Achieving SDG 3: Postnatal Care in Reducing Infant Mortality

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POLI 170A
28 July 2022

In 2020, 2.4 million infants died within their first month of birth. Building on case studies about postnatal care, this study will explore whether countries with higher proportions of infants with access to postnatal care have decreased infant mortality rates. From a public health perspective, it certainly seems like increased access to postnatal care can lead to the early discovery of adverse neonatal health outcomes. Using data from the World Bank and UNICEF, I hypothesize that countries with higher percentages of access to postnatal care will have decreased infant mortality rates. Controlling for country GDP per capita, I find that a one-unit increase in postnatal care national percentage is associated with a 0.407 unit decrease in infant mortality, per 1000 births at the 95% significance level. Given this connection, governments and INGOs should explore how postnatal care access can be implemented to address high levels of infant mortality, especially in developing countries.

Question

In 2020, 2.4 million children died during the neonatal period, which is the first 28 days after birth ("Newborn Care"). Although neonatal mortality has been slowly decreasing over the years, even one preventable death of a child is significant. To address the high levels of neonatal mortality, the United Nations set Target 3.2 of the Sustainable Development Goals to be: "By 2030, end preventable deaths of newborns… with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births" ("SDG Indicators"). As the global rate in 2020 was 17 deaths per 1000 births, it seems like we are on the right track towards meeting this goal. However, as seen in Figure 1, this global statistic masks the current health inequalities around the world where some countries may have low levels of infant mortality but many still have extremely high levels of infant mortality. From the figure, many countries in Africa and South Asia average around 25 to over 35 deaths per 1000 live births. As an intervention to address this issue, the World Health Organization suggests increasing access to postnatal care so that infants can receive care within 24 hours of birth and receive another 3 visits before 6 weeks of birth ("Newborn Care"). Despite these recommendations, research has found that only about 66 percent of infants receive the totality of these visits in 2021, which may be a reason why neonatal mortality is still so high in many countries ("Newborn Care"). As postnatal care seems to be a possible healthcare intervention to address high rates of neonatal recovery, this study will ask whether countries with higher percentages of infants with access to postnatal care have decreased infant mortality rates.

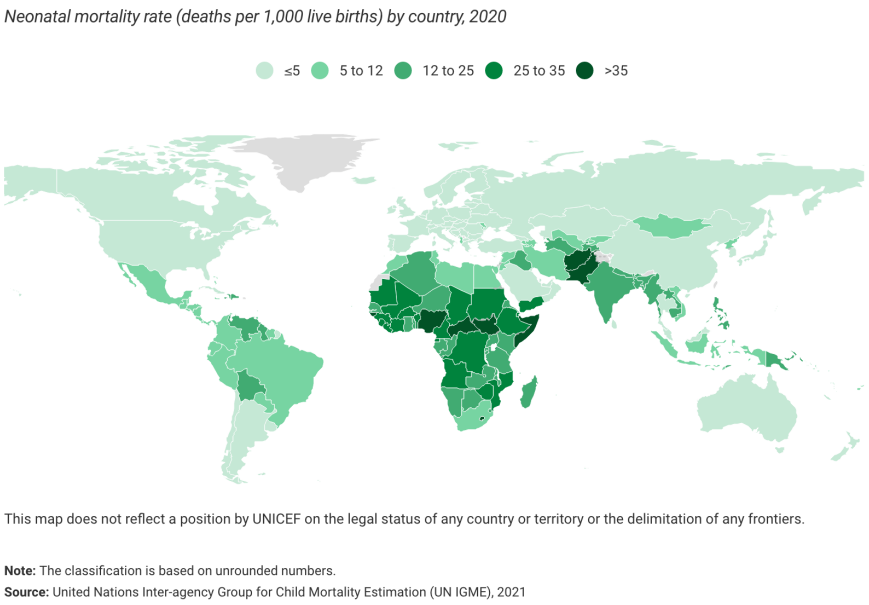

Figure 1: Map of Neonatal Mortality Rate (data.unicef.org/topic/child-survival/neonatal-mortality/#status)

