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| Complete List of Authors: | Triyana, Margaret; Nanyang Technological University, Economics; University of Notre Dame, Kellogg Institute for International Studies<br>Shankar, Anuraj; Harvard School of Public Health, Department of Nutrition |
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# The Effects of Household Conditional Cash Transfer on Coverage and Quality of Prenatal Care: Evidence from Indonesia

Margaret Triyana
Assistant Professor, Department of Economics
Nanyang Technological University
14 Nanyang Drive
Singapore 637332
mtriyana@nd.edu
and
Visiting fellow, Kellogg Institute for International Studies
University of Notre Dame
130 Hesburgh Center
Notre Dame, IN 46556

Anuraj H. Shankar
Senior Research Scientist,
Department of Nutrition
Harvard School of Public Health
655 Huntington Avenue
Building 2, Room 331A
Boston, Massachusetts 02115
ashankar@hsph.harvard.edu

Running title: Conditional cash transfer programme impact on prenatal care

## Abstract

### Objective

The effectiveness of household conditional cash transfer programmes (CCT) to increase the use of healthcare services have been widely documented, but not much is known on the effects of CCTs on quality of care. We analysed the effects of Indonesia's CCT programme on prenatal coverage and quality of prenatal care (PNC).

### Setting

Secondary data analysis was performed using the CCT impact evaluation survey. The CCT was implemented as a cluster randomised control trial in 2007. The impact evaluation survey consisted of information on 6,869 pregnancies and 1,407 midwives in 588 sub-districts in Indonesia.

### Outcome measures

Our main outcomes are PNC coverage reported by women and PNC provider quality reported by midwives. We used principal component analysis to create a prenatal service index for PNC components reported by women and a prenatal quality index for services provided by midwives.

### Results

The CCT was associated with improved PNC service index [0.07 standard deviation (0.002-0.141)]. Women were more likely to receive the following services: weight [OR 1.56 (1.25-1.95)], height [OR 1.41 (1.247 - 1.947)], blood pressure [OR 1.36 (1.045 - 1.761)], and fundal height measurements [OR 1.65 (1.372 - 1.992)], fetal heart beat monitoring [OR 1.29 (1.006 - 1.653)], and external examination [OR 1.28 (1.086 - 1.505)]. Women were also more likely to receive iron pills [OR 1.42 (1.081 - 1.859)] and information on pregnancy complications [OR 2.09 (1.724 - 2.551)]. However, on the supply side, the programme had no significant effect on provider quality.

### Conclusions

The CCT programme improved PNC service coverage received by women, but this change was not associated with improved pregnancy outcomes partly because midwives did not improved PNC quality. The results suggested that enhanced PNC coverage may not be sufficient to improve health outcomes, and steps to improve quality of care are essential for programme impact.


### Strengths and limitations of this study

- This study takes advantage of the cluster randomisation design of the CCT and the longitudinal impact evaluation survey which included near poor and poor households. The findings are therefore representative of the relevant population and may apply to similar policies in other low and middle-income countries.
- Measurement error and recall bias limit the interpretation of the study since women with older children might not accurately recall the services received during pregnancy. However, only information on births in the two years prior to the survey was collected.

## Introduction

Maternal and child health in low and middle-income countries (LMICs) is of global importance; 99% of maternal and neonatal deaths occur in LMICs. [1,2] To address this, LMICs have implemented various interventions to improve maternal and child health, especially among the poor. One widely implemented policy is the household Conditional Cash Transfer (CCT) programme. CCT programmes combine poverty reduction and investments in children's health and education by providing targeted cash transfers to poor households conditional on meeting the program's pre-specified health and education requirements. Poor households usually face the greatest barriers to access to healthcare and education, so CCTs can increase financial resources to such households to reduce inequality.

