

Literacies as a Strategic Means of Implementation for Sustainable Development Goals: Lessons from Health and Water Literacies

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Abstract

The Sustainable Development Goals (SDGs), now known as the “2030 Agenda for Sustainable Development,” are aimed at building on the progress achieved through the Millennium Development Goals (MDGs). In addition, they address persistent issues and new challenges facing people and the planet. While much discussion on the SDGs tends to focus on the content of the goals, the fundamental question remains of how to achieve these goals. Education has been one of the core components of the MDGs, and it continues to play a critical role in the SDGs. Against this background, our paper aims to highlight quality education as a critical means of implementation to deliver effective SDGs. In particular, we suggest the importance of having every human being foster multiple ‘literacies’ so as to actively reflect and deal with the complex challenges surrounding people both individually and collectively. To do so, we first draw lessons from the educational goals among the MDGs to demonstrate how multiple literacies acquired through quality education have contributed to the achievement of other MDGs. The evolution of the concept of ‘literacies’ is presented, situating it in the wider context of transformative and progressive pedagogy. Then, we focus on two important areas of the SDGs—namely, health and water—and demonstrate the importance of ‘health literacy’ and ‘water literacy’ as means of implementing the SDGs. The following two points are drawn as important lessons. First, for effective implementation of health-related SDGs, it is essential to empower all people by providing them with access to information and quality education, especially at the community level, in order to help prevent negative spirals that would affect subsequent generations. Second, it is equally imperative that government representatives and other stakeholders acquire an accurate understanding of water-related issues, and that systems be established to create opportunities for all people to gain the knowledge, skills, values and attitudes they need to respond effectively to water-related sustainability challenges. Finally, we argue that fostering literacies for all through quality education is also essential for achieving all the other SDGs, such as eradicating poverty, boosting shared prosperity and building peaceful, tolerant societies.

Key words: competencies, education, food, health, literacies, Sustainable Development Goals (SDGs), water

1. Introduction

Education has been one of the core components of the Millennium Development Goals (MDGs), and it is expected to continue to play a critical role in the achievement of the Sustainable Development Goals (SDGs). While much attention in SDG discussions tends to focus on the content of the goals, the fundamental

question remains of how to achieve these goals. Against this background, our paper aims to highlight ‘literacies’ as a critical means of implementation to deliver effective SDGs. To do so, we first draw lessons from the educational goals in the MDGs to demonstrate how education-related MDGs, and ‘multiple literacies’ in particular, have contributed to the achievement of other MDG goals. Then, we focus on two important areas of

the SDGs, i.e., Goal 6: Water, and Goal 3: Health, and demonstrates the critical importance of “health literacy” and “water literacy” as means of implementing the SDGs.

Among the SDGs, Goal 4 refers to education: “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” (United Nations, 2015). This goal has seven targets and three indicators, most of which follow the MDGs. Two of these targets assert the role of education in achieving a sustainable society. Target 7 also emphasizes the role of education: “By 2030 ensure all learners acquire the knowledge and skills needed to promote sustainable development, including among others through education for sustainable development and sustainable lifestyles, human rights, gender equality, the promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of the contribution of culture to sustainable development.” In addition, Target 6 refers to literacy: “By 2030, ensure that all youth and substantial proportion of adults, both men and women, achieve literacy and numeracy.” The importance of these targets is inarguable. The present paper argues, however, that the meaning of literacy should not be limited merely to reading and writing, but be understood to comprise knowledge, skills, ethics, critical thinking and attitudes that enable human beings to imagine future scenarios and make important decisions in a collaborative way.

2. Central Role of ‘Literacies’ as a Strategic Means of Implementing the SDGs

Education is a fundamental human right and an essential foundation for human development.

Recognizing the importance of education, world leaders incorporated two education-related goals among the MDGs established in 2000, namely Goal 2: the achievement of universal primary education by 2015, and Goal 3: the elimination of gender disparities at the primary and secondary levels by 2005 and across all education levels by 2015.

