A Neonatologist's Experience: From Neonatal Intensive Care Unit to Community Based Newborn Care in an Effort to Save Newborn Lives in Zambia, 1985 to 2011

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INTRODUCTION

As a young scholar I looked forward to a fulfilling medical career. Being a paediatrician brought with it the idea of saving lives, the smaller the infant, the greater the achievement, so it seemed. My mentor at the time with the greatest influence on my professional shaping was Professor Chifumbe Chintu, first Zambian Paedaitrician, Dean of the School and also head of the Neonatal Intensive Care Unit in C13 and Haematoncology services for the whole hospital. With this inspiration for a bright and fulfilling career, I set out to train as a paediatrician, with The Royal College of Physicians in the United Kingdom, supported by the Beit Trust. With further support of my Departmental Head of department, Prof. Mukelabai, I proceeded to Mie University, Japan where with support from the Japanese International Cooperation Agency, I embarked on my career as a neonatologist in 1989 having worked with newborns from 1985. I was exposed to lifesaving feats in Japan's high technology medical milieu. Infants with necrotizing enterocolitis survived well, while birth asphyxia continued drawing its breath from a ventilator for very long periods. To exemplify this iatrogenic effect of success in the newborn period, I experienced and wondered at a five year old child who had been premature at birth, still on the ventilator, with family holding on to hope for more than five years. For me this was the height of the grip technology on all of us. How far will this go? I have not yet found out, because I remain challenged by the mundane fact that newborns are still dying today, the same if not worse than in the 1980s in my own back yard, and our response is far from adequate[1,2].

And so my move to the world of preventative care, a stint as Reproductive and Child health advisor at the Ministry of Health and World Health Organisation helped stabilize my understanding of my role in neonatology, childhealth and whole care of the child in the family setting.

DEMOGRAPHIC PROFILE OF THE NEWBORN, INFANT AND CHILD MORALITY

The under five and infant mortality has declined over that last 2 decades, indicating improved socioeconomic and health profiles of countries. In 1992 the rural under five mortality was a horrendous 201 per 1000 live births, and ten years later in 2002 (table 1), reduced by 19 deaths per 1000 births to 182 per 1000 births and and just 5 years later, in 2007 to 119 per 1000 births. (2) (3). Similarly the infant mortality rate has declined from 107 per 1000 births(1992), to 95 per 1000 births in 2001 and five years later to 70 per 1000 births in 2007.

Survey	Neonatal Mortality	Infant Mortality	Under-five Mortality
ZDHS 2001-2002	37	95	168
ZDHS 2007	34	70	119

Table 1: Table of comparative mortalities 2001 and 2007 ZHDS.

Neonatal mortality on the other hand is more slowly lowered or static. In general districts do not report newborn data. Urban figures for 1992 were 43 per 1000 LB, four years later reducing to 35 per 1000 LB, 2002 37 per 1000 LB and most recently in the 2007 survey, 34 per 1000 births.[2,3].

While a significant decrease in infant and child mortality occurred between ZDHS 2001 and ZDHS 2007, a drop of 25 per 1000 births in infants up to 12 months of age, and an even greater drop among under-fives as a group by a staggering 48 per 1000 births in five years, only 3 per 1000 births among the newborns, there must be lessons to be learned in this. Among these lessons are those based on empirical evidence, such as experiences of countries in the West and the few prosperous African states like Mauritius, who have low infant mortality rates. The socioeconomic determinants indicate that good economies correlate well with low mortality.

To add to the dilemma of survival, HIV and AIDs was documented in the early 1980s when the economy hit rock bottom in Zambia. It accompanied much suffering and decline in all social services, during the “shock” period when the country had to come to terms with the devastation of a new disease that was little understood. A national response to the pandemic evolved over two decades, first to make blood and its products safe for patients, then a multidisciplinary non medicalised approach, followed by medical advances such as the prevention of mother to child transmission and use of antiretroviral drugs to treat cases, in the 90s and new millennium. The child and infant under one year seem to have benefited from this evolution in HIV services, but again, not the newborn in Zambia.

