DOI: 10.1111/1471-0528.13818
www.bjog.org

Review Article

Antenatal and postnatal care: a review of innovative models for improving availability, accessibility, acceptability and quality of services in low-resource settings

AD Kearns,[a] JM Caglia,[a] P ten Hoope-Bender,[b] A Langer[a]

[a] Department of Global Health and Population, Harvard T.H. Chan School of Public Health, Boston, MA, USA [b] ICS Integrare, Barcelona, Spain

Correspondence: AD Kearns, Department of Global Health and Population, Harvard T.H. Chan School of Public Health, 677 Huntington Avenue, Boston, MA, 02115, USA. Email akearns@mail.harvard.edu

Accepted 13 October 2015. Published Online 23 December 2015.

Key lessons can be drawn from innovative approaches that have been implemented to ensure access to better antenatal care (ANC) and postnatal care (PNC). This paper examines the successes and challenges of ANC and PNC delivery models in several settings around the world; discusses the lessons to be learned from them; and makes recommendations for future programmes. Based on this review, we conclude that close monitoring of ANC and PNC quality and delivery models, health workforce support, appropriate use of electronic technologies, integrated care, a woman-friendly perspective, and adequate infrastructure are key elements of successful programmes that benefit the health and wellbeing of women, their newborns and families. However, a full evaluation of care delivery models is needed to establish their acceptability, accessibility, availability and quality.

Keywords Antenatal care, health systems, postnatal care, quality of care.

Tweetable abstract New paper examines global innovations in antenatal/postnatal care @MHTF @ICS_Integrare #MNCH #healthsystems.

Linked article This article is commented on by N van den Broek, p. 558 in this issue. To view this mini commentary visit http://dx.doi.org/10.1111/1471-0528.13937.

Please cite this paper as: Kearns AD, Caglia JM, ten Hoope-Bender P, Langer A. Antenatal and postnatal care: a review of innovative models for improving availability, accessibility, acceptability and quality of services in low-resource settings. BJOG 2016;123:540–548.

Introduction

The new millennium has seen increased emphasis from ministries of health, programme implementers and donors on ensuring skilled care during pregnancy, childbirth and the postnatal period for women and newborns.[1] Support for such efforts has been bolstered by Millennium Development Goals (MDG) 4 and 5, which prioritise improving child and maternal health, respectively, as well as reducing mortality.[2] Increased access to skilled care has been recognised as a crucial contribution to improved maternal and perinatal health outcomes.[3] As a result of these and other factors, in 2013, global maternal deaths were estimated at 289 000, down from 523 000 in 1990.[4] During the same period, the global neonatal mortality rate fell from 33 deaths per 1000 live births in 1990 to 20 in 2013.[5] Projections show that by the end of 2015 when the MDGs expire, maternal and child deaths will be half what they were in 1990.[6] But much work remains. To address the unfinished agenda, the maternal and newborn health communities have strived to ensure that their common goals are included in the Sustainable Development Goals (SDGs) that will shape the future global policy agenda.[7]

During the last 15 years, access to skilled care during delivery and antenatal care (ANC) coverage, measured as the proportion of women who receive one to four or more ANC visits during their pregnancy, have been used by countries and international initiatives to track progress towards achieving MDG5.[2,8,9] Coverage of ANC has significantly increased: between 1990 and 2014, the proportion of women who received any ANC in developing countries rose from 64 to 83%.[10] Postnatal care (PNC) for mothers and newborns, although not part of the core set of indicators, is garnering increased attention, especially through

© 2015 The Authors. *BJOG An International Journal of Obstetrics and Gynaecology* published by John Wiley & Sons Ltd on behalf of Royal College of Obstetricians and Gynaecologists.
This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

global initiatives such as the Every Newborn Action Plan[11] and Ending Preventable Maternal Mortality.[12] Access to and uptake of PNC have improved, but remain limited: in low-income and middle-income countries, respectively, just 37 and 51% of women receive a postnatal visit within 2 days of giving birth.[13]

In 2001, the World Health Organization (WHO) developed and rigorously evaluated a new ANC model[14] geared towards low- and middle-income countries that included only evidence-based, high-quality interventions delivered through fewer ANC visits than the traditional model. Now known as Focused Antenatal Care (FANC), the protocol included information on standard medical care to be provided to all pregnant women, as well as guidelines on additional care and treatment for those women requiring it. This simplified model endorsed by WHO facilitated increased access to antenatal care, but little is known about the quality of the care provided,[15] as few indicators have been developed and validated, and those that do exist are inconsistently measured.[16] Unfortunately, ANC is often evaluated only through the number of visits; its content, if evaluated at all, is assessed with a simple checklist of interventions, potentially limiting the extent to which antenatal care can address a pregnant woman's general health and wellbeing.

Similarly, the content of PNC had not been clearly defined and standardised until recently,[17] and there is little information about its implementation. Data on the number of healthcare visits a woman and newborn receive are important, but fail to describe whether such care effectively addresses maternal and perinatal needs. Without delivering *quality content*, the number of *contacts* a woman has with the health system both during pregnancy and the postnatal period has limited relevance for maternal and newborn health.

The potential benefits of quality ANC and PNC go well beyond pregnancy and childbirth. With ANC often being the first point of contact women have with the health system,[18] increasing access to high-quality, well-coordinated care in this time period can encourage future health-seeking behaviours. Furthermore, putting ANC and PNC in the context of broader reproductive health services is likely to ease access to other services, including contraception, detection of sexually transmitted infections, or identification of intimate partner violence.