CCT programmes have been shown to be effective in improving access to healthcare services, but the results are mixed on health outcomes.[3,4] Brazil's CCT programme was associated with lower child mortality.[5] India's CCT programme, which targeted facility-based delivery, reduced neonatal mortality.[6] Mexico's CCT programme improved pregnancy outcomes, including increased birthweight and a four percent decline in the incidence of low birthweight. [7-9] In addition, Mexico's programme was also associated with a 1.1 standard deviation increase in height among children under six months.[10] Colombia's CCT programme was associated with a 16% increase in height-for-age z-score for children under 24 months, but there were no statistically significant effects on children's health status in Nicaragua or Ecuador. [3,11-13]

The Indonesian CCT programme, *Program Keluarga Harapan* (PKH, the Hopeful Family Programme), was piloted as a cluster-randomised controlled trial in 2007. The Government of Indonesia implemented the pilot in response to poverty rates and poor health and educational outcomes among the poor. [14] In 2007, Indonesia's infant mortality was 31 per 1,000 live births and low birthweight rate was nice percent of births. [15,16] One of PKH's goals was to reduce infant mortality and low birthweight. Low birthweight has been shown to adversely affect later outcomes, including mortality, morbidity, and educational outcomes.[17-19] The use of prenatal care (PNC) is one component that can improve pregnancy outcomes, but PNC attendance alone may be insufficient to improve pregnancy outcomes. [20,21] Similar to earlier CCT programmes, PKH improved PNC utilisation, but PKH had no significant effects on pregnancy outcomes.[3,14,22] In spite of this puzzle in the literature, there is limited evidence on the link between increased PNC utilisation and quality of care. [22,23] One potential explanation for the lack of impact on pregnancy outcomes may be due to low PNC quality. Specifically, improvements in utilisation reflected better access to prenatal care, but the quality of care provided by healthcare providers may be suboptimal. Therefore, in this study, we compared the effect of PKH on PNC quality provided by midwives and prenatal clinical coverage received by patients.

## Methods

### *An overview of Program Keluarga Harapan (PKH, the Hopeful Family Programme)*

The household CCT programme, *Program Keluarga Harapan* (PKH, the Hopeful Family Programme), was piloted in the following provinces: Jakarta, West Java, East Java, North Sulawesi, Gorontalo, and East Nusa Tenggara (NTT). Randomisation was done at the sub-district level because many facilities, including health centres, were provided at the sub-district level. [14] In the Indonesian public healthcare system, each sub-district has at least one community health centre, headed by a doctor, and staffed by several nurses and midwives. [24] The cluster design also took into account the possibility of spillover from the treatment. There were 329 sub-districts randomised into treatment and 259 sub-districts randomised into

the control group. Within sub-districts that were randomised into treatment, Statistics Indonesia (*Badan Pusat Statistik*, BPS) used proxy-means test to all poor households to identify extremely poor households with expectant or lactating women, children under five, and school-aged children.

The CCT pilot programme delivered quarterly cash transfers to expectant women and mothers of the enrolled households. The amount that each household received depended on the household composition, with a minimum transfer of 600,000 *Rupiah* (USD 60), and a maximum transfer of 2,200,000 *Rupiah* (USD 220). The transfer amounted to 15 to 20% of estimated total consumption of poor households. Each household received the transfer every quarter so long as they met the programme requirements. The health requirements included: at least four prenatal care visits, delivery assistance from a doctor or midwife, postnatal care, and vaccination. Verification for the pilot programme was conducted by trained facilitators who collected monthly attendance sheets from schools, and patient and service lists from healthcare providers.

***Study design and data source***

A secondary data analysis was performed using pre-existing impact evaluation data. Details of the impact evaluation are published elsewhere.[14] A series of household and provider surveys were conducted to assess the primary outcomes of interest.

The longitudinal household baseline and follow-up surveys included women's pregnancy history in the 24 months prior to the survey. Approximately 96% of households were followed up. All reported pregnancies in both waves of the survey were included in the analysed sample. The pregnancy history included detailed, self-reported information on each pregnancy, including birth weight, delivery assistance, prenatal and postnatal care. Recall bias and measurement error may introduce bias, but the relatively short time window of 24 months should limit the bias.

The provider survey covered practicing community-based midwives since they are the primary skilled attendants at delivery, especially in rural areas.[24,25] Midwives employed by the government are allowed to hold dual practice, which is private practice undertaken by healthcare workers employed in the public sector. Eighty percent of midwives in the survey were engaged in dual practice. Dual practice midwives were asked to self-report the prenatal care services they provided in their public and private practice.

