

existing indices do not fully capture MDCP multilevel linkages. MDCP and the child's quality of life typically depend not only on the child's individual characteristics (either observed or unobserved, such as age, gender, health status, talent, attitude and identity, among others) but on collective factors—within and beyond the household—and their dynamic interactions. For example, the attitudes and behaviour of the people surrounding the child (mother, father, caregivers, teachers, siblings), and more generally, of the environmental context such as the social norms and policies in place where the child lives, influence outcomes to different degrees (Yousefzadeh et al. 2019). To the extent that resources available to the child within the household are misrepresented and the embeddedness of a child within a system (beyond her household) is overlooked, MDCP measures will not contribute to an accurate understanding of multidimensional poverty.

3 An Integrated Conceptual Framework on MDCP and Well-Being Dynamics

This section introduces an integrated conceptual framework that disentangle these complexities of MDCP, and distinguishes causes, interlinkages, as well as individual, household, local contexts and macro influences. The new framework combines in an integrated manner the most well-established approaches underpinning existing MDCP measures: the Capability Approach, the Human Rights Approach, and the Basic Needs Approach, and uses a bio-ecological framework to bring them together. We call it the Integrated Framework of Child Poverty, or IFCP. This integration captures relational dynamics at different levels and places the child at the centre of the analysis thereby addressing the two deficiencies of MDCP measurement among current approaches identified above.

The Human Rights Approach is the milestone for setting, the *de jure* entitlements and thus, through the legal system determining, protecting and guaranteeing opportunity freedom and process freedom (Santos-Pais 1999; Sen 2005, 2007). Analysing the MDCP outcomes in terms of the fulfilment of rights (CRC and CRPD) implies setting poverty lines for each dimension (or right) independently of the others. These poverty thresholds are such that being above them implies the child has opportunities that are sufficient in terms of quantity and quality, and in accordance with the stage in his/her life cycle (Stoecklin and Bonvin 2014). Poverty dimensions are selected because they are expressions of unfulfilled rights, so it is not possible to rank one above another (Burchardt and Vizard 2011; Vizard et al. 2011). This is considered the most relevant difference in comparison with the standard economics logic of resources scarcity—which will prioritize poverty dimensions based on their individual or marginal impact on well-being (Reddy 2011). A challenge in the Human Rights Approach is some rights among the universally predetermined set might have not only *intrinsic* value, but also an *instrumental* role in enhancing other poverty related dimensions. For example, being educated or healthy not only has value as ends by themselves but are also vital to facilitate other dimensions both in the short-term and long-term (e.g. leisure, employment). The possibility of taking into consideration the instrumental role of human rights is relevant for policymaking purposes.

The Basic Needs Approach (BNA), formalized by Streeten et al. (1981), is at the base of the concept of MDCP. This approach conceptualizes needs as those basic goods and services that need be distributed and accessible to every individual for the full physical, mental and social development of human personality (Streeten et al. 1981, Reddy 2011). This approach primarily focuses on the minimum requirements for a decent life (such as health, nutrition, water and sanitation, to mention some) and the goods and services that are needed to realize it (Deneulin 2009)—with an underlying universal scope. Therefore, the Human Rights approach and the Basic Needs are strongly complementary. As Stewart (1989: 350) says: "Both the basic needs and the human rights approaches can be seen as attempts to develop a moral and political agenda which would ensure fulfilment of basic needs and not leave the extent of fulfilment to contingent force".

The Capability Approach (Sen 1985, 1999, Nussbaum 2011) has incorporated many of the concerns inherent in the BNA into a full-fledged conceptual framework with an additional emphasis on empowerment and well-being (Clark 2006). The capability perspective enhances our understanding of the nature and causes of child poverty and well-being deprivation by shifting primary attention away from means towards ends that children have reason to pursue (Biggeri et al. 2006), and, correspondingly, to the freedoms to be able to satisfy these ends (Sen 1999: 90). This approach goes beyond the resource-based approach (Rawls 1971) as resources are not considered as the exclusive focus of concern for a theory of justice (Sen 2007). The capability approach considers income as a relevant means but at the same time underlines the inadequacy of income as a proxy for the freedom of children capabilities (Biggeri, Ballet and Comin 2011). This is particularly evident for children with disabilities who need different resources (in quality and in quantity) with respect to their peers (Trani et al. 2011).

The integration of these three approaches allow for a better understanding of MDCP and the mechanics for its change by adding three main elements to the analysis. First, it helps to disentangle child outcomes (achieved functionings) from child capabilities (opportunities for children to function) from goods and resources availability (child poverty in terms of resources/inputs). Second, it explains the MDCP dynamics that link the resources (goods and services), to child capabilities (opportunities) and achieved functionings (outcomes), and describes how these are mediated by the individual, social and environmental conversion factors as specified in the capability approach. Third, it enlarges the policy space for action which now focuses on the conditions for children to flourish, rather than on merely assuring that they can realise a minimally decent life.

Thanks to these three elements, the IFCP maps where changes in well-being come from. For example, the new framework can determine whether an observed child deprivation in a certain dimension (e.g. education) reflects lack of opportunity or lack of resources; and how it is mediated by conversion factors (at both the individual level such as impairment, or societal level) that affect positively or negatively the capacity of the child to transform available goods into opportunities. From a rights' perspective, a child failing to go to school fails to satisfy de facto a *de jure* entitlement to education. Taking account of the characteristics of the child, the household and the community (conversion factors), the new IFCP explores the constraints and the factors that enable or disable children's opportunities (or de facto entitlements). Furthermore, the roles and interactions among stakeholders is also relevant to understand children's multidimensional poverty dynamics—in the same way it is for monetary poverty. A child is

entitled *de jure* to a sufficient level of access to resources and opportunities that must be guaranteed by the State, regions, the household and other duty bearers (caregivers) actions (CRC, 1989); and de facto their level of well-being depends on the societal arrangements and on characteristics of the place where s/he lives.

We use a bio-ecological model (Bronfenbrenner and Morris 1998; Bronfenbrenner and Morris 1995) to bring together the different levels of interactions and actors that affect MDCP dynamics. We also build from Bronfenbrenner and Minkkinen's bio-ecological model of child well-being, which recognizes the social and cultural aspects of child well-being beyond individual, household and community relationships.[3] The child is at the centre of relationships, surrounded by her/his immediate environment – the 'microsystem' (e.g. home, peers, and proximate community). Microsystems are further embedded within broader systems: the microsystem's interactions (or "mesosystem" in Bronfenbrener's terminology) the exosystem and the macrosystem (see Fig. 1). These levels interact with each other and may have a cascading effect on children's well-being. For example, the child interacts—daily—with caregivers at home and peers at school (the microsystem). Caregivers have a strong influence in terms of resources, capabilities and choices, and thus the outcomes the child achieves. Interactions between microsystems take place, for example, between schools and families. The exosystem captures the linkages and processes taking place in broader settings that have an influence on the child even though s/he does not directly participate in them. For example, the parent's workplace schedule agreements or the availability of early childcare facilities are part of the child's exosystem. The macro-system is the outermost layer comprising economic and historical context, respect for human rights, social norms and culture. They provide the structures that shape the country's system. Suppose a child grows up in a country with discriminatory norms toward girls or in a country, which does not hold parents responsible for severe physical punishment to their children. Such countries provide a distinctive set of values that might affect children's development in substantively different ways.

The local-system is introduced as a new category to capture the fact that the relationships are geographically determined. In other words, the local-system and its functionings are central in terms of outcomes (goods and services delivered). For instance, the security (road safety, freedom from violence) of the neighbourhood, the freedom from pollution or the presence of quality educational services in the geograph-ical area where the child lives, all have a substantive impact on the child's well-being. They can vary substantially even within the same city. The local/territorial is a key level for analysis: the changing characteristics of the immediate settings in which children live and in which their personal and societal development interact, shapes and influ-ences the ability to exercise human rights in the capability space.

