**VIEWPOINT**

**Building resilient societies after COVID-19 requires multifaceted investment targeting maternal, neonatal and child health**

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**Introduction**

Resilient societies respond rapidly and effectively to health challenges and the associated economic consequences and adapt to be more responsive to future challenges. Though it is only possible to recognise resilience retrospectively, uniquely, the COVID-19 pandemic has occurred at a point in human history when sufficient knowledge is available on the early life determinants of health to indicate clearly that a focus on maternal, neonatal and child health (MNCH) will promote later resilience. This offers an unprecedented opportunity to disrupt entrenched strategies and to reinvest in MNCH in the post-COVID-19 ‘new normal’. Furthermore, analysis of the short, medium- and longer-term consequences of previous socioeconomic shocks provides important insights into domains in MNCH such as neurocognitive development and nutrition, where investment will generate greatest benefit. Such considerations apply to high- as well as middle and low-income countries (HICs and LMICs). However, implementing appropriate policies in the post-COVID-19 recovery period will be challenging and requires political commitment and public engagement.

**The life-course implications of maternal, neonatal and child health**

In the short-term, MNCH is measured by maternal and neonatal mortality and other routinely collected outcomes. Although the magnitude and nature of adverse pregnancy outcomes differ within and between HICs and LMICs, in all settings, maternal conditions such as pre-existing obesity, and related non-communicable diseases (NCD) such as diabetes and hypertension, amplify risks of adverse outcomes substantially.1

The medium-term effects of poor MNCH operate largely over the first 1000 days of life, from conception to age two years, but establish trajectories that persist across the life-course and into the next generation.2 For example, under-and over-nutrition lead to childhood stunting and overweight or obesity, emotional deprivation to altered neurocognitive development, and air pollution to impaired respiratory development. The developing infant is very sensitive to societal factors such as family cohesion, parental socioeconomic status3 and conflict as well as environmental toxins, extreme weather events and earthquakes. These cause damage directly and indirectly through anxiety and stress, are exacerbated by poverty and demographic factors and can amplify pre-existing adverse trajectories.

The long-term effects of MNCH have been largely considered in terms of NCD through research encompassing the developmental origins of health and disease (DOHaD) field.2 Early studies focused on the associations between low birth weight and later NCDs but more recent research revealed three important concepts. First is the recognition that “low birth weight” is a crude proxy for more sensitive biomarkers of risk. These include preterm birth, ethnicity, and specific causes of growth restriction such as maternal smoking and hypertension. Adults born preterm, have a threefold greater risk of developing the metabolic syndrome, and nearly double that of developing Type 2 diabetes, hypertension and stroke compared to those born full-term.4 Pre-existing maternal NCD such as diabetes, or pregnancy-related NCD such as gestational diabetes, amplify the passage of risk to the next generation.2,5 Paternal factors are now also implicated, especially in the preconception period.5 As these biomarkers are measurable, they should be incorporated into targeted preventive policies and interventions, alongside an assessment of impact post-COVID-19. Secondly, there is increasing evidence of a causal relationship between early life exposures and later NCD.2 As public health policy-making requires knowledge of causation rather than association, this should be translated into preventive interventions.6 Thirdly, growing understanding of the factors attenuating or amplifying health trajectories initiated in early development enables modelling of the likely impact of specific policies, e.g. age-specific interventions targeting obesity and sedentary lifestyles, on NCD and hence on population health. Such knowledge is crucial in deciding which policies are likely to be most cost-effective in the economic recession accompanying the pandemic.

**Learning from the impact of previous socioeconomic crises on maternal, neonatal and child health**

Data from several countries show an increase in markers of poor MNCH during socioeconomic shocks, including low birth weight, preterm birth, maternal and infant malnutrition, maternal drug or alcohol abuse and HIV infection.7,8 Longer-term, increased NCD prevalence has been shown in retrospective studies of historical cohorts, such as the effects of famine in the Dutch Hunger Winter,9 the Chinese Great Leap Forward10 and the Biafran conflict.11 Such socioeconomic shocks act through multiple inter-related pathways.