Answer

According to UNICEF, most causes of neonatal mortality are preventable, so from a public health perspective, increased access to postnatal care can lead to early detection of symptoms that the infant's life is in danger ("Newborn Care"). Postnatal care could also be beneficial for informing new mothers about how to care for their child's health. Several case studies from literature reviews reflect this sentiment as many have found a connection between increased access to postnatal care and lower infant mortality rates. For example, community-based postnatal care interventions implemented in Bangladesh found a two-third reduction in infant mortality for infants who received a neonatal visit within 24 hours of birth compared to infants who never received postnatal care (Baqui et al). Other researchers have cited other factors along with postnatal care as necessary for addressing neonatal mortality. Bancalari et al. who conducted a qualitative study on attitudes towards postnatal care in Chiapas, Mexico cited low health literacy, lack of community health workers, and structural barriers to postnatal

care as other factors to consider when implementing these interventions. Lastly, researchers, Baird et al, found a strong, negative, correlation between GDP per capita and infant mortality (Baird, 2011, 847). They found that approximately 30 percent of deaths in poor countries occur in children under five. Comparatively, only one percent of deaths in wealthier countries are attributed to children under five (847). With these previous studies and possible confounders in mind, I hypothesize that countries with higher percentages of access to postnatal care will have decreased infant mortality rates. However, it is unclear if it is a causal relationship as wealthier countries tend to have better health infrastructure that can lead to positive neonatal outcomes.

Data & Methods

My unit of analysis was on each country and I decided to focus on 2019 data because it contains the most recent information from before the COVID-19 pandemic, which has the potential to skew the data. To test this hypothesis, I drew data from UNICEF's maternal and newborn health coverage dataset to find information about the independent variable: the national percentage of newborns with access to at least one postnatal care visit in 2019. This dataset included information from around 20 countries. For the dependent variable, infant mortality rate per 1000 births in 2019, I drew data from the World Bank's World Development Indicators, which contained information from around 217 countries. Lastly, I chose GDP per capita in 2019 as my confounding variable because there may be a higher connection between the wealth of a country and its infant mortality outcomes because in general, wealthier countries have better health infrastructure and people in wealthier countries generally can afford better healthcare.

Findings

After running a multivariate regression, I find that controlling for country GDP per capita, a one-unit increase in postnatal care national percentage is associated with a 0.407 unit decrease in infant mortality, per 1000 births at the 95% significance level. Since the p-value is around 0.05, we can reject the null hypothesis. There is an association between access to postnatal care and infant mortality rate. The adjusted R-squared is 0.5423 which means that 54.23% of the variation in infant mortality rate is explained by variation in access to postnatal care and GDP per capita.

As seen in Figure 4, there is a general, negative relationship between infant mortality rate and access to postnatal care. Countries, such as Somalia, with low proportions of infants with access to care have higher infant mortality rates. Meanwhile, countries with access to postnatal care percentages close to 100 have very low infant mortality rates. The relationship depicted in Figure 4 reflects the conclusion drawn by the hypothesis.

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Call:
lm(formula = mortality.x ~ gdp + national_percentage, data = merged_data_all)

Residuals:
    Min      1Q  Median      3Q     Max
-22.663  -9.484  -1.417   4.952  41.441

Coefficients:
                   Estimate Std. Error t value Pr(>|t|)
(Intercept)        76.732125  12.475654   6.151 1.07e-05 ***
gdp                -0.003989   0.001821  -2.191   0.0427 *
national_percentage -0.407400   0.189869  -2.146   0.0466 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 17.16 on 17 degrees of freedom
  (322 observations deleted due to missingness)
Multiple R-squared:  0.5905,    Adjusted R-squared:  0.5423
F-statistic: 12.26 on 2 and 17 DF,  p-value: 0.0005061
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Figure 2: Regression Summary

	Dependent variable:
	mortality.x
gdp	-0.004**
	(0.002)
national_percentage	-0.407**
	(0.190)
Constant	76.732***
	(12.476)
Observations	20
R^2	0.590
Adjusted R^2	0.542
Residual Std. Error	17.156 (df = 17)
F Statistic	12.257*** (df = 2; 17)
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure 3: Regression Table