Given the urgency of improving the quality of maternal and newborn health care and the limited documentation in this area so far, this study focused on identifying and analysing innovative approaches aimed at improving ANC and PNC and drawing potentially generalisable lessons from them. Learning from practical experiences and exploring the potential for scale-up and adaptation of organisational and technological innovations is essential. The selected innovative models had all been well documented, but not subjected to a rigorous evaluation, a limitation they share with a wide range of programmatic experiences.[19] Aware of these limitations, we explored the innovative models using a variety of data sources and approaches, which allowed us to identify successes and challenges of several ANC and PNC delivery models in different settings around the world, explore the lessons learned from these models, and make recommendations for future programmes.

Methods

Between October 2013 and December 2014, we reviewed a wide range of ANC and PNC delivery models. Source material included peer-reviewed articles, which were systematically obtained via searches in PubMed, MEDLINE, POPLINE and GoogleScholar. Search terms included 'antenatal care', 'prenatal care', 'postnatal care', 'postpartum care' and 'perinatal care'. Articles published before 2004 were discarded. Results were excluded if they were in a language other than English, Spanish or French. After the results had been collated, titles were read to determine applicability to the current study (i.e. papers on topics other than antenatal, perinatal or postnatal care were excluded). The abstracts of the remaining results were read and papers that did not refer to maternal care or did not discuss different models for delivering care were excluded. The researchers of this study also reviewed bibliographies of relevant papers. Demographic and Health Survey analyses and programme evaluations from 2004 and later, available from Demographic and Health Survey and programme-specific websites respectively, supplemented the peer-reviewed material. We conducted key informant interviews with experts involved with delivering maternal and perinatal care in low- and middle-income countries. Four researchers, three directors at international organisations, two leaders of global consortia, and one programme implementer were interviewed to explore barriers to and enablers of successful interventions relevant to their areas of expertise. Gathered information was reviewed, synthesised, and used for the selection and development of several case studies.

We considered several inclusion criteria for the selection of the programmes in our study. First, we identified countries and regions where innovative ANC, PNC, or integrated care programmes, either small-scale or countrywide, were being implemented in a way that differed from a clinic-based patient–provider interaction and were shown to have had some form of positive effect. Second, we explored models of care that used a variety of methods to improve their quality, including organisational, workforce, and supply or demand-creation components. Our third criterion was the availability of sufficient documentation obtained through monitoring processes or evaluations. Finally, we considered practical aspects, such as existing

© 2015 The Authors. *BJOG An International Journal of Obstetrics and Gynaecology* published by John Wiley & Sons Ltd on behalf of Royal College of Obstetricians and Gynaecologists.

connections with the organisations that could facilitate obtaining the information needed for the analysis. Using these criteria, we selected eight innovative care delivery models: four implemented at a national scale and four delivering care on a smaller scale.

To explore the factors that contribute to or hinder the success of ANC and PNC programmes, we critically examined the eight case studies and analysed similarities and differences in the models. We used an analytical framework developed by WHO in the late 1970s[20] that gives equal weight to the availability, accessibility, acceptability and quality of care (AAAQ). The AAAQ framework uses these elements to identify characteristics of the health system that need to align to ensure effective coverage of any health system component—in our case, improvements in ANC and PNC delivery.

Results

The eight case studies cover a variety of approaches for delivering ANC and PNC in urban and rural settings and at the hospital, clinic and community levels, mostly in sub-Saharan Africa and South Asia (Table 1); the case studies are available online as Supplementary material. These models variably address how, where, or by whom ANC or PNC is delivered, as well as the potential for scale-up. Applying the AAAQ framework, we were able to identify the commonalities across the case studies and the factors that appeared to either support or hinder successful ANC and PNC programmes.

Overview of case studies

The Health Extension Worker (HEW) Programme in Ethiopia was founded in 2003 to bring health knowledge and basic care directly to households.[21] The programme uses a large countrywide network of health workers at the community level. Our case study (see Appendix S1) examined its effect on uptake of ANC and PNC and found that the proportion of pregnant women receiving ANC has increased substantially since the programme began. However, HEW influence on skilled birth attendance is limited, and data on PNC coverage remain incomplete.[22]

A second case (see Appendix S2) analysed several programmes in Nepal aimed at increasing access to and uptake of maternity care, especially PNC.[23] Historically, use of PNC has been low in Nepal; most women do not receive care until the infant's first immunisation visit 6 weeks after birth.[24] The programmes included in this case study explored the effects of community-based postpartum and neonatal care delivery, increased provider training, and improved referral networks. With the support of these programmes, uptake of PNC and postpartum contraception has increased.

Third, we looked at Pakistan's Lady Health Workers (LHWs), who provide basic care and health education within their communities (see Appendix S3).[25] The programme was implemented in 1994 as part of the national strategy to reduce poverty and improve health, and directly contributes to the nation's effort to meet the MDGs.[26] LHWs provide basic preventive care and serve as liaisons between community members and higher-level health facilities.[27] They focus on common childhood illnesses, reproductive health and family planning, and promotion of healthy behaviours. LHWs have also been successful in encouraging pregnant women to receive ANC at local health clinics.