Almost 15 years after the establishment of the MDGs, there has been ample evidence that education is also strongly associated with many development outcomes that contribute to other MDGs. For example, the links between a mother’s education and the health of her child as well as herself are strong. Each extra year of a mother’s schooling reduces the probability of infant mortality by 5 to 10 percent (Schultz, 2003). Furthermore, mothers’ education level is closely associated with the immunization and nutritional status of their children under age five (UNDP, 2010). It has also been reported that effective health education both in and out of schools promotes a better understanding of health risks and encourages safe behavior. Integrated school health programs, which provide malaria treatment, deworming, school-feeding programs and clean water, have been proven to impact the health and survival of children directly (UNESCO, 2010). A study covering 32

countries showed that women with post-primary education were five times more likely than illiterate women to know about HIV and AIDS (Vandermoote & Delmonica, 2000).

Education also helps people acquire the knowledge, skills, values and behavior needed for environmental sustainability. In Tashkent, Uzbekistan, the incorporation of environmental protection and water management in a school curriculum at a secondary school enabled students and teachers to gain valuable knowledge and develop new positive attitudes toward supporting sustainable development (ASPnet, 2009). Such evidence of the strong linkages between education and other development progress suggests that education continues to be the cornerstone of SDG implementation, as adopted under the title “2030 Agenda for Sustainable Development” at the United Nations summit in September 2015.

The world has experienced unprecedented socio-economic and environmental transformation, as a result of increased economic growth, globalization, technological advancement, rapid urbanization and steady population growth. These changes inevitably put pressure on ecosystems, resulting in the depletion of natural resources, climate change, freshwater shortages, frequent occurrence of natural disasters and so forth. It is therefore imperative that every human being acquire the knowledge, skills, attitudes and values necessary to shape a sustainable future, so that “the tensions between human development and planetary boundaries are addressed” (Ofei-Manu & Didham, 2014).

Since 2000, there has been considerable progress in terms of access to education. According to UNESCO (2015a), “The primary school net enrollment ratio was 84% in 1999, and is estimated to reach 93% in 2015.” Despite the progress in ‘access’ to education, however, improvement in ‘quality’ has not always kept pace. Approximately 205 million children have not had a chance to learn the basics—even though approximately 130 million of them have spent at least four years in school (UNESCO, 2014). Furthermore, there are still about 774 million youth and adults around the world who lack basic literacy skills, of whom two-thirds are women (Easton, 2014). This is a worrying fact, which sheds a negative light on the future success of the SDGs.

Accordingly, this paper proposes renewed efforts to improve the ‘quality of learning’ for all, to make a sustainable future a reality, transcending the past focus on educational access and attainment. Specifically, it suggests that the development of multiple ‘literacies’ should be the central means of implementing the SDGs.

The concept of ‘literacy’ has traditionally been understood as the ability of a person to read and write a simple statement on everyday life in his/her mother tongue. International conceptions of literacy have evolved since the mid-twentieth century, however (UNESCO, 2005). In recent years, the international community has embraced a more expanded notion of literacy, in which instead of a discrete, static set of

technical skills, the concept has shifted to multiple literacies that are defined as capabilities for socio-cultural and political transformation (UNESCO, 2005). Such an expanded notion of ‘literacies’ was partly influenced by Paulo Freire’s idea (1970) that literacy is about empowerment and social transformation. Freire criticized traditional ‘banking education,’ in which learners are expected to acquire knowledge passively and uncritically from teachers. Instead, Freire proposed learning activities that were more democratic, engaging, dialogic and problem posing.

The vision presented by Freire linked up with a broad tradition of education theories developed across the 20th century, which emphasize integrative, active and reflexive learning as opposed to merely memorizing facts (for example, Dewey, 1916; Piaget, 1959; and Vygotsky, 1986).

More recently, Freire’s work has influenced ‘transformative learning’ theory, such as that proposed by Jack Mezirow (1990, 1998), which positions learning as becoming critically aware of one’s own tacit assumptions and expectations.

This shift in emphasis from knowledge acquisition to knowledge creation is also well documented in the recent attempts of many international organizations to define the ‘competences,’ and ‘21st century skills’ that people need to acquire in order to thrive in today’s complex and inter-connected knowledge-based world. The most influential is the concept of ‘key competencies’ set out by the Definition and Selection of Competencies (DeSeCo) project of the Organization for Economic Cooperation and Development (OECD), which defines such competencies as both cognitive and non-cognitive skills that enable learners to take advantage of rapidly changing technologies, act critically and collectively, and deal with society’s challenges in globalized knowledge societies (OECD, 2002).