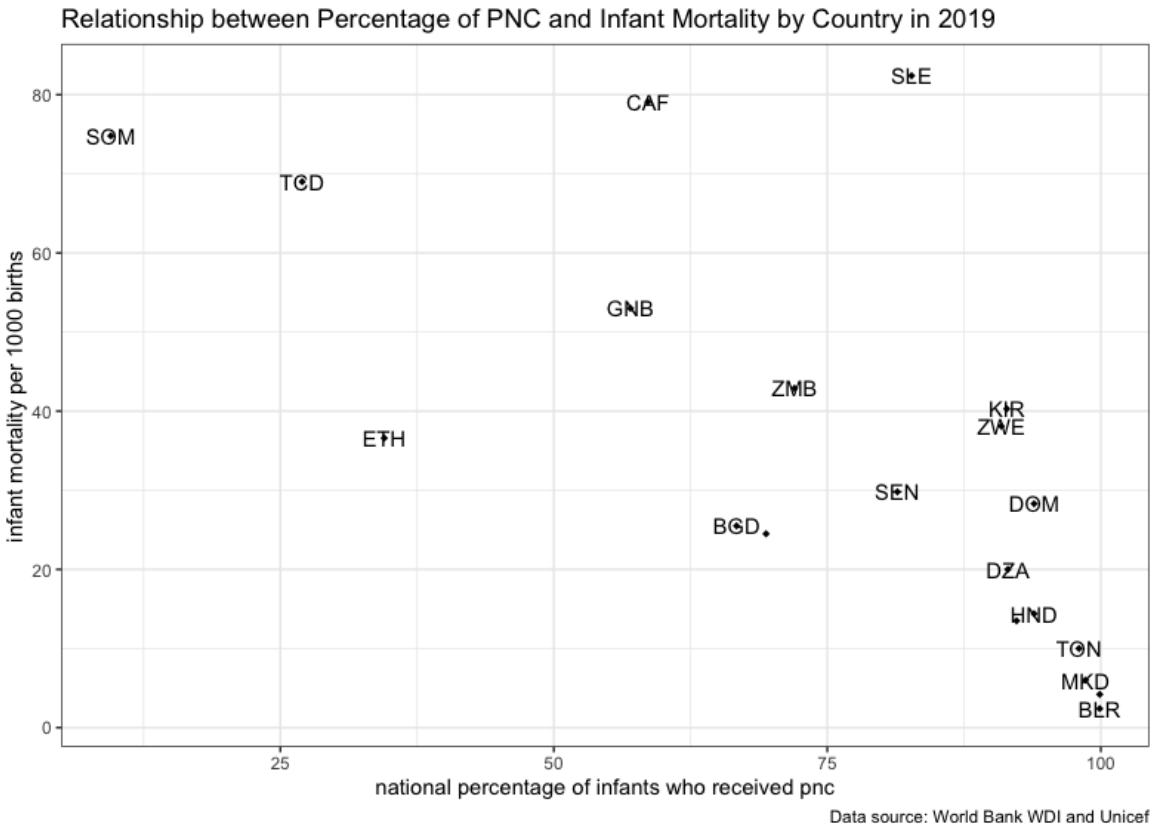

Figure 4: Scatter plot of the relationship between access to postnatal care and infant mortality

Contribution and Improvement

Although the findings of this study returned significant results, it is important to note that the sample size for the regression is very small. The postnatal dataset for 2019 only consists of information from around 20 countries. In comparison, the dataset for infant mortality rates in 2019 consisted of data from 217 countries. Moreover, it is also apparent from the regression that GDP per capita has some explanatory power, though it does not overtake the effects of access to postnatal care. When considering how to implement the results of the study though, it will be imperative to consider how infrastructure and the demographics of people in wealthier countries may be confounding the results.

Beyond the potential issues with the study and the fact that the findings do not prove a causal relationship, the significant results still point to a relationship between access to postnatal care and lower infant mortality rates that governments and INGOs should take note of in order to address high neonatal mortality rates and to fulfill the Sustainable Development Goals. Future studies can explore how postnatal care can be implemented alongside other public health interventions to improve health literacy, increase community health workers, and inform communities about the benefits of postnatal care. As this study only ran a regression on postnatal care outcomes, it would be beneficial to run other regressions on factors such as the number of community health workers, access to antenatal care, etc. to see if there are interventions that may have better statistical outcomes. Lastly, based on the outliers shown in Figure 4, it would be interesting to explore case studies in specific countries and communities. As studies have shown the benefits of community-based interventions, addressing the issue of infant mortality rate does not seem to call for a blanket global solution but for governments and INGOs to work within communities and meet their needs.

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