A fourth case profiles Tanzania (see Appendix S4), which has adopted WHO's FANC model.[28] FANC was well received by providers in Tanzania. However, health systems challenges such shortages within the healthcare workforce and make implementation difficult, and many facilities do not have the supplies they need to deliver FANC appropriately.[29] A vast majority (87.8%) of women receive at least one ANC visit, but less than half of women (42.8%) receive the four visits that FANC intends.[30]

Next we explored the Manoshi Project in urban Bangladesh, which uses community health workers to provide health education and basic health care to roughly eight million women and children, including ANC and PNC (see Appendix S5).[31] The project has built several birth centres in low-income peri-urban areas and has effectively reduced the 'three delays'[32] by developing a 'facilitated referral network', allowing women who need emergency care to access services immediately. Results are promising: the proportion of women receiving at least four ANC visits has substantially increased and the majority of women are delivering with a community midwife and receiving PNC.[33]

Jacaranda Health is a network of private clinics that has provided comprehensive ANC, PNC, and labour and delivery care in low-resource peri-urban Nairobi, Kenya since 2011.[34] Jacaranda has tested several innovations for encouraging uptake and improving quality of care, including electronic medical records, client incentive schemes, and both clinic- and home-based delivery of PNC. The organisation uses a continual client feedback loop to ensure the quality and acceptability of its services.[35] Whereas data on quality and utilisation of maternity care services in comparison to more traditional models are not yet available, patient satisfaction at Jacaranda is high and their number of monthly patient visits is increasing (see Appendix S6).[36]

Since 2000, the Developing Families Center in Washington, D.C. has provided a midwife-led model of care to low-income families with limited access to comprehensive, co-located care outside the hospital setting.[37] The midwives and staff provide personalised care from pregnancy through early childhood; ANC is provided by midwives in group

© 2015 The Authors. *BJOG An International Journal of Obstetrics and Gynaecology* published by John Wiley & Sons Ltd on behalf of Royal College of Obstetricians and Gynaecologists.

Table 1. Key elements of the case studies*

Models delivered at national scale	
Case Study Topic (year programme started, if applicable)	**Programme Highlights**
Health Extension Worker (HEW) Programme, Ethiopia (2003)	Nationwide community health-worker cadre; all HEWs completed primary school and provide free health education, screening and prevention[17] By 2010, 33 819 HEWs had been deployed, reaching 89% of communities[18] ANC uptake increased from 26.8% in 2000 to 42.5% in 2011[18]
Postnatal care, Nepal	Several recent nationwide maternal health programmes specifically emphasised free postnatal care[19] Both demand- and supply-side interventions are included Uptake of early PNC increased under the Community-based Neonatal Care Package from 65 to 94%[20] The Nepal Family Health Programme II was associated with increased PNC uptake from 41 to 55%[21] Receipt of early PNC increased under the Birth Preparedness Package from 11 to 25%[22]
Lady Health Worker (LHW) Programme, Pakistan (1994)	Nationwide community health-worker cadre; LHWs are all women who completed primary school and received a community endorsement; they provide free integrated preventive and curative health services and liaise with the formal health system[23] By early 2013, more than 105 000 LHWs had been trained[24] Women reached by LHWs are 11% more likely to use modern contraception and their children are 15% more likely to receive a neonatal check-up than those of other women[25] LHWs strongly influence women's decision to seek ANC[26]
Focused Antenatal Care, Tanzania (2002)	WHO model for four antenatal visits is adapted to local context; visits are free of charge and aim to shift focus from quantity to quality by providing individual counselling, assessments, and evidence-based interventions[27] Uptake of ANC is 87.8%,[28] but delivery of comprehensive care has been difficult—only 22.5% of women receive complete birth preparedness counselling and 39.5% are not informed of any danger signs[29]
Models delivered at small scale	
Case Study Topic	**Programme Highlights**
The Manoshi Project, Bangladesh (2007)	BRAC-run project that developed community health worker cadres and local birthing facilities in six urban areas, serving eight million people[30] Focused on building a direct referral system to connect pregnant and lactating women, newborns, and children under five with quality health facilities; user fees are dependent on ability to pay From 2007 to 2011, receipt of at least four ANC visits increased from 27 to 52%, birthing alone decreased from 65 to 24%, and the proportion of women receiving early PNC increased from 15 to 62%[31]
Jacaranda Health, Kenya (2011)	Jacaranda's clinics provide comprehensive, low-cost maternity care in low-income peri-urban areas[32] Services include family planning, antenatal, delivery and postnatal care, with the latter serving mothers and children up to 1 year Surveys conducted with Jacaranda's patients have shown that 95% are happy with the completeness and quality of care they have received[33] In response to SMS-based family planning messages, Jacaranda saw a 35% increase in postpartum family planning visits during the programme's pilot period.[34]
The Developing Families Center, United States (2000)	'One-stop shop' for family-focused primary care, including a midwife-led birthing centre with direct referral access[35] Services are covered by insurance and include family planning, maternity care, men's health care and early childhood health and development Women receiving care here are less likely to have a caesarean section (odds ratio 0.59, $P < 0.01$) and have lower rates of low birthweight babies (7%; 95% CI 3.3–9.5%,]compared with 11.6%) than the local average[36,37]
Group care models, United States, Australia, the Netherlands, Malawi, Tanzania	Models foster women's empowerment, deliver health information, and provide space for pregnant women and new parents to receive specialised care[38] Structure is adaptable to the groups' specific needs; fee structure varies by country Group care was associated with a 32% reduction in neonatal mortality in India,[39] and 33% lower likelihood of preterm birth in the USA[40]

*The case studies are available as online supporting information.