To illustrate the framework, consider the example of a teenager dropping out of school. At the centre of Fig. 1, there is the child with specific characteristics such as age, gender, talent, identity, motivation, mental health and self-efficacy. These charac-teristics are (partly) the result of the individual's interactions with his/her proximate

---

[3] Minkkinen's model (2013) defines three dimensions of well-being for children, namely, physical, mental and social; and four systemic levels of influence, that is, subjective, circle of care, society and culture. Unfortunately, the model does not describe—nor disentangle—the interlinkages among such levels nor discusses the implications for measuring well-being. Instead, it focuses on aggregating all levels into the bio-ecological model and advocates for a multi-disciplinary and thorough analysis of well-being.

Conversion factors: resources and barriers

Exosystem
- Parent's work environments
- Mass media
- Neighborhoods
- School Board
- Extended family
- Associations (church)
- ...

Macro-system
- Historical context
- Social conditions
- Economic system
- Cultural background
- Law system
- Resources (investments) and barriers ...

Microsystems Interactions

Microsystem
- Family, Siblings
- Caregivers
- Peers
- Classmates
- Teachers
- Microsystem and its resources
- ...

Macro-system
Local-system
Exosystem
Micros. Interact.
Microsystem

Child

Local-system
- Social norms
- Environmental characteristics
- Local Culture
- Educational system
- Health system
- Informational system
- Local/territorial context and its resources access
- ...

Child
- Age of the child
- Maturity
- Talent
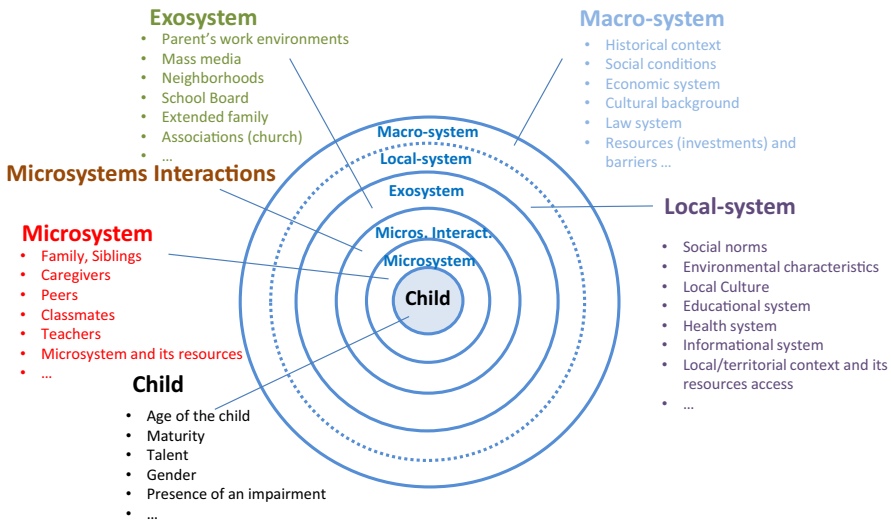- Gender
- Presence of an impairment
- ...

Fig. 1 The Child's Bio-ecological System, Source: adapted from Bronfenbrenner (1995)

world characterized by family, peers, schools, and teachers. Family resources (economic, cultural, social) play a critical role in influencing school dropout. Similarly, peers can also have push-and-pull effects. Factors such as the quality of school and teachers also affect drop out. Micro-systems interactions include the relations between schools and parents. When different stakeholders in a community show mutual supportive collaboration toward school inclusion, then the adolescent is less likely to drop out. Exosystem includes—among other things—the labour market regulations that influence the time parents can devote to the education of their child. The local-system is the context where the child lives and interacts as well as the good and services and norms that are available. These can influence the child's opportunities to go to school (for instance, transport options and disabled-friendly buildings). Finally, the macrosystem through culture, adult role models, the economic system and the law also has an impact the risk of dropout.

The IFCP dynamics in Fig. 2 show that all the traditional approaches of poverty and well-being (plus the bio-ecological model) are complementary and be successfully combined to understand MDCP dynamics. The diagram presented here builds from the Biggeri and Ferrannini's (2014) STEHD framework conceptualisation of territorial level dynamics and Robeyns' (2005) framework for individual level functioning further developed by Ballet et al. (2011) and Trani et al. (2011). The IFCP explicitly disentangles: i) agency and choice processes for the individual child (lower right-hand side), including the microsystem, microsystems interactions and exosystem; ii) the territorial functionings of children (left-hand side), which captures the availability of playgrounds, sport facilities, mobility facilities, and a pollution-free environment (among other achievements); iii) the collective dynamics level (upper right-hand side), which reflects the extent to which individuals—including children—can foster change in the

socio-institutional context through collective action; and iv) multilevel governance relations—that are central for human rights advocacy—which are sketched vertically at the top of Fig. 2, and help to account for the influence that the macrosystem (law systems, economic systems, social norms) has on children's development.

The dynamic nature of the framework is represented by several feedback loops and interactions that occur within and between each component (numbered 1–9 in Fig. 2), which drive the evolution of social, economic, ecological and institutional systems impacting children's well-being and poverty. This does not mean, however, that all the feedback loops are necessarily active, with different temporal lags and conditions usually governing their operation and influencing overall dynamics.

The child with her own individual conversion factors is at the centre of the framework. The age of the child, her maturity, talent, gender, presence of impairments, among other factors, are all decisive in determining her multidimensional poverty status. They influence her capacity to transform the available goods and services into achievable functionings (outcomes) while interacting with the most proximate environments (microsystems). In the proposed framework, the third group of feedback loops (6, 7 and 8) relate to the linkages that determine individual empowerment, while Arrow 9 connects individual dynamics to local development processes (a single child can make the difference as shown by Malala well known for the Peace Nobel Price for her battle against child labour and female children discrimination and Greta, leading the movement Fridays for Future).

Even in the presence of multiple systems, the individual microsystem continues to play a central role. This is especially true in early childhood development. The microsystem gives resources to the child (arrow "a" in the lower right panel); helps the child to improve her conversion factors (arrow "b"); and may enable other agents to contribute toward the child's achieving some functions (arrow "c"); assists the child
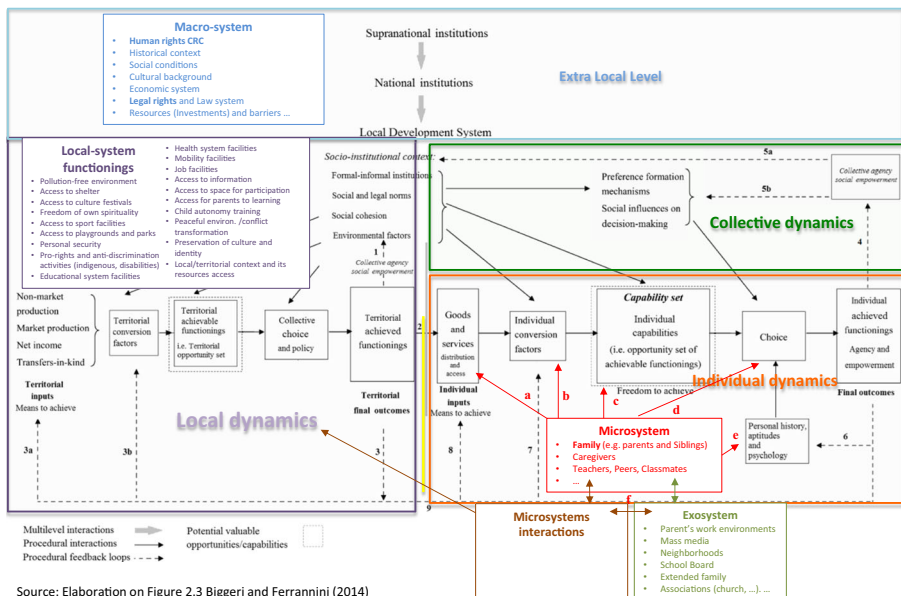
Fig. 2 Multidimensional child poverty dynamics: An Integrated Framework

with the process of choice (arrow "d"); and facilitates—or inhibits—the child's agency, autonomy of judgement, and psychological character and behaviour (arrow "e"). The emotional and cognitive development of children go through different stages in which their decision-making processes and agency are shaped by their life experiences and mimicking behaviour. This dynamic process is also influenced by feedback loops (Ballet, Biggeri and Comim 2011) which are depicted as dotted lines in Fig. 2.

