The Role of Emerging Technologies in Women's Health and Sustainable Development

How policymakers in developing countries can use emerging technologies to improve health outcomes and reduce inequality

WORLD GOVERNMENT SUMMIT 2019

in partnership with

> accenture

Answering Tomorrow's Questions Today

The World Government Summit is a global platform dedicated to shaping the future of governments worldwide. Each year, the Summit sets the agenda for the next generation of governments with a focus on how they can harness innovation and technology to solve universal challenges facing humanity.

The World Government Summit is a knowledge exchange center at the intersection of government, futurism, technology, and innovation. It functions as a thought leadership platform and networking hub for policymakers, experts and pioneers in human development.

The Summit is a gateway to the future as it functions as the stage for analysis of future trends, concerns, and opportunities facing humanity. It is also an arena to showcase innovations, best practice, and smart solutions to inspire creativity to tackle these future challenges.

Table of Contents

Topics

Introduction

The journey towards sustainable development requires the empowerment of women. The World Bank describes women's empowerment as "the expansion of the freedom of choices and action, which could increase women's authority and control over resources and decisions regarding their lives." This "freedom of choices and actions"—determined by both community and individual agency—impacts women's health outcomes by enabling adequate nutrition, access to health resources, control over maternal and reproductive health, and access to finances, among other factors.

The following issues present significant barriers to women's health empowerment:

- Lack of appropriate infrastructure and investments, restricting women's health choices
- Social norms and institutions that prevent or impede choice for women, whether with their consent or through coercion
- Policy context that is unable to provide an integrated approach towards women's health empowerment.

Complete empowerment can be achieved only by providing access to health services at every stage of women's lives. While there is no magic pill, the emergence of new technologies enables developing countries to reach higher levels of health empowerment for women in a shorter time with minimal additional spend. This paper aims to demonstrate how policymakers can make crucial interventions, aided by technology, to foster women's health empowerment and social justice. We present women's health empowerment as a composite measure including resources, agency, and outcomes.

The challenges at hand, and how technology can help

Despite significant progress, especially since the 1960s, more than half a million women die every year in pregnancy and childbirth due to entirely preventable reasons.

99 percent of them live in the developing world. Along with this persistent threat, women today face new and serious health risks: 50 percent of all adults living with HIV/AIDS worldwide are women, with those aged 15–24 years disproportionately affected.[i]

According to the United Nations Women's Policy Division, women's empowerment requires focused interventions, and all development projects and policies must be gender-sensitive.[ii] It is vital to build resilience from birth, embed it in communities, and support women throughout their lives.

However, developing countries struggle to implement policies and programs that seek to improve health outcomes for women. While many programs are designed to address specific aspects of empowerment at different stages of life, none of them are integrated into a holistic model that can be measured periodically to provide feedback to policymakers on the efficacy of such interventions at scale.

>500k
Women die every year in pregnancy and childbirth

99%
Live in the developing world

50%
Adults living with HIV/AIDS worldwide are women

That's where technology can help. By bringing together data and systems, technology can deliver actionable insight into specific local contexts where change is essential, helping stakeholders and decision-makers to design targeted women's health empowerment programs (see figure 1). For example, if social norms prevent women making effective use of existing resources, the most urgent requirement would be to address this challenge rather than simply spending more on expanding the health infrastructure. At a more fundamental level, technology can also help gather insights into the specific challenges that women face, and on which policymakers should focus their attention.

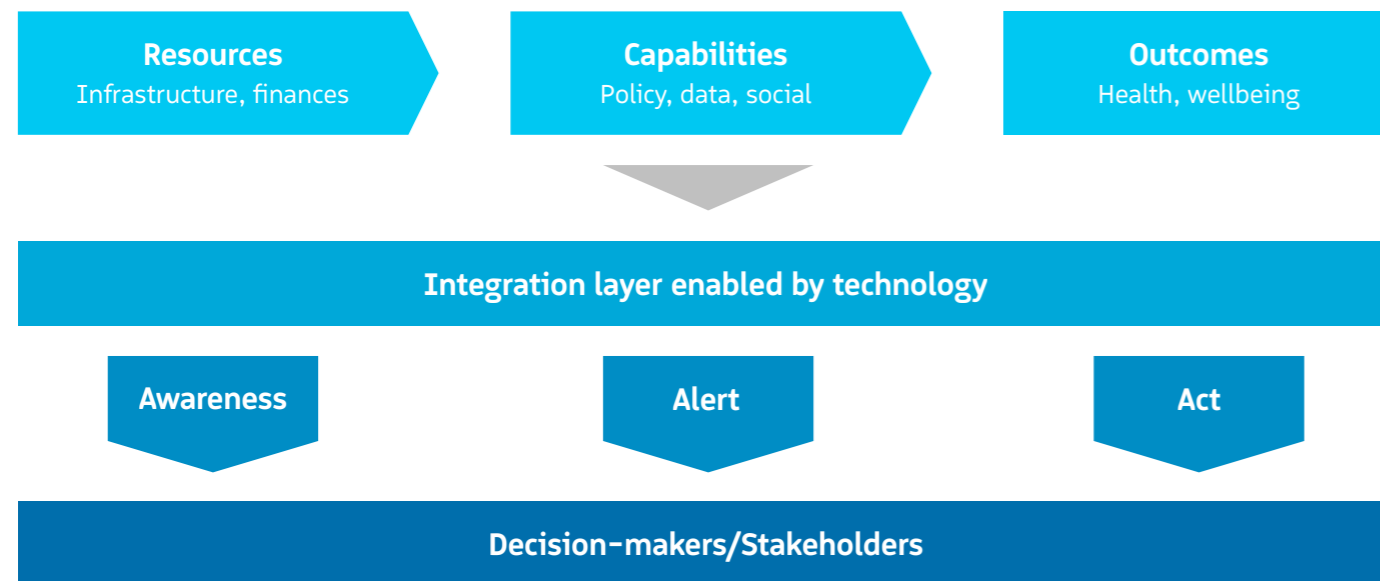This paper will explore areas including:

- What does health empowerment of women mean?

- Which resource and capability issues need to be addressed to achieve women's health empowerment?

- How can new and emerging technologies be used as agents of change?

- How can governments orchestrate an innovation ecosystem to radically improve outcomes at scale?

The study combines primary and secondary research methods to understand the potential of emerging technologies to guide policymakers' approach to women's health empowerment.

The paper uses case-studies of projects and pilots for women's health empowerment, as well as interviews with leading experts in the field, to learn where existing approaches tend to fail and identify potential best practices for delivering desired results.

Figure 1: Proposed use of technology to guide policymakers' approach to fostering women's health empowerment

Resources Infrastructure, finances	Capabilities Policy, data, social	Outcomes Health, wellbeing

Integration layer enabled by technology

Awareness	Alert	Act

Decision-makers/Stakeholders

Source: Accenture Research

Measuring women's health empowerment

While "health empowerment" is not a straightforward variable that can be measured, literature around the topic tends to focus on three key areas:

- Universally accepted fundamentals of well-being, such as increased life expectancy

- More complex aggregated measures of achievement, such as the number of women political representatives involved in defining healthcare policies, and

- The absence of choice or active discrimination against women.

Using a combination of these factors, we have developed a "health empowerment index" (HEI) to rank countries based on their achievements and identify correlations with per-capita income and economic growth. Comprised of 12 indicators across three dimensions—agency, resources, and outcomes (see appendix for the methodology and scores), the index draws on the principles used in the Capabilities Approach developed by Amartya Sen and others, and provides an interesting framework to guide action.

The approach hypothesizes that women's choices can be restricted by lack of access to resources (such as public hospitals and doctors) or agency (the ability to define personal goals and act to achieve them). "Capabilities" are a combination of resources and agency that allow people to lead the lives they want, and "functioning achievements" are the specific capabilities realized by individuals.

Agency

The extent to which women have access to skills and opportunities to become equal participants in society (covering indicators around educational attainment, economic participation, political participation, and health and reproductive choices).
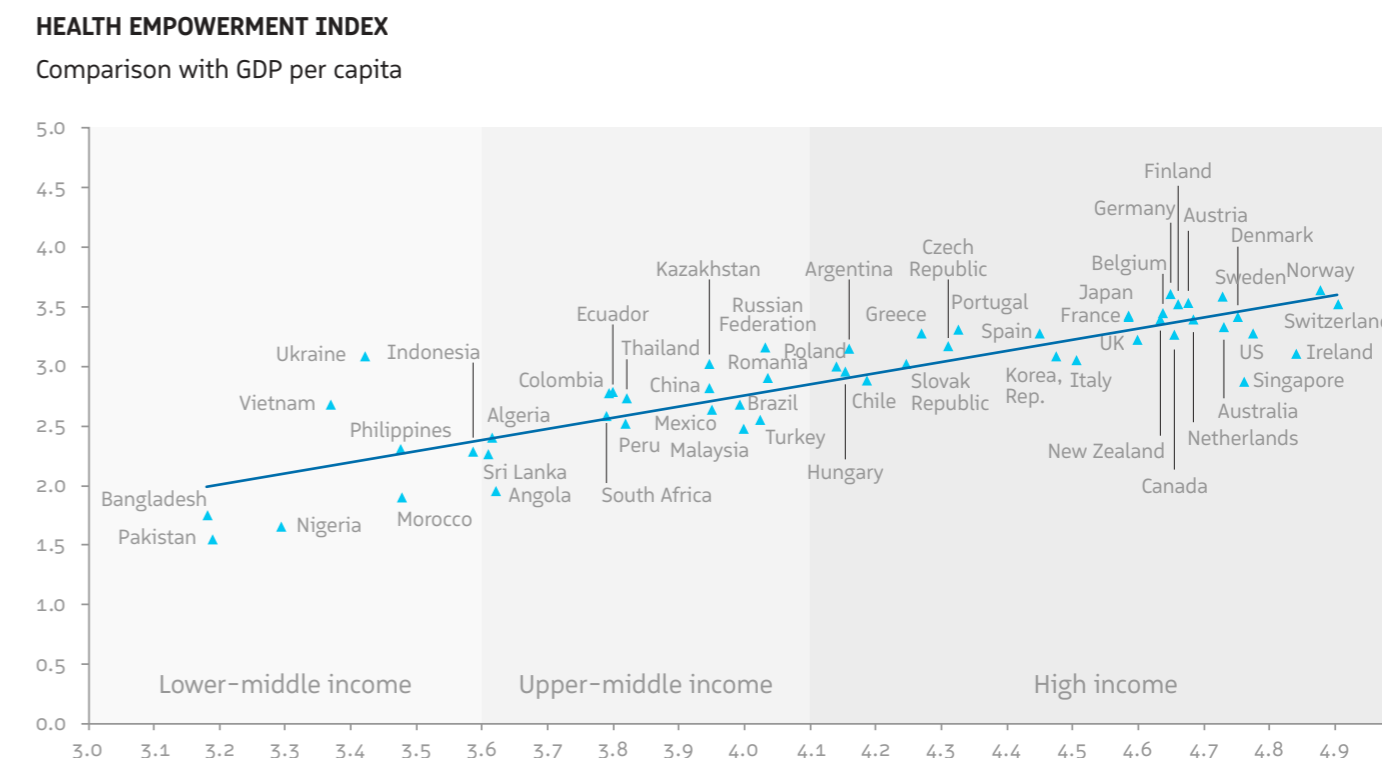
Resources