© 2015 The Authors. *BJOG An International Journal of Obstetrics and Gynaecology* published by John Wiley & Sons Ltd on behalf of Royal College of Obstetricians and Gynaecologists.

settings, unless women opt out. If complications occur, an existing and well-nurtured relationship with a local hospital allows for uninterrupted referral. This model has led to improved maternal and neonatal outcomes, high patient satisfaction, and strong community support (see Appendix S7).[38]

The final case study examined group care, which is a model of care delivery that involves one or two providers engaged with several patients at the same time and is found in many settings around the world (see Appendix S8).[39] Present in a variety of forms, group care models foster women's empowerment, encourage collective learning and provide social support. Groups can be exclusive to pregnant or postpartum women, or open to an entire community. Many groups are formed to provide ANC to several women simultaneously, but others simply bring women together to discuss community issues and develop local solutions. Groups have seen better maternal and neonatal outcomes compared with traditional models, and both providers and group members have expressed high satisfaction with the format.

Factors enabling high-quality care

Increased demand for maternal health care

Women's empowerment has been shown to positively impact maternal and child health through several mechanisms, including increased use of health services.[40] As our case study on group care shows, accessibility and acceptability of ANC and PNC can be improved by using women's groups. These groups can build consensus,[41] act as support networks for their members,[42] and be more effective in delivering ANC and PNC information and health- and pregnancy-related knowledge than individualised care.[43] These groups have demonstrably improved health outcomes across settings, including in India[41] and the USA.[43]

Building support for care-seeking behaviours among women and communities can improve uptake and satisfaction, as described in two additional case studies. Jacaranda has high patient satisfaction, probably a result of its patient-centred approach.[34] At a larger scale, in response to evidence that involving men could allow more women to access such care,[44] Tanzania's Ministry of Health and Social Welfare has stressed partner involvement in its most recent national policy to improve maternal, newborn and child health, with calls for male involvement in ANC.[45]

Supported health workforce

With a robust, comprehensive network of healthcare providers, ANC and PNC can be provided at multiple levels: directly in the community, at rural health posts, or within specialised referral facilities. Some of the models of care described in our case studies are strongly focused on strengthening the healthcare workforce.

The LHW and HEW cadres in Pakistan and Ethiopia, respectively, have been instrumental in strengthening the national health systems, particularly in rural settings, given that skilled providers are largely concentrated in urban areas. The education and cultural background of these cadres[46,47] ensure that they are respected, supported and motivated members of the communities they serve and can be important liaisons with the primary healthcare system.

When incentives, whether monetary or otherwise, reflect responsibilities and workers receive adequate support and feel valued, they may be more motivated to provide higher-quality care.[48] One of the models included in our case study on Nepal, the Aama Programme, issues cash incentives to both patients and providers when the latter attend a birth, whether at home or in a facility.[49] Supportive supervision and professional development opportunities to staff are also important tools, as the case of Jacaranda shows. The organisation trains its existing staff members to run future clinics that can reach a broader array of women and children, expanding its network while also building clinical and leadership skills and staff loyalty.[50]

To assist providers in delivering high-quality care in fewer visits, Tanzania clearly specified the client education and counselling activities that were expected at each visit. Rather than simply advising clients on pregnancy danger signs, for example, Tanzania's FANC model also emphasises physiological and emotional changes in pregnancy, postpartum care planning, and the importance of rest and exercise in pregnancy.[51] Instead of relying on a checklist, Tanzania's providers have clear guidance on how to deliver the specific components of ANC.

Referral networks

Access to care can be considerably improved by strengthening the connection between community-based care and higher-level care so that, when complications arise, such specialised care is easily accessible. Three of the programmes featured in our case studies established systems that include direct access to a referral facility as a core component.

In Nairobi, during the early planning stages, Jacaranda's management team assessed the capacity of nearby, higher-level facilities that could admit their complicated labour and delivery cases and perform caesarean sections when needed.[52] When women face complications, Jacaranda helps plan for delivery at the previously vetted facility, thereby reducing the impact of the 'three delays'.[32] Similarly, the Developing Families Center in Washington, DC developed a unique relationship with a nearby referral hospital that understands the value of midwife-led care. Hence, even in hospital, the Developing Families Center midwives

© 2015 The Authors. *BJOG An International Journal of Obstetrics and Gynaecology* published by John Wiley & Sons Ltd on behalf of Royal College of Obstetricians and Gynaecologists.

are the primary birth attendants during labour and delivery, and physicians only intervene to provide emergency care or consultation.[37]

The Manoshi Project in Bangladesh created an expansive network of urban community health workers[53] that provide basic primary care, including ANC and PNC and attendance of uncomplicated deliveries. Access to emergency care is secured through partnerships with referral facilities. By bringing services to women's neighbourhoods, developing trust through antenatal care, and facilitating access to referral hospitals when needed, Manoshi has substantially reduced maternal and newborn deaths and improved the health and wellbeing of women, children and families in the early years of life.