In this continuous dialogue of transformation—that links a-d capture—there are several freedoms that depend on the assistance and actions of others (Sen 2007: 9). Thus, the microsystem interaction with the exosystem are usually mediated by the parents and the caregivers, especially when the child is very young. This can make a difference in access to resources and can settle or unsettle some issues and open or reduce opportunities. This is also the level where intra-household inequalities in the allocation of expenditure or time devoted to household chores can result in skewed opportunities. For example, parents might choose to send some of their children to private schools (if of better quality) while sending others to public school (Iram et al. 2008; Ota and Moffatt 2007).

Spaces of participation and individual and collective agency freedom can boost the transformation of local societies (e.g. through the protection of local public goods, the change of discriminatory social norms or the advocacy of human rights, to mention some channels). This is described by the feedback loops 4, 4b, and 5a. Examples of these loops include social movements for ending child labour and child marriage.

The environment enabling—or hindering—the development of the child is not limited to a single, immediate setting. It may well incorporate trans-territorial interconnections between settings and external influences accruing from upper levels. If the local perspective can produce the adequate answers to children deprivation with tailored actions and services, coordination with higher levels is needed and becomes central to, for example, maintain national guidance and equity. As illustration, the opportunity to have a healthy life for a boy or girl living in the city is determined by multiple factors such as access to services, the quality of those services, the quality of the environment, prevailing social norms, access to economic means, and awareness of and exposure to risks, and so on and so forth. To improve the opportunity to be healthy, policies that stem only from the local level will almost certainly not be enough. Instead, a strategy involving different levels of governance and the same objective remains fundamental. Consider a small village where the local authority is responsible for improving the quality of the environment (water and sanitation); the regional authority is responsible for reorganizing health service provision; and the national authority is responsible for upholding the legal system, encouraging investment, increasing salaries for health workers and guaranteeing free access to health services for under-5 children. In such cases, local-system's functionings are the outcomes of both bottom-up (via participation) and top-down (policy design) dynamics.

At the macrosystem level, child opportunities are enhanced or shunned depending on existing norms, institutions and policies implemented at national level (see for example Marcus et al. 2002, Harper et al. 2009, and Drywood 2011 for mainstreaming children's rights in policy discourses). For example, the quality of the child's life is typically favoured if the CRC is recognized and adopted by the national legal system. However, the adoption of regulation does not automatically imply that the law is enforced. Funds are often not allocated to support the implementation of measures.

For example, Italy passed in April 2017 a law to guarantee the rights of unaccompanied children. However, the budget allocated to migrant children has not increased as a result of the law. Transforming this *de jure* guarantee into a de facto right remains a daunting challenge in Italy.

The IFCP highlights some relevant implications from a measurement point of view. First, individual child resources are not necessarily equivalent to (and are not necessarily transformed into) the functionings/outcomes of the child. Second, symmetrical household resources are not necessarily equivalent to functionings/outcomes of the same household because children differ in their capacity to transform resources into effective opportunities. Equality in inputs can in fact translate into inequality in outcomes. Furthermore, the conceptual framework allows distinguishing between different levels of measurements. If one is interested in MDCP, then the measure should be based only on individual outcomes reflecting the quantity and quality of multidimensional achievements (or deprivations). This is an indicator of equality. Conversely, if one is interested in equity rather than equality, then the measure should incorporate opportunities, representing the freedom to achieve valuable being and doings. And, most importantly, the framework shows that functionings at the household level do not correspond to individual child functionings.

4 Applying the Integrated Framework of Child Poverty and Well-Being Deprivation: A Conceptual Illustration on Access to Safe Water and Sanitation

In this section, the Integrated Framework is applied to access to safe water and sanitation as a conceptual illustrative case. Despite the progress, too many children die every year from diseases caused by poor water and sanitation (JMP, WHO and UNICEF 2017). Every year, some 443 million school days are lost because of water and sanitation related diseases (JMP, WHO and UNICEF 2017). Not having access to an improved water source impacts on several other dimensions such as health and disability, education, social recognition, participation and employment. Women and children are disproportionately affected because they bear the primary responsibility of water collection in most households in the developing world.

Applying the framework implies the following starting question: "*Is the child deprived in terms of achieved functionings related to water use such as drinking water and/or personal hygiene?*" (left-hand side of the diagram in Fig. 2). In this dimension, capability or opportunity is defined as having access to sufficient and safe water for personal and domestic use (JMP, WHO and UNICEF 2017). The related functionings (outcomes) are drinking safe water, being hydrated. Washing hands and practising a standard personal and household hygiene. This immediately raises the issue of how to measure it and which indicators to select. Most MDCP measures include "access to water" and access to an improved sanitation facility as proxies of WASH. This is usually measured by the distance of the household to water source and its quality (improved or unimproved), and the quality of the sanitation facility of the household (improved or not). The implicit assumption is that the availability of a resource at household level translates automatically into child outcomes. However, this might not always be the case as it depends on individual characteristics such as gender, education,

age or presence of impairment. Indicators should be child specific and should measure functionings' outcomes rather than inputs to truly capture these processes and outcomes. An example the question, at the individual level, could be formulated as follows correct questions at the individual level includes: "is the child well hydrated? "How many litres of water do you drink every day?"; "What is the source of water you drink?'"; "Did you wash your hands with soap before eating?" or for young children; "Do you wash hands before feeding your child", among others.

Household surveys capture these functionings to different degrees. The degree of safe water available to household members to drink is usually captured in all living standards; income and expenditure; and demographic and health (DHS) types of survey. Also, the new round of UNICEF's Multiple Clustered Indicator Surveys (MICS) detects whether the drinking water of the household is contaminated with *E. coli* through a specialized water quality test administered to the household water source (UNICEF 2018a, 2019). And demographic and health surveys in Liberia and Peru have already tested for *E. coli* in the past (USAID 2013, 2015). None of the standard household surveys, however, captures the degree of hydration of the child, although DHS and MICS routinely ask whether a child drink more water than usual and/or received oral rehydration therapy when suffering from diarrhoea (UNICEF 2018b). Personal hygiene, specifically in the form of washing hands before eating, is not asked directly in most household surveys. Instead, they report whether there is a dedicated place in the dwelling for hand washing with soap. Time use specific surveys report time spent on washing, although this information is not specific for hand washing but, rather, is aggregated to other activities such as grooming and dressing (see, for example, the Albania Time Use Survey 2010 or US PSID time use interviews for a comparison of the actual questions; Albania Institute of Statistics 2014, The Institute for Social Research 2016). Hence, despite a solid progress in measuring multidimensional aspects of access to water, only a very limited number standard household survey contains enough information to fully implement IFCP. This should not be a reason for discarding IFCP: questions that in the past seemed too technically challenging or too sensitive to be asked are now collected on a systematic basis. This is the case of anaemia testing through blood tests or detailed anthropometric information from rigorous measuring and weighting in demographic and health surveys. Sensitive questions on intimate partner violence and sexual behaviour, subjective questions on happiness, life satisfaction or discrimination against people living with HIV, and questions related to mental health conditions are now routinely, comparably and systematically collected in demographic and health surveys and MICS.