Access to healthcare services and general government expenditure on healthcare.

Outcomes

Indicators around life expectancy at birth, child mortality rate, and sex ratio.

We selected the top 65 countries by GDP size (World Bank, 2017), excluding 10 countries[iii] due to unavailability of data. The three dimensions—agency, resources, and outcomes—carry equal weight.

Figure 2: Mapping Health Empowerment Index and GDP per capita

HEALTH EMPOWERMENT INDEX
Comparison with GDP per capita

Source: Accenture Research analysis based on publicly available data (details in Appendix)

Note: Country scores were calculated from data published by multilateral agencies including the World Bank, International Labour Organization, and the World Health Organization. The methodology used in developing the Index is in line with the approach adopted in the human development index calculations. A single index may not capture the full complexity of issues involved in measuring women's health empowerment, but provides an indicative direction of travel for policymakers.

Today's economic situation doesn't have to determine current and future health empowerment

The HEI index shows that women's health empowerment goes hand-in-hand with economic growth. However, lower—and middle—income countries need not wait decades until they have stronger economies to tackle health empowerment. High-impact interventions enabled by technology can cut years off the time needed for a country to achieve greater health empowerment and better health outcomes for women.

First, we'll look at the policy levers that countries can use to empower women.

Factors affecting women's health empowerment

Clearly, economic development has a positive impact on women's health outcomes—driven both by increased resources and improved agency. Does this mean that developing countries need to wait until their per-capita income is on par with the developed world to see a positive impact on women's health? Not quite.

Let's look at some of the well-known factors (not intended as an exhaustive list) determining women's health empowerment across the resources and agency dimensions.

Rise in income

We have established that economic growth has a positive effect on women's health outcomes. One effect of rising incomes is that households that move out of poverty or low-income levels do not need to ration resources between their children according to gender. Economic growth also expands opportunities for women and allows governments to increase expenditure on public services directly impacting women's health empowerment. However, economic growth need not necessarily address the issue of women's health empowerment. Take the issue of sex ratio at birth and you can see that even though South Korea, China and India have widely different levels of per-capita income, they suffer from a skewed ratio.

On the flipside, countries including Ukraine and Vietnam score disproportionately high in the health empowerment index in relation to income levels. This is explained by respective governments' significant investments in public

health and education, which have resulted in very high life expectancy for women, low under-5 mortality rate, and overall sex ratios favoring women. Economic participation of women in these countries is among the highest in the world. In Ukraine, nearly all births are attended by skilled health personnel.

Investment in health infrastructure

Public investments in healthcare facilities improve access to care and overall health outcomes. Researchers studied a period of rapid decline in maternal mortality in Sri Lanka during the 1940s and 1950s, brought about by medical progress and improvements in the public health system. They found that reducing maternal mortality risk significantly increased female life expectancy; a 70 percent reduction in maternal mortality risk over the sample period increased female life expectancy at age 15 by 4.1 percent, and female literacy by 2.5 percent.[v]

Developing countries still need specific interventions, not only in building healthcare capabilities but ensuring equitable access for women. Angola, for example, has a much higher number of hospital beds per 1,000 population than South Africa, but much worse health outcomes. Child mortality rates for females under-five are more than twice the rate in South Africa, and female life expectancy at birth is two years lower. Equality in access to healthcare is a big difference between the two countries, as is investment in education and the availability of economic opportunities for women.

Education

Most research suggests that education has a positive impact on the empowerment of women, though estimating the effect remains difficult. Education improves the position of women in the family because it provides them with knowledge, skills and resources to make life choices that enhance their welfare.[vi] Other research studies show that education lowers women's desired number of children, gives them the ability to make decisions that affect their sexual and reproductive health (from pre-conception health to planned pregnancy to menopause) and reduces their tolerance for norms that damage their well-being. Highlighting the need for sustained cultural and social change, there's little evidence to suggest that education directly improves decision-making authority, asset ownership, or community participation.[vii]

Employment

Previous research studies reveal that increased opportunities for women in the labor market translate into women gaining greater control over their health status.[viii] Improved standing in the household and in society gives them more control over choices related to health and wellbeing. Technological innovations have had a positive impact on women's opportunity to participate in the workforce. For example, digital fluency (the extent to which people embrace and use digital technologies to become more connected and effective) is helping to close the gender pay gap and level the playing-field for women at work. That's particularly true in developing countries, where digital fluency has had a stronger positive impact on the education of women than in the developed world.[ix] Accenture Research reveals that if governments and businesses can double the pace at which women become digitally fluent, we could reach gender equality in the workplace by 2040 in developed countries and by 2060 in developing countries.

Reproductive choice

A research study analyzed the rollout of a large-scale family planning campaign across Colombia in the 1960s and 1970s and found that access to contraception delayed the time at which women began childbearing, which in turn increased their education levels as well as employment rate.[x] This is consistent with another study showing that access to oral contraceptives transformed the career opportunities of women in the United States, making careers that require years of upfront investment (like law and medicine) more feasible and attractive.[xi] Access to these opportunities enhances women's agency, allowing them to set and achieve more ambitious goals.

However, some argue that technological innovations can have an adverse effect on women's health empowerment, as shown by the worsening of sex ratio at birth in South Korea and India after the introduction of techniques for sex determination during pregnancy.[xii] A recent study, however, suggests an increase in sex ratio (males to females) at birth may be caused by reduced fertility, though the propensity to use sex-selection techniques and preference for sons may be on the decline.[xiii] This means that although fewer couples are using sex-selection techniques, the impact of these methods on the overall sex ratio at birth may become pronounced when fertility is declining.

Right to property

Constitutional reform allowing equal estate and inheritance rights to women was expected to enhance women's empowerment. The evidence, however, suggests that it would need to be backed by other reforms. The Indian state of Kerala, with human development indicators similar to the developed world, offers an interesting case study.

Traditionally, women in Kerala have had high levels of education, independence, and social status. This was especially true of the influential Nair community, which had matrilineal and matrilocal family ties. The community, however, witnessed a fundamental shift in the legal and social structure with the dismantling of the matrilineal tharavadus (ancestral property), encouraged during the British administration.

Over time, the role of men in providing financial security and that of women as homemakers became the dominant narrative, giving rise to male-centric, patrilocal systems. Dowry is now often a topic of discussion at the time of marriage, and preference for sons and sex-selection propensity have both grown.[xv]

Although it might be expected that inheritance rights for women in the Nair community would empower them, a recent research study shows that equal inheritance rights can increase prejudice against girl children. The researchers found that after inheritance law reform, children in families with a first-born daughter were 3.8 to 4.3 percentage points less likely to be girls, indicating that the reform encouraged female feticide.[xvi] One of the big drivers of this shift toward preference for sons is the emergence of the son as a provider of security in old age, compared to daughters who relocate to the groom's house and contribute to his family.

Further, evidence from Ghana suggests that inheritance of assets, unless backed by secure property rights, can have an adverse impact on women's and household incomes. Women face a particular disadvantage in an environment of insecure property rights as they have less access to other forms of power, drawn from lineage or political participation.[xvii]

Political agency

The right to vote and a greater representation of women in parliament and government positions have led to improved health outcomes. The enfranchisement of women in the United States during the early twentieth century led to a sharp rise in public health expenditure and a steep drop in infant mortality.[xviii] A more recent study in India found that a 10 percent increase in women's representation results in a 2.1 percent reduction in neonatal mortality. Researchers agree that women's political representation may be an underutilized tool for addressing health in developing countries.[xix]

Women's empowerment in Rwanda

After the genocide of 1994, Rwanda found itself with a predominantly female population. The economic and social progress made by the country in subsequent years is an interesting example of women's empowerment and its positive impact on health and development.

After the atrocity, Rwanda became the first country to have more than 50 percent female members of parliament. Women led rebuilding and restoration efforts in association with multilaterals and non-profit organizations, producing improved outcomes in economic growth, health, and political empowerment.