Technological innovations

Advances in and new uses of technology have the potential to increase collaboration between providers, improve patient flow and increase user satisfaction. The use of electronic medical records allows patient medical histories to be readily available as they move through the continuum of care, enables care providers to quickly transmit relevant information to national- or regional-level databases, and fosters monitoring and evaluation.[54]

In addition to electronic medical records, Jacaranda has used several technological innovations to support improved care. A 24-hour hotline for health and logistical concerns has proven to be an important and dynamic communication channel connecting clients and providers. Mobile phones are used to administer patient surveys, collect payments, remind patients of upcoming appointments and remotely connect patients with providers.[34]

Integration of health care

Increased collaboration between maternal health and other health programs has been associated with improved access to integrated, quality care along the continuum from pre-pregnancy to the early years of life, including ANC and PNC. Manoshi's birthing centres and referral facilities, for example, are staffed by community health workers and midwives who offer antenatal, delivery, postnatal, neonatal and child health care.[53] In addition to increasing uptake of ANC, Manoshi has successfully extended care provision to the early weeks and years of life including breastfeeding support, nutrition and hygiene, kangaroo mother care, weight monitoring, immunisation and family planning.

Providing care for multiple family members in one clinic also appears effective in improving access to care. At the Developing Families Center, primary care is provided for the entire family, from pregnant women to children under-five to men; early childhood development programmes are also available.[37] The LHWs and HEWs in Pakistan and Ethiopia provide community-based services for the whole family so that one visit can meet multiple health needs, alleviating acceptability concerns and increasing access to care.[55] Jacaranda provides services for pregnant women, new mothers and children up to 1 year of age so that these interconnected, underserved populations can mutually benefit from increased access.[34]

Barriers to implementing best practices

Weak monitoring and evaluation

In most countries, information is available on indicators such as the average number of ANC or PNC visits, the approximate timing of first ANC visit, and whether a birth was attended by a skilled provider. Although these indicators are considered weak,[12,15] the models studied here show that ANC and PNC content-related indicators are even weaker, as they continue to be poorly defined, and there is no consensus on the definition of quality and its measurement.[16] Improved measurement tools, validated indicators and further implementation research are vital to better assess quality of ANC and PNC and identify and address priorities.

Financing

Demand-side financing mechanisms have been effective in increasing access to and use of ANC and PNC as well as other maternal health services.[56] Nepal introduced conditional cash incentives for women to access ANC and PNC[57] or deliver in certain health facilities,[58] and also provides free services in government-run birthing centres.[49] Although these incentives have showed some positive effects on use of services, the distribution of funds to husbands or other relatives in certain regions has limited the effectiveness of the schemes.[19] Increased recognition of these cultural norms and the importance of delivering incentive funds directly to women may further improve health outcomes.[59]

Weak infrastructure

Poor programme operationalisation, shortage of skilled providers, inadequate supply chain management, lack of transportation and weak human resource support contribute to poor quality of ANC and PNC and are persistent factors in multiple settings.[29,55,60] In Pakistan, for example, LHWs are trained to refer all pregnant women to the government health facility in their catchment area for labour and delivery.[61] However, many remote areas are so far from quality health facilities that even if LHWs can notify a facility, distance may prevent a patient from receiving timely care.[62]

© 2015 The Authors. *BJOG An International Journal of Obstetrics and Gynaecology* published by John Wiley & Sons Ltd on behalf of Royal College of Obstetricians and Gynaecologists.

Discussion

The case studies discussed in this paper were selected based on explicit criteria and their characteristics were analysed using a strong conceptual framework. The individual analysis of the cases and their comparison helped us to identify the enablers of and challenges with delivering ANC and PNC in a wide variety of settings.

As these case studies show, delivering high-quality ANC and PNC that is acceptable, available and accessible is feasible in a variety of settings. With existing tools and resources, delivery of ANC and PNC can be improved to better meet the needs of women, children and families.

High-quality ANC and PNC require a supported health workforce with knowledge-building opportunities that smoothly transition from pre-service training to in-service continuing education. A fully enabled, adequately resourced clinical environment with relevant technologies, including electronic medical records and mobile tools, is an important step towards tailoring services and improving dialogue with and between providers. Proper remuneration, both monetary and otherwise, that accurately reflects the skills and workload of care providers will help to ensure that workers feel appreciated and valued. Increased coordination between ANC and PNC providers and other services, either through strengthened referral networks or co-located services, can lead to higher satisfaction with and uptake of services, including specialised services for when complications arise.

Family- and women-centred approaches with supported care providers can encourage continuity of care across the health sector, such that women and newborns receive care that recognises their interconnected needs. Women and girls need to be supported and empowered in their decision-making and care-seeking behaviours, whether through group care models, involvement of supportive partners, or adapting programmes to respond to the views and needs of women. Those seeking services should be deeply involved in how, where, when and by whom services are provided. When healthcare leaders and policymakers proactively support the provision of high-quality, culturally acceptable, women-centred ANC and PNC from prepregnancy through the early years of life, all women and families should benefit.

New tools and methodologies can help to address the aforementioned recommendations and facilitate data collection. ANC and PNC models and specific interventions should be assessed by thorough evaluation using indicators that have been validated globally and locally. This would allow for better measurement of the quality of care, rather than simply the delivery of care, and could be linked to health outcomes. Policymakers and programme implementers would then be able to use data on quality of care rather than relying on uptake of ANC and PNC as a proxy. Ensuring better and more complete data on the specific interventions included in ANC and PNC is essential to assess quality of care and its changes over time.