***Variables and covariates***

This study examined prenatal clinical coverage as reported by expectant women and prenatal quality as reported by midwives.

At the patient level, the outcomes of interest were the prenatal clinical service items received by expectant women. Changes in clinical coverage were estimated using a prenatal clinical coverage index, which was constructed using principal component analysis of all prenatal service items. The prenatal care items included the following dichotomous variables: measurements of women's weight, height, blood pressure, fundal height, and fetal heartbeat. In addition, women should also receive a blood test (for syphilis and HIV), external and internal pelvic examinations, 90 iron pills, two tetanus toxoid vaccinations, information on signs of pregnancy complications, and what to do if there were signs of pregnancy complications. The following sociodemographic characteristics were included: indicators for male child and first child (conditional on the pregnancy ending in live birth), mother's

education, mother's age at delivery, log per capita expenditure in 2007 *Rupiah*, and indicators for asset ownership at baseline in 2007.

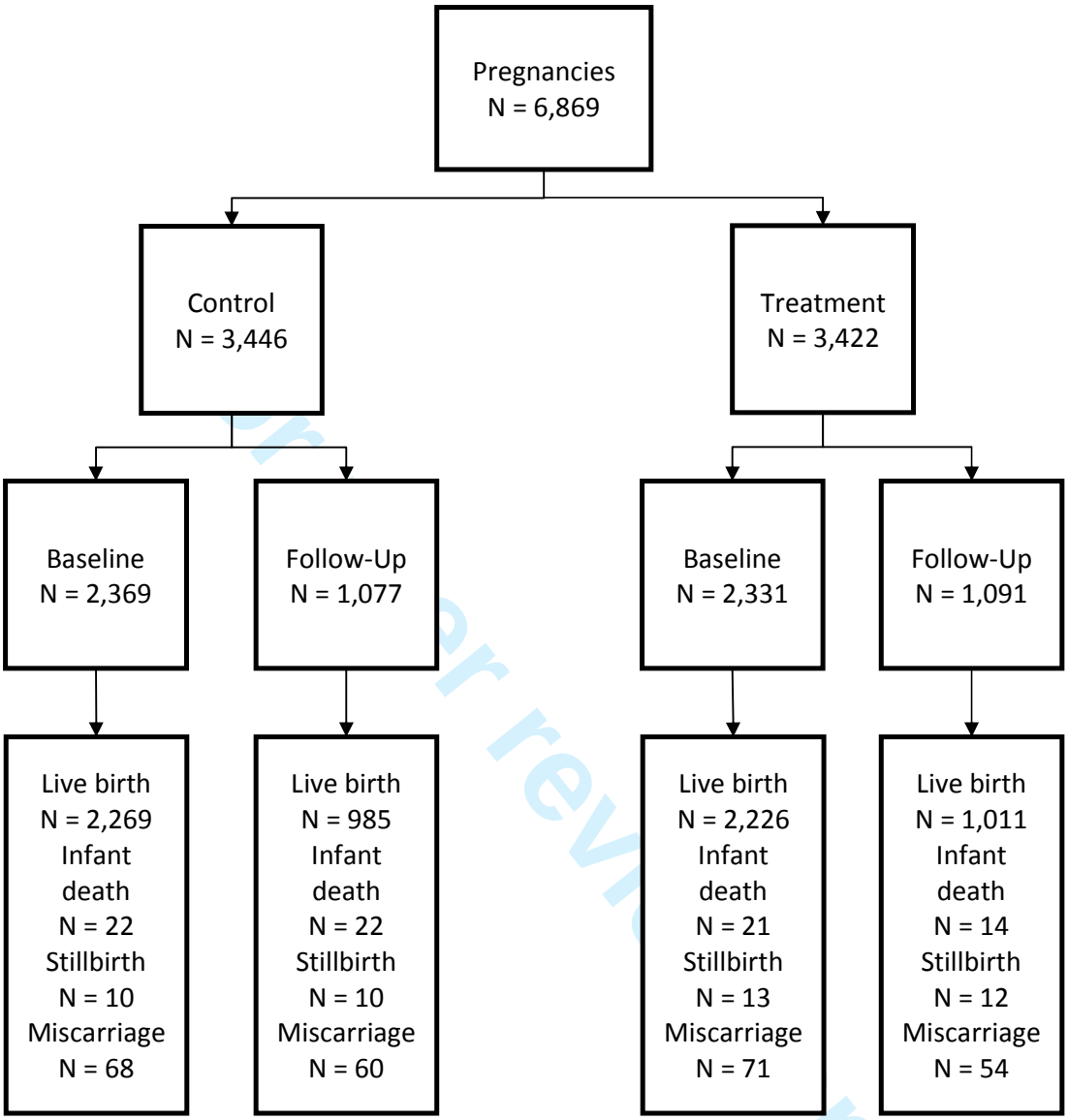
At the provider level, the outcomes of interest were the prenatal visit items provided by midwives in their public and private practice. The prenatal quality index was constructed using principal component analysis based on self-reported prenatal items performed. The prenatal quality items included the following dichotomous variables: the measurements of patient's weight, height, blood pressure, blood test, urine test, internal and external pelvic examinations, fundal height, and fetal heartbeat. Midwives were also asked if they provided iron pills and information on pregnancy complications, nutrition, and the development of a facility-based delivery plan. Midwives were also asked to estimate the average time spent on a prenatal visit in the first trimester.