The transformative and progressive pedagogy mentioned above that emphasizes multiple ‘literacies’ or ‘competencies’ is indeed the cornerstone of Education for Sustainable Development (ESD), as proposed in December 2002 when the UN Decade of ESD (2005–2014) was declared. ESD motivates and empowers learners to change their behavior and take action for sustainable development, by promoting competencies such as critical thinking, imagining of future scenarios and making decisions in a collaborative fashion.

Relevant learning opportunities that equip multiple literacies for all are not limited to the classroom, but can be promoted outside of the classroom too. Essentially, such opportunities need to be locally contextualized to incorporate the specific environment surrounding a learner.

The next section provides a rigorous review of empirical research on the critical importance of ‘health literacy’ and ‘water literacy’ as means of implementing the SDGs.

3. Health Literacy: A Food-Health Nexus for SDG implementation

The eradication of extreme poverty and hunger is the first of the eight MDGs. Although the proportion of undernourished people in developing countries has decreased from 24% in 1990–1992 to 14% in 2011–2013, the goal to halve the percentage of people suffering from hunger by 2015 will require further efforts. For instance, 162 million young children are still suffering from chronic under-nutrition (UN, 2014a).

Recently, greater attention has been directed toward addressing the double burden of malnourishment, which is defined as both under-nutrition and obesity, occurring simultaneously in and among different population groups (Iguchi *et al.*, 2014). Obesity is recognized as a major risk factor for a number of chronic diseases including diabetes, cardiovascular conditions and cancer. According to the World Health Organization (WHO), over 6 million adults aged 18 years and over were obese (WHO, 2015a). This number is on the rise in both developed and developing countries. Accordingly, both under-nutrition and obesity are addressed in one of the SDGs (UN, 2014b).

In order to tackle this health issue, improving health literacy is crucial. According to the WHO, the definition of ‘health literacy’ is the cognitive and social skill “to understand and use information in ways which promote and maintain good health” (WHO, 2015b). In this paper, health literacy means not only cognitive skills for individual good health but also those that affect future generations’ health. Given that health literacy implies the need to enhance capabilities for socio-cultural and political transformation in order to address this ‘double burden’ of malnourishment, it is essential to empower all people by improving the quality of education, especially at the community level, in order to help prevent negative spiral patterns affecting sequential generations. Health literacy is the key for implementing health-related SDGs effectively.

Using education strategically to reach targets will significantly contribute to achieving food and health-related goals. For instance, case studies from Malaysia clearly demonstrate that woman with more years of education are healthier and have a higher nutritional status, given that the “improvement in education leads to better opportunities for employment, which can eventually improve household food security levels” (Mohamadpour *et al.*, 2012).

This argumentation is based on an assumption that education programs will help prevent negative spiral patterns affecting sequential generations. Studies indicate that nutritional deficiencies during fetal life and during the first few years after birth may program a child’s metabolism, which can cause adverse effects later in life (Rolland-Cachela *et al.*, 2006). This is particularly evident in developing countries: for instance, parents’ education is a vital factor associated with child mortality in Bangladesh, where an increase in

the father's education significantly reduces the child mortality rate (Uddin *et al.*, 2009). Toward this end, various programs have been introduced to improve the nutritional status of children, such as school feeding programs, which in turn have positive impacts on the academic achievements of children (Lassi *et al.*, 2013; Jomaa *et al.*, 2011).

Other health issues, such as gestational diabetes and obesity, can contribute to the risk of diabetes in the next generation (Hanson *et al.*, 2012). Poor nutrition contributes to at least half of the 10.9 million child deaths each year (WHO, 2013). Therefore, increasing health literacy of mothers is of utmost importance. Researchers have clearly established links between education and health. Existing studies show that mothers who receive health literacy education can positively impact their children's health (Burchi, 2012; Christiaensen & Alderman, 2001; Webb & Block, 2004; Medrano *et al.*, 2008).