These exploratory case studies have revealed many insights into efficient provision of antenatal and postnatal care in low-resource settings that are relevant in both lower and higher resource contexts. The interventions identified in the FANC studies in the late 1990s can be delivered using some of these innovative methods while implementation researchers explore best practices in operationalising guidelines and protocols, further improving patient and provider engagement, and measuring quality of care and patient satisfaction. By training community health workers and other providers to collect and track these data and providing them with smart tools to record and share such information, a detailed image of the contact, content, quality of and satisfaction with antenatal and postnatal care will become available so that services can be further tailored and more fully meet the needs of women, families and communities.

This study has some important limitations. The sample of cases we used was not comprehensive and the models we included in the study had not been rigorously evaluated, making a systematic review of these experiences impossible. These limitations were even more pronounced in the case of smaller programmes compared with the national-scale ones, given the larger scope and duration of the latter group. Better monitoring and evaluation would be needed to identify the most successful approaches and barriers for delivering ANC and PNC.

Future analyses should also include models that did not succeed in increasing access to or quality of ANC or PNC, to learn from their failures. Although this project discussed both the challenges and successes of the selected programmes, these programmes were picked because there was some evidence of their positive impact. Learning from programmes that have been less effective would further our understanding of the factors that can potentially improve the AAAQ of ANC and PNC. More extensive research is needed to fully assess these complex factors, including field visits and interactions with ANC and PNC users and providers for deeper understanding of these complex processes.

Disclosure of interests

Full disclosure of interests available to view online as supporting information.

Contribution to authorship

All authors contributed fully to the conception and implementation of formative research leading to this report. Data gathering was performed by ADK, PHB and JMC as well as the case study development team listed in the Acknowledgements. ADK prepared the first draft of this

© 2015 The Authors. *BJOG An International Journal of Obstetrics and Gynaecology* published by John Wiley & Sons Ltd on behalf of Royal College of Obstetricians and Gynaecologists.

report. JMC, PHB and AL provided subsequent writing and editing support to assist ADK in developing ensuing drafts. All authors contributed to the overall report structure and concepts.

Funding

This paper was written as part of the Adding Content to Contact project, which was made possible by Grant Number OPP1084319 from the Bill & Melinda Gates Foundation.

Acknowledgements

Nina Zhu, Elizabeth Allen, Rifat Atun, Taylor Hurst and Saki Onda worked with this paper's authors to develop the case studies, which were critical for this analysis. This paper was written as part of the Adding Content to Contact project, which was made possible by Grant Number OPP1084319 from the Bill & Melinda Gates Foundation, and was a collaboration between the Maternal Health Task Force and Department of Global Health and Population at the Harvard T.H. Chan School of Public Health, HRP/WHO and ICS Integrare. Liz Abbate, of Someone Creative, LLC, designed the artwork, colour scheme and formatting for the original case studies. The Maternal Health Task Force at the Harvard T. H. Chan School of Public Health and the authors of the case studies grant permission to *BJOG* to publish the case studies referred to in this paper as online supporting information.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Health Extension Workers in Ethiopia.
Appendix S2. Postnatal care in Nepal.
Appendix S3. Lady Health Workers in Pakistan.
Appendix S4. Focused Antenatal Care in Tanzania.
Appendix S5. The Manoshi Project.
Appendix S6. Jacaranda Health.
Appendix S7. The Developing Families Center.
Appendix S8. Group Care. ■