If the child is deprived (that is, s/he drinks contaminated water or does not wash his/her hands adequately), we need to enquire about child poverty dynamics in this dimension. This involves answering the question: does the child have an opportunity in that dimension? Since the measurement of opportunities is typically problematic if the survey is not purposively constructed to assess those opportunities (Krishnakumar 2007), one could at least assess whether children with similar characteristics are equally deprived in that dimension. If the child has the opportunity, but not the functioning, then the deprivation is rooted in the process of choice. The choice in question is influenced by personal characteristics (such as attitude) and household and social norms (such as social influences on decision-making). For instance, if a child does not wash his/her hands despite having the opportunity to do so, it may well be because

of his/her attitude towards hygiene practice. Those attitudes might in turn be affected by social norms, household literacy, peer to peer relations, and role models. For example, Wasonga et al. (2016) found that cultural beliefs and social principles regarding age, kinship and age strongly govern water, sanitation use and hygiene practice in a rural community in Kisumu County in Kenya. They also found that hand washing was not practiced as it was believed that doing so would affect the person's ability to rear livestock.

If the child does not have the opportunity to access sufficient safe water for personal and domestic use, then it is important to understand why. This can be due to lack of (or the inadequacy of) public and private goods and services at the local level or it can be due to insufficient conversion factors. The first case includes water shortages and poor infrastructures, but also biased or corrupt institutional arrangements and regulatory environments. Rural and remote communities, for instance, are the most vulnerable because poor infrastructure generally prevents the delivery of safe water (Pond and Pedley 2011). Yet urban polluted areas are more at risk of water contamination. The availability of water at local level is further dependent on factors operating at the macro-level such as legal enforcement, geopolitical factors, the national supply of water, technological progress and geography and climate.

The second case includes circumstances where—regardless of the level of goods and services provided—there are additional factors (the so-called conversion factors) that prevent specific persons from having opportunities. These conversion factors can be at individual (impairment, age, and gender), household (literacy, income), social (stigma, unequal access to resources of different groups), and environmental (lack of safety) levels. Usually children—girls in particular—living in illiterate families, orphans, and children with disabilities face additional barriers. In these cases, it is important to identify the mechanisms involved. For example, it might be the case that girls are disadvantaged because lack of safety prevents them from using improved water sources if this requires walking long distances, or because of intra-household unequal allocation of resources and time across household chores. It could be also the case that a combination of factors ultimately causes deprivation. Lack of security, the presence of non-friendly social norms on female children, household monetary poverty and illiteracy, the lack of a legal and enforcement system, and poor infrastructures are all factors that often act as concomitant causes. It follows that the reasons why a child may lack this or that capability can markedly vary case to case even within the same geographical area.

In terms of data and measurement, the IFCP framework allows us to disentangle outcomes at child level (e.g. how many litres of safe water the child drinks) from confounding factors (household distance to water source). It also distinguishes between individual child conversion factors (age, gender, and disability), household conversion factors (parents' literacy, income), environmental factors (safety of the area) and social factors (informal norms that regulate access to water). Moreover, it acknowledges the role of national and supranational law as well as the transformative change that can arise from collective action and social empowerment. Lastly, it considers goods and services that are provided at the local level (wells, aqueducts) together with the norms that govern the access to water (economic, social) and their accessibility. Standard household surveys do not currently collect all the indicators needed to disentangle the interlinkages identified above that determine whether a child is deprived of safe water

and why. But the IFCP shows that this is a practical rather than conceptual gap, which can be breached with the collection of additional indicators. The IFCP helps identify those questions, which in the case of access to water, are relatively modest in number and technical difficulty.

As with access to safe and sufficient water, each dimension of deprivation must be analysed with respect to its interactions with other dimensions (e.g. overlapping deprivations) to understand its instrumental value and role. While any MDCP measure aggregates dimensions, the integrated MDCP framework, based on the capability approach dynamics, reveals the key interactions among dimensions driving the choice of relevant policy options to address multidimensional poverty that hang on instrumental dimensions. This can only be understood with an expanded and integrated framework that details multiple interactions across dimensions.

The example just discussed raises relevant issues not only for policy making (that is, which challenges and at which different levels exist) but also several issues that are crucial for measurement. We focus here on the importance of adopting the child as the unit of evaluation since household-level defined variables (such as access to water) might hinder severe differences among children depending on individual conversion factors and intra-household inequality. Patterns of intra-household inequalities are well known, yet usually unaccounted for in MDCP measures. For instance, patterns of preferential resource allocation to male children is particularly strong across South Asia and East-Asia (Behrman and Deolalikar 1990; Almond et al. 2013, Bongaarts 2013, Kabeer et al. 2014), although this is generally true worldwide (Quisumbing and Maluccio 2003). In addition, birth order can have an impact on children's achieved functioning (Mechoulan and Wolff 2015), and so can polygamy or the presence of multiple wives (Bolt and Bird 2003, Arthi and Fenske 2016). The complexity of such relations suggests that simply reporting MDCP status disaggregated by gender and age of the child may not be enough. Patterns of preferential allocation of material and non-material resources are likely to be determined by other circumstances of the child. For example, differentiated investment allocation between siblings can depend on their initial endowments: physical development (Leight 2017), early health shocks and health status (Ayalew 2005, Yi et al. 2015), and cognitive ability (Ayalew 2005). Children with disabilities are usually the most disadvantaged even within the family as they are discriminated against and are deprived of basic opportunities such as food, education and shelter and are at greater risk of experiencing physical or sexual violence than peers without disabilities (Yeo 2001, Trani et al. 2013). Being an adopted child can also have an impact on treatment within the family (Bolt and Bird 2003; Guarcello et al. 2010; Covarrubias 2015). Case and Paxson (2011) note that the absence of a child's biological mother in a household may lead to reduced consumption and increased domestic violence against that child.

All this evidence contributes to strengthening the case for considering the child as the unit of evaluation for poverty measurement. The example above has demonstrated that "household distance to water source" is not informative of every child's capability to access safe water. This argument can be applied to other dimensions ranging from "having access to information" to "having access to nutritious food". Child-level defined variables on outcomes are crucial. More efforts are needed in identifying and including individual-related questions to capture behaviours and attitudes. Such efforts

have already taken place in some dimensions but need to be adopted consistently across others before the full application of IFCP can be a reality. Finally, for a complete application of the IFCP empirical application, it is important to take into account the functionings in terms of WASH of the community/territory where the child lives also.

5 Applying the Integrated Framework of Child Poverty and Well-Being Deprivation: An Empirical Illustration on the Measurement of Child Poverty and Well-Being among Egyptian Children Ages 0 to 5

This section presents a case study consisting of measuring child poverty and well-being among Egyptian 0 to 5 year-old children using the 2014 data from the Egypt Demographic and Health Survey (EDHS). The example illustrates how a local-sensitive measure of water and sanitation deprivation, that captures individual access as well as the community connections usually ignored in national measures, improves the diagnostics of a nationally based measure. We contextualize this exercise as part of a broader measurement of child well-being for the IFCP. Thus, the selection of the seven dimensions shaping the measure of child well-being is based on commonly used pillars of child well-being as reported by previously reviewed studies (see in particular on Biggeri et al. 2006 and Trani et al. 2013).[4] As a result, we construct a composite index for child well-being, national and regional, that aggregates all seven dimensions of well-being. Regionally, Egypt is composed of 27 primary -level administrative regions, or governorates. Two methodologies are used for the calculation of the individual child composite index, one using the arithmetic mean and, the other, using the geometric mean.[5] The geometric mean (used also in the Human Development Index) considers the heterogeneity of the individual outcomes in a more salient way than the traditional arithmetic mean (i.e. perfect substitutability among dimensions). We also construct different measures of the level of deprivation on water and sanitation, separately (and across definitions), and one combined measure of WASH. The IFCP emphasis on capturing local heterogeneity is taken into account by including the standard deviations of the respective indicator defined at each territorial cluster used in the EDHS.