A study conducted by Wallace *et al.* (2014) showed the effectiveness of providing community-based nutritional education programs for women in rural areas of Cambodia. Although women in the area consume vitamin-A- and iron-rich foods daily, they lack sufficient intake of other necessary nutrients. The women do not always buy nutritious foods, as they consider them expensive, even though inexpensive nutrient-rich foods are in fact available. The study showed that women who had nutritional knowledge through a community-based nutrition program were able to make appropriate choices in selecting nutritious foods which in turn had positive effects on their children's health.

Other case studies have shown that obesity and under-nutrition co-exist in developing countries (James *et al.*, 2004; Usfar *et al.*, 2010). In Indonesia, for example, while 14% of children under the age of five are lacking nutrition, 12% of children are excessively fed (Usfar *et al.*, 2010). The issue of obesity has become a major health issue, as "rapidly changing dietary practices and a sedentary lifestyle have led to the increasing prevalence of childhood obesity (at 5–19 years age) in many countries, including developing countries—for example, 41.8% in Mexico, 22.1% in Brazil, 22.0% in India, and 19.3% in Argentina" (Gupta *et al.*, 2013). Another example from Pakistan shows the importance of maternal education in children's nutrition, which is largely influenced by community service and infrastructure (Alderman & Garcia, 1994).

Health literacy also holds significant importance in developed countries. For example, in the United States, community-based nutrition education programs have had positive impacts on people by raising their awareness that they themselves have some control over their own health. Hence they reduce the risk of food insecurity (Hamm & Bellows, 2003; Dollahite *et al.*, 2003).

This evidence clearly demonstrates that focusing solely on improving 'access' to education is not sufficient; rather, improving the 'quality' of education at

the community level is essential to realizing a sustainable future. Through school education, people are able to acquire various perspectives and values. The school curriculum, however, cannot always provide enough knowledge and skills to them because health issues are strongly linked with their daily lives. Therefore, this paper emphasizes the point that health literacy means skill in applying knowledge from other subjects to improving one's own health-related issues.

In order for health literacy to be a critical means of SDG implementation, the following two lessons from the MDGs need to be considered. First, the MDGs have often been criticized for not reflecting the needs of the recipients in a regional-specific context (Shepherd, 2008). To put it simply, the MDGs did specify an overall goal but did not set out a specific process to make it possible with reference to national priorities, and hence lacked the necessary implementation mechanisms (Fukuda-Parr, 2010). It is important to point out that there is a fundamental 'educational gap' between rich urban and poor rural areas in developing countries. These rural-urban disparities in turn affect children's nutritional status within the country, and hence such disparities must be overcome to deliver health- and food-related SDGs (Srinvasen *et al.*, 2013).

Second, because the MDGs were formulated based on the idea of results-based management, considerations of 'quality' were not included (Hulme, 2007). In this regard, foreign aid for educational status enhancement in developing countries needs to avoid repeating the failed policy of result-based management of the past; rather, it should empower community-level-based capabilities to address the double burden of malnourishment.

4. Water Literacy: A Water-Education Nexus for the SDGs

The role of education must also be explored in connection with water, a 21st-century issue of vital importance, which is sure to be among the most important post-2015 international sustainable development goals (Kitamura *et al.*, 2014). In this section, we argue that it is important for every human being to acquire not only water-related knowledge but also the skills for using such knowledge, in the areas of safe-drinking water, sanitation, water management and water-related disaster management.

The international community has pursued a range of water-related global initiatives, starting with the International Drinking Water and Supply and Sanitation Decade (1981–1990), adopted at the United Nations Water Conference in 1977. At the World Summit on Sustainable Development (Johannesburg Summit) in 2002, then UN Secretary-General Kofi Annan proposed the WEHAB (water, energy, health, agriculture and biodiversity) initiative, a framework for action in five key areas. This emphasized the importance of water, among other factors, for sustainable development (UN WEHAB working Group, 2002). In the MDGs, Goal 7

“Ensure environmental sustainability” includes as its target “[halving], by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation.” In 2013, the UN General Assembly established the UN Inter-Agency Mechanism on All Freshwater-related Issues, including Sanitation (WHO & UNICEF, 2013) as a UN inter-agency coordinating body. Discussions held on relevant issues culminated in Resolution 64/292, adopted by the UN General Assembly in 2010, which states that enjoying safe water and sanitation is a basic human right of all persons (WHO & UNICEF, 2013).

