Is improving female literacy in areas of lowest rates a productive way to improve maternal and neonatal outcomes?

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BACKGROUND

The Millennium Development Goals (MDG), written by the United Nations in 2000, highlighted 8 key areas requiring global initiatives to meet the needs of the world's poorest. Goals 2 (achieve universal primary education) and 3 (promote gender equality and empower women) can be simultaneously improved by increasing girls' access to education. Separately, a third of a million women die annually from pregnancy-related conditions. Yet 75% of them are avoidable, as such initiatives have been created to reduce child mortality (goal 4) and improve maternal health (goal 5).

Questions:

1. Is there is a link between female literacy rates (FLR) and maternal and neonatal health (MNH)?
2. Is it strong enough that a rise in female literacy could be expected to simultaneously lower maternal health and child (specifically neonatal) mortality?

Yes?

Limited resources could be placed strategically. In areas were FLR and MNH are low, prioritising schemes targeting education allows finances, materials and people to be spread further geographically.

Alternatively in areas where long-term MNH initiatives are failing to show results, also targetting female literacy may be the prompt needed.

METHODS

To analyse the correlation I used data from the World Bank database and use the most recent figures. My inclusion criteria when choosing countries included those with sufficiently reliable data from after the millennium on all three measures.

Secondly, the literature search included the terms: female literacy rate, MLIC, maternal outcomes, neonatal outcome, health initiatives. With a preference for various types of texts (including retrospective studies, comparative reviews, closed audits and books) in an attempt to negate the limitations of each method.

WHY WAS FLR CHOSEN?

Choices perceived, from western perspectives, as 'disempowered' or oppressive under a patriarchal system are often active decisions made by females in unknown cultures, continuing social norms. It would be wrong to make assumptions of an individual's empowerment based on their age at their first marriage or pregnancy, but over larger populations, lower results are, sadly, often markers of female oppression due to a lack of autonomy.

Furthermore, Akseer et al[1] reviewed the progress made by sub continental countries to improve MNH since their last paper 12 years ago. They definitively show:

increased markers of female empowerment across all 8 countries, correlating to better MNH outcomes.

However, they, perhaps controversially, chose a variety of markers to measure female empowerment from: adult and adolescent fertility rate, mean age at first marriage to adult and adolescent literacy rate.

Fig1.

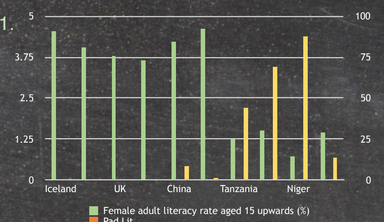
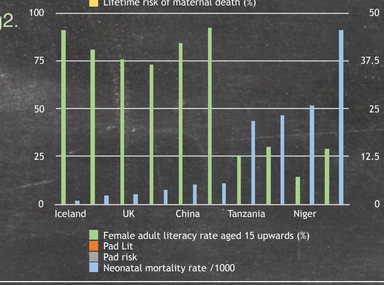


Fig2.



RESULTS

Is there a correlation?

- Female adult literacy rates (largely synonymous with maternal literacy rates) are often used as a marker for female empowerment.
- Fig 1 and 2 illustrate general trends that a decrease in FLR correlates with worse measurers of neonatal and maternal health.
- High income countries (HIC) have higher FLR due to developed education systems, cultural expectations and infrastructure.
- Of the HIC analysed below, the FLRs were all above 73%% (USA) and the risk of maternal death (RMD) below 0.42%% (China); in comparison with the MLIC (middle lower income countries) featured, which have FLRs below 30%% (Malawi) and RMD reaching 4.37% (Niger).
- The trend is also seen between the FLR and neonatal mortality rates.

DISCUSSION

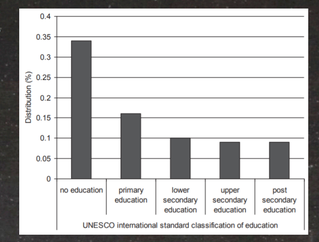
Does correlation mean causation?

A WHO led retrospective Study[2] across 24 countries in Africa, Asia and Latin America was conducted between 2004 and 2008. Data was recorded for 287,035 maternal inpatients during their delivery. Karlsen's analyses focused on the individual's level of education and intrapartum mortality, then normalised results for the capability of the institution where the women gave birth (assessed by their provision of the obstetric Bellwether and additional procedures).