***Study population***

The CCT impact evaluation survey was conducted in 2,723 villages. Two waves of the survey were carried out in control and treated sub-districts as part of the evaluation series. The baseline round was conducted in 2007 prior to programme implementation and a follow-up survey was conducted in 2009. The surveys included household, village, midwife, and facility surveys.

The household survey includes a survey of ever married women, which was used to estimate the programme's effect on prenatal clinical coverage. The survey contains women's pregnancy history in the 24 months prior to the survey. The baseline survey included pregnancies between June 2005 and August 2007 (the baseline survey was conducted between June and August 2007, before programme fund was disbursed in November 2007). The follow-up survey included pregnancies between October 2007 and December 2009 (the follow-up survey was conducted between October and December 2009). Figure 1 presents the number of pregnancies in the analysis. There were 2,369 pregnancies in the control group and 2,333 pregnancies in the treated group at baseline. There were 1,077 pregnancies in the control group and 1,091 pregnancies in the treated group at follow-up. The follow-up survey separated prenatal care obtained in public and private practice, so we conducted a separate cross-sectional analysis to estimate changes in prenatal clinical coverage in public and private practice. While a longitudinal analysis would be preferred, data availability limited the interpretation of the results. The sub-district randomisation showed that other characteristics at baseline were balanced, thereby suggesting that the cross-sectional analysis would allow us to interpret the estimates causally.

Figure 1. Study population



The midwife survey was used to estimate the programme's effect on the prenatal care quality provided. The quality of prenatal care provided was only asked in the follow-up survey, so the analysis was based on cross-sectional data. We restricted the sample to 1,396 midwives in dual practice to estimate changes in prenatal care quality in their public and private service.

***Statistical analysis***

All statistical analyses were performed using STATA MP 12.0. We exploited the cluster randomisation of Indonesia's CCT pilot programme to estimate the Intent-to-Treat (ITT) effects. We compared respondents in sub-districts that were randomised into treatment to those in the control sub-districts.

At the patient level, we used each prenatal service item as a dichotomous outcome and created a continuous prenatal clinical coverage index using all prenatal care items. The clinical coverage index was created using STATA's built-in command, pca.

At the midwife level, we used each prenatal service item as a dichotomous outcome and created a continuous prenatal care quality index using all prenatal care items. The prenatal care quality index was created using the same built-in command, pca.

We used least squares regressions for all continuous outcome variables. The odds ratio (OR) and 95% confidence interval (CI) for dichotomous outcomes were calculated using logistic regressions. In all our analyses, district fixed effects were included to capture non time-varying district characteristics and all standard errors were clustered at the sub-district level to adjust for the sub-district level of cluster randomisation. Indicators for missing variables were included.