According to the report, the MDG target for water accessibility has almost been achieved (WHO & UNICEF, 2012). From 1990 to 2010, the population able to reach safe drinking water increased from about 2 billion to 6.1 billion, or about 89 percent of the total world population. Regional disparities and economic inequality, however, have grown much wider. In Africa in particular, about 780 million persons, or about 61% of the total population, have no access to safe drinking water. On the other hand, nearly 90% of the population of Latin America, the Caribbean, North Africa and Asia has access to safe drinking water.

Against such a background, discussions on the SDGs have consistently covered water and sanitation. Goal 6 is to “ensure availability and sustainable management of water and sanitation for all,” and its targets are set to provide access to safe and potable water for all persons, and to improve wastewater management by 2030. It must be pointed out, however, that these targets aimed at solving water-related problems were drawn up from a perspective that failed to consider how the targets should be achieved. This is why we propose in this paper the above-cited development goal and global policy targets, with emphasis on the importance of reflecting on the water-education nexus and the importance of literacies as the means of implementing the SDGs.

Literacies enable people both individually and collectively to promote access to safe drinking water and manage sanitation effectively by themselves. That will be achieved when people become active agents for change. For example, research by Pokherel *et al.* (2004) in Nepal demonstrates that the spread of diarrheal disease is affected not only by poor sanitation management per se but also by low literacy and low socio-economic status of the population. The research shows that environmental and health education programs are effective at improving the situation. In particular, women’s literacy has a clear linkage to knowledge on health and sanitation because such knowledge makes women aware of how to use safe water because they understand water-related issues, and it encourages them to put such knowledge into practice. Another case study in Guatemala examined the effect of health paradigms, population, culture, economics, history and education on health issues related to water (Nagata *et al.*, 2011). The research demonstrated that literate people have better awareness of sanitation as well as of safe drinking water

than illiterate people.

Global issues are closely interconnected. For example, agricultural issues are closely related to poverty- and water-related issues. Hanjra *et al.* (2009) demonstrated that land area, the literacy of household heads and the number of years of education of other adults affect people’s welfare positively, because literate people can obtain knowledge related to soil conservation or water harvesting. The research indicates that investing in irrigation reduces poverty, but investing in human resources has an even greater poverty-reduction impact.

Water literacy is also required in a society when it faces water-related disasters. A case study conducted in Fiji by the scientists Marfai and King (2007) illustrated the effectiveness of water literacy at the community level. They found that the spread of bacteria in soil or water after a cyclone damaged people’s health.

The impact of education is also seen in the long term. Research in Chile conducted by Koch *et al.* (2012) examined the main factors related to maternal mortality reduction over a period of 50 years, from 1957 to 2007. The results showed that increasing education levels appeared to impact the downward trend in the maternal mortality rate (MMR) favorably, from 41.3 to 12.7 per 100,000 live births. This indicates that women who are educated can acquire the skills to use clean water and thereby prevent disease more easily than women who are illiterate.

Considering SDG implementation, literacy is an essential skill because it connects knowledge and people’s lives. It is also critical that government representatives and other stakeholders acquire an accurate understanding of water-related issues, and that systems be established for implementing concrete measures in order to create opportunities for people to gain the knowledge and skills they need to respond effectively to water-related sustainability challenges.

5. Conclusion: ‘Literacies’ as a Strategic Means of Implementation for the SDGs

Through a rigorous review of both theoretical and empirical literature, our paper demonstrates the centrality of quality education in achieving a balance between human well-being and quality of the environment. As such, we argue that a quality education can be seen as a strategic development investment for achieving the SDGs.

Specifically, drawing on a number of examples of strong linkage between quality education and health- and water-related development outcomes, we have demonstrated the imperative for all learners to acquire water and health literacies as strategic means of implementing the food/health- and water-related SDG goals.

In this paper, ‘literacies’ are understood not merely as reading and writing skills, but as both cognitive and non-cognitive skills that enable learners to act critically and deal with their own challenges as active agents, both

individually and collectively. Therefore, this paper suggests that the world should move away from conventional education systems, which focus solely on individual knowledge acquisition, to systems based on more transformative and cooperative approaches to teaching and learning. Such social learning will enable learners to deal with the specific risks and complexity that exist in their own society, and bring all learners of various backgrounds and different experiences to learn from one another together, in order to contribute to a more sustainable world.