Rwanda has improved most health indicators by introducing a universal healthcare system covering more than 90 percent of the population. Life expectancy has doubled in the last 20 years, and mortality of children under five has fallen by 50 percent.[xx] As a result of the compulsory education program, enrollment in primary and secondary schools is split evenly between boys and girls. Women have equal property rights and continue to move into leadership positions in all walks of life.[xxi]

The progress that Rwanda has made is best exemplified by the country being listed second only to Sweden in the Social-Watch Gender Equity Index (2009; in 2012, it had a score of 0.77, equal to France and higher than the United Kingdom).[xxii] The commitment toward women led to the introduction of many initiatives aimed at maximizing the participation of women and advancing their economic status and well-being. These include Vision 2020 (1998–99), National Constitution (2003) and New Civil Code, Ministry of Gender and Family Promotion, Economic Development and Poverty Reduction Strategy (2008–2012), and National Gender Policy.[xxiii]

This is not to say that further reform is unnecessary. There are calls to counter traditional patriarchal norms and violence against women in the country.[xxiv]

The preeminence of social and cultural norms

One of the critical reasons behind persistent gender inequality in developing countries is the prevailing social and cultural norms that subjugate women's rights. Patriarchy and traditional gender roles deny women access to education, healthcare and the labor market. While gender gaps narrow with economic growth and education, social and cultural norms (including patriarchy and notions about female purity) can increase inequality.[xxv] Social norms discriminate against women in access to nutrition and education and push them into low-paid occupations in the informal economy. They face restrictions on movement, sexual choice, and reproductive decision-making.[xxvi]

A consequence of these limiting norms is what Amartya Sen terms "missing women" – the shortfall of women that would have lived, relative to men, had they had equal access to what they needed to survive.[xxvii] Economic growth, investment in public health and education, and reform in property rights are important. But unless accompanied by social and cultural change, they have a limited effect on women's empowerment.

Limitations of current policy interventions

Women's health empowerment is a complex issue, determined by a variety of often interconnected factors. Focusing on one or two variables is unlikely to deliver results and may even cause unintended negative consequences. Instead, policymakers must simultaneously deliver a package of solutions to increase women's agency and their access to resources, which can translate into better health outcomes and empowerment. Challenges in current policy interventions include:

Inadequate access to data
Multiple government agencies and departments are tasked with women's health and empowerment objectives leading to disjointed efforts with limited success. A lack of a single lifetime view of an individual limits the scope for making timely and life-stage appropriate interventions. Beneficiaries are also affected by a lack of reliable and up-to-date information on health issues and their rights.

Unbalanced investments
Public investment in women's health is often disproportionately allocated to child and maternal health. There is also a need to strike a balance in investments that build health infrastructure with those that seek to enhance women's agency. For example, investments in health infrastructure without a campaign to address prevailing social or cultural norms may find limited success. Deficiencies in service delivery and oversight add to the ineffectiveness of investments.

Lack of a coordinated effort
Government agencies, non-profits, and enterprises do not always work together to accomplish women's empowerment goals. Policy announcements and interventions should provide for specific roles to be performed by each stakeholder in the health empowerment ecosystem. Programs are often implemented in silos without bringing onboard expertise and innovation to which other ecosystem participants have access. A consequence of this is that women's health empowerment programs find difficulty in scaling and objectives take much longer to meet.

Last-mile delivery issues
The best of plans and policy interventions often fail if the person responsible for service delivery is not equipped and empowered. Community health workers and other allied workers do not always have access to resources that enable them to provide information or services to those in need. Related to this are difficulties in capturing feedback on challenges or needs and relaying them back to government officials or other decision-makers.

Institutional voids
Empowering women to take control of their health choices requires addressing a number of institutional voids, such as unequal access to public resources, weak market mechanisms, limiting social and cultural norms and lack of enforcement of property rights.

These limitations can to a large extent be addressed by incorporating technology tools and platforms, whether in the integration and dissemination of data or equipping the last-mile health worker with digital tools and knowhow. The use of digital technologies in public health has great potential to improve health outcomes and health equity, benefiting and empowering women.[xxviii] Technology interventions can bring increased transparency and accountability in women's health empowerment funding while enabling greater reach and better outcomes. Technology can also help address critical institutional voids: Bitland, for example, is addressing the lack of protection of property rights in Ghana through Blockchain. The country's Lands Commission has faced a host of challenges in registering land titles and resolving disputes, with nearly 78% of all land in Ghana remaining unregistered. Bitland seeks to bring transparency to the land registration system by allowing individuals and groups to record titles on an immutable public ledger.[xxix] The UN 2030 Agenda for Sustainable Development, recognizing the potential impact of digital technologies, calls for investment in and access to them as a means to support achievement of the Sustainable Development Goals.[xxx]

Technology as The Force-Multiplier

The different policy levers analyzed in the previous section will continue to be essential components of a country's health-empowerment plan. However, adding technology to the mix can radically reduce the time to scale and make a transformative impact. There's potential to make technology-enabled interventions at every stage of life to ensure that women are empowered and healthy.

Renewing the capabilities approach with emerging technologies

Research studies continue to show how health, equality and development indicators are interconnected.

Societal inequality has direct, negative consequences on population health, more so for the poor.[xxxi] The impact of poverty and inequality on women is even more pronounced. When women are empowered, all of society benefits. The Capabilities Approach provides a useful framework to guide action toward ensuring positive health outcomes for women. Though there's significant research to identify the causes and cures for addressing the gap between men and women, policymakers struggle to address the consequences of this inequality.

Policy interventions and funding in some countries are targeted entirely at care for mothers and children. Though well-intentioned, this leads to lopsided results.[xxxii] Experts call for a feminist lens in the allocation of resources for women's health and interventions across life stages. There's a need to look at each stage, from birth to motherhood and beyond, and identify challenges to be addressed. As Dr. Indrani Bhattacharya, Deputy Director, The Child in Need Institute said: "The disempowerment of women starts even before they are born or when they are still in the womb. Female foeticide is not an individual decision, but a family decision rooted in social norms. The discrimination continues through childhood on issues related to education, nutrition, vaccination, or even physical violence and safety. For a girl child born in relatively disempowered family, these become further pronounced through child marriage and early motherhood. The lack of awareness, communication and access to reliable health information further accentuates this disempowerment. While investment in health infrastructure is important, cultural barriers are so huge that increased government spending alone cannot mitigate those barriers."[xxxiii]
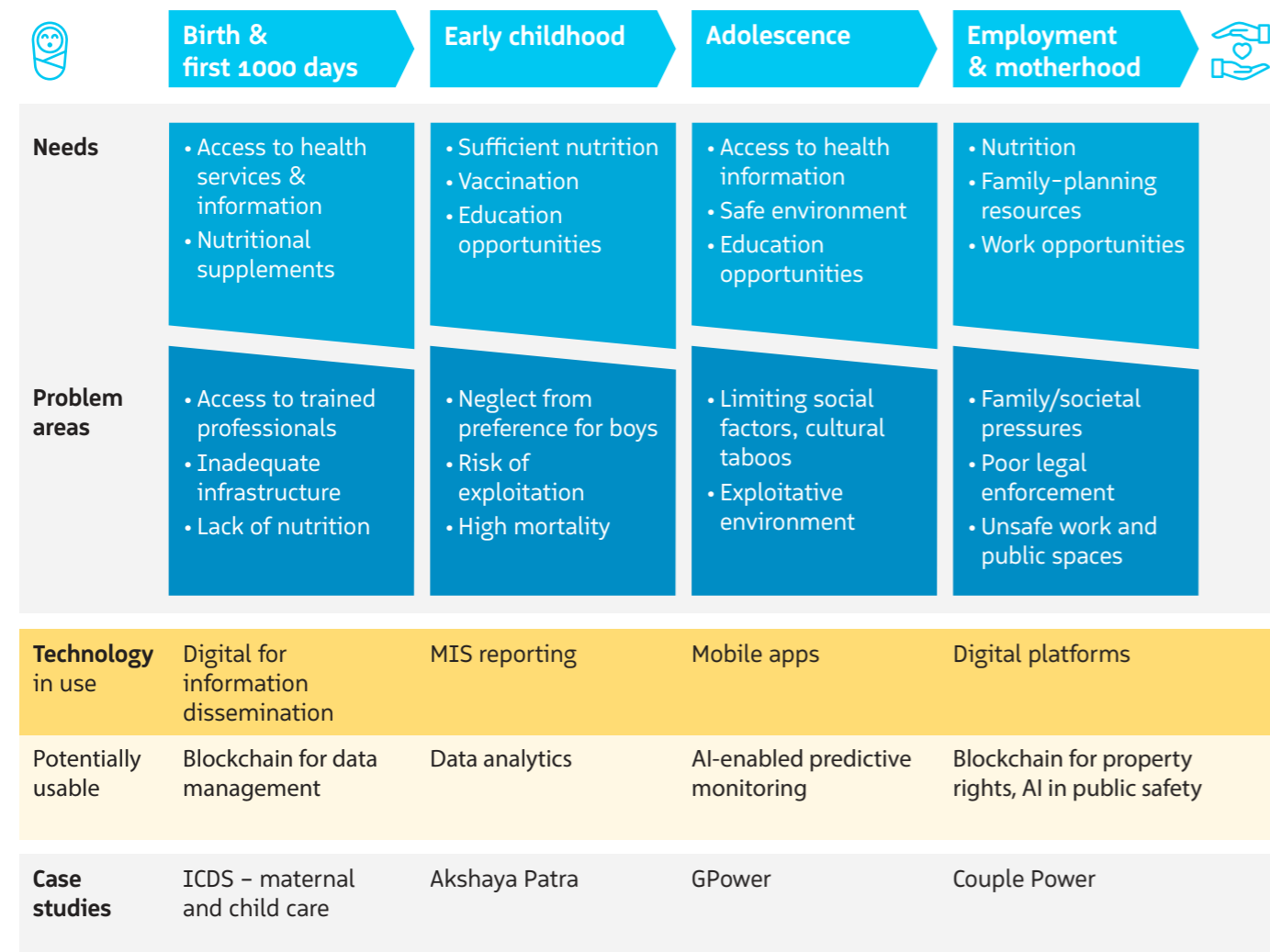
Too often, policymakers overlook adolescence, which could have a lasting impact on women's health and quality of life. During this life-stage, there's a greater need for access to information on health and well-being, availability of educational opportunities, and breakdown of social and cultural barriers that stand in the way of women's progress.