Table 1 reports those dimensions, the definitions and indicators used (with different options for water and sanitation) and the means of each of such indicators—presented as standardized z-scores—for the subpopulation of children ages 0 to 5. For each dimension the poverty thresholds is reported as well as the number of observations for 2014 and the well-being mean. According to the dimensions selected (where 0 means full deprivation and 1 full well-being), Egypt is scoring quite well in several of them such as water (definition 1) and sanitation (definition 1) and health (the scores are respectively, 0.971, 0.902 and 0.735). By contrast, the performance is quite weak in

---

[4] In other words, while the information specific to each single dimension is very important for sector-specific policy making and monitoring, we concentrate on analysing water and sanitation, nationally, regionally and locally to connect this empirical analysis to the conceptual discussion in section 4.

[5] In both cases, a small change in any dimension will be associated with a small change in the overall index, avoiding discontinuities in the overall index. The overall average (i.e. for all children) is calculated then by using the arithmetic mean.

Table 1 Dimensions chosen to operationalize the conceptual frame for the MDCD: Definitions of wellbeing dimensions and indicators

Dimension (used)	Indicator	Deprivation threshold (this is set at 0.5 score)	Well-being Mean z-score	N. Obs
Health	Vaccinations[7]	Recommended n of vaccination per age (months)	0.735	14,584
	Stunting	Height-for-age < −2 s.d. from WHO reference		
Nutrition[8]	Undernutrition	Weight-for-height < −2 s.d. from WHO reference	0.644	13,462
	Over nutrition	Weight-for-height > 2 s.d. from WHO reference		
Water	**(definition 1)**	Access to safe water	Time to a safe water	
source more than 30 min	0.971	14,945		
Water	**(definition 2)**	Access to safe water	Time to a safe water	
source more than 5 min	0.956	14,945		
Sanitation	**(definition 1)**	Type of toilet facility		
Improved sanitation: any type of flush toilet divided by the number of	households using it	0.902		14,947
Sanitation	**(definition 2)**	Type of toilet facility		
Sanitation	1 + account for handwashing place with water and soap	0.843		14,947
Sanitation	**(definition 3)**	Type of toilet facility		
Sanitation	2 + divided also by the number of household members (divided by two every 3 members)	0.661		14,947
Housing	House crowding	3 people per room	0.564	14,952
Household Assets	Wealth score	Score is equal to that of families who have a minimum of assets.[9]	0.527	14,952
Violence	Exposure to violent discipline	Any type of physical violence	0.317	13,612
WASH at the local level	Water and sanitation at the local level	WASH: average of water2 and Sanitation3 (see above)	0.809	14,952

[7] Child health is a combination of immunization by age and stunting (height for age z-score under −2 s.d.), where the lowest score is taken as the health score

[8] Nutrition comprises both under- and over-nutrition, measured in z-scores of weight-for-height

[9] Fewer than two communication/information devices, no mobility asset (car, bike), and fewer than two durable assets

dimensions such as the exposure to violent discipline (0.317) and household material wealth (0.527).

Table 2 presents the results for the separate dimensions of water and sanitation, the full child well-being measures as composite indexes (using arithmetic and geometric means, respectively), and the WASH aggregate. Results are reported for Egypt as a whole and for all its governorates.

Results for the aggregate definition of child well-being show that the incidence of child deprivations varies substantively depending on the mean used to aggregate the different individual well-being dimensions (see last note in Table 2). Thus results using the geometric mean are, as expected, lower than the arithmetic mean, since they take into account the heterogeneity of the outcomes among the different dimensions at the individual level. It is important to keep in mind that technically the geometric mean can penalise heterogeneity too much if there are dimensions close to zero (Klugman et al. 2011).[6]

Furthermore, WASH at the local level can be captured by the variance across governorates. The standard deviation to the mean at cluster/local level shows the differences *within* governorates, thus providing a more precise map for policy intervention across local areas within each governorate. This analysis adds granularity to simply looking at the evolution of a national measure over time and/or the comparison of deprivations across governorates. When we look at deprivations at the local level, as advocated by the IFCP, we do better understand the heterogeneity of access to WASH (or any other well-being dimensions) at the local level and direct or targeted policy interventions where most needed. In other words, according to IFCP, well-being and deprivation are given by an interaction between the individual and the community where the children and their households live and interact. Therefore, analyses that combine multiple dimensions with the data at the local level can reveal important insights for policy-making.

6 Concluding Remarks

The analysis of poverty and the selection of indicators for poverty and well-being is not a neutral process and is necessarily grounded in conceptual frameworks (even if this framework is not made explicit—Sen 1980). Notwithstanding improvements, current applications of MDCP measures are often far from reflecting a comprehensive and consensus understanding of child well-being and its linkages. This is in part because of

[6] To overcome this technical issue, it is possible to use the MSI aggregation method introduced by Mauro et al. (2018). This method involves a function *g* set at the individual level that indicates to what extent individual can substitute different dimensions to compensate for low well-being in one dimension relative to others taking into account at the same time, at the individual level, the average level and the heterogeneity of outcomes (Mauro et al. 2018).

Table 2 Water, Sanitation and composite indexes: simple mean and geometric mean, and WASH (at local level) by governorate (Egypt, EDHS 2014)

	Water 1	Water 2	Sanitation 1	Sanitation 2	Sanitation 3	WASH* mean	s.d.	min	max	Number of Clusters	Cluster s.d.	Child well-being Arith-metic mean^	Child well-being Geo-metric mean^
Egypt	0.969	0.956	0.903	0.843	0.661	0.809	0.152	0.167	1	1750	0.102	0.679	0.507
Urban Governorates													
Cairo	0.998	0.997	0.996	0.968	0.777	0.887	0.109	0.501	1	131	0.065	0.691	0.525
Alexandria	0.993	0.984	0.987	0.950	0.770	0.865	0.117	0.523	1	85	0.070	0.714	0.557
Port Said	0.958	0.956	0.967	0.939	0.706	0.831	0.162	0.171	1	63	0.124	0.728	0.598
Suez	0.998	0.998	0.992	0.984	0.793	0.895	0.101	0.579	1	70	0.050	0.744	0.627
Lower Egypt													
Damietta	1.000	1.000	0.891	0.885	0.737	0.873	0.102	0.600	1	64	0.049	0.715	0.569
Dakahlia	0.997	0.995	0.974	0.924	0.744	0.870	0.116	0.319	1	76	0.066	0.742	0.605
Sharkia	0.893	0.883	0.908	0.847	0.669	0.778	0.165	0.327	1	78	0.110	0.651	0.498
Kalyubia	0.944	0.929	0.926	0.796	0.648	0.810	0.156	0.288	1	83	0.100	0.711	0.591
Kafr El-Sheikh	0.747	0.863	0.132	0.351	1	0.68	0.063	0.736	1	0.606	0.987	0.973	0.964
Gharbia	0.940	0.877	0.964	0.936	0.765	0.822	0.162	0.326	1	72	0.083	0.695	0.536
Menoufia	0.952	0.926	0.918	0.908	0.730	0.830	0.143	0.366	1	69	0.069	0.740	0.622
Behera	0.983	0.976	0.850	0.816	0.651	0.815	0.140	0.226	1	77	0.076	0.710	0.571
Ismailia	0.990	0.988	0.926	0.865	0.698	0.840	0.140	0.294	1	66	0.081	0.726	0.589
Upper Egypt													
Giza	0.941	0.904	0.955	0.904	0.711	0.819	0.162	0.337	1	103	0.112	0.661	0.479
Beni Suef	0.997	0.996	0.909	0.830	0.656	0.827	0.131	0.379	1	68	0.068	0.642	0.464
Fayoum	0.996	0.992	0.912	0.787	0.592	0.795	0.130	0.294	1	68	0.064	0.651	0.449

Table 2 (continued)