To achieve higher quality education will require a holistic integration of ESD perspectives. The UNESCO world conference on the Decade of Education for Sustainable Development (DESD), which was held in Nagoya, Japan in September 2014, adopted the Global Action Program (GAP). GAP identifies what international society should do to strengthen efforts to promote ESD in the post-2015 DESD world. GAP also emphasizes the need to promote ESD to a variety of stakeholders and policy makers at all levels—local, regional and international. This paper suggests the imperative of revisiting and considering the concept of ‘literacies’ when multiple stakeholders formulate their concrete goals, targets and strategies to achieve them.

In May 2015, world leaders adopted the “Incheon Declaration: equitable and inclusive quality and lifelong learning for all by 2030 — transforming lives through education” at the World Education Forum 2015 in Incheon, Republic of Korea (UNESCO, 2015b) The Declaration proposed ways toward a new vision for education based on five key themes: Right to Education, Equity in Education, Inclusive Education, Quality Education and Lifelong Learning. ESD, Global Citizenship Education (GCED), and the development of analytical, problem-solving and interpersonal and social skills, which are all necessary for facing regional and global challenges, were also included in the Declaration, as methods of achieving higher quality education in the post-2015 era. The significant value of the concept of ‘literacies’ proposed in this paper is therefore clear: they are a means of achieving the quality education envisaged in the Incheon Declaration.

Finally, we argue that fostering literacies for all through quality education is essential to achieving all of the SDGs, not just the health- and water-related goals. It is also necessary to eradicate poverty, boost shared prosperity, promote broad-based economic growth and build peaceful, tolerant societies.

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References

- Alderman, H. and Marito Garcia (1994) Food security and health security: explaining the levels of nutritional status in Pakistan. *Economic Development and Cultural Change*, 42: 485–507.
- ASPNet (2009) *Regional Collection of Good Practice — Millennium Development Goals and Education for Sustainable Development in Asia and the Pacific Region*. Seoul: Korean National Commission for UNESCO.
- Burchi, F. (2012) Whose education affects a child’s nutritional status? From parents’ to household’s education. *Demographic Research*, 27: 681–704.
- Christiaensen, L. and H. Alderman. (2001) Child malnutrition in Ethiopia: Can maternal knowledge augment the role of income? *Africa Region Working Paper Series No. 22*. Washington DC: World Bank.
- Dewey, J. (1916) *Democracy and Education*. New York, NY: The Free Press.
- Dollahite, J., C. Olson and M. Scott-Pierce (2003) The impact of nutrition education on food insecurity among low-income participants in EFNEP. *Family and Consumer Sciences Research Journal*, 32: 127–139.
- Easton, P. (2014) *Concept Note on the Post-2015 Education Agenda*. Paris: UNESCO.
- Freire, P. (1970) *Pedagogy of the Oppressed*. New York, NY: Herder and Herder.
- Gupta, N., K. Goel, P. Shah and M. Anoop (2013) Childhood obesity in developing countries: epidemiology, determinants, and Prevention. *Endocrine Reviews*, 33: 48–70.
- Fukuda-Parr, S. (2010) Reducing inequality—The missing MDG: A content review of PRSPs and Bilateral Donor Policy Statements. *IDS Bulletin*, 41(1): 26–35.
- Hanjra, M.A., T. Ferede and D.G. Gutta (2009) Pathways to breaking the poverty trap in Ethiopia: Investments in agricultural water, education, and markets. *Agricultural Water Management*, 96: 1596–1604.
- Hanson, M. A., P.D. Gluckman, R.C.W. Ma, P. Matzen and R.G. Biesma (2012) Early life opportunities for prevention of diabetes in low and middle income countries. *BMC Public Health*, 12:1025–1034.
- Hulme, D. (2007) *The Making of the Millennium Human Development Meets Results-Based Management In an Imperfect World*. Manchester.
- Iguchi, M., T. Ehara, E. Yamazaki, T. Tasaki, N. Abe, S. Hashimoto and T. Yamamoto (2014) *Ending the Double Burden of Malnourishment: Addressing the Food and Health Nexus in the Sustainable Development Goals*. POST2015/UNU-IAS Policy Brief #6.
- James, P.T., N. Rigby and R. Leach (2004) The obesity epidemic, metabolic syndrome and future prevention strategies. *European Journal of Cardiovascular Prevention and Rehabilitation*, 11: 3–8.
- Jomaa, L. H., E. McDonnell and C. Probart (2011) School feeding programs in developing countries: impacts on children’s health and educational outcomes. *Nutrition Reviews* 69(2): 83–98.
- Lassi, Z.S., J.K. Das, G. Zahid, A. Imdad and Z.A. Bhutta (2013) Impact of education and provision of complementary feeding on growth and morbidity in children less than 2 years of age in developing countries: a systematic review. *BMC Public Health* 13:S13.
- Kitamura, Y., E. Yamazaki, N. Kanie, B. Edwards Jr., R.B. Shivakoti, K.B. Mitra, N. Abe, H.A. Pandyaswargo and C. Stevens. (2014) *Linking Education and Water in the Sustainable Development Goals*. POST2015/UNU-IAS Policy Brief #2.
- Koch, E., J. Thorp, M. Bravo, S. Gatica, C.X. Romero, H. Aguilera and I. Ahlers (2012) Women’s Education Level, Maternal Health Facilities, Abortion Legislation and Maternal Deaths: A Natural Experiment in Chile from 1957 to 2007. *PLoS ONE*