Many pilot programs on health empowerment end up duplicating infrastructure and processes, without making a dent in tackling the real challenge. There is an opportunity for governments to work with the private sector to use emerging technologies like artificial intelligence, machine learning, IoT, blockchain, and edge-computing to develop locally relevant, scalable solutions to address these problems. According to Indrani, technology has a huge role to play in reaching the most vulnerable girls by filling the data gaps, addressing the knowledge barrier (which is the starting point for disempowerment) and making cost-effective, real-time interventions a reality. Technology can also play a role in integrating the various components of the health and social justice system. Collaboration between governments, non-profit organizations, large corporations and start-ups can produce innovative ecosystems, platforms and intelligent solutions that address specific problems at each stage of women's lives.

Scaling social transformation through a continuum of care

Working in partnership with governments and non-profit organizations, Accenture is piloting intelligent technologies to address some of the most pressing challenges faced by women in developing countries, especially India (see figure 3). These pilots can act as a roadmap for developing economies to adopt a multi-pronged approach toward women's health empowerment.

Figure 3: Potential technology intervention at each life-stage

	Birth & first 1000 days	Early childhood	Adolescence	Employment & motherhood
Needs	• Access to health services & information • Nutritional supplements	• Sufficient nutrition • Vaccination • Education opportunities	• Access to health information • Safe environment • Education opportunities	• Nutrition • Family-planning resources • Work opportunities
Problem areas	• Access to trained professionals • Inadequate infrastructure • Lack of nutrition	• Neglect from preference for boys • Risk of exploitation • High mortality	• Limiting social factors, cultural taboos • Exploitative environment	• Family/societal pressures • Poor legal enforcement • Unsafe work and public spaces
Technology in use	Digital for information dissemination	MIS reporting	Mobile apps	Digital platforms
Potentially usable	Blockchain for data management	Data analytics	AI-enabled predictive monitoring	Blockchain for property rights, AI in public safety
Case studies	ICDS – maternal and child care	Akshaya Patra	GPower	Couple Power

Source: Accenture Research

First 1,000 days

The health and well-being of mother and child are deeply intertwined, and both are positively impacted by early interventions in provision of nutrition and medical care.

Prenatal and early childhood interventions affect outcomes at every stage of the lifecycle. There's growing evidence that early-life health and nutritional interventions—including those aimed at improving the health and nutrition of potential mothers and pregnant women—have a significant impact on lifetime education levels, earnings, and productivity.[xxxiv] Researchers find that the current and childhood health of the mother has a significant influence on the well-being of the next generation.[xxxv] Sweden's early-intervention program provided a model for the universal infant-care programs in Scandinavian countries. Pioneered in 1931-33, the intervention monitored infant care through home visits and clinics, placing special emphasis on nutrition and sanitation.[xxxvi]

New digital devices and analytics tools enable policymakers to enhance and scale initiatives to meet the needs of a large population of women and children in lower-income and middle-income countries. Accenture Labs, for example, has developed an innovative enterprise mobility solution that addresses the operational gaps

in the delivery of Integrated Child Development Services (ICDS) and has been piloted across 5,000 families in Karnataka State in India. Launched in 1975 by the Indian government, ICDS has been instrumental in improving the health of mothers and children under the age of six by providing supplementary nutrition, health services, and pre-school education. One of the largest in the world, the program reaches more than 58 million children (aged 0-6 years) and 10.23 million pregnant and breastfeeding mothers every year.

There are many operational challenges involved in running a program of this scale. Maternity wards are often overwhelmed by high numbers of patients, which far exceed their capacity. Rural maternal caregivers are trained to provide primary healthcare services and to motivate pregnant women to give birth at a medical facility. It's a tough job. Simply to record a case of pregnancy and recover a woman's past medical history, these caregivers must access and read multiple healthcare registers. Many of them are semi-skilled, which reduces the trust pregnant women place in their advice. Duplicate entries, inconsistent data and lack of traceability in information make their task even harder.

To overcome these challenges, Accenture developed a novel mobile application, with the following goals:

- assist with data collection and integration

- ensure continuous care, from early registration to ANC check-ups to institutional delivery and postnatal care and

- provide contextual advisory based on UNICEF guidelines and local context.

A scientific tracking algorithm determines the level of risk associated with the pregnancy on a scale of 0 to 2, from no risk to high risk. Early deployment in a polyclinic showed extremely encouraging results: the system cut the time needed to register a pregnancy and retrieve appropriate medical records by 40%, received a 100% accuracy and usefulness rating from patients and medical staff, and reduced the waiting time for consultation to near zero from 90-120 minutes, nearly doubling each clinic's capacity.

The big advantage of such interventions is that they have a multiplier effect on the resources already deployed by the government, rather than duplicating them through other channels. They also improve the agency of women, as well as healthcare workers, to better utilize these resources.

40%
Less time to register pregnancy and retrieve medical records

100%
Accuracy and usefulness rating

~Zero
Waiting time for consultation

Early childhood

Adolescence

Akshaya Patra is the world's largest NGO-run midday meal program, serving nutritious school lunches to 1.6 million children in 13,636 schools across 12 states in India.

The program intends to expand its operations to feed 5 million children in government schools every day by 2020. For many poor children, the midday meal provided by the school is the first meal of the day. Akshaya Patra's vision is that no child in India should be deprived of education because of hunger.

Optimizing one of Akshaya Patra's kitchens in two areas—data collection via intelligence at the edge, and IoT-based monitoring of kitchen processes—enabled the team to serve 20.5 million additional meals every year using the existing infrastructure. The results suggested that replicating the model across the program's 20 mega-kitchens, and building some additional capacity, could empower Akshaya Patra to achieve its goal of servicing 5 million meals per day by 2020.

These interventions are particularly important for girls. Studies show that midday meals have a much more significant impact on girls than boys—addressing malnutrition, stunting, unhealthily low body weight and school enrolment and dropout rates.[xxxvii]

Girls aged between 10 and 24 remain vulnerable to issues such as child marriage, child labor, child pregnancy, and trafficking.

These problems cannot be resolved by running education, protection, health, and nutrition (EPHN) programs in vertical silos. Instead, government programs need to take a 360-degree view of the individual vulnerabilities of each girl to predict and prevent problems. Given the data requirements and complexity of associated analysis, it would be practically impossible and financially unviable to run such a program using a paper-based system.

With the digital revolution—including the advent of cloud computing and increased reach of smartphones—delivering a holistic solution has become affordable. GPower, jointly developed by Accenture Labs and CINI, is one such solution.

GPower demonstrates the power of data science to help underprivileged girls make healthy transitions from childhood to adulthood by addressing key issues such as school drop-out, early marriage and human trafficking. During the pilot in West Bengal, India, the research project saved over 200 girls from trafficking.

Available on tablets and mobile phones, GPower is an app that generates data in the field through intermediate agents, which is then analyzed at two levels—at the edge (on the mobile device) for quick decisions and centrally (via cloud) to examine millions of records and generate detailed insights. Based on this analysis, GPower generates a vulnerability index for each girl, village and district. Based on the score, community facilitators are informed of the steps to be taken based on the girl's information sheet, which also details government schemes to which she is entitled. The app informs them of any additional mitigation steps that may be required.

Motherhood and employment

For adolescent girls (15-19 years), the leading cause of death is a complication related to pregnancy or childbirth. Pregnancy-related maternal mortality is an area of concern even in the developed world.

For example, in the United States, women today are more likely to die in childbirth than their mothers. In 2015, more than 26 deaths were reported per 100,000 pregnant women compared to 17 in 1990. To address this issue, policymakers need to deliver more than just quality healthcare facilities. There's a need for a greater social-support system for women to ensure their health and well-being.xxxviii

A fundamental issue that remains unaddressed in most public programs is the lack of women's autonomy in reproductive decision-making and poor male involvement in sexual—and reproductive—health matters. To be scalable and sustainable, such programs need to be community-led, with peer support. The Clinton Health Access Initiative (CHAI) is using technology to improve access to its program that delivers long-acting reversible contraceptives in Africa, aiming to improve the efficiency and cost-effectiveness of family-planning supply chains and service-delivery systems.

CHAI and its partners implemented technology-led interventions in two critical areas—a supply-chain solution to improve availability at all service—delivery points and a health-workforce solution to train health workers in improving service delivery. These solutions have led to significant uptake of long-acting reversible contraceptives and family planning methods, benefitting over two million women in seven countries across Africa.xxxix

Accenture Labs, the Child in Need Institute in India and the International Center for Research on Women, collaboratively launched the Couple Power project. This aims to motivate women aged between 15 and 24 to have their say in sexual—and reproductive-health decisions at home. The project uses positive-deviant role-modeling for gender transformation and to create a safe, supportive environment to sustain change. It identifies lead peer couples, whose positive behaviors enable them to find better solutions to problems than their peers, who then act as agents of change by being role models for other participating couples. Currently, 120 lead peer couples are role models for more than 2,700 participating peer couples across 64 villages in the state of Jharkhand, which has one of India's highest maternal mortality rates.

Motherhood and employment are closely interlinked issues for women and both influence their health outcomes. Employment, among other things, can decide the relative bargaining power of women in the household decision-making process and use of resources. Reentering the workforce post-childbirth can be a challenge for women. Access to high-quality feedback to improve interview skills—especially self-awareness and self-confidence—can help.

Using behavioral science, a conversational agent, and emotional AI, Accenture Labs developed a 24x7 dynamic interview practice tool that provides real-time, actionable insights for job seekers. The tool helps users and recruiters predict job performance.

It has been piloted with youth@East London Business Alliance (UK) and Her Second Innings (India) to improve interview success rates for women reentering the workforce.