References

1 de Bernis L, Sherratt DR, AbouZahr C, Van Lerberghe W. Skilled attendants for pregnancy, childbirth and postnatal care. *Br Med Bull* 2003;67:39–57.
2 United Nations. Official list of MDG indicators [Internet]. United Nations; 2008. [http://mdgs.un.org/unsd/mdg/Host.aspx?Content=indicators/officiallist.htm] Accessed 2 February 2015.
3 Kassebaum NJ, Bertozzi-Villa A, Coggeshall MS, Shackelford KA, Steiner C, Heuton KR, et al. Global, regional, and national levels and causes of maternal mortality during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2014;384(9947):980–1004.
4 WHO, UNICEF, UNFPA, World Bank, UNDP. *Trends in Maternal Mortality: 1990 to 2013*. Geneva: WHO, 2014.
5 You D, Hug L, Chen Y. *Levels & Trends in Child Mortality: Report 2014*. New York: UNICEF; 2014.
6 Requejo J, Bryce J, Victora C. *Countdown to 2015: Fulfilling the Health Agenda for Women and Children*. Geneva: World Health Organization; 2014.
7 Open Working Group of the General Assembly on Sustainable Development Goals. Open Working Group proposal for Sustainable Development Goals. UN, 2014 Contract No.: A/68/970.
8 Countdown to 2015. Countdown to 2015: Maternal, Newborn & Child Survival 2015 [www.countdown2015mnch.org/]. Accessed 2 February 2015.
9 ICF International. DHS Survey Indicators – Maternal and Child Health 2015. [http://dhsprogram.com/data/DHS-Survey-Indicators-Maternal-and-Child-Health.cfm]. Accessed 2 February 2015.
10 UNICEF. *Progress for Children: Achieving the MDGs with Equity*. New York: UNICEF, 2010.
11 WHO. *Every Newborn: An Action Plan To End Preventable Deaths*. Geneva: WHO, 2014.
12 Warren CK, Kivunga J, Mdawida B, Ndwiga C, McCarthy K, Blanc A. *Validating the Indicators of the Quality of Maternal Health Care, Final Report: Kenya*. Nairobi: Population Council, 2014.
13 WHO. *World Health Statistics 2014*. Geneva: WHO, 2014.
14 Villar J, Bergsjo P. *WHO Antenatal Care Randomized Trial: Manual for the Implementation of the New Model*. Geneva: WHO, 2002.
15 Berdichevsky KD-O, McCarthy K, Blanc A. *Validating Indicators of the Quality of Maternal Health Care: Final Report, Mexico*. Mexico City: Population Council, 2014.
16 Hodgins S, D'Agostino A. The quality-coverage gap in antenatal care: toward better measurement of effective coverage. *Glob Health Sci Pract* 2014;2:173–81.
17 WHO. *WHO Recommendations on Postnatal Care of the Mother and Newborn*. Geneva: WHO, 2013.
18 Lincetto O, Mothebesoane-Anoh S, Gomez P, Munjanja S. Postnatal Care. In: Lawn J, Kerber K editors. *Opportunities for Africa's Newborns*. Cape Town: WHO, 2006.
19 Powell-Jackson TM, Tiwari S, Neupane BD, Costello AM. The experiences of districts in implementing a national incentive programme to promote safe delivery in Nepal. *BMC Health Services Res* 2009;9:97.
20 Tanahashi T. Health service coverage and its evaluation. *Bull World Health Organ* 1978;56:295–303.
21 Ethiopia Federal Ministry of Health. *Health Sector Development Programme-IV*. Addis Ababa: Federal Ministry of Health, 2011.
22 Caglia J, Kearns A, Langer A. *Health Extension Workers in Ethiopia: Delivering Community-based Antenatal and Postnatal Care*. Boston, MA: Maternal Health Task Force, 2014.
23 Kearns A, Onda S, Caglia J, Tuncalp O, Langer A. *Postnatal Care in Nepal: Components of Care, Implementation Challenges, and Success Factors*. Boston, MA: Maternal Health Task Force, 2014.
24 Khadka N. Increasing access to quality postnatal care: findings from PNC project in Nepal. *MotherNewBorNews* 2005;1:4.
25 Zhu N, Allen E, Kearns A, Caglia J, Atun R. *Lady Health Workers in Pakistan: Improving Access to Health Care for Rural Women and Families*. Boston, MA: Maternal Health Task Force, 2014.
26 WHO Regional Office of the Eastern Mediterranean. Pakistan: Health service delivery Islamabad: WHO Regional Office of the Eastern Mediterranean 2014. [www.emro.who.int/pak/programmes/service-delivery-lady-health-workers.html]. Accessed 25 February 2015.
27 Peers for Progress. *Program Spotlight: Pakistan's Lady Health Workers: A National Model for Delivering Primary Healthcare and Peer Support*. Chapel Hill, NC: Peers for Progress, 2013.

© 2015 The Authors. *BJOG An International Journal of Obstetrics and Gynaecology* published by John Wiley & Sons Ltd on behalf of Royal College of Obstetricians and Gynaecologists.

28 Kearns A, Hurst T, Caglia J, Langer A. *Focused Antenatal Care in Tanzania: Delivering Individualised, Targeted, High-quality Care*. Boston, MA: Maternal Health Task Force, 2014.

29 Tanzania National Bureau of Statistics, Macro International. *Tanzania Service Provision Assessment Survey 2006*. Dar es Salaam, Tanzania: National Bureau of Statistics, 2007.

30 WHO African Region: United Republic of Tanzania statistics summary (2002 – present) [Internet]. World Health Organization. 2012. [http://apps.who.int/gho/data/?theme=country&vid=20700]. Accessed 19 March 2014.

31 ten Hoope-Bender P, Kearns A, Caglia J, Langer A. *The Manoshi Project: Bringing Quality Maternity Care to Poor Women in Urban Bangladesh*. Boston, MA: Maternal Health Task Force, 2014.

32 Maine D, Akalin M, Ward V, Kamara A. *The Design and Evaluation of Maternal Mortality Programs*. New York: Center for Population and Family Health – Columbia University, 1997.

33 Alam N, Begum D, Ahmed S, Streatfield P. *Manoshi Community Health Solutions in Bangladesh: Impact Evaluation Surveys in Dhaka Urban Slums 2007, 2009, and 2011*. Dhaka: ICDDR, B, 2011.

34 Jacaranda Health. Jacaranda Health [updated 2014]. [jacarandahealth.org]. Accessed 27 March 2014.

35 Kearns A, Onda S, ten H-BP, Tuncalp O, Caglia J, Langer A. *Jacaranda Health: A Model for Sustainable Affordable High-quality Maternal Care for Nairobi's Low-income Women*. Boston, MA: Maternal Health Task Force, 2014.

36 Muigai F. Jacaranda Health: Next Steps in Maternal Health, 2013.

37 Lubic R, Randolph L. Interview with Kearns, A. Washington, DC: February 11, 2014.

38 Kearns A, ten H-BP, Tuncalp O, Caglia J, Langer A. *The Developing Families Center: Providing Maternal and Child Care to Low-income Families in Washington, D.C*. Boston, MA: Maternal Health Task Force, 2014.

39 ten Hoope-Bender P, Kearns A, Caglia J, Tuncalp O, Langer A. *Group Care: Alternative Models of Care Delivery to Increase Women's Access, Engagement, and Satisfaction*. Boston, MA: Maternal Health Task Force, 2014.