- 7(5):e36613. Doi:10.1371/journal.pone.0036613.
- Marfai, M.A. and L. King (2008) Coastal flood management in Semarang, Indonesia. *Environmental Geology*, 55, 1507–1518.
- Medrano, P., C. Rodríguez and E. Villa (2008) Does the mother's education matter in child's health? Evidence from South Africa. *South African Journal of Economics*, 76: 612–627.
- Mezirow, J. (1990) *Fostering Critical Reflection in Adulthood: A Guide to Transformative and Emancipatory Learning*. San Francisco: Jossey-Bass.
- Mezirow, J. (1998) Transformative learning and social action: A response to Inglis. *Adult Education Quarterly*, 49(11):70–72.
- Hamm, M. W. and A. C. Bellows (2003) Community food security and nutrition educators. *Journal of Nutrition Education and Behaviour*, 35: 37–43.
- Mohamadpur, M., Z.M. Sharif and M.A. Keysami (2012) Food insecurity, health and nutritional status among a sample of palm-plantation households in Malaysia. *Journal of Health Population Nutrition*, 30(3): 291–302.
- Nagata, J.M, R.C. Valeggia, W.N. Smith, K.F. Barg, M/ Guidera and K.D. Bream (2011) Criticisms of chlorination: social determinants of drinking water beliefs and practices among the Tz'utujil Maya. *Revista Panamericana de Salud Publica*, 29: 09–16.
- OECD (2002) *Definition and Selection of Competencies (DESECO): Theoretical and Conceptual Foundations—Strategic Paper*. Paris: OECD.
- Ofei-Manu, P. and R.J. Didham (2014) *Quality Education for Sustainable Development—A Priority in Achieving Sustainability and Well-being for All*. Policy Brief November 28, IGES.
- Piaget, J. (1959) *Language and Thought of the Child (M. Grabain, Trans.)*. New York, NY: Humanities Press.
- Pokhrel, D. and T. Viaraghavan (2004) Diarrhoeal diseases in Nepal vis-à-vis water supply and sanitation status. *Journal of Water Health*, 2: 71–81.
- Rolland-Cachera MF., M. Deheeger, M. Maillot and F. Bellisic (2006) Early adiposity rebound: causes and consequences for obesity in children and adults. *International Journal of Obesity*, 30: 511–517.
- Schulz, P. (2003) Investment in women's human capital. *Center for Economic Growth*. New Haven, University of Yale.
- Shepherd, A. (2008) *Achieving the MDGs: The Fundamentals*. ODI Briefing Paper 43.
- Srinivasan, C. S., S. Zanillo and B. Shankar (2013) Rural-urban disparities in child nutrition in Bangladesh and Nepal. *BMC Public Health*, 13: 581.
- Uddin, J., Z. Hossain and M.O. Ullah (2009) Child mortality in a developing country: a statistical analysis. *Journal of Applied Quantitative Methods*, 4(3): 270–283.
- United Nations Water and Sanitation, Energy, Health and Agriculture and Biodiversity (UN WEHAB) Working Group (2002) *A Framework for Action on Water and Sanitation*. <http://www.susana.org/_resources/documents/default/2-1386-wehabwatersanitation.pdf> (retrieved 25 Sep. 2015).
- United Nations (2014a) *The Millennium Development Goals Report 2014*. New York: United Nations.
- United Nations (2014b) *Outcome Document—Open Working Group for Sustainable Development Goals*. <<http://sustainabledevelopment.un.org/focussdgs.html>> (accessed 20 Oct. 2014).