**Results**

***Baseline characteristics***

Table 1 presents women's characteristics at baseline. Baseline characteristics were similar across treatment and control groups. The majority of women in the sample were under 30 in 2007. Since the programme targeted poor households, the majority indeed had low socio-economic status. About 70% of women in the sample had 6 years of education or less. Per capita total household expenditure was 160,000 *Rupiah* per month (USD 16) at baseline. Land ownership was around 35% and home ownership was 86% in the control group. The low asset ownership and household expenditure were consistent with high poverty rates in the analysed sample. Baseline pregnancy outcomes were similar across the treatment and control groups. About 48% of women delivered a male child, and 22% had their first child in our analysed sample at baseline.

Table 1. Baseline characteristics

| | Treatment N=2,331 | | Control N=2,369 | | Adjusted difference* | |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | 95% CI | |
| Age: | | | | | | |
| <25 | 0.272 | 0.445 | 0.267 | 0.442 | 0.01 | (-1.22,1.23) |
| 26-30 | 0.253 | 0.435 | 0.251 | 0.434 | 0.00 | (-1.67,1.67) |
| 31-35 | 0.241 | 0.428 | 0.243 | 0.429 | 0.00 | (-1.58,1.58) |
| >35 | 0.233 | 0.423 | 0.239 | 0.427 | -0.01 | (-1.27,1.26) |
| Education: | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 years or less | 0.730 | 0.444 | 0.724 | 0.447 | 0.01 | (-0.96,0.98) |
| 6-9 years | 0.191 | 0.393 | 0.202 | 0.401 | -0.01 | (-0.51,0.48) |
| 9 years or more | 0.079 | 0.270 | 0.074 | 0.262 | 0.00 | (-1.18,1.19) |
| Asset ownership: | | | | | | |
| Land ownership | 0.343 | 0.475 | 0.362 | 0.481 | -0.02 | (-0.44,0.40) |
| Home ownership | 0.882 | 0.323 | 0.864 | 0.343 | 0.02 | (-0.19,0.22) |
| Per capita household expenditure (in 2007 *Rupiah*) † | 164,114 | 89,709 | 164,114 | 89,709 | -6,093 | (-6093,-6093) |
| Child characteristics: | | | | | | |
| Male child | 0.475 | 0.499 | 0.475 | 0.499 | 0.00 | (-1.94,1.94) |
| First child | 0.226 | 0.418 | 0.215 | 0.411 | 0.01 | (-0.84,0.86) |
| Outcome variables: | | | | | | |
| Any prenatal service | 0.744 | 0.436 | 0.736 | 0.441 | 0.01 | (-1.20,1.22) |
| Clinical coverage index | 0.101 | 0.967 | 0.068 | 0.986 | 0.03 | (-0.62,0.68) |
| Prenatal service items: | | | | | | |
| Weight | 0.832 | 0.374 | 0.821 | 0.384 | 0.01 | (-0.81,0.83) |
| Missing observations | 257 | | 289 | | | |
| Height | 0.402 | 0.490 | 0.417 | 0.493 | -0.02 | (-0.52,0.49) |
| Missing observations | 267 | | 299 | | | |
| Blood pressure | 0.836 | 0.370 | 0.831 | 0.375 | 0.00 | (-1.40,1.41) |
| Missing observations | 293 | | 261 | | | |
| Blood test | 0.331 | 0.471 | 0.334 | 0.472 | 0.00 | (-1.79,1.79) |
| Missing observations | 271 | | 304 | | | |
| Fundal height | 0.455 | 0.498 | 0.442 | 0.497 | 0.01 | (-0.99,1.01) |
| Missing observations | 270 | | 304 | | | |
| Fetal heartbeat | 0.760 | 0.427 | 0.736 | 0.441 | 0.02 | (-0.13,0.17) |
| Missing observations | 262 | | 293 | | | |
| Internal examination | 0.201 | 0.401 | 0.202 | 0.402 | 0.00 | (-1.82,1.82) |
| Missing observations | 272 | | 312 | | | |
| External examination | 0.240 | 0.427 | 0.247 | 0.431 | -0.01 | (-1.23,1.22) |
| Missing observations | 314 | | 274 | | | |
| Received >90 iron pills | 0.128 | 0.334 | 0.121 | 0.326 | 0.00 | (-1.38,1.39) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Missing observations | 33 | | 51 | | | |
| Complete tetanus toxoid | 0.582 | 0.493 | 0.576 | 0.494 | 0.01 | (-1.14,1.16) |
| Missing observations | 695 | | 599 | | | |
| Information on signs of pregnancy complications | 0.334 | 0.472 | 0.316 | 0.465 | 0.02 | (-0.45,0.49) |
| Missing observations | 257 | | 286 | | | |
| Told what to do in case of pregnancy complications | 0.311 | 0.463 | 0.287 | 0.452 | 0.02 | (-0.18,0.23) |
| Missing observations | 950 | | 946 | | | |

