Antenatal care

Authors: Kaur G, Ahmed S, Watkins D, Coates MM, Økland JM, Haaland ØA, Johansson KA

Date: 2.11.2021

Date updated: 29.11.2021

Description of condition and intervention

Antenatal care is an important facet for ensuring a positive pregnancy experience for women and their unborn children. Components of antenatal care propagate about the healthy behaviours, provide interventions targeting good health for the mother and the baby. The World Health Organization recommends at least four antenatal visits during the pregnancy. Comprehensive guidelines provided by WHO gives evidence-informed recommendations on the routine antenatal care. These guidelines are relevant to all the pregnant women in any healthcare or community (WHO 2021).

Specific interventions included as part of antenatal care are preeclampsia screening, screening for various conditions like diabetes, HIV/syphilis, opportunistic detection and treatment of bacteriuria, tetanus/diphtheria immunization and detection of growth restricted fetuses and fetal anomalies (WHO 2021). We assess the effects and costs of the following interventions as part of antenatal care in this evidence brief.

1. *Preeclampsia screening*
2. *Screening of diabetes during pregnancy*
3. *HIV/syphilis screening pregnant women*
4. *Opportunistic detection & treatment of bacteriuria*
5. *Tetanus/Diphtheria (TD) immunization, pregnancy*
6. *Detection of growth restricted fetuses and fetal anomalies*

International guidelines

Organization	Indications/recommendations	Applicability in LIC & Lower MIC settings
World Health Organization 2016	Recommendations on Antenatal Care for a Positive Pregnancy Experience.	Yes

Intervention attributes

Type of interventions & Delivery platform

Table 1: Type of interventions & delivery platform

Intervention	Type	Delivery platform
1. Preeclampsia screening - Blood pressure measurement - Testing for proteinuria	Diagnostic	Health centre
2. Screening of diabetes during pregnancy	Diagnostic	Health centre
3. HIV/syphilis screening pregnant women	Diagnostic	Community
4. Opportunistic detection & treatment of bacteriuria	Diagnostic	Health centre
5. Tetanus/Diphtheria (TD) immunization, pregnancy	Preventive	Health centre
6. Detection of growth restricted fetuses and fetal anomalies	Diagnostic	First-level hospital

Equity

In addition to considerations like cost-effectiveness and health systems factors, dimensions of equity can be relevant for priority setting. The opportunity for a long and healthy life varies according to the severity of a health condition that individuals might have, so there are inequities in individuals' opportunities for long and healthy lives based on the health conditions they face. Metrics used to estimate the severity of illness at an individual level can be used to help prioritize those with less opportunity for lifetime health. FairChoices: DCP Analytics Tool uses Health adjusted age of death (HAAD), which is a metric that estimates the

number of years lived from birth to death, discounting years lived with disability. A high HAAD thus represents a disease less severe in terms of lifetime health loss, while a low HAAD represents a disease that is severe on average, causing early death or a long period of severe disability. It is also possible to estimate the distribution of HAAD across individuals with a health condition. FairChoices shows for each intervention an average HAAD value of the conditions that are affected by respective interventions that have health effects. Additionally, a plot shows HAAD values for around 290 conditions (Johansson KA et al 2020).

Time dependence
Moderate level of urgency. Treatment outcomes not highly affected by some days of delay.

Population in need of interventions
Table 2: Population in need of interventions

Intervention	Treated population		Affected population		Disease state addressed
	Treated age	Treated fraction	Affected age	Affected fraction	
1. Preeclampsia screening • Blood pressure measurement • Testing for proteinuria	15 to 49 years; pregnant female	1	No effects		
2. Screening of diabetes during pregnancy	15 to 49 years; pregnant female	1	No effects considered for diagnostic intervention		
3.HIV/syphilis screening pregnant women	15 to 49 years; pregnant female	0.05			
4. Opportunistic detection & treatment of bacteriuria	15 to 49 years; female; incidence based	1	15 to 49 years	1	Urinary tract infection and interstitial nephritis
5.Tetanus/Diphtheria (TD) immunization, pregnancy	15 to 49 years; female;	1	15 to 49 years	1	Tetanus

	incidence based		0 to 0 years	
6. Detection of growth restricted fetuses and fetal anomalies	15 to 49 years; female; incidence based	1	No effects considered for diagnostic intervention	Neonatal preterm birth

Intervention effect and safety

Table 3: Effect and safety of interventions for antenatal care

Effect of intervention		Certainty of evidence
Mortality reduction (due to condition) Opportunistic detection & treatment of bacteriuria	0.92 reduction (assumed)	See appendix
Tetanus/Diphtheria (TD) immunization, pregnancy Pregnant mothers	0.94 (Source: One Health tool)	
Neonates (0 to 0 year)	0.94 (assumed same benefit as in pregnant mothers)	

Model assumptions

Table 2: Summary of model parameters and values used in FairChoices – DCP Analytical Tool

