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Leveraging paraprofessionals and family strengths to improve coverage and penetration of nutrition and early child development services

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Abstract

Children need to be protected in intergenerational networks, with parents who have positive mood, resources to feed their children, and skills to promote early childhood development (ECD). Globally, more than 200 million children are raised annually without these resources. This article reviews the potential contributions of increasing coverage and penetration of services for these children, challenges to achieving penetration of services in high risk families, the opportunities created by bundling multiple services within one provider, the potential leveraging of paraprofessionals to deliver care, and mobilizing communities to support children in households at high risk for negative outcomes. We end with a number of suggestions for how to ensure the equitable scale up of integrated ECD and nutrition services that take into account current global priorities, as well as coverage and penetration of services.

Introduction

Child health across the lifespan in low- and middle-income countries (LMICs) is compromised by multiple risk factors such as the cumulative impact of poverty and related deficits from infectious diseases, nutritional deficits, and maternal ill-health. It has been conservatively estimated that 200 million children in poor countries are failing to achieve their developmental potential as a consequence of poverty.¹ These children are multiply disadvantaged, suffering adverse consequences in growth, physical health, socio-emotional competence, and cognitive development. Improving child health and development demands that we directly address the causes of negative outcomes by implementing successful,

evidence-based, programs. Such a comprehensive program would need to (a) increase the coverage and penetration of existing nutrition and early childhood development (ECD) interventions; (b) while bundling services that include efficacious strategies for reducing depression among parents with integrated funding lines; as well as (c) leverage paraprofessionals to expand facility-based care in order to increase the coverage, penetration, and dose of interventions to reach the families most at risk.

The combination of these will of course depend on the infrastructure mix in any country. For poor countries, centre-based services are often limited, while in many middle income countries there may be higher levels of these services. Regardless of the exact mix however, most LMICs (certainly in the short to medium term) are going to have to implement a mix of home- and centre-based services. In light of this, the first part of this paper we will argue that improving ECD, and integrating nutrition and ECD will depend on two factors - coverage and penetration. By penetration we mean the extent to which interventions are actually taken up by families and people once coverage has been achieved. Included in the concept of coverage is that of intensity – the number of visits required to ensure success of the intervention while at the same time being affordable in poor countries. We will argue that if nutrition and ECD interventions are to be successfully integrated and scaled up in low and middle income countries, both questions are central.

2. Coverage

2.1. Centre based early childhood development services

The United Nations Educational, Scientific, and Cultural Organization (UNESCO) has estimated that, in 2009, 157 million children were enrolled in pre-primary education programmes.² While this is a significant improvement of 40% since 1999, only about 46% of children globally are enrolled in pre-primary programmes, and in many LMICs enrollment is close to zero.² In South Africa for example, among children in the age group 3–4 years only 50% attend an out-of-home facility while the figure for children 0–4 years is lower at 30%.³ This figure is even worse for poorer children; in the poorest 40% of households, only 20% of children 0–4 years attend an out-of-home facility.³ While accurate figures are difficult to access, it has been estimated that if the enrolment rate of children in pre-primary education programmes was raised to 25% in countries such as Ethiopia and Yemen, this would increase school attendance and contribute to a future wage income 6.4 times higher than the cost of providing the pre-school education.² In many countries the greatest portion of government funding for early child development services is for centre-based care. Improving access to out-of-home facilities is a crucial component of any development agenda, but in order to ensure greater coverage and outreach, community health workers (CHWs), or community-based paraprofessionals delivering early child development interventions at the household level will be essential – especially for the most vulnerable children. In countries such as Ethiopia, there are low rates of antenatal coverage, high rates of home births, and cultural constraints on women leaving the home in the first few months of delivering a child.^{4,5} In such a context, early intervention to ensure optimal early infant development will depend entirely on a home visiting CHW approach. CHW programmes have been a global delivery platform for many decades, but there is less

evidence of their use in delivering ECD interventions. To the best of our knowledge there is currently no systematic study of the effectiveness of CHWs in delivering community-based ECD services, but the evidence attesting to the benefits of interventions conducted by paraprofessionals/CHWs for children and mothers in LMICs is growing.⁶ Much of this evidence however is from Latin America and there is compelling evidence from Jamaica,^{7,8} but this needs to be replicated in Africa and other LMICs.