* Baseline differences adjusted for district fixed effects, clustered at the sub-district level.
† 1 USD was approximately 10,000 *Rupiah*. Real prices and expenditures were obtained based on the Consumer Price Index from Statistics Indonesia.

Prenatal clinical coverage was high at baseline: about 75% of women reported receiving any prenatal care (74.4% in treatment vs. 73.6% control). Women also reported receiving similar clinical coverage (using our quality index, the average was 0.10 in treatment vs. 0.07 control). About 80% of women had their weight measured at least once during pregnancy, 40% had their height measured, 83% had their blood pressure taken, 33% underwent a blood test, 45% had their fundal height measured, and more than 70% had at least one fetal heartbeat examination. Only 20% of women received at least one internal and external pelvic examinations. This low proportion is likely due to the infrastructure of the healthcare facility and cultural norms. About 30% of women reported receiving information on signs of pregnancy complications, and about 30% were also told what to do if there were signs of pregnancy complications. Almost 60% of women reported receiving the complete set of two tetanus toxoid vaccinations during pregnancy. Only 12% of women reported receiving at least 90 iron pills during pregnancy, although about 80% of women received at least iron pills at least once during pregnancy. This large discrepancy suggests poor compliance to prenatal care visits and prenatal iron supplementation. Consequently, compliance to prenatal care visits became part of the CCT programme's requirements.

***Prenatal clinical coverage***

One of the objectives of the CCT programme is to increase healthcare access and utilisation among poor households. The CCT programme has been shown to increase the utilisation of prenatal care by 15%, but it is unclear whether higher utilisation of prenatal care is accompanied by improved coverage of the required prenatal clinic services.[14,22]

Table 2 presents changes in prenatal clinical coverage, which came from women's self-report. Expectant women living in treated communities were more likely to receive the following services during pregnancy: weight measurement (OR 1.56; 95% CI 1.247 to 1.947; p<0.0001), height measurement (OR 1.41; 95% CI 1.164 to 1.700; p<0.0001), blood pressure measurement (OR 1.36; 95% CI 1.045 to 1.761; p = 0.023), fundal height measurement (OR 1.65; 95% CI 1.372 to 1.992; p < 0.0001), fetal heartbeat measurement (OR 1.29; 95% CI

1.006 to 1.653; p = 0.001), external examination (OR 1.28; 95% CI 1.086 to 1.505; p < 0.0001), receiving more than 90 iron pills (OR 1.42; 95% CI 1.081 to 1.859; p < 0.0001). Women were also more likely to receive information on pregnancy complications (OR 2.10 ; 95% CI 1.724 to 2.551; p < 0.0001) and information on what to do if there were signs of complications (OR 1.97 ; 95% CI 1.605 to 2.407; p < 0.0001). There were no statistically significant changes on the probability of receiving a blood test, internal examination, or the probability of receiving two tetanus toxoid vaccinations during pregnancy. For sensitivity, we created an alternative clinical service coverage index that excluded items that were either targeted by the programme or were rarely received by women. When indicators for iron pills, pelvic examinations, and pregnancy complications were excluded, the estimated change in clinical coverage were qualitatively similar. These results suggest that the CCT programme was successful in increasing the prenatal clinical service coverage received by poor households.