A Call to Action

Technology-based interventions have real potential to transform every stage of a woman's life. These interventions help address specific challenges and could go a long way toward ensuring women's health empowerment.

However, there's a need for a more holistic approach, bringing together all stakeholders to make informed decisions and investments. We present an action framework for governments that seeks to match the promise of intelligent technologies with women's health empowerment goals.
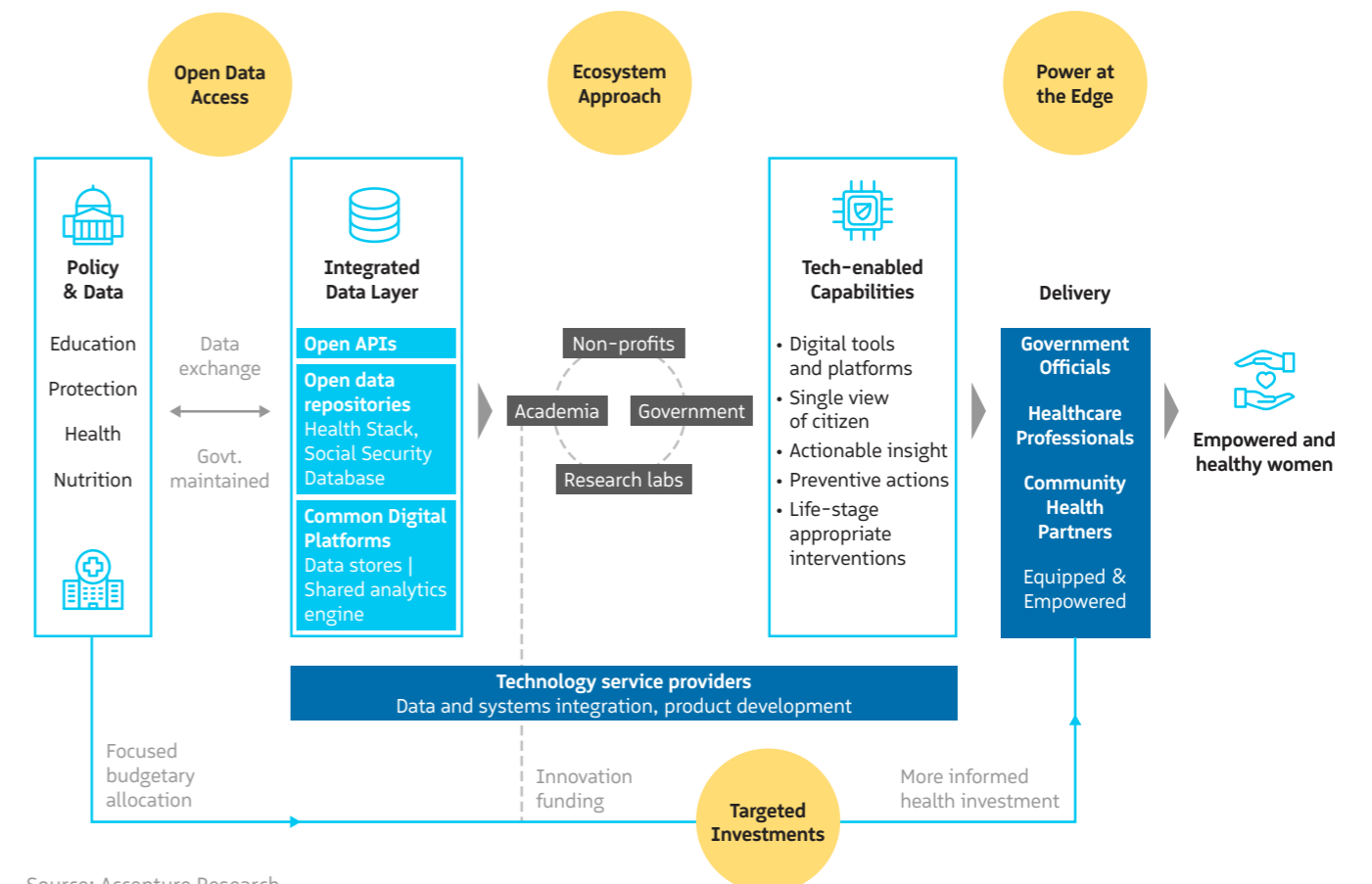
Actions for policymakers

While the expectation is that gender inequality in developing countries will fall naturally as their economies grow, policymakers can use technology-enabled interventions to speed up the process.

Public investment in education and health will continue to be crucial. Education helps expand women's capabilities, enabling them to speak out against inequality in the family as well in society. Reforms to boost women's participation in politics and promote them to leadership positions will also increase their voice and agency.

Existing investments and policy reforms need to be better implemented and scaled up. Technology can play a critical role here, as highlighted in the previous section. However, policymakers need to be aware of the conditions under which emerging technologies will deliver the best results. The action plan to improve women's health empowerment must involve targeted investments based on analysis of open data, an ecosystem of players and participants to multiply the impact, and empowering workers responsible for the last-mile delivery of health services (see Figure 4).

Figure 4: A tech-enabled action plan for women's health empowerment

Source: Accenture Research

Promote transparency and data access

The importance of data in the quest for gender equality and sustainable development cannot be overstated. The constraints of current data-collection methods in the developing world limit our understanding of the problems around gender health inequity. The collection of health and socio-economic data disaggregated by sex is essential to provide deeper insight into problem areas and guide policymakers to make the right interventions at the appropriate time. Take Equal Measures 2030, for instance, an independent civil society and private sector-led partnership that connects data and evidence with advocacy and action. This helps to fuel and track progress toward gender equality and other commitments for girls and women across the UN Sustainable Development Goals (SDGs).[xl]
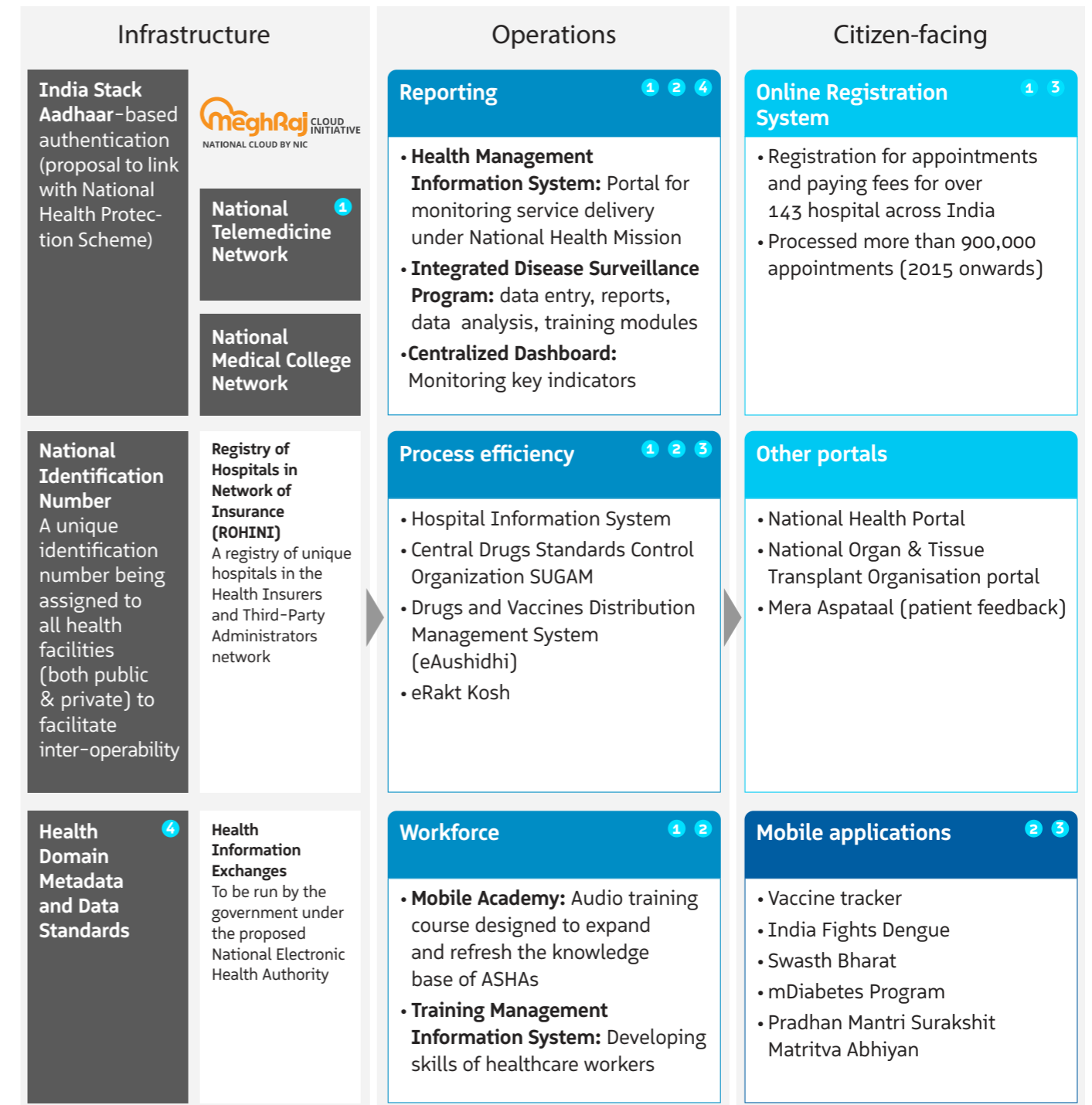
Satish Choudhury, Senior Associate for Technology Solutions at the Clinton Health Access Initiative believes that "solutions specifically designed for low-tech resource settings of developing countries can bring detailed visibility of the ground-level operations of health-focused programs. Digital tools rapidly and accurately surface information, enabling administrators to make data-driven decisions".[xli]

Without a technology layer that enables data sharing and the provision of actionable insights to decision-makers, health systems are unlikely to realize a meaningful return on investment.