Their data showed maternal mortality was 2.7 times higher in women with no formal education compared to those with 1-6 years of education. Karlsen argues that levels of education are a greater predictor than institutional capacity (fig3)[2]. Educational benefits to maternal outcomes are not a dichotomy but show a clear trend with time spent in education. Women with 1-6 years in school are still twice as likely to die than those who spent 12 years, even after adjusting the data for marital status (unmarried or co-habiting women had double the mortality rate than married women), age, parity, institutional capacity and level of state investment into healthcare. Clearly a strong causative relationship exists between female literacy and maternal & neonatal health, separate to external factors that may strengthen trends.

Evidence shows educated females are more **empowered**, can **pursue careers**, have a greater **understanding** of the life-choices that affect health and are more likely to **seek medical advice**. Within their cultural contexts, they often **delay marriage, postpone childbearing**, have **fewer** and **spaced pregnancies**, all known to improve maternal and child health. They can **read and absorb more information**, are better **integrated** communities and have more **independence**, exposing them to and encouraging participation in public health initiatives.

Fig3.



IS THE CORRELATION DUE TO A THIRD CONFOUNDING FACTOR – ECONOMICS?

The economic status of each country is intrinsically linked to each marker. Hence the correlation could be due to the financial state of the country separately affecting both, and not a causal relationship between FLR and MNH. However, two points exist in contention:

1. Trends between FLR and MNH exist within each economic subgroups.
2. Countries, such as Sri Lanka, suggest a causal relationship. Providing case studies illustrating how finances are not the dictating factor.

Sri Lanka has 9% of the UK's GDP per capita, a history or recent civil war and comparatively inferior healthcare provisions; yet a FLR of 92%, higher than UK, USA, China and France. Sri Lanka also has lower markers of maternal and neonatal mortality in line with countries far more economically developed.

CASE STUDY: Neonatal Transport Service, Sri Lanka

It is widely accepted that time is a critical factor in maternal and neonatal mortality, leading to numerous global initiatives to improve transport services. The Neonatal Retrieval Service[3] established by Dr Gupta and his team in Sri Lanka managed to drastically lower the number of infants arriving with hypothermia and/or hypoglycaemia – bad prognostic factors in neonatal care. A year after the scheme was introduced they compared the percentage of infants with each that had been retrieved by the new transport service and those that hadn't (Fig4). After such success, the scheme was established in all the provinces of the country. Speaking to Dr Gupta, he attributes the success of the initiative to supportive and influential individuals in the country, a well thought-out scheme that was strongly community based and a series of fortunate events. However, in rural areas the need for local mothers to recognise the signs and need for medical attention was dependent on a certain level of education. Furthermore, the sustainability of the scheme depended on ToTs (Training of Trainers) workshops that ultimately trained over 700 people based on a manual written specially. However, these would have been completely inaccessible to those without formative education.

Fig4.

Marker	Retrieved group (%)	Non-retrieved group (%)
Temp between 36.5 to 37.5	46	8
Hypoglycaemia	0	6

In contrast, a study in Pakistan[4] looked at the success and scalability of transport interventions aimed at maternal, child and neonatal outcomes, by analysing 7 interventions against the CORRECT criteria. Sadly their results couldn't highlight an intervention with sufficient statistical success that warranted upscaling, but they believed a variety of relatively simple community based models would provide the best outcomes in that context. As relatively similar countries and initiatives, it would not be unreasonable to assume the success of the Sri Lankan model is due to them taking advantage of the higher rates of maternal education to successfully create community based improvements, nationwide.

CONCLUSION

How do we use this information?

Countless studies have shown the increased effectiveness and sustainability of health initiatives when based in the community. Giving locals autonomy in planning and designing the intervention, fosters a sense of ownership and investment, simultaneously avoiding perceptions of 'western superiority' which can hinder progress. Rifkin[5] argues that women, in MLIC particularly, are often better placed to improve healthcare for a multitude of reasons:

- Principal providers of health care – informally and
- Their role in communities often allow for greater communication with other women – sharing valuable information.
- Stronger community roots (particularly when MILCs men migrate to urban areas for work) encourages continuity of initiatives
- Many traditionally female roles: water collection, preparation of food, upbringing of children, are areas of intersectional approaches to improving health. Teaching the importance of sanitation, clean water and safety encourages prevention rather than curative actions.

Many of these well established initiatives use leaflets and written advice that requires basic literacy. A recent and effective initiative of many schemes involve training local women to enact the change and teach others, but an inability to read prevents whole communities from accessing such help. One can begin to understand why female literacy rates are so closely linked to maternal and neonatal health outcomes despite the efforts of international aid, governments and NGOs.

References

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