Table 2. Changes in prenatal clinical coverage*

| | Pooled | | | Public practice, wave 3 | | | Private practice, wave 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| | N= 6,869 | | p-value | N= 1,378 | | p-value | N= 581 | | p-value |
| Clinical coverage index | 0.072 | (0.002-0.141) | 0.057 | -0.005 | (-0.131 - 0.120) | 0.934 | 0.022 | (-0.113 - 0.158) | 0.745 |
| Prenatal care service: | | | | | | | | | |
| Weight | 1.558 | (1.247 - 1.947) | 0.000 | 0.594 | (0.352 - 1.005) | 0.052 | 1.690 | (0.576 - 4.958) | 0.340 |
| Height | 1.407 | (1.164 - 1.700) | 0.000 | 0.897 | (0.675 - 1.192) | 0.454 | 1.391 | (0.966 - 2.003) | 0.076 |
| Blood pressure | 1.356 | (1.045 - 1.761) | 0.023 | 1.197 | (0.731 - 1.959) | 0.475 | 0.364 | (0.148 - 0.894) | 0.028 |
| Blood test | 1.058 | (0.871 - 1.285) | 0.166 | 0.985 | (0.715 - 1.356) | 0.927 | 0.878 | (0.560 - 1.377) | 0.571 |
| Fundal height | 1.654 | (1.372 - 1.992) | 0.000 | 1.012 | (0.745 - 1.374) | 0.938 | 1.584 | (1.049 - 2.393) | 0.029 |
| Fetal heart beat | 1.290 | (1.006 - 1.653) | 0.001 | 1.104 | (0.722 - 1.688) | 0.647 | 0.828 | (0.425 - 1.611) | 0.578 |
| Internal examination | 0.875 | (0.708 - 1.080) | 0.559 | 0.869 | (0.641 - 1.177) | 0.364 | 1.022 | (0.592 - 1.766) | 0.936 |
| External examination | 1.279 | (1.086 - 1.505) | 0.000 | 0.815 | (0.625 - 1.064) | 0.133 | 1.175 | (0.789 - 1.750) | 0.426 |
| >90 iron pills | 1.418 | (1.081 - 1.859) | 0.000 | 1.055 | (0.721 - 1.542) | 0.439 | 0.769 | (0.404 - 1.465) | 0.659 |
| Tetanus vaccinations | -0.001 | (-0.087 -0.086) | 0.257 | 0.074 | (0.796 - 1.346) | 0.517 | -0.022 | (0.600 - 1.488) | 0.481 |
| Pregnancy complications: | | | | | | | | | |
| Information on signs | 2.097 | (1.724 - 2.551) | 0.000 | 1.119 | (0.842 - 1.488) | 0.796 | 0.907 | (0.588 - 1.399) | 0.807 |
| Told what to do | 1.970 | (1.605 - 2.417) | 0.000 | 1.091 | (0.839 - 1.419) | 0.784 | 0.857 | (0.559 - 1.316) | 0.425 |

* Covariates included were: indicators for male child and first child, mother's education, mother's age, log per capita expenditure and indicators for home and land ownership at baseline. District fixed effects included in all specifications. Confidence intervals in parentheses, clustered at the sub-district level.

Due to the high prevalence of dual practice, we examined the relationship between prenatal clinical service coverage in public and private practice. The estimation was based on cross-sectional data from the follow-up survey. We found that the programme has no statistically significant effect on clinical service coverage in public practice. In addition, women who went to public healthcare service were less likely to have their height measured (OR 0.59; 95% CI 0.352 to 1.005; p=0.052). The CCT programme was associated with some improved service coverage in private practice. In particular, women who chose private practice were more likely to receive height measurement (OR 1.391; 95% CI 0.966 to 2.003; p = 0.076) and fundal height measurement (OR 1.58; 95% CI 1.049 to 2.393; p=0.029).

***Prenatal quality***

Another potential explanation for programme's lack of impact on pregnancy outcomes is that improvements in prenatal clinical service coverage received only reflected better access to prenatal care service at the current standards, but the actual care provided or follow-up actions for better quality of care supplied by healthcare providers may have remained suboptimal. In other words, women from poor households may have limited access to healthcare service prior to the programme. Now that women have healthcare access through the programme, they are able to obtain prenatal care, but midwives may provide suboptimal care. To explore this channel, we compared the changes in the prenatal clinical service coverage received to the reported PNC quality provided by midwives.