Taking India's healthcare system as an example (see figure 5), we see potential to apply digital technologies at every stage to enable radical transformation, leading to better health outcomes for women. However, most current technology implementations appear to be at an operational level, for reporting or for citizen-facing initiatives, with limited scope and reach. Determining causality and addressing gaps requires an integrated approach, with an emphasis on data authenticity and measurement of causal relations between various socio-economic indicators. The Indian government is proposing a technology backbone with a unified health and social services database, but it is still years away.[xlii] Technology can help both to fill some of the institutional gaps that prevent an equitable distribution of resources and to provide actionable insight to policymakers to drive better targeting of resources.

Overall, access to good data is crucial to driving change and achieving greater gender equality to ensure sustainable development. Governments are responsible for making data available to the ecosystem and continuing to refresh and maintain the repository for constant innovation.

Figure 5: India's healthcare system and potential for digital technology implementation

Source: Accenture Research analysis based on government announcements and press articles

Targeted investments

To achieve better health empowerment outcomes, public investment must be targeted within a given context. For example, as discussed earlier, not only do programs need to take a holistic view across EPHN programs to address the specific vulnerabilities of adolescent girls, they must also empower health workers in the local community to ensure sustained impact. This means big-budget programs need to be broken down into more targeted investment decisions informed by intelligent data. Intelligent resource allocation will lead to improved returns on existing health infrastructure, by avoiding neglect in certain areas and over-investment in others. It is imperative to build into these programs a real-time monitoring and risk management system to account for variation in the local context, whether it is social norms, health issues or limited skills and motivation of community health workers. This is the idea behind localized solutions like GPower, which rely on locally generated data to create a vulnerability index for girls in their local environment and connect them to relevant government services. The idea is not to replace or reinvent the government health infrastructure, but rather to make it more targeted, efficient and effective in meeting its goals.

Investing in FemTech

In June 2018, Portfolia Funds, a US-based venture capital firm, launched a fund dedicated to FemTech, reflecting the growing significance of this market segment. FemTech refers to apps, devices, services, and other products that focus on women's health and wellness.[xliii] These include fertility solutions, period-tracking apps, pregnancy, nursing care, and many other aspects of sexual and reproductive health. According to CB Insights, FemTech start-ups have raised over USD 1.1 billion in funding since 2014.[xliv]

The Maternity Foundation and experts from the University of Southern Denmark and Copenhagen have developed the Safe Delivery App—an innovative mobile health platform that uses animated instruction-based films to train birth attendants and improve their performance and skills. The app is used across sub-Saharan Africa and Southeast Asia to provide instant access to up-to-date clinical guidelines and evidence-based neonatal and basic emergency obstetric care.[xlv]

With the growth in interest and funding from venture capitalists, technology solutions designed to improve women's health will become increasingly important.

Take an ecosystem approach

The sheer complexity of the issues and the need for substantial financial resources imply that women's health empowerment is difficult to achieve without government programs re-architecting themselves to build trusted partnerships with businesses, non-profit organizations, and academia. Technology can act as the glue that brings them together to harness their collective intelligence and work toward ensuring sustainability, scalability and affordability.

For example, in the United States, which is facing a rising maternal mortality crisis[xlvi], multiple stakeholders are coming together to eliminate preventable maternal deaths and to promote the health and well-being of expecting and new mothers. One of the initiatives focused on this issue is 'Review to Action', a resource platform developed by the Association of Maternal and Child Health Programs in partnership with the CDC Foundation and the CDC Division of Reproductive Health, with funding from Merck. With the steady rise in pregnancy-related maternal mortality, Review to Action aims to promote the state-based maternal mortality review process by increasing maternal mortality surveillance and intervening in pregnancy-related deaths. The program seeks to enable the sharing of forms, processes, and strategies to build capacity for reviews and take appropriate action.[xlvii] The program has developed a Maternal Mortality Review Information Application data system that empowers the maternal mortality review community by delivering actionable data and insights. The system helps review committees organize data and take steps to identify and assess maternal mortality cases.[xlviii]

A good example of the power of ecosystem, and the role of technology in orchestrating it, is the collaboration between Grameen Foundation and Accenture Labs to develop two applications —Emotional Analytics for Social Enterprises (EASE) and Grameen Guru. Grameen Guru uses AI and AR-based technologies to help women and other low-income populations that can't read or write to better understand financial products and services, enabling them to make informed choices that positively impact their financial and social well-being. Users can hold their phone over a brochure that details available financing options, for example, and the Guru virtual assistant will pop up and prompt a conversation in the local language to explain the material. Due to be launched across 300 villages in India, the app is an example of how technology can bridge the educational and cultural divide in a country like India. More importantly, it empowers more than 1,000 frontline microfinance workers and over 58,000 women beneficiaries to use digital financial services. EASE—an AI-based web and mobile app—helps these frontline workers to gain real-time insights on the emotional and cognitive status of their clients and engage them in relevant conversations that address their specific requirements. the tool could, for example, help detect whether a woman applying for a loan would find it genuinely useful or is being pressured into doing so by someone else.

Health systems operate in a wide variety of ecosystems with a range of participants, which means operations must be optimized to suit a range of participants to achieve better health outcomes. One potential solution is to use the micro-services architectural style, in which each health application is a suite of small services that can be deployed independently to meet specific business requirements. Another option is to harness the power of blockchain to build trusted partnerships for service delivery—a vital component of the work with Akshaya Patra that provides mid-day meals to schoolchildren. Governments must play the role of bridge-builder and force multiplier to take these technology pilots and generate a more significant impact. In the words of Dr. Indrani Battacharyya, Deputy Director of the Child in Need Institute, "If we want to do anything at scale, then the government has to be involved. Governments are convinced that technology can help and are looking for cost-effective solutions that can be scaled-up rapidly".[xlix]

Power at the edge

To be responsive, healthcare systems need to provide intelligence at the edge, empowering healthcare workers and increasing the agency of women who need help. Given the increased reach of mobile devices, one potential solution includes developing a host of native mHealth applications that can provide intelligence for local decision support as well as capacity for local data storage. This is especially important for developing countries where systems that rely on "always-on" data connectivity are unlikely to work in rural and semi-urban areas. Solutions involved in core healthcare delivery must function with little dependency on back-end services, and be able to synchronize data with the server seamlessly when connectivity is available. According to Satish Choudhury, Senior Associate for Technology Solutions at the Clinton Health Access Initiative, "the lack of avenues for gaining knowledge and awareness is one of the key challenges that limit women's health choices. With mobile penetration higher than ever in developing countries, mobile technology can be leveraged to develop platforms that provide easy-to-access media for creating effective awareness campaigns".[l]

Big data is useful in understanding the broad trends, but it needs to be broken down into relevant insights for consumption by decision-makers. Small data, which uncovers variations in human behavior, has its place, especially for health empowerment of women, by generating locally relevant "timely actionable insights."[li] Cornell's Small Data Lab is developing a series of apps that passively track patients' habits and help forecast when an episode (for example, of rheumatoid arthritis) might flare up. In a broader context, the challenge is to make big data useful at the last mile, in the hands of community health workers, where most of the value is generated.

Positive reinforcement through mass-communication programs has been shown to influence the motives and decisions of individuals and communities. With the mobile revolution and social media, government can now target messaging at different sectors of the population to nudge them to change their attitudes and actions towards women.

The hope is that a sustained communication effort will lead to the breakdown of social and cultural norms that perpetuate gender inequality and the mistreatment of women even before birth.

Conclusion

Governments constrained by resources and capabilities can tap into the potential of emerging technologies to bridge the gap in health outcomes and health empowerment between women in developing and developed countries, and between men and women within each country. They do not always have to start from scratch. The typical challenge with introducing new health empowerment programs is that they end up duplicating resources, without making any real dent in the problem. Emerging technologies like artificial intelligence, IoT, blockchain and edge computing can help scale and transform the current health infrastructure and resources to address these problems.

Up to now, data availability has often been the focus of digitization in women's empowerment programs. However, determining causality and addressing gaps requires an integrated approach, with an emphasis on data authenticity, interlinkages between various indicators and measurement of causal relations with broader socio-economic data. Government programs must also harness the power of ecosystems—benefiting from the collective intelligence of large corporations, technology companies, non-profit organizations, and start-ups.

Technology—like APIs, micro-services architectures and blockchain—can help stitch this ecosystem together. Ultimately, the power has to shift to the edge (including devices and community health workers), and programs must make the edge more intelligent to enable real-time data-driven decisions that help women. These technology-enabled interventions could produce women's health empowerment at scale and without decades being spent waiting for economic growth.

For more information, please contact

Gianmario Pisanu
Managing Director
Management Consulting Lead Middle East & Turkey
gianmario.pisanu@accenture.com

Sanjay Podder
Managing Director
Accenture Labs – Technology for Good R&D
sanjay.podder@accenture.com

SPONSORS

Amanda McCalla-Leacy
Managing Director, Global I&D Lead, Accenture

Gianmario Pisanu
Managing Director, Management Consulting Lead
Middle East & Turkey, Accenture

Rekha M. Menon
Chairman and Senior Managing Director,
Accenture in India

Sanjay Podder
Managing Director, Accenture Labs
Technology for Good R&D

Shantha Maheswari
Managing Director, Industry Practice and I&D,
Accenture Technology

Authors

Shalabh Kumar Singh
Thought Leadership Senior Principal
Accenture Research

Nataraj S Kuntagod
Principal Director – R&D
Accenture Labs

Giju Abraham Mathew
Research Manager
Accenture Research

Acknowledgments

Our grateful thanks for the valuable insights
of the many external industry experts who
contributed to the report's findings: Diva Dhar,
Indrani Battacharyya, and Satish Choudhury.