2.2 Potential solutions to coverage problem

In light of the significant numbers of children in LMICs without access to centre-based care, alternative strategies to increase coverage, penetration, dose, and quality of interventions are essential if there is to be a meaningful change to maternal, ECD, and nutritional outcomes. Increasing home-based CHW delivered interventions (ideally integrated into the primary health care system) is one potential solution. There has recently been a call for the introduction of 1 million CHWs in sub-Saharan Africa by 2015 in order to revitalize the health systems of countries in the region.⁹ Traditionally, a narrow disease-focused model has dominated interventions, characterised by categorically funded, vertically integrated interventions. For instance, there are numerous evidence based vertical interventions for improving maternal and child outcomes with about 13 bodies validating the efficaciousness and providing lists of evidence based interventions (e.g., United States Centers for Disease Control and Prevention).

Many donor agencies (e.g., The President's Emergency Plan for AIDS Relief (PEPFAR); The World Bank, The United Nations Children's Fund (UNICEF)) tend to fund programs to address single risk factors. For example, HIV funding cannot be spent for maternal depression, and alcohol funding cannot be spent for HIV. Vertical programs may not work as effectively or efficiently as more comprehensive approaches, particularly in countries that face multiple and concurrent health challenges.¹⁰ This is especially true in domains such as nutrition and ECD where the synergistic interaction between them makes vertical non-integrated programming nonsensical.

Even effective programs will only improve the development and nutrition of the children they reach, so achieving as complete coverage as possible of those at risk is a major determinant of impact.¹¹ In the case of ECD and nutrition, total geographical coverage of households with infants and pre-school children is clearly desirable, but its achievement is dependent on the availability of additional resources required to reach people who may be less accessible geographically or socially, and on their level of risk. Countries in sub-Saharan Africa for instance, typically spend less than 5% of their total budgets on health,¹² making it unlikely that health systems will be able to achieve high levels of coverage, penetration rates and the intensity that will be needed for broad implementation of evidence based interventions to improve children's outcomes. Paraprofessionals such as CHWs are an alternative strategy for enhancing coverage. There is an increasing global focus on equity and the extent to which vulnerable sub-populations (poorest two quintiles) within a country may not, despite apparently high levels of intervention coverage, be benefitting from interventions, and in fact, in some cases, may be getting worse.¹³ At times, as we have shown, this is related to familial reluctance or inability to take up an intervention.

At other times, due to unavailability of services, cost, geography, cultural appropriateness, political conditions and transport costs, vulnerable populations simply do not receive interventions. There now exists research and experience from a growing number of countries that shows rapid improvements in child health when good household coverage is attained through the use of community-level workers who are supported by clinics and health centres and are equipped with basic skills to identify, prevent and treat common conditions.¹⁴ Typically, coverage of populations is primarily perceived as a health system concern, encompassing everything from where the intervention is focused (facility or community-based), the mode of delivery (including task shifting to CHWs), resource allocation and scale-up.

An additional factor is the issue of intensity - the frequency and quality of contact. Here measures of workers per mother-child, and supervision ratios, are relevant. The number of tasks that CHWs can reasonably perform depends not only upon the intensity (ratio of CHWs to households), but also on the duration and quality of their training, and the extent and quality of their supervision. In Thailand and Rwanda a high CHW-to-household ratio ensures that all households, including the poorest with the most vulnerable children, are visited regularly and health problems are detected early. In Thailand, high coverage is achieved by instituting a 'two-tier' system where there is one full-time CHW for every 300–500 households, who supervises 10 part time CHWs who have more limited training.¹⁵ In Niger, there is a peripheral level of voluntary CHW (known as *relais communautaire*) who are based in villages and refer clients to full time CHWs.¹⁶ The potential impact lay health workers can have in ECD in resource-constrained settings is likely to be influenced significantly by the intensity of their contact and by definition of a feasible and effective set of activities. Consideration should be given to allocating these activities according to the differentiated roles of two levels of community-based workers, one full-time and one part-time and possibly voluntary.

Extrapolating from these and other community-based health and nutrition programmes in Bangladesh, Jamaica and Honduras, an effective ratio seems to be in the range of 1 CHW to 500 households for full-time employed CHWs, and 1:10 or 20 for local volunteers on a part-time basis.¹¹ However, a factor that needs to be taken into account is the complexity and thus duration of the intervention. Clearly, a lengthier intervention will demand a higher ratio of workers to households if coverage is to be universal. A caveat is necessary here: it may be unreliable to extrapolate numbers for ECD from health and nutrition programmes directed at children under 5, since there are likely to be fewer preschool children than there are under 5s, although the duration of the ECD intervention may be greater than that required in general health and nutrition programmes.