- United Nations (2015) *Open Working Group Proposal for Sustainable Development Goals*. <<https://sustainabledevelopment.un.org/sdgsproposal>> (accessed 29 May 2015).
- United Nations Development Plan (UNDP) (2010) *What Will It Take to Achieve the Millennium Development Goals?* New York; UNDP.
- United Nations Education Scientific and Culture Organization (UNESCO) (2005) *EFA Global Monitoring Report 2006—Literacy for Life*. Paris: UNESCO.
- United Nations Education Scientific and Culture Organization (UNESCO) (2010) *The Central Role of Education in the Millennium Development Goals*. Paris: UNESCO.
- United Nations Education Scientific and Culture Organization (UNESCO) (2011) *Education Counts: Towards the Millennium Development Goals*. Paris: UNESCO.
- United Nations Education Scientific and Culture Organization (UNESCO) (2014) EFA Global Monitoring Report 2013–2014: teaching and learning. *Achieving Quality for All*. Paris: UNESCO.
- United Nations Education Scientific and Culture Organization (UNESCO) (2015a) EFA Global Monitoring Report 2000–2015: achievement and challenges. *Achieving Quality for All*. Paris: UNESCO.
- United Nations Education Scientific and Culture Organization (UNESCO) (2015b) Incheon Declaration Education 2030: Towards inclusive and equitable quality education and lifelong learning for all.
- Usfar, A.A., E. Lebenthal, Atmarita, E. Achadi, Soekirman and H. Hadi (2010) Obesity as a poverty-related emerging nutrition problem: the case of Indonesia. *Obesity Reviews*, 11: 924–928.
- Vandermoote, J. and E. Delmonica (2000) Education 'vaccine' against HIV/AIDS. *Current Issues in Comparative Education*. 3(1): 6–13.
- Vygotsky, L.S. (1986). *Thought and Language (Rev. ed.)*. Cambridge, MA: MIT Press.
- Wallace, L.J., A.J. Summerlee, C.E. Deewey, C. Hak, A. Hall and C.V. Charles (2014) Women's nutrient intakes and food-related knowledge in rural Kandal province, Cambodia. *Asia Pacific Journal of Clinical Nutrition*, 23(2): 263–271.
- Webb, P. and S. Block (2004) Nutrition information and formal schooling as inputs to child nutrition. *Economic Development and Cultural Change*, 52: 801–820. <<http://www.who.int/mediacentre/factsheets/fs311/en/>>
- World Health Organization (WHO) (2013) *World Hunger and Poverty Facts and Statistics*. <<http://www.worldhunger.org/articles/Learn/world%20hunger%20facts%202002.htm>> (retrieved 5 Sep. 2015).
- World Health Organization (WHO) (2015a) *Obesity and Overweight*. <<http://www.who.int/mediacentre/factsheets/fs311/en/>> (retrieved 1 Oct. 2015).
- World Health Organization (WHO) (2015b) *Track 2: Health Literacy and Health Behaviour, 7th Global Conference on Health Promotion*, Track Themes. <<http://www.who.int/healthpromotion/conferences/7gchp/track2/en/>>
- WHO and UNICEF (2012) *Progress on Drinking Water and Sanitation 2012 Update*, World Health Organization and United Nations Children's Fund.
- WHO and UNICEF (2013) *Progress on Drinking Water and Sanitation 2013 Update*, World Health Organization and United Nations Children's Fund.



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