	Water 1	Water 2	Sanitation 1	Sanitation 2	Sanitation 3	WASH*				Number of Clusters	Cluster s.d.	Child well-being Arith-metic mean^	Child well-being Geo-metric mean^
						mean	s.d.	min	max				
Egypt	0.969	0.956	0.903	0.843	0.661	0.809	0.152	0.167	1	1750	0.102	0.679	0.507
Menya	0.993	0.990	0.818	0.711	0.556	0.778	0.142	0.333	1	72	0.073	0.628	0.373
Assuit	0.986	0.977	0.780	0.726	0.534	0.756	0.142	0.259	1	67	0.067	0.623	0.363
Souhag	0.996	0.995	0.803	0.693	0.464	0.725	0.141	0.185	1	72	0.088	0.601	0.347
Qena	0.967	0.961	0.845	0.763	0.582	0.769	0.156	0.180	1	70	0.096	0.684	0.528
Aswan	1.000	0.999	0.863	0.782	0.545	0.776	0.132	0.336	1	68	0.076	0.679	0.507
Luxor	0.996	0.993	0.805	0.727	0.552	0.785	0.138	0.214	1	66	0.087	0.679	0.503
Frontier Governorates													
Red Sea	0.939	0.905	0.955	0.896	0.758	0.783	0.217	0.167	1	31	0.181	0.669	0.504
New Valley	1.000	1.000	0.910	0.821	0.642	0.850	0.126	0.500	1	31	0.072	0.722	0.568
Matroh	0.728	0.722	0.834	0.824	0.492	0.635	0.184	0.224	1	32	0.148	0.625	0.517

Source: authors' elaboration on EDHS 2014

Note: Water1: Time to a safe water source more than 30 min. Water2: Time to a safe water source more than 5 min. Sanitation1: Improved sanitation: any type of flush toilet (in the house or close to) divided by the number of households using it. Sanitation2: Sanitation 1 and accounting for handwashing place with water and soap. Sanitation3: as Sanitation2 but further adjusted for number of hh members (every three)

*WASH: average of Water 2 and Sanitation 3 calculated using individual data. While, standard deviation, Max and Min refer to the data related to the clusters within each governorate according to the 1750 primary localities of the EDHS

^Arithmetic mean and geometric mean are calculated using the seven dimensions reported in Table 1 (choosing Water2 and Sanitation3 as dimensions)

the difficulty in understanding all the conceptual linkages behind the individual child, household and community or local levels and, in part, because data limitations do not currently allow for a full operationalization of child individual data only. In this paper, we seek to better understand the multi-level conceptual linkages governing MDCP by integrating different approaches into a single framework borrowing from the human rights, the capability and the basic needs approaches. While integration is not an end itself, it helps to inform decisions on what indicators to include, what assumptions to accept, and how they relate to each other according to the level and the aspects chosen in the analysis. Moreover, taking from the bio-ecological model, our approach highlights the need to include multiple levels of relationships around—but beyond—the child. The child emerges at the centre of our analysis but is embedded in his/her community.

The ensuing integrated framework, IFCP, has the potential to disentangle causes from effects, outcomes from opportunities, dynamic from static elements, and observed from assumed behaviours. The framework allows us to analyse MDCP beginning with the child as the unit of evaluation and disentangling all the factors that contribute to child's deprivations in the capability and functionings spaces. In practical terms, our framework contributes to determine critical criteria to build a consistent and effective MDCP analytical framework; identify data and knowledge gaps; and map binding constraints for children to thrive. Furthermore, this paper has shown how the IFCP can be used to identify and guide the demand for expanded data collection in the area of multidimensional child poverty and well-being. The IFCP by disentangling different aspects and dynamics MDCP and well-being helps to capture the complexity for better policies. Moreover, the soundness of the IFCP in terms of reasoning and practice is demonstrated using water and sanitation (WASH) as an illustrative case and the measurement of child Egypt as empirical example.

For measurement alone, several lessons arise from the development of the IFCP. First, an MDCP measure should retain the child as the unit of evaluation. The drawbacks of not doing so include the flawed assumptions that household members benefit equally from the goods and services that are available at household level. Second, a MDCP measure should be based exclusively on information regarding child outcomes. When this is not possible (due to limited data availability), the use of proxies should be justified both conceptually and empirically. Third, a MDCP measure should build upon a clear definition of dimensions for understanding poverty and should be expanded to include those vital for the child to thrive. Forth, the adoption of a MDCP measure must not come at the expense of the dashboard approach where different factors are analysed separately. Fifth, in theory, a MDCP measure should reveal children's overlapping deprivations, allowing us to identity synergies and vicious circles across the dynamics of several dimensions. Sixth, a well-integrated framework and related MDCP measures have the potential to address the information gaps and to change the process of data collection and analysis. In the example of access to safe water, these additional questions were modest in number and technical complexity: number of litres drank in the day; whether individual washes hands before eating; or whether the child had recently suffered or being treated from dehydration. Standard household surveys need to ask these questions both specifically and systematically. Seventh, MDCP measures derived from IFCP can influence policy-making if they help

identify potential synergies between policies directed to the child, to the family, and policies aimed at improving the context where the family lives.

References

Albania Institute of Statistics. (2014). *Microdata: Sourcebook for time use survey 2012*. Tirana: INSTAT.

Alkire, S., and M. Santos. (2013). A multidimensional approach: poverty measurement and beyond. *Social Indicators Research, 112*(2), 239–57.

Alkire, S. (2014). Measuring acute poverty in the developing world. Robustness and scope of the multidimensional poverty index. *World Development, 99*, 251–274.

Alkire, S., Dorji, L., Gyeltshen, S., & Minten, T. (2016). *Child poverty in Bhutan: Insights from multidimensional child poverty index and qualitative interviews with poor children*. Bhutan National Statistics Bureau: Thimphu.

Alkire, S., & Foster, J. (2011). Counting and multidimensional poverty measurement. *Journal of Public Economics, 95*(7), 476–487.

Almond, D., Edlund, L., & Milligan, K. (2013). Son preference and the persistence of culture: Evidence from south and east Asian immigrants to Canada. *Population and Development Review, 39*(1), 75–95 Retrieved from http://www.jstor.org/stable/41811953.

Arthi, V., & Fenske, J. (2016). Polygamy and child mortality: Historical and modern evidence from Nigeria's Igbo. *Review of Economics of the Household*, 1–45.

Atkinson, A. B. (2015). *Inequality: What can be done?* Cambridge MA: Harvard University Press.

Atkinson, A. B. (2003). Multidimensional deprivation: Contrasting social welfare and counting approaches. *The Journal of Economic Inequality, 1*(1), 51–65.

Ayalew, T. (2005). Parental preference, heterogeneity, and human capital inequality. *Economic Development and Cultural Change, 53*(2), 381–407.

Ballet, J., Biggeri, M., & Comim, F. (2011). Children's agency and the capability approach: A conceptual framework. *Children and the capability approach*, 22–45.

Behrman, J. R., & Deolalikar, A. B. (1990). The intrahousehold demand for nutrients in rural South India: Individual estimates, fixed effects, and permanent income. Journal of human resources, 665-696.

Ben-Arieh, A. (2008). The child indicators movement: Past, present, and future. *Child Indicators Research, 1*(1), 3–16.

Ben-Arieh, A., & Frønes, I. (2011). Taxonomy for child well-being indicators: A framework for the analysis of the well-being of children. *Childhood, 18*(4), 460–476.

Biggeri, M., Ballet, J., & Comim, F. (Eds.). (2011). *Children and the capability approach*. Springer.

Biggeri, M., & Ferrannini, A. (2014). *Sustainable human development: A new territorial and people-centred perspective*. Springer.

Biggeri, M., Libanora, R., Mariani, S., & Menchini, L. (2006). Children conceptualizing their capabilities: Results of a survey conducted during the first Children's world congress on child labour. *Journal of Human Development, 7*(1), 59–83.

Biggeri, M., Trani, J. F., & Mauro, V. (2009). The multidimensionality of child poverty: An empirical investigation on children of Afghanistan. OPHI research in Progress, 19, first version.

Bolt, Vincent J., and Kate Bird. "The intrahousehold disadvantages framework: A framework for the analysis of intra-household difference and inequality." (2003).

Bongaarts, J. (2013). The implementation of preferences for male offspring. *Population and Development Review, 39*(2), 185–208.