In addition, the issue of volunteer versus paid CHWs is an issue gaining significant attention recently. While early studies implied that volunteers are ideal, most programmes pay their community workers either a salary or an honorarium. Thailand's CHWs are not paid, and it has been suggested that volunteers prefer the prestige associated with their position to receiving a low stipend.¹⁷ However, in many cases CHWs combine their health care roles with other activities, such as agricultural activities, which vary in their demands according to the season.¹⁸ Financial incentives range from a small salary from the state to payments for

attendance at training sessions.¹⁹ Fee- for- service payments or payments associated with drug sales, which have been employed in certain programmes, may encourage inappropriate treatment at the expense of prevention and overuse of medications. Rwanda has rapidly increased its CHW numbers to over 60,000 nationally. While they are volunteers, recently CHW cooperatives have been formed, with over 400 now engaged in various income generating activities ranging from livestock and crop farming to other off-farm activities. The Rwanda Ministry of Health has registered them as legal entities, sensitized communities, and provided training in cooperative law, financial management and business planning in collaboration with the Ministry of Trade and Industry. Performance-based payment is made quarterly to these cooperatives. All CHW cooperatives have obtained tentative district authorization to operate, and a high proportion have been legally registered at the national level. All cooperatives are engaged in various income generating activities. These incentives have ensured that CHWs are more motivated and has resulted in improved service delivery.²⁰

3. Penetration issues

Family social network and supports are critical for healthy early child development. Several key features of the family influence how and whether an intervention message will be able to penetrate into the household.

3.1 Family structure

Culturally diverse households that exhibit a range of family structures may not be suited to parent-child centred psychological interventions because of the complex arrangements associated with domestic roles, responsibilities, decision-making and child care.^{21,22} Increasing migration to major urban settings has often disrupted intergenerational family structures, made neighbours of persons from diverse backgrounds (e.g. through migration both between and within countries), and reduced the access and utilization of social support among city or peri-urban dwellers. Absence of fathers may be less important than single mothers' parenting skills,²³ but mothers who live with a partner have also been shown to provide better caregiving environments.²⁴ Cole and colleagues have shown that mothers that are able to make the greater improvements are those that live alone (perhaps because they then have power to make decisions).²⁴ This may, however, be off a low base as single mothers are consistently at most risk.²³ Fathers are also generally less inclined to participate in study activities than are mothers,²⁵ and in many instances are the financial gatekeepers in families thus limiting household access to interventions.

Adolescent mothers may experience both support and interference from individuals in their familial and social networks.²⁶ Although relatives can play a supportive role, they are also the most significant source of interference on issues relating to child rearing. Specific strategies that consider the role that extended family members play in the family unit are needed in local contexts to address this barrier.²⁷ The mother-grandmother relationship is complex, and these intergenerational roles have to be carefully negotiated. Research on multigenerational households has shown that conflict between mothers and grandmothers over who is responsible for child care can negatively impact maternal parenting practices.²⁸ Solidarity and stable alliances between the parental figures in multigenerational families are

central to a child's well-being.²⁹ In the context of maternal depression, there is evidence that grandmothers may have important ameliorative effects²³ as their presence has been shown to be related to secure infant attachment.³⁰ Amongst adolescent mothers, the presence of a grandmother increases the likelihood of completing school and reduces the likelihood of receiving welfare.³¹ Three-generational families that include children, mothers and grandmothers are becoming increasingly common.²⁸ Although grandmothers often share childrearing responsibilities, their involvement may vary from providing limited care to assuming the role of primary caregiver. Grandmothers who head up a household often make important decisions regarding childcare, daily routines and the allocation of family resources (even when not the primary caregiver). Kitzman and colleagues³² have shown how grandmothers exert considerable influence over their daughters, even when living in separate households. Aubel,³³ with particular reference to maternal and child nutrition, has shown how grandmothers frequently advise younger women about feeding, while their social networks play a pivotal role in determining child nutrition related practices. In a similar vein, Ijumba and colleagues have shown that the ability of an HIV+ mother to implement her decision to exclusively breastfeed will depend to a large extent on familial support, and the attitudes of other family members to exclusive breastfeeding.³⁴ Pressures to introduce other foodstuffs may be difficult to resist,³⁵ and the mother may have to abide by the recommendations of others, such as her mother or her mother-in-law.²⁴