Thanks are also due to Barbara Harvey,
Svenja Falk, Pradeep Roy, Prashanthi Balaji, and
Masa Al-Chalabi for their inputs in this paper.

About Accenture

Accenture is a leading global professional services
company, providing a broad range of services and
solutions in strategy, consulting, digital, technology
and operations. Combining unmatched experience
and specialized skills across more than 40 industries
and all business functions—underpinned by the
world's largest delivery network—Accenture works
at the intersection of business and technology
to help clients improve their performance and
create sustainable value for their stakeholders.
With 469,000 people serving clients in more than
120 countries, Accenture drives innovation to
improve the way the world works and lives.

Visit us at www.accenture.com

About Accenture Labs

Accenture Labs incubates and prototypes new
concepts through applied R&D projects that are
expected to have a significant strategic impact
on clients' businesses. Our dedicated team of
technologists and researchers work with leaders
across the company to invest in, incubate and
deliver breakthrough ideas and solutions that
help our clients create new sources of business
advantage. Accenture Labs is located in seven key
research hubs around the world: Silicon Valley,
CA; Sophia Antipolis, France; Arlington, Virginia;
Beijing, China; Bangalore, India; Herzliya, Israel and
Dublin, Ireland. The Labs collaborates extensively
with Accenture's network of nearly 400 innovation
centers, studios and centers of excellence located
in 92 cities and 35 countries globally to deliver
cutting-edge research, insights and solutions
to clients where they operate and live.

Visit us at www.accenture.com/labs

About Accenture Research

Accenture Research shapes trends and creates
data-driven insights about the most pressing
issues global organizations face. Combining the
power of innovative research techniques with
a deep understanding of our clients' industries,
our team of 250 researchers and analysts
spans 23 countries and publishes hundreds of
reports, articles and points of view every year.
Our thought-provoking research—supported by
proprietary data and partnerships with leading
organizations such as MIT and Singularity—guides
our innovations and allows us to transform theories
and fresh ideas into real-world solutions for
our clients.

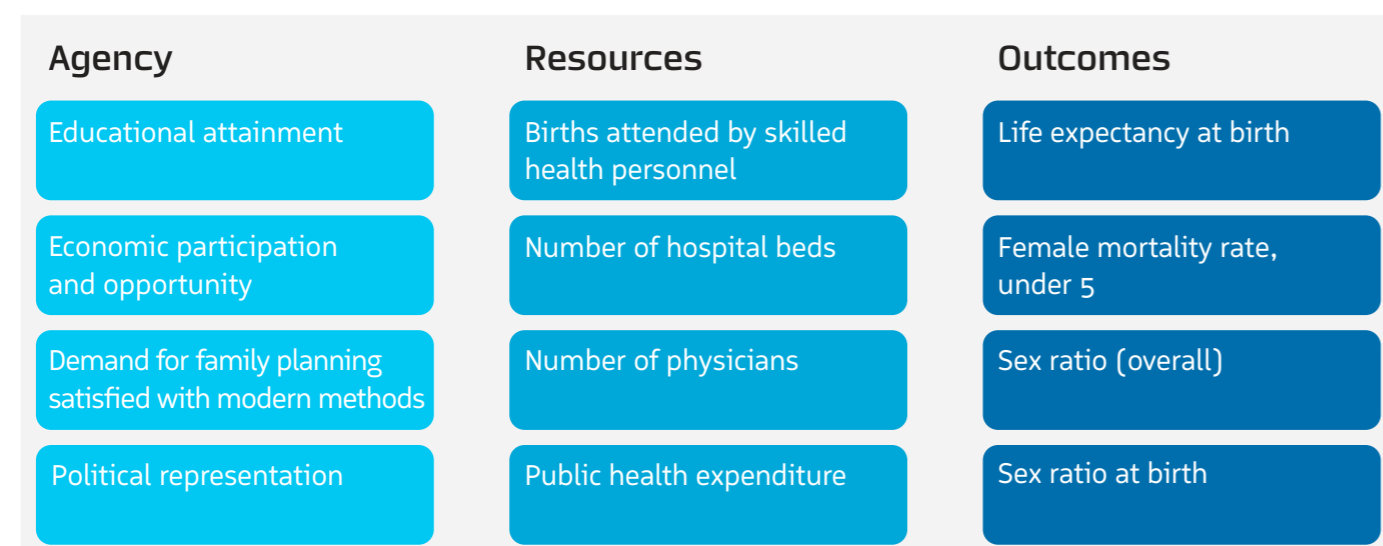Visit us at www.accenture.com/research

Appendix

Developing the Health Empowerment Index

The following 12 indicators were selected for developing the health empowerment index:

Components of the Health Empowerment Index (HEI)
Health Empowerment Index

Agency	Resources	Outcomes
Educational attainment	Births attended by skilled health personnel	Life expectancy at birth
Economic participation and opportunity	Number of hospital beds	Female mortality rate, under 5
Demand for family planning satisfied with modern methods	Number of physicians	Sex ratio (overall)
Political representation	Public health expenditure	Sex ratio at birth

Each of the 12 indicators was normalized to a scale of 0 to 5 using this formula:

$$\text{Score} = \left[\frac{(\text{Actual data} - \text{Sample minimum})}{(\text{Sample maximum} - \text{Sample minimum})} \right] \times 5$$

The scores were then added together, and the average was taken as a measure of the health empowerment of women. Note that this index measures the gap betweenv the developing and developed world and therefore suggests what the developing countries could aspire to achieve (with no implication that they shouldn't want to do better).

Country Name	HEI	GDP per capita (log)
United States	3.27	4.77
China	2.81	3.95
Japan	3.42	4.58
Germany	3.60	4.65
France	3.42	4.59
United Kingdom	3.23	4.60
Brazil	2.68	3.99
Italy	3.06	4.50
Canada	3.27	4.65
Russian Federation	3.16	4.03
Spain	3.28	4.45
Australia	3.33	4.73
Korea, Rep.	3.08	4.47
Mexico	2.63	3.95
Turkey	2.54	4.02
Indonesia	2.28	3.59
Netherlands	3.39	4.68
Switzerland	3.52	4.90
Poland	3.00	4.14
Sweden	3.59	4.73
Belgium	3.44	4.64
Norway	3.63	4.88
Nigeria	1.65	3.29
Argentina	3.15	4.16
Austria	3.53	4.67
South Africa	2.58	3.79

Country Name	HEI	GDP per capita (log)
Thailand	2.73	3.82
Colombia	2.78	3.80
Malaysia	2.48	4.00
Ireland	3.10	4.84
Denmark	3.41	4.75
Singapore	2.87	4.76
Philippines	2.30	3.48
Chile	2.88	4.19
Finland	3.52	4.66
Greece	3.27	4.27
Czech Republic	3.16	4.31
Pakistan	1.55	3.19
Portugal	3.30	4.33
Romania	2.90	4.03
Algeria	2.40	3.62
Peru	2.52	3.82
Kazakhstan	3.02	3.95
New Zealand	3.39	4.63
Bangladesh	1.75	3.18
Vietnam	2.68	3.37
Hungary	2.95	4.15
Ukraine	3.08	3.42
Morocco	1.90	3.48
Slovak Republic	3.01	4.25
Angola	1.95	3.62
Ecuador	2.77	3.79
Sri Lanka	2.26	3.61

References

i Grown, C., G. Gupta, and R. Pande. "Taking Action to Improve Womens Health through Gender Equality and Womens Empowerment." The Lancet 365, no. 9458 (2005): 541-43. doi:10.1016/s0140-6736(05)70278-6. https://doi.org/10.1016/S0140-6736(05)17872-6

ii Khalid, Nooreen & Ali, Muhammad & Noman, Muhammad & Begum, and Azeema. Dimensions of Women Empowerment: A Case Study of Pakistan. 2015. Research gate publication. https://www.researchgate.net/publication/319099845_Dimensions_of_Women_Empowerment_A_case_study_of_Pakistan

iii Countries excluded include Hong Kong, Egypt, Iran, Iraq, Sudan, Myanmar, UAE, Kuwait, Saudi Arabia and Qatar

iv Demographers expect the sex ratio at birth to be an average of 1.05 males per females, or broadly in the range of 1.02 to 1.08. The average for these countries, as projected by the UN Population Division for the period 2015-2020, is much higher: South Korea – 1.07, China – 1.15, India – 1.106. Source: The World Bank database, http://data.un.org/Data.aspx?d=PopDiv&f=variableID%3A52

v Jayachandran, Seema, and Adriana Lleras-Muney. "Life Expectancy and Human Capital Investments: Evidence From Maternal Mortality Declines." 2008. doi:10.3386/w13947. https://www.nber.org/papers/w13947.pdf

vi Duflo, Esther. "Women's Empowerment and Economic Development." Journal of Economic Literature, 2012. doi:10.3386/w17702. https://economics.mit.edu/files/7417

vii Samarakoon, Shanika, and Rasyad A. Parinduri. "Does Education Empower Women? Evidence from Indonesia." World Development 66 (2015): 428-42. doi:10.1016/j.worlddev.2014.09.002. https://core.ac.uk/download/pdf/82313991.pdf

viii Duflo, Esther. "Women's Empowerment and Economic Development." Journal of Economic Literature, 2012. doi:10.3386/w17702. https://economics.mit.edu/files/7417

ix "Getting to Equal: How Digital is Helping Close the Gender Gap at Work", Accenture Research, 2016, https://www.accenture.com/t20160303T014010Z_w_/za-en/_acnmedia/PDF-9/Accenture-IWD-2016-Research-Getting-To-Equal.pdf

x Miller, Grant. "Contraception as Development? New Evidence from Family Planning in Colombia." The Economic Journal 120, no. 545 (2009): 709-36. doi:10.1111/j.1468-0297.2009.02306.x. https://www.nber.org/papers/w11704

xi Goldin, Claudia, and Lawrence F. Katz. "The Power of the Pill: Oral Contraceptives and Women's Career and Marriage Decisions." Journal of Political Economy 110, no. 4 (2002): 730-70. doi:10.1086/340778. https://dash.harvard.edu/bitstream/handle/1/2624453/goldin_powerpill.pdf?sequence=4

xii As per the UN Population Division, the sex ratio at birth in South Korea increased from 1.07 in 1980-85 to 1.14 in 1990-95, but has since gradually declined and stabilised at 1.07. Source: The World Bank database, http://data.un.org/Data.aspx?d=PopDiv&f=variableID%3A52

xiii Dubuc, Sylvie, and Devinderjit Singh Sivia. "Is Sex Ratio at Birth an Appropriate Measure of Prenatal Sex Selection? Findings of a Theoretical Model and Its Application to India." BMJ Global Health 3, no. 4 (2018). doi:10.1136/bmjgh-2017-000675. https://gh.bmj.com/content/3/4/e000675#xref-ref-9-1

xiv Bank, World. "The World Bank Annual Report 2011." Open Knowledge Repository. January 01, 1970. Accessed November 19, 2018.