Bourguignon, F., & Chakravarty, S. R. (2003). The measurement of multidimensional poverty. *Journal of Economic Inequality, 1*(1), 25–49.

Bradshaw, J., Hoelscher, P., & Richardson, D. (2007). An index of child well-being in the European Union. *Social Indicators Research, 80*(1), 139–172.

Bradshaw, J., & Richardson, D. (2009). An index of child well-being in Europe. *Child Indicators Research, 2*(3), 319–351.

Bronfenbrenner, U. (1995). Developmental ecology through space and time: A future perspective. *Examining lives in context: Perspectives on the ecology of human development, 619*(647), 10176–10018.

Bronfenbrenner, U., & Morris, P. A. (1998). *The ecology of developmental processes*. Chicago.

Bronfenbrenner, U., & Morris, P. A. (2006). The Bioecological Model of Human Development. In R. M. Lerner & W. Damon (Eds.), Handbook of child psychology: Theoretical models of human development (p. 793–828). John Wiley & Sons Inc.

Burchardt, T., & Vizard, P. (2011). Operationalizing' the Capability Approach as a Basis for Equality and Human Rights Monitoring in Twenty-first-century Britain. *Journal of Human Development and Capabilities, 12*(1), 91–119.

Case, A., & Paxson, A. (2011). The long reach of childhood health and circumstance: Evidence from the Whitehall II study. *The Economic Journal, 121*, F183–F204.

Chakravarty, S., Deustsch, J., & Silber, J. (2008). On the Watts multidimensional poverty index and its decomposition. *World Development, 36*(6), 1067–1077.

Chzhen, Y., & Ferrone, L. (2017). Multidimensional child deprivation and poverty measurement: Case study of Bosnia and Herzegovina. *Social Indicators Research, 131*(3), 999–1014.

Chzhen, Y., de Neubourg, C., Plavgo, I., & de Milliano, M. (2016). Child poverty in the European Union: The multiple overlapping deprivation analysis (EU MODA). *Child Indicators Research, 9*(2), 335–356.

Clark, D. A. (2006). Capability approach. In D. A. Clark (Ed.), *The Elgar companion to development studies* (pp. 32–45). Cheltenham: Edward Elgar.

CONEVAL. (2009). *Metodologia para la medicion multidimensional de la pobreza en Mexico*. Mexico City: CONEVAL.

Covarrubias, K. (2015). *Intra-household decisions and discrimination: Orphanage, bargaining and child labour*. Graduate Institute of International and Development Studies, Geneva: Mimeo.

Cuesta, J., Negre, M., Revenga, A., & Schmidt, M. (2018). Tackling income inequality: What works and why? *Journal of Income Distribution, 26*(1), 1–48.

Cuesta, J. (2007). The distributive consequences of *machismo*: A simulation analysis of intra-household discrimination. *Journal of International Development, 18*(8), 1065–1080.

Deneulin, S. (Ed.). (2009). *An introduction to the human development and capability approach: Freedom and agency*. Routledge.

Deutsch, J., & Silber, J. J. (2005). Measuring multidimensional poverty: An empirical comparison of various approaches. *Review of Income and Wealth, 51*(1), 145–174.

De Vreyer, P., & Lambert, S. (2018). *By ignoring intrahousehold inequality, do we underestimate the extent of poverty?* Paris School of Economics: Mimeo.

Domínguez-Serrano, M., & del Moral Espín, L. (2018). From relevant capabilities to relevant indicators: Defining an Indicator system for Children's well-being in Spain. *Child Ind Res, 11*, 1–25.

Dotter, C., & Klasen, S. (2014). *The multidimensional poverty index: Achievements, conceptual and empirical issues*. UNDP Occasional Paper, UNDP Human Development Office, New York: UNDP.

Drywood, E. (2011). 'Child-proofing 'EU law and policy: Interrogating the law-making processes behind European asylum and immigration provision. *The International Journal of Children's Rights, 19*(3), 405–428.

Duclos, J-Y., Sahn, D., & Younger, S. (2006). Robust multidimensional poverty comparisons. *Economic Journal, 116*(514), 943–968.

Dunbar, G. R., Lewbel, A., & Pendakur, K. (2013). Children's resources in collective households: Identification, estimation and an application to child poverty in Malawi. *American Economic Review, 103*(1), 438–471.

Evans, M. C., & Abdurazakov, A. (2018). The measurement properties of multidimensional poverty indices for children: Lessons and ways forward. In *OPHI working paper 115*. Oxford: University of.

Fernandez, E. (2011). Conceptualizing indicators for children in diverse contexts and particular circumstances. *Challenges and Constraints. Child Ind Res, 4*, 547–553.

Ferreira, F. H., & Lugo, M. A. (2013). Multidimensional poverty analysis: Looking for a middle ground. The World Bank research observer, lks013.

Gordon, D., Nandy, S., Pantazis, C., Pemberton, S., & Townsend, P. (2003). *The distribution of child poverty in the developing world*. Bristol: Centre for International Poverty Research.

Government of Colombia (2014). The Social Map http://mapasocial.dps.govco/

Guarcello, L., Mealli, F., & Rosati, F. C. (2010). Household vulnerability and child labor: The effect of shocks, credit rationing, and insurance. *Journal of Population Economics, 23*(2010), 169–198.

Hanafin, S., & Brooks, A.-M. (2005). Report on the development of a national set of child well-being indicators in Ireland. Dublin: The National Children's Office. .

Harper, C., Jones, N., McKay, A. (2009). 'Including children in policy responses to economic crises: Lessons from the past and policies for a sustainable future'. ODI and UNICEF synthesis conference paper.

Hjelm, L., Ferrone, L., Handa, S., & Chzhen, Y. (2016). *Comparing approaches to the measurement of multidimensional child povety, Innocenti working paper 2016–29*. Florence: Unicef Office of Research.

Iram, N., Hussain, Z., Anwar, S., Hussain, I., & Akram, W. (2008). Determinants of child school choice in Punjab: Policy implications. *European Journal of Scientific Research, 23*(2), 285–293.

Lery, E., Tsang, T., & Vizard, P. (2014). The Children's measurement framework: A new Indicator-based tool for monitoring Children's equality and human rights. *Child Ind Res, 7*, 321–349.

JMP/WHO/UNICEF (2017). Progress on drinking water, sanitation and hygiene: 2017 update and SDG baselines.

Kabeer, N., Huq, L., & Mahmud, S. (2014). Diverging stories of "missing women" in South Asia: Is son preference weakening in Bangladesh? Feminist economics, 20(4), 138-163.Chicago.

Karpati and de Neubourg, (2017). Child Poverty Measurement and Monitoring in the Context of SDG1.1 and SDG1.2. SPRI Working Paper SPRI Global Working Paper Series, 2017. SPRI Brussels.

Klasen, S., & Lahoti, R. (2016). *How serious is the neglect of intra-household inequality in multi-dimensional poverty indices courant center discussion paper 200*. Gottingen: Georg-August-Universitat Gottingen.

Klugman, J., Rodríguez, F., & Choi, H. J. (2011). The HDI 2010: New controversies, old critiques. *Journal of Economic Inequality, 9*(2), 249–288.

Krishnakumar, J. (2007). Going beyond Functionings to capabilities: An econometric model to explain and estimate capabilities. *Journal of Human Development, 8*(1), 39–63.

Leight, J. (2017). Sibling. *Rivalry: Endowment and Intrahousehold Allocation in Gansu Province, China, Economic Development and Cultural Change, 2017, 65*(3), 457–493.

Marcus, R., Wilkinson, J., & Marshall, J. (2002). Poverty reduction strategy papers (PRSP) – Fulfilling their potential for children in poverty? *Journal of International Development, 14*(8), 1117–1128.

Massoumi, E. And M.a. Lugo (2008). The information basis of multivariate poverty assessments in quantitative approaches in multidimensional poverty measurement. *Kakwani and Silber (eds) Palgrave MacMillan.*

Mauro, V., Biggeri, M., & Maggino, F. (2018). Measuring and monitoring poverty and wellbeing: A new approach for the synthesis of multidimensionality. *Social Indicators Research, 135*(1), 75–89.