Alongside these medical truths is the human resource challenge, with few qualified health workers willing to work in rural areas of Zambia and when adequately trained, leave for

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greener pastures to lucrative NGOs, neighbouring SADC countries and elsewhere in the UK and USA. Even among paediatricians few express interest in the newborn and life in NICU.

The Zambia National Position Paper on the Newborn estimates that 77,300 children under the age of five years in Zambia die annually and of these, about 17,000 babies die within the first 28 days of life, the neonatal period. This is one in every five under 5 deaths in Zambia today attributable to neonatal causes. Also tragic for the newborn, is that an estimated 3,000 Zambian mothers also die every year due to pregnancy and childbirth related illness at the same time. A clear challenge on survival.

Zambia, like many African countries does not regard the neonate as an individual until it is a month or more in age. Kaseba et al and Bang et al demonstrate the high cultural acceptance of neonatal mortality in their unpublished works that describe that neonate remain unnamed during the neonatal period and in the event of death are unmourned and soon forgotten[23,24].

The Zambian newborn therefore faces a fraught struggle for survival in a health system with inadequate health personnel and which has only recently recognised newborn health as a priority.

LIFE IN THE NEONATAL INTENSIVE CARE UNIT.

The Neonatal Intensive Care Unit is a specialized (Fig. 1) ward which marks itself apart from other wards in its shoes off, sparse jewellery, cover your hair, mothers by the cotside policies, incubators, open cots and gowned nursery staff, doctors, nurses and auxiliary staff and every manner of high technology equipment such as ventilators, rescuscitaires, parenteral nutrition drips, oxygen hoods and monitors, constant beeping of machines, regular wiping of foreheads by staff and a warm, humid environment that is merciless to the nearly menopausal nurse or doctor and anyone else for that matter. And the resource cost ofcourse ?

In over thirty years of care , we see that neonatal morbidity and mortality in Zambia, have little changed, with the newborn contributing increasingly to the infant mortality profile[1].

We too recorded prematurity, birth asphyxia, low birth weight, newborn infection and congenital malformation (Fig. 2) contributing greatest to the morbidity and mortality profile in the Neonatal Intensive Care Unit up to the 1980s[2].

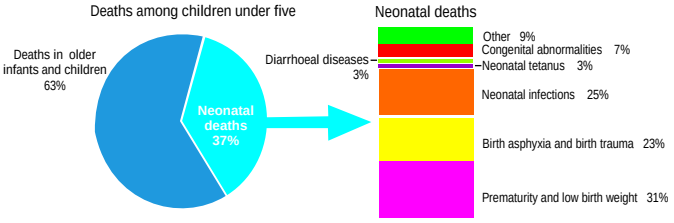

Fig 2: Estimated distribution of direct causes of neonatal deaths. (*Source: World Health Organisation. The Global Burden of disease: 2004 update. World Health Organisation, Geneva, 2008).*

One did not expect dramatic change in mortality among newborns, in the eighties during which time we actually experienced added morbidity and mortality, largely due to HIV and AIDs in Zambia. A confounding aggressive illness emerged among high risk neonates in the NICU in which infants born to HIV positive women. We conducted a prospective case series study in 1991 on 108 premature newborns to understand a new phenomenon that we observed on NICU in 1989 to 1990.[6]

Without paediatric and infant diagnosis of HIV, polymerase chain reaction testing (PCR), we relied on HIV antibody testing in both mother and infant. HIV seropositive mothers gave birth to infants with prematurity, failure to thrive, diarrhea, sepsis, fever and recurrent thrush. Symptomatic babies died 3 to 4 weeks of onset of symptoms, without antiretroviral medication. This aggressive scenario remained as such, not only among high risk infants, but also other infants brought to the hospital for care until 1999 when Prevention of mother to

Fig 1: UTH NICU, Current status

child transmission with its breakthrough science, was offered to pregnant women(6). In 2004 children began to officially receive antiretroviral treatment and with these events, the morbidity and mortality profile begun to change among infants and children.