Category	Model parameter	Notes
Interventions	Preeclampsia screening Screening of diabetes during pregnancy HIV/syphilis screening pregnant women Detection of growth restricted fetuses and fetal anomalies Opportunistic detection & treatment of bacteriuria Tetanus/Diphteria (TD) immunization, pregnancy	

Cost parameters		
Treated population	See Table 2	Global Burden of Disease Study 2019
Gender		
Age		
Treated fraction		
Effect parameters		
Affected population	Those with condition	
Affected gender	See Table 2	
Affected fraction age		
Affected fraction		
Comparison	No intervention	
Mortality Reduction (RRR) Opportunistic detection & treatment of bacteriuria	0.92	
Tetanus/Diphtheria (TD) immunization, pregnancy Pregnant mothers Neonates (0 to 0 year)	0.94 0.94	

Intervention cost

We used the cost of community screening for hypertension, 1.00 USD per person screened in South Africa in 2012 (NCD Countdown), as a proxy for the cost of preeclampsia screening during pregnancy. The cost for screening for diabetes during pregnancy is estimated to be 6.59 USD in 2011 in India (Marseille E, Lohse N, Jiwani A, et al). The cost for HIV screening pregnant women is estimated to be 9.36 USD per person-year in a specified population in 2011 in Swaziland using the cost for provider-initiated HIV testing as a proxy (Obure CD et al 2012). The cost for syphilis screening per woman tested is estimated to be 0.53 USD in 2014 in low-income countries (LIC) (Guttmacher report 2014). To determine the cost of treating bacteriuria, we used the cost of managing UTI (0.51 USD per case in 2014 in LIC) as a proxy. The cost for Tetanus/Diphtheria (TD) immunization, pregnancy is estimated to be 0.0165 USD per woman

immunized in 2020 for all countries (UNICEF estimates). The cost for the TD vaccination was calculated based on the cost of the ten-dose DT formulation/10. The cost for detecting growth-restricted fetuses and fetal anomalies is estimated to be 5. the cost for IUGR detection and management is estimated to be 315.76 USD per affected live birth in 2008 in Nigeria. We are using the cost for care for very low birth weight (VLBW) neonates as a proxy until we can identify closer estimates for IUGR management.

References

WHO 2021: WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience. Geneva: World Health Organization; 2016. PMID: 28079998.

Johansson KA et al 2020: Johansson KA, Coates MM, Økland JM, Tsuchiya A, Bukhman G, Norheim OF, Haaland Ø. Health by disease categories. Distributional Cost-Effectiveness Analysis: Quantifying Health Equity Impacts and Trade-Offs. 2020 Sep 30:105.

OneHealth Tool: OneHealth Tool. Geneva: World Health Organization; 2021. Available from https://www.who.int/tools/onehealth (accessed on 25-October-2021) One Health Tool

NCD Countdown

Marseille E, Lohse N, Jiwani A, et al. The cost-effectiveness of gestational diabetes screening including prevention of type 2 diabetes: application of a new model in India and Israel. J Matern Fetal Neonatal Med. 2013;26(8):802-810. doi:10.3109/14767058.2013.765845

Obure CD et al 2012: Obure CD, Vassall A, Michaels C, Terris-Prestholt F, Mayhew S, Stackpool-Moore L, Warren C; Integra research team, Watts C. Optimising the cost and delivery of HIV counselling and testing services in Kenya and Swaziland. Sex Transm Infect. 2012 Nov;88(7):498-503. doi: 10.1136/sextrans-2012-050544. Epub 2012 Aug 2. PMID: 22859498; PMCID: PMC3595498.

Guttmacher report 2014: Table 8, Appendix Guttmacher report 2014: Darroch JE, Sully E, Biddlecom A. Adding it up: investing in contraception and maternal and newborn health, 2017—supplementary tables. New York, NY: The Guttmacher Institute. 2017.

UNICEF estimates:
https://public.tableau.com/app/profile/supply.division/viz/UNICEFPricedataoverviewforvaccines/Fulldashboard

Tongo OO, Orimadegun AE, Ajayi SO, Akinyinka OO. The economic burden of preterm/very low birth weight care in Nigeria. J Trop Pediatr. 2009 Aug;55(4):262-4. doi: 10.1093/tropej/fmn107. Epub 2008 Dec 9. PMID: 19066170.

Appendix

Literature Review for effectiveness & safety

This literature search is an example of Level 1 search for intervention inputs taken from DCP3 or generated in an ad hoc manner (e.g., quick google search found one study of cervical cancer screening cost-effectiveness that was used to create an effectiveness parameter for that intervention).

Level of evidence of efficacy studies:

1. low (expert opinions, case series, reports, low-quality case control studies)

2. moderate (high quality case control studies, low quality cohort studies)

3. high (high quality cohort studies, individual RCTs)

4. very high (multiple RCTs, meta-analysis, systematic review, clinical practice guidelines)