3.2 Extended family networks

Nurses conducting a prenatal and early childhood home visitation programme among young mothers in the USA found care delivery within the family context to be challenging.³² The problems faced by the mothers often stemmed from factors beyond their personal control or from obligations to their extended family unit. The emotional and instrumental support given by extended family members usually involved a cost to the young mother, who felt obliged to reciprocate by accepting multiple caregiving responsibilities within the family. These responsibilities often impeded the mother's ability to engage in programme activities, making it difficult for her to improve her parenting practices.³²

Several studies have highlighted children's varied living arrangements, many of which include the absence of one or both parents.³⁶ South African children who belong to "stretched" or "dispersed" family units are often rotated through the homes of relatives who are thought to be in a better position to meet their care and educational needs.³⁷ As a result of this practice, the costs of child rearing are shared and adults are able to move to distant localities to secure employment.³⁸ It is not unusual for working mothers to place their children with kin caregivers, such as aunts or grandmothers, and contribute to the household income. When the mother's income has to be distributed among all the members of the kinship care group, maternal absence may have a negative impact on nutritional status due to smaller and less frequent meals.³⁹ In addition, maternal absence can pose a barrier to the successful implementation of family-based interventions aimed at improving ECD and nutrition. Kin caregivers do not have legal custody of the children in their care⁴⁰ and may therefore have difficulty authorising health care and enrolment in intervention programmes.

3.3 Family beliefs

In addition to intra-family dynamics, family belief systems regarding child development, decision making, parenting and potential interventions are key determinants of the success or failure of an intervention. Spoth and colleagues have shown that two of the most important barriers to participation in an intervention are beliefs and attitudes about interventions and family member influences.²⁵ Cole and colleagues have shown how, in a nurse-delivered home based intervention, programme benefits are not evenly distributed amongst all recipients.²⁴ Home visits are impacted by maternal resources and the mother's freedom to exert control over her immediate environment.²⁴ A woman's ability to autonomously implement changes and make decisions within her family is affected by her mobility, financial resources, household position and social equity. Women are often in a subordinate position, and this is particularly evident during her child rearing years when participation in social and economic activities is restricted.²⁹ In many countries, women have to obtain permission from their husband or mother-in-law before they seek health care.⁴¹

Gaining and maintaining access to families during home-based interventions can be difficult because other family members are often the gatekeepers who control key aspects of programme delivery, including the focus, meeting times and duration of the home visit. The reluctance of individual family members to participate in activities may pose a considerable barrier to the uptake of home-visitation programmes. Spoth and Redmond found resistance from spouses and offspring to be particularly influential in this regard.²⁵ The same authors have also described a range of barriers to engagement in preventive interventions, such as time demands and scheduling issues, beliefs about family-focused interventions and the mental health of family members.⁴² Similarly, the refusal of families to participate in intervention activities is frequently attributed to time constraints, a perception that the activities are unnecessary, combined with limited knowledge about child development.³² In addition, mothers' resistance to engage in an intervention and nurses' unwillingness to implement its components are important determinants of impact.⁴²

3.4 Maternal depression

An important and often overlooked factor that may impede penetration or limit the impact of an intervention is maternal mental health, specifically depression. Globally, unipolar depression continues to be the leading cause of years lived with disability.⁴³ Women are 2–3 times more likely to suffer from a depressive episode sometime in their lives compared to men,⁴⁴ and a recent review and meta-analysis suggests that rates of depression in the perinatal period may be particularly high in LMICs, ranging from 18 to 33%.⁴⁵ The evidence for the negative effects of maternal depression on early interaction, parenting and child-care practices continues to mount, and this appears to be universal, across cultures and socioeconomic status.^{46,47} The association of maternal depression with reduced infant growth, especially stunting, is demonstrated by several new studies,^{48–51} with possible contributions from lack of responsive feeding and early cessation of breastfeeding in depressed mothers.^{52,53} Risk factors for maternal depression, such as poverty, low levels of education, lack of empowerment, and poor social support⁴⁷ are also risk factors for sub-

optimal ECD,^{54,55} suggesting that the relationship between maternal depression and poor child development is likely to be interactional and multifactorial rather than linear.

Depressed parents are less likely to seek or accept emotional and material support from others.⁵⁶ The mental health of parents has an impact on child development as poor parenting practices associated with depression can affect the physical and mental well-being of children in both the short and long term. An important finding in this regard has been that in some cases, even when the depression has been successfully treated, parenting quality does not necessarily improve.⁵⁷ In the context of maternal depression, Cohn, et al.⁵⁸ found a positive benefit for the mother-infant relationship when the depressed mother was not based at home full-time.