Between 300 and 350 babies came to NICU each month, most of whom were born at the adjacent labour ward delivering 15,000 to 20,000 infants each year or 1200 to 1500 infants per month. The numbers have reduced to about 12,000 per annum due to the introduction of new first and second level hospitals in Lusaka. Twenty per cent to twenty five percent of these high risk newborns need some attention such as extra warmth, extra feed, phototherapy, blood incompatibility exchange transfusion, care of prematurity, care for large for dates, small for dates and congenital infections of every sort. NICU impacts the lives of the most high risk infants referred from the nearer and more fortunate areas of Lusaka, mainly. What about the rest of Zambia? Urban centres such as the Copperbelt towns, Solwezi, Kabwe and Livingstone may have their own NICUs, but what happens to the newborn in rural centres?

LOOKING BEYOND NICU

There remains some challenging facts, that 98% of all neonatal deaths occur in developing countries, that up to 60 per cent of babies are born at home, that neonatal deaths account for one in five deaths in the under fives and 75% of them die in the first week of life.[2,3,7,8,10].

My question remains, what has technology done for the newborn ? What happens to those who are not near these services?

In these questions together with other professionals we were tasked to develop a Zambian Newborn Position Paper which recognizes the gap in newborn care and acknowledges the role of inpatient midwifery care for mothers and newborns but importantly urges Zambia to consider adopting community based initiatives for newborn care and survival. [22]

Among the dilemmas of a newborn specialist is that technology required to care for newborn babies is expensive and difficult to maintain, midwives are specialized nurses requiring three years of training and NICUs need paediatricians and neonatologists. Although this level of practice is ideal and Zambia must aspire towards skilled healthcare givers, these need investment and time, meanwhile newborns continue to die. What else should we be doing at this stage in our health system?

COMMUNITY AND HOME BASED NEONATAL CARE

The 21st century has at last spawned new hope for the newborn. A new focus, of enthusiasm and commitment by the global, national and local communities to reduce neonatal illnesses and deaths and to improve their survival brings with it hope for the newborn. (Lancet series, India and Nepal)

History has taught us that we do not need expensive technologies to facilitate the reductions of either maternal or newborn deaths. The European nations during their industrial phases were burdened with high Maternal and newborn mortality, but managed to reduce them before the introduction of sophisticated and expensive technologies. This was achieved by merely improving hygiene practices.

A visit to India, with the Ministry of Health Director of Research and Public Health in 2006 turned my thinking and perspective on the newborn 360 degrees.

Home Based Neonatal Care by Drs Abhay and Rani Bang in India demonstrated remarkable reductions in the incidence of neonatal illness by 49%, neonatal and perinatal mortality by 62% and 71% respectively. Their efforts through Society for Education Action and Research in Community Health (SEARCH) have mirrored similar results through the Ankur initiative in seven other rural, urban slum and tribal sites in Maharashtra states.[12,18].

These outstanding works by Bang et al have had a far reaching influence on both the global and national communities. If successfully adopted the deaths of millions of newborns, Children and Mothers could be prevented provided adequate resources are invested in a HBNC initiative.

Home-based Neonatal Care is a proven, low-cost and cost-effective intervention initiative that has undergone several years of rigorous testing. Over a 12-year period, the HBNC initiative has shown how the grass root workers are able to reduce newborn and infant mortality utilising appropriate technologies. This work depends on the Community Health Worker e trained to be able to the meet the needs of the mother and baby at home by being at hand to attend to the birth and thereby manage delivery of baby and when need arises, prevent or treat sepsis and birth asphyxia, which are the major causes of morbidity and mortality in the newborn period. This Indian HBNC has shown a reduction of neonatal mortality of up to 75% following low technology interventions at home.[12,18,19,20,24]

These achievements influenced our strategies defining the continuum of care from the pregnant women to the newborns in two pilot districts of Mpongwe and Chongwe in Zambia and also a study by Boston University in Lufwanyama. The Boston group tested two interventions and attributable deaths in asphyxia and sepsis demonstrating need to use all components to demonstrate life saving effect.