The global financial crisis of 2008 provided more recent lessons about the effects of socioeconomic shocks on MNCH. Excess infant mortality was observed in HICs and LMICs.12 In some LMICs a 10% reduction in GDP was associated with an 8.5% increase in maternal mortality, disproportionately affecting adolescent mothers.13 In Portugal, over 2007-2014, a 25% increase in low birthweight accompanied the reduction in GDP (GDP growth rate for the period -1%), health expenditure and social protection, especially for children of migrant mothers.14 In Greece, one of the European countries most affected by the 2008 financial crisis, GDP fell by >25% between 2008 and 2014 and unemployment increased from 7.8 to 26.5%.15 Overall, stillbirths to women aged <25yrs increased by 42%.7 Compared to 2005-2007, in 2012-2014 preterm births (<37 weeks gestation) increased from 8.1 to 12.7% and low birth weight (<2500g) from 6.7 to 11.5%, with mean birthweight decreasing by 64.4 g.7 In the USA, the global financial crisis was followed by deterioration in mental health in children, increasing child maltreatment and behavioural problemsand greater use of special educational services.16

**The effects of the COVID-19 pandemic on maternal, neonatal and child health**

During the pandemic, public focus is inevitably on preserving life, with less attention to women and children, who are reported to be less susceptible to severe SARS-Cov-2 infection.17  Data show that, at least in HICs, individuals from black, Asian and ethnic minority groups, of low socioeconomic position and with pre-existing health conditions such as obesity and hypertension have greater mortality and morbidity from COVID-19.18 Focusing on individual risk however ignores the social inequalities that underlie such risk, and which contribute to community resilience.19 Both between and within countries, risk varies with levels of poverty, urbanization and social cohesion. Universally, however, women are more vulnerable to socioeconomic and gender inequalities, domestic violence and economic insecurity, their sexual and reproductive health rights are challenged and they have less secure employment.20,21 The pandemic, by disproportionately affecting women through multiple pathways, threatens to undermine future population physical and mental health and economic resilience globally.

The analysis of data from 30 HICs and LMICS suggests that each additional month of lockdown will reduce gross domestic product (GDP) by 2.5 - 3%.22 The fall varies between countries but could be as high as 10-15% with extended lockdown. However, this underestimates the impact on MNCH, as GDP does not include unpaid work such as breast-feeding, care of children and the elderly, domestic chores and food production, exclusively or predominantly undertaken by women. Moreover, the informal economy accounts for 61% of the global workforce and in many LMICs almost half such workers are women.23 This sector seldom provides wage protection, job security, sickness or maternity leave. Dropout rates from school are higher for girls during times of crisis8 and, because maternal education is of proven societal benefit, this adversely affects both the individual and subsequently her children and community.

**Investing in maternal, neonatal and child health to build population resilience**

The global economic recession following the COVID-19 pandemic is likely to result in reduced investment in MNCH in the short-term24 and the immediate effects will be clear. Under-five mortality, child wasting and stuntingand maternal mortality are likely to increase in LMICs through interrupted food systems and healthcare services.20 There may be an increase in preterm and low birth weight babies as in European countries such as Greece and Portugal following the 2008 recession.7,14 A negative effect on family planning, child health facilities and routine immunization coverage is already occurring, as seen previously after outbreaks of Ebola and SARS.20 There are active concerns about increasing domestic violence, loss of earnings and food insecurity.21

Recently, the World Health Organization called for member states to invest in gender-sensitive policies in their COVID-19 responses and to ensure equitable access to key services.21 Recommendations to mitigate the differential impact of the pandemic on women included better collection and analysis of data, disaggregated by sex and age, sustained access to sexual and reproductive health services and effective responses to violence against women.

**Post-COVID-19 recovery policies**

The future following the COVID-19 pandemic is uncertain, and infection may remain endemic or seasonal. The recovery phase nonetheless offers unprecedented opportunities to undertake multifaceted actions to promote MNCH as priorities globally (see Panel1). The ‘new normal’ in both HICs and LMICs will inevitably focus on economic as well as health policies, providing unique opportunities to empower women, and reduce the gender pay, career and status gaps that make women vulnerable.