3.5 Solution to penetration issues

CHW's directly target potential barriers by, for example, motivating the entire family around the connection between the health of the mother and the baby. Engaging the family members is a key component of the intervention, which aims at harnessing family support for the mother so that she in turn can have maximum time to interact with the child and carry out suggested child-related activities. This approach also ensures that the family members (especially the husband and the mother-in-law) are sensitized to the importance of maternal psycho-social and physical well-being, which is directly linked to the child's developmental and physical outcomes. The approach furthermore ensures that the support to the mother should continue even after the formal intervention ends. Thus the intervention promotes the uptake and the maintenance of family-level behaviours that support the mothers for the sake of the child's well-being. Instead of the family becoming a potential barrier to the successful implementation of the intervention, the family members are explicitly incorporated and empowered to participate.

In outlining potential barriers to penetration, there is a danger that the focus remains at the level of individual behavior change and fails to address the structural drivers of inequality and poor uptake of services.⁵⁹ Maternal education for instance has been positively associated with the type, quality and quantity of child care arrangements which in turn has been closely linked to school readiness,⁶⁰ breastfeeding duration and quality of diet of young children,^{61,62} as well as a 2.7 times increase in maternal mortality amongst women with no education compared to women with more than 12 years of education.⁶³ Poor cognitive stimulation of infants and children and a higher incidence of behavioural problems has also been associated with low maternal education levels.^{64,65} System-wide changes to the structural inequalities that maintain low levels of schooling of girls must also be addressed. In addition, it may be that intervention programmes need to be tailored to account for differing levels of maternal education, with poorer educated caregivers requiring different delivery formats.

In the case of maternal depression, recent studies provide evidence that depression is a treatable condition, even in environments where resources are limited.^{66–68} If maternal depression is reduced, there are substantial subsequent improvements such as increased maternal sensitivity,⁶⁸ higher quality child-care (indicated by improved immunization and reduced diarrhoea), and more time spent playing with the infant.⁶⁶ Our ability to effectively

treat maternal depression in LMICs emphasizes the need for early identification to reduce the risk of adverse consequences for mothers and children.⁶⁹ Consistent with the conceptual framework of this paper (see Figure 1), programmes designed to treat maternal depression, coupled with broader programmes that strengthen women's education, empowerment and social support are likely to have a large impact on early child development.

Conclusion and a call for action

Claeson and Waldman⁷⁰ have argued that significant improvements in child health will depend to an increasing degree on what happens in the household, in combination with a responsive and supportive health system, and that such improvements will be linked to the promotion of household behaviours. Bundling of interventions that affect the most families and children in a specific context, community or country is going to be critical to creating a sustainable package of services in LMICs. We have argued that a successful scale up and integration of ECD and nutrition will depend on horizontally integrated programmes that utilize both centre-based and CHW home-based models of intervention. It is likely, that the most vulnerable households in LMICs will only be reached by community-based paraprofessionals who, with sufficient support from the health and social service sectors will deliver essential early interventions. Such a combination of ECD centres and CHW home visiting will ensure coverage. We have also argued however, that coverage is not sufficient and that interventions often target a single person within the household – in ECD and nutrition interventions most commonly the mother. Unless interventions take wider family processes into account and directly target intra-familial barriers, the ability of a mother to implement an intervention may be compromised.

Much of the evidence for the effectiveness of CHW delivered ECD interventions comes from Latin America. Data are needed from other LMICs (particularly low-income countries) to establish the extent to which CHWs can deliver ECD interventions, but also the extent to which ECD interventions can be integrated into broader universal health coverage packages, particularly in severely resource constrained regions and countries.

In the light of this discussion we would like to suggest a few steps to ensure the equitable scale up of integrated ECD and nutrition services:

1. Horizontally integrated programmes are essential in order to prevent the vertical delivery in isolation of nutrition or ECD interventions such as (for example) stand-alone nutrition supplementation or infant stimulation programmes;
2. Family based, rather than individual or disease targeted models are essential;
3. CHWs/paraprofessionals are an essential delivery platform to ensure coverage and equity;
4. Coverage, intensity of intervention and penetration are all essential ingredients and need to be factored in to intervention delivery planning;
5. Interventions must be designed with potential familial barriers to successful penetration in mind;

6. ECD and nutrition interventions must be integrated within primary health care services if scale up is to be successful.
7. Research is needed to explore the effectiveness of integrated ECD interventions delivered by CHWs in LMICs and particularly in severely resource constrained countries and regions.

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Figure 1.
Conceptual framework