Our four year study, (2007-2011) in Mpongwe and Chongwe begun with a cross-sectional baseline study of health seeking practices and mortality patterns followed by a randomized community interventional study for a continuum of care, by community based agents(CBAS). These CBAs provided care, from pregnancy tracking, antenatal care, screening for HIV with Oraquick, providing prevention of mother to child transmission care, delivery, perinatal care, kangaroo method of warming care, early breast feeding soon after birth, identifying and treating birth asphyxia, identifying and managing newborn sepsis and pneumonia, reaching significantly more infants in the intervention than control sites.

The pie chart below (Fig. 3) summarises our findings for newborn deaths with fresh still births suggesting interventions earlier might avert deaths:

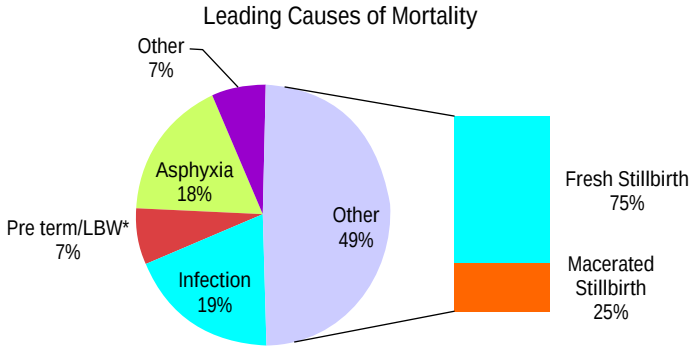

Fig 3: 31.5% of the deaths were underlined by LBW and or prematurity in addition to the main cause of death.

The control sites carried on with business as usual, though community based agents received the same training as those in the intervention sites. The CBAs in the intervention sites were also equipped and supported to conduct the appropriate interventions or refer clients.

We found that the interventions for the most had a significant contribution to lives of the newborn as follows:

1. Our Knowledge Attitude and Practice survey emphasized the community's role in recognizing socio-cultural priorities and challenges that determine health seeking for the newborn and how they are able to improve this with training. The survey mapped out areas for intervention into an algorithm, feasibility of the subsequent randomized study, as well providing baseline data.

2. Community Based Agents live in the communities they serve and when trained equipped, supervised and provided with appropriate incentives they are the answer, at least for now, in the effort to save newborn lives.

3. The potential to save newborn lives is within the community. If key interventions in the continuum of care, from pregnancy tracking, 2 visits for antenatal care, screening for HIV with Oraquick, providing prevention of mother to child transmission care, kangaroo method of warming care, early breast feeding, identifying and treating birth asphyxia, identifying and managing newborn sepsis are implemented, up to 58 per cent of newborns that would otherwise die, will be saved in the first 28 days of life.

4. Key interventions include: pregnancy tracking, recognition of antenatal danger signs, use of oraquick saliva test to screen mothers for HIV, offer prevention of mother to child transmission, care, keep infant warm, breast feed early, identify birth asphyxia and rapid response with ambu bag and mask and identify newborn infection and treat with amoxicillin.

5. All the interventions in the community are feasible and will need support.

6. Community based agents conducted a diversity of tasks capably after they had been trained and in the process were able to save lives.

7. Evidence from Zambia, Chongwe, Mpongwe and Lufwanyama, indepedently reproduced results of the Indian work.

CONCLUSION

From my high technology university loft, I wish to shift from my position of skeptic to sold out in support of community based agents implementing the community based continuum of newborn care because evidence based results show that “yes they can” where we couldn't. Let us give our rural babies in Zambia a chance for life, where they are, in rural communities.

With my experience from 1985 to date, in a world of sharp contrasts, and more recent research findings of the last five years, I passionately believe the answer to an escalated approach to saving newborn lives lies largely in the communities to implement key interventions in a continuum of care, where they are born and die. It is now up to government to take up the implementation challenge.

In the end, I am glad to be part of a fulfilling career that awaits aspiring neonatologists in Zambia.

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