40 Simkhada B, van TE, Porter M, Simkhada P. Major problems and key issues in Maternal Health in Nepal. *Kathmandu Univ Med J (KUMJ)* 2006;4:258–63.

41 Tripathy P, Nair N, Barnett S, Mahapatra R, Borghi J, Rath S, et al. Effect of a participatory intervention with women's groups on birth outcomes and maternal depression in Jharkhand and Orissa, India: a cluster-randomised controlled trial. *Lancet* 2010;375:1182–92.

42 Teate A, Leap N, Homer CS. Midwives' experiences of becoming CenteringPregnancy facilitators: a pilot study in Sydney. *Australia. Women Birth* 2013;26:e31–6.

43 Ickovics JR, Kershaw TS, Westdahl C, Magriples U, Massey Z, Reynolds H, et al. Group prenatal care and perinatal outcomes: a randomized controlled trial. *Obstet Gynecol* 2007;110:330–9.

44 Msuya SE, Mbizvo EM, Hussain A, Uriyo J, Sam NE, Stray-Pedersen B. Low male partner participation in antenatal HIV counselling and testing in northern Tanzania: implications for preventive programs. *AIDS Care* 2008;20:700–9.

45 Tanzania Ministry of Health and Social Welfare. *The National Road Map Strategic Plan to Accelerate Reduction of Maternal, Newborn and Child Deaths in Tanzania 2008–2015*. Dar es Salaam: Ministry of Health and Social Welfare, 2008.

46 Koblinsky M, Tain F, Gaym A, Karim A, Carnell M, Tesfaye S. Responding to the maternal health care challenge: the Ethiopian Health Extension Program. *Ethiop J Health Dev* 2010;24(S1):105–9.

47 Global Health Workforce Alliance. *Country Case Study: Pakistan's Lady Health Worker Program*. Geneva: WHO, 2008.

48 Pradhan YV, Upreti SR, Kc NP, Thapa K, Shrestha PR, Shedain PR, et al. Fitting Community Based Newborn Care Package into the health systems of Nepal. *J Nepal Health Res Council* 2011;9:119–28.

49 Pradhan A, Barnett S. *An Assessment of the Impact of the Aama Programme: Changes in the Utilisation of Emergency Obstetric Care (EOC) Services*. New York: UNFPA, 2010.

50 Pearson N. Interview with Kearns, A. Boston, MA: 19 Feb 2014.

51 von Both C, Flessa S, Makuwani A, Mpembeni R, Jahn A. How much time do health services spend on antenatal care? Implications for the introduction of the focused antenatal care model in Tanzania. *BMC Pregnancy Childbirth* 2006;6:22.

52 Pearson N. *W&HI Lecture Series: Designing Patient-centered Maternity Services in Kenya*. Boston, MA: Harvard School of Public Health; 2014.

53 Afsana K, Bhuiya A, Koblinsky M, Nasreen H, Ahmed SM, Ali A, et al. *A Programme for Improving Maternal, Neonatal and Child Health in the Urban Slums of Bangladesh*. Dhaka: ICDDR,B and BRAC, 2009 Contract No.: 1.

54 Conway S, Surka S, Campbell J. *A Connected Health Workforce: An Innovation Brief*. Barcelona: ICS Integrare, 2015.

55 Oxford Policy Management. *Lady Health Worker Programme: External Evaluation of the National Programme for Family Planning and Primary Health Care – Summary of Results*. Oxford, UK: Oxford Policy Management, 2009.

56 Gupta I, Joe W, Rudra S. *Demand Side Financing in Health: How Far Can it Address the Issue of Low Utilization in Developing Countries?*. Geneva: WHO, 2010.

57 Stoermer M, Fuerst F, Rijal K, Bhandari R, Nogier C, Gautam G, et al. *Review of Community-based Health Insurance Initiatives in Nepal*. Sanepa, Nepal: Health Sector Support Programme, Department of Health Services, 2012.

58 Adhikari S. *An Evaluation of Nepal's Free Health Care Schemes: Evidence from a Quasi-Experimental Design*. Kathmandu: Social Science Research Network, 2013.

59 Upreti S, Baral S, Tiwari S, Elsey H, Aryal S, Tandan M, et al. *Rapid Assessment of the Demand Side Financing Schemes: AAMA Programme and 4ANC. Kathmandu: Ministry of Health and Population*. Nepal: Health Sector Support Programme; HERD, 2012.

60 Ministry of Health and Social Welfare. *The National Road Map Strategic Plan To Accelerate Reduction of Maternal, Newborn and Child Deaths in Tanzania 2008–2015*. Tanzania: Ministry of Health and Social Welfare, 2008.

61 Omer K, Mhatre S, Ansari N, Laucirica J, Andersson N. Evidence-based training of frontline health workers for door-to-door health promotion: a pilot randomized controlled cluster trial with Lady Health Workers in Sindh Province. *Pakistan. Patient Educ Couns* 2008;72:178–85.

62 Tulenko K, Mogedal S, Afzal MM, Frymus D, Oshin A, Pate M, et al. Community health workers for universal health-care coverage: from fragmentation to synergy. *Bull World Health Organ* 2013;91:847–52.

© 2015 The Authors. *BJOG An International Journal of Obstetrics and Gynaecology* published by John Wiley & Sons Ltd on behalf of Royal College of Obstetricians and Gynaecologists.