xv S. Sudha, S. Khanna, S Irudaya Rajan, and Roma Srivastava, "Traditions in transformation: Gender bias among the Nairs of Kerala," CEPED-CICRED-INED Seminar on Female Deficit in Asia: Trends and Perspectives, Singapore, 5-7 December 2005, https://www.researchgate.net/publication/237573565_Traditions_in_transformation_Gender_bias_among_the_Nairs_of_Kerala

xvi Bhalotra, Sonia, Rachel Brulé, and Sanchari Roy. "Womens Inheritance Rights Reform and the Preference for Sons in India." Journal of Development Economics, 2018. doi:10.1016/j.jdeveco.2018.08.001. https://www.sciencedirect.com/science/article/pii/S0304387818300294

xvii Duflo, Esther. "Women's Empowerment and Economic Development." Journal of Economic Literature, 2012. doi:10.3386/w17702. https://economics.mit.edu/files/7417

xviii Miller, Grant. "Womens Suffrage, Political Responsiveness, and Child Survival in American History." Quarterly Journal of Economics 123, no. 3 (2008): 1287-327. doi:10.1162/qjec.2008.123.3.1287. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3046394/

xix Bhalotra, Sonia, and Irma Clots-Figueras. "Health and the Political Agency of Women." American Economic Journal: Economic Policy 6, no. 2 (2014): 164-97. doi:10.1257/pol.6.2.164. https://www.aeaweb.org/articles?id=10.1257/pol.6.2.164

xx "Rwandan Life Expectancy Doubles in Last 20 Years, Study Finds." The Guardian, April 4, 2014. https://www.theguardian.com/world/2014/apr/04/rwanda-life-expectancy-doubles-20-years

xxi "Rwanda, A Success Story Of Women Empowerment." Huffington Post, May 01, 2018. https://www.huffingtonpost.com/entry/rwanda-a-success-story-of-women-empowerment_us_5a4f1d87e4b0ee59d41c09ad

xxii "Social Watch Gender Equality Index 2012." Stuck in Poverty | Social Watch. 2012. Accessed November 19, 2018. http://www.socialwatch.org/node/14367

xxiii Muhammad, Nader. Report on Gender Equality in Rwanda. 2016. Researchgate publication. https://www.researchgate.net/publication/304352388_Report_on_Gender_Equality_in_Rwanda

xxiv "Gender Equality | ONE UN Rwanda." United Nations. Accessed November 19, 2018. http://www.rw.one.un.org/mdg/mdg3

xxv Jayachandran, Seema. "The Roots of Gender Inequality in Developing Countries." Annual Review of Economics 7, no. 1 (2015): 63-88. doi:10.1146/annurev-economics-080614-115404. https://www.annualreviews.org/doi/abs/10.1146/annurev-economics-080614-115404

xxvi Sen, G., and P. Östlin. "Gender Inequity in Health: Why It Exists and How We Can Change It." Global Public Health 3, no. Sup1 (2008): 1-12. doi:10.1080/17441690801900795. http://www.who.int/social_determinants/resources/csdh_media/wgekn_final_report_07.pdf

xxvii Sen, Amartya. "Missing Women: Social Inequality Outweighs Women's Survival Advantage in Asia and North Africa." British Medical Journal .1992. Accessed November 19, 2018. https://www.sas.upenn.edu/~dludden/GenderInequalityMissingWomen.pdf

xxviii Chauvin, James, and Laetitia Rispel. "Digital Technology, Population Health, and Health Equity." Journal of Public Health Policy 37, no. S2 (2016): 145-53. doi:10.1057/s41271-016-0041-0.

xxix Sanjay Podder, Pradeep Roy, Praveen Tanguturi and Shalabh Kumar Singh, Blockchain for Good: 4 Guidelines for Transforming Social Innovation Organizations, Accenture, 2017, https://www.accenture.com/t20180102T200432Z_w_/in-en/_acnmedia/PDF-68/Accenture-808045-BlockchainPOV-RGB.pdf#zoom=50

xxx How information and communications technology can achieve the Sustainable Development Goals (2015), Ericsson in collaboration with Earth Institute at Columbia University. http://unsdsn.org/wp-content/uploads/2015/09/ICTSDG_InterimReport_Web.pdf

xxxi Sapolsky, Robert M. "The Health-Wealth Gap." Scientific American 319, no. 5 (2018): 62-67. doi:10.1038/scientificamerican1118-62. https://www.nature.com/scientificamerican/journal/v319/n5/full/scientificamerican1118-62.html

xxxii Dhar, Diva. "Interview with Diva Dhar, Gates Foundation." Online interview by Giju Abraham Mathew, Shalabh Kumar Singh. October 29, 2018.

xxxiii "Interview with Dr. Indrani Battacharyya, Deputy Director, Child in Need Institute." Telephone interview by Shalabh Kumar Singh and Nataraj S Kuntagod. November 22, 2018.

xxxiv Nandi, Arindam, Jere R. Behrman, Sonia Bhalotra, Anil B. Deolalikar, and Ramanan Laxminarayan. "The Human Capital and Productivity Benefits of Early Childhood Nutritional Interventions." Disease Control Priorities, Third Edition (Volume 8): Child and Adolescent Health and Development, 2017, 385-402. doi:10.1596/978-1-4648-0423-6_ch27.

xxxv Bhalotra, Sonia, and Samantha B. Rawlings. "Intergenerational Persistence in Health in Developing Countries: The Penalty of Gender Inequality?" Journal of Public Economics 95, no. 3-4 (2011): 286-99. doi:10.1016/j.jpubeco.2010.10.016

xxxvi Bhalotra, Sonia, Martin Karlsson, and Therese Nilsson. "Infant Health and Longevity: Evidence from A Historical Intervention in Sweden." Journal of the European Economic Association 15, no. 5 (2017): 1101-157. doi:10.1093/jeea/jvw028.

xxxvii Christie Minj et al, "Impact of School Mid Day Meal Program on the Nutritional status of Children in a rural area of South Karnataka, India," International Journal of Current Research and Academic Review, 2 (8), August 2014.

xxxviii Shah, Neel. 2018. "A Soaring Maternal Mortality Rate: What Does It Mean for You?" Harvard Health Blog. October 16, 2018. https://www.health.harvard.edu/blog/a-soaring-maternal-mortality-rate-what-does-it-mean-for-you-2018101614914

xxxix "Interview with Satish Choudhury, Senior Associate, Technology Solutions, Clinton Health Access Initiative." E-mail interview by Giju Abraham Mathew. November 26, 2018.

xl "Data and Analysis." Equal Measures 2030. Accessed November 19, 2018. https://www.equalmeasures2030.org/how-we-work/data-and-analysis/

xli "Interview with Satish Choudhury, Senior Associate, Technology Solutions, Clinton Health Access Initiative." E-mail interview by Giju Abraham Mathew. November 26, 2018.

xlii Government of India. NITI Aayog. July 2018. Accessed November 19, 2018. http://www.niti.gov.in/writereaddata/files/document_publication/NHS-Strategy-and-Approach-Document-for-consultation.pdf

xliii "Femtech Is Becoming More Influential. But Is the Market Healthy?" 2018. ReadWrite. November 6, 2018. https://readwrite.com/2018/11/13/femtech-is-becoming-more-influential-but-is-the-market-healthy/

xliv "The Femtech Market Map: 45 Startups Focused On Women's Healthcare & Sexual Wellness." CB Insights Research. September 21, 2018. Accessed December 03, 2018. https://www.cbinsights.com/research/femtech-market-map

xlv "Our Work." Maternity Foundation. Accessed December 03, 2018. https://www.maternity.dk/our-work/

xlvi Shah, Neel. "A Soaring Maternal Mortality Rate: What Does It Mean for You?" Harvard Health Blog. October 16, 2018. Accessed November 21, 2018. https://www.health.harvard.edu/blog/a-soaring-maternal-mortality-rate-what-does-it-mean-for-you-2018101614914.

xlvii "About Us." Review to Action. Accessed November 21, 2018. http://reviewtoaction.org/about-us

xlviii "Maternal Mortality Review Information Application." MMRIA. Accessed November 21, 2018. http://mmria.org/

xlix "Interview with Dr. Indrani Battacharyya, Deputy Director, Child in Need Institute." Telephone interview by Shalabh Kumar Singh and Nataraj S Kuntagod. November 22, 2018.

l "Interview with Satish Choudhury, Senior Associate, Technology Solutions, Clinton Health Access Initiative." E-mail interview by Giju Abraham Mathew. November 26, 2018.

li Lindstrom, Martin, and Chip Heath. Small Data: The Tiny Clues That Uncover Huge Trends. New-York: Picador, 2017.

WORLD
GOVERNMENT
SUMMIT