We recognise that policy-making at central or local government levels involves choices and the balancing of options. We emphasise the abundant data showing that investing in MNCH offers high rates of return in the medium- to longer-term, in addition to reducing the burden of short-term adverse outcomes such as maternal and child deaths and stillbirths.25 Interventions to promote early childhood health and development, including training and provision of community health workers as recommended by the recent WHO-UNICEF-Lancet Commission26, offer long-term benefit in reducing NCD risk factors such as obesity. The cost is modest: investing US $5 per person per annum in the 74 countries which together carry 95% of the global MNCH mortality burden is calculated to yield up to a nine-fold return in socioeconomic terms by 2035.25 Almost a third of such investments are related to health system strengthening, especially contraception, preconceptional, antenatal and postnatal care and child health. Similarly, investing in primary care and community health services, to improve hygiene, breastfeeding support and immunization reduces under-five mortality. In the medium-term, multi-stakeholder (government, health care providers, teachers, social workers, parents, and young people) engagement will be needed to mitigate effects of social distancing and school closures on mental health and to monitor child educational attainment and behaviour following the pandemic.27

At the community level, cash transfer and health practitioner home-visit programmes show promise for improving health and educational outcomes in marginalised communities. For example, the Nurse-Family Partnership programme led to an improvement in educational and cognitive outcomes in adolescents, along with a reduction in government welfare expenditure.28 In Brazil the Bolsa Familia Conditional Cash Transfer programme provided a safety net for childhood nutrition, food security and education29 that improved childhood height-for-age, school attendance especially for girls, and reduced fertility rate. Sustaining such schemes requires investment in building capacity of community health workers in MNCH.

Longer-term, efficient monitoring and surveillance systems for MNCH are needed to help governments monitor and report on the after-effects of the pandemic efficiently, along with behavioural and socioeconomic position markers using qualitative and participatory approaches. A reliable evidence base is needed to assess population health and MNCH. This includes changes in the incidence of preterm birth and low birth weight in relation to the COVID-19 pandemic. Collecting such data is challenging, but achievable in both high as well as low- and middle-income countries. Valuable insights can be obtained from population datasets and linked records, coupled with greater efforts to collect data in specific geographic areas through observational field sites or household surveys.

These need to be supported by increased knowledge translation and engagement between communities and policy-makers.6 Resilient societies will not only meet future epidemics more effectively: the UN recently called for accelerating efforts to develop such resilience in the recovery phase of COVID-19 to achieve the sustainable development agenda addressing climate change.30

**Conclusion**

Previous socioeconomic crises reveal short, medium- and longer-term detrimental effects on population health, in particular MNCH, productivity and resilience. Attention needs to be given urgently to measure the effects of the COVID-19 pandemic and the resulting economic recession on MNCH, to design appropriate responses. Previous socioeconomic shocks also provide insights that can be translated into policies targeting MNCH and reducing associated gender-based, reproductive, racial and social inequalities. To be robust and reflective of future resilience, socioeconomic modelling should incorporate uncompensated work undertaken by women, and assess long-term as well as shorter-term impacts. Societies and political landscapes that protect MNCH are key to withstanding future unpredictable disasters.

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| **Panel 1: Priority Actions for Policies to Invest in MNCH to Improve Population Health and Resilience in response to the COVID-19 pandemic**  |
| * Generate new political will through evidence-informed policy and greater public awareness of the importance of promoting and investing in MNCH services for health, wellbeing and resilience in the short and longer-term.
* Promote recognition that MNCH-care is an essential service and a human right and initiate immediate pre-emptive interventions to protect or increase it at individual and population levels. These should include investment to sustain access to contraception and reproductive health services, preconceptional, antenatal and postnatal care and child health and development programmes.
* Strengthen primary care and institute and sustain community-based interventions to promote MNCH such as home-visits during and after pregnancy and in the early years to improve hygiene, nutrition, breastfeeding support, contraception services and immunization programmes. Explore the use of schemes such as conditional cash transfers to develop motivation and compliance.
* Develop new policies to drive gender-equity and reduce the penalties of motherhood, such as providing 6 months parental leave for each parent on a “use it” or “lose it” basis, and which acknowledge and support effects on women’s work history and earnings which can drive higher breastfeeding rates.
* Increase and sustain training and capacity building for community health workers in MNCH.
* Invest in research and data collection to monitor the immediate and longer-term impact of COVID-19 and the related socioeconomic crisis on MNCH. This would include strengthening routine data collection systems and reinstating systems suspended for safety reasons.
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**Declarations: All authors declare no competing interests.** GC is Trustee of the charity Foundation Years Information and Research (FYIR). NM is the current president of the UK Medical Women's Federation, the vice-chair of the Strategy and Advocacy Committee of the Medical Women's International Association, a patron of Keep Our NHS Public, and a trustee of the charity Their World.

**Author contributions statement:**

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