Mechoulan, S., & Wolff, F. C. (2015). Intra-household allocation of family resources and birth order: Evidence from France using siblings data. *Journal of Population Economics, 28*(4), 937–964.

Milliano de, M and S. Handa (2014). Child poverty and deprivation in Mali: the first national estimates. Innocenti Working Paper WP-2014-20 Unicef Office of Research, Florence.

Milliano De, M. and I. Plavgo (2017). Analysing Multidimensional Child Poverty in Sub-Saharan Africa: Findings Using an International Comparative ApproachChild Indicators Research 1–29.

Minkkinen, J. (2013). The structural model of child well-being. *Child Indicators Research, 6*, 547–558.

Neubourg de, C., Chai, J., de Milliano, M., Plavgo, I., & Wei, Z. (2012). *Cross-country MODA study*. Technical Note: Multiple Overlapping Deprivation Analysis (MODA).

Nussbaum, M. C. (2011). *Creating capabilities*. Harvard University Press.

OECD. (2009). *Doing Better for Children*. Paris: OECD.

O'Hare, W. P., & Gutierrez, F. (2012). The use of domains in constructing a comprehensive composite index of child well-being. *Child Indicators Research, 5*(4), 609–629. https://doi.org/10.1007/s12187-012-9138-6.

Ota, M., & Moffatt, P. G. (2007). The within-household schooling decision: A study of children in rural Andhra Pradesh. *Journal of Population Economics, 20*, 223–239.

Pollard, E. L., & Lee, P. D. (2003). Child well-being: A systematic review of the literature. *Social Indicators Research, 61*(1), 59–78.

Pond, K. R., & Pedley, S. (2011). Current situation in access to drinking-water.

Qizilbash M. (2018). "In Defence of inclusiveness: On sustainable human development, capability and indicators of Progress." Cambridge Capability Conference.

Quisumbing, A. R., & Maluccio, J. A. (2003). Resources at marriage and Intrahousehold allocation: Evidence from Bangladesh, Ethiopia, Indonesia, and South Africa. *Oxford Bulletin of Economics and Statistics, 65*(3), 283–328.

Rawls, J. (1971). A theory of justice (1971).

Reddy, S. G. (2011). Economics and human rights: A non-conversation. *Journal of Human Development and Capabilities, 12*(1), 63–72.

Robeyns, I. (2005). The capability approach: A theoretical survey. *Journal of Human Development, 6*(1), 93–117.

Roche, J. (2013). Monitoring progress in child poverty reduction: Methodological insights and illustration to the case study of Bangladesh. *Social Indicators Research, 112*(2), 363–390.

Roelen, K., Gassmann, F., & de Neubourg, C. (2009). The importance of choice and definition for the measurement of child poverty—The case of Vietnam. *Child Ind Res, 2*, 245–263.

Roelen, K., Gassmann, F., & de Neubourg, C. (2010). Child poverty in Vietnam: Providing insights using a country specific and multidimensional model. *Social Indicators Research, 98*(1), 129–145.

Santos-Pais, M. (1999). A human rights conceptual framework for UNICEF, IRC. UNICEF IRC. *Innocenti Essay n., 9*.

Save the Children. (2008). *The child development index: Holding governments in account for children's well-being*. London: Save the Children UK.

Sen, A. K. (1980). Description as choice. *Oxford Economic Papers, 32*(3), 353–369.

Sen, A. K. (1985). Well-being, agency and freedom: The Dewey lectures 1984. *The Journal of Philosophy, 82*(4), 169–221.

Sen, A. K. (1999). *Development as freedom*. New York: Oxford University Press.

Sen, A. K. (2005). Human rights and capabilities. *Journal of Human Development, 6*(2), 151–166.

Sen, A. K. (2007). *Identity and violence: The illusion of destiny*. Penguin Books India.

Stewart, F. (1989). Basic needs strategies, human rights, and the right to development. *Human Rights Quarterly, 11*, 347–374.

Stoecklin, D., & Bonvin, J. M. (2014). *Children's rights and the capability approach*. New York, NY: Springer.

Streeten, P., Burki, S. J., Haq, U., Hicks, N., & Stewart, F. (1981). First things first: Meeting basic human needs in the developing countries.

The Institute for Social Research. (2016). *Panel study of income dynamics: Disability and time II 2013 time diary interviews 1 and 2 Ann Arbor*. MI: The Institute of Social Research.

Trani, J. F., Biggeri, M., & Mauro, V. (2013). The multidimensionality of child poverty: Evidence from Afghanistan. *Social Indicators Research, 112*(2), 391–416.

Trani, J.-F., Bakhshi, P., Bellanca, N., Biggeri, M., & Marchetta, F. (2011). "Disabilities through the capability approach Lens: Implications for public policies", *ALTER. European Journal of Disability Research., 5*(3), 143–157.

Tsui, K. (2002). Multidimensional poverty indices. *Social Choice and Welfare, 19*(1), 69–93.

USAID. (2015). *Liberia DHS 2013*. Washington DC: USAID.

USAID. (2013). *Peru DHS, 2011 - final report continuous (2011)*. Washington DC: USAID.

UN (1989). Convention on the Rights of The Child.

UN. (1995). *The Copenhagen declaration and Programme of action: World summit for social development 6–12 march 1995*. New York: UN.

UN (2015). Transforming our world: The 2030 agenda for sustainable development, a/RES/70/1, 25 September 2015.

UNICEF. (2019). *MICS6 indicators and definitions*. New York: UNICEF.

UNICEF. (2018a). *MICS6: Water Quality Testing Questionnaire*. New York: UNICEF.

UNICEF. (2018b). *MICS6: Questionnaire for Children Under Five*. New York: UNICEF.

UNICEF. (2017). *Global study on child poverty and disparities 2007–2008 Guide. Global Policy Section Division of Policy and Planning*. New York: UNICEF.

UNICEF Office of Research (2013). Child well-being in rich countries: A comparative overview, Innocenti report card no. 11, UNICEF Office of research, Florence.

UNESCWA, UNICEF, LAS, & OPHI. (2017). *Arab multidimensional poverty report*. Lebanon: UNESCWA.

Vizard, P., Fukuda-Parr, S., & Elson, D. (2011). Introduction: The capability approach and human rights. *Journal of Human Development and Capabilities, 12*(1), 1–22.

Vijaya, R. M., Lahoti, R., & Swaminathan, H. (2014). Moving from the household to the individual: Multidimensional poverty analysis. *World Development, 59*, 70–81.

Wasonga, J. Mark Okowa, and Felix Kioli, (2016). Sociocultural Determinants to Adoption of Safe Water, Sanitation, and Hygiene Practices in Nyakach, Kisumu County, Kenya: A Descriptive Qualitative Study, Journal of Anthropology, Article ID 7434328, 5 pages, 2016.

World Bank. (2017). *Monitoring global poverty: Report of the commission on global poverty*. Washington DC: World Bank.

World Bank. (2016). *Poverty and shared prosperity 2016*. Washington DC: World Bank.

Yeo, R. (2001). Chronic Poverty and Disability. In *Chronic poverty and disability*.

Yi, J., Heckman, J. J., Zhang, J., & Conti, G. (2015). Early health shocks, intra-household resource allocation and child outcomes. *The Economic Journal, 125*(588), F347–F371.

Yousefzadeh, S., Biggeri, M., Arciprete, C., & Haisma, H. (2019). Capability approach to child growth. *Child Indicators Research, 12*(2), 711–731.

Affiliations

Mario Biggeri[1,2] · Jose Antonio Cuesta[3]

[1]   University of Firenze, Florence, Italy

[2]   Department of Economics and Management, University of Florence, Via delle Pandette 9, 50127 Florence, Italy

[3]   World Bank, Social Sustainability and Inclusion Global Practice, Washington, DC, USA