Table 3 presents changes in prenatal quality among dual practice midwives. The programme had no statistically significant effect on prenatal quality index in public and private practice. Similarly, the programme had no statistically significant effect on each service provided: weight measurement, height measurement, blood pressure measurement, blood test, fundal height measurement, fetal heart beat measurement, internal and external examination, iron pills. The programme also had no statistically significant effect on the provision of information on signs of pregnancy complications, nutrition, and delivery facility. Midwives reported spending 2 fewer minutes per patient (95% CI -3.332 to 0.263; p=0.094) in their private practice.

Table 3. Changes in prenatal quality*

| | Public practice | | | Private practice | | |
|---|---|---|---|---|---|---|
| | | N = 1,396 | p-value | | N = 1,396 | p-value |
| Quality index | -0.036 | (-0.352 - 0.281) | 0.161 | -0.048 | (-0.344 - 0.247) | 0.150 |
| Service provided: | | | | | | |
| Weight | 1.097 | (0.767 - 1.570) | 0.200 | 0.976 | (0.637 - 1.497) | 0.213 |
| Height | 0.910 | (0.734 - 1.128) | 0.100 | 0.898 | (0.716 - 1.127) | 0.104 |
| Blood pressure | 0.948 | (0.667 - 1.347) | 0.170 | 0.905 | (0.590 - 1.388) | 0.198 |
| Blood test | 1.049 | (0.819 - 1.344) | 0.132 | 0.790 | (0.613 - 1.018) | 0.100 |
| Fundal height | 0.954 | (0.697 - 1.306) | 0.153 | 0.953 | (0.674 - 1.348) | 0.169 |
| Fetal heartbeat | 1.009 | (0.733 - 1.389) | 0.165 | 1.107 | (0.774 - 1.582) | 0.202 |
| Internal examination | 0.959 | (0.702 - 1.310) | 0.153 | 0.980 | (0.718 - 1.340) | 0.156 |
| External examination | 0.835 | (0.653 - 1.067) | 0.105 | 0.875 | (0.686 - 1.115) | 0.109 |
| Iron pills | 1.024 | (0.759 - 1.380) | 0.156 | 1.031 | (0.739 - 1.439) | 0.175 |
| Tetanus toxoid | 0.999 | (0.703 - 1.418) | 0.179 | 0.931 | (0.647 - 1.340) | 0.173 |
| Information on: | | | | | | |
| Signs of complications | 0.925 | (0.693 - 1.234) | 0.136 | 0.947 | (0.686 - 1.308) | 0.156 |
| Nutrition during pregnancy | 0.953 | (0.685 - 1.326) | 0.161 | 0.913 | (0.619 - 1.346) | 0.181 |
| Facility-based delivery | 0.997 | (0.741 - 1.341) | 0.151 | 0.985 | (0.714 - 1.358) | 0.162 |
| Time spent per prenatal visit | -0.253 | (-1.955 - 1.449) | 0.770 | -1.534 | (-3.332 - 0.263) | 0.094 |

* District fixed effects included in all specifications. Confidence intervals in parentheses, clustered at the sub-district level.

**Discussion**

This study compared the prenatal clinical coverage received by patients and the PNC quality rendered by healthcare providers. The results of our study provided further evidence on the effectiveness of social assistance programmes such as CCT programmes to improve health seeking behaviour, including increasing prenatal clinical service coverage received by poor households.[3,4,14] This study also showed that the CCT programme did not increase the quality of prenatal care rendered by healthcare providers. Taken together, the discrepancy in prenatal clinical service coverage reported by women and the PNC quality provided by midwives suggested that the improvements in prenatal care quality experienced by women were likely associated with improved access because of the CCT programme requirements.

Programmes that incentivise patients such as CCT programmes have been shown to increase the number of patients at healthcare facilities, this higher demand for services may burden providers, which in turn may lead to lower quality of care rendered.[14,26] Fortunately, we found no significant evidence of lower quality of care provided in response to the programme. Healthcare providers respond to higher demand on the price dimension in private practice, but healthcare providers did not respond to the programme on the quality dimension.[22] When incentives are only provided to patients, healthcare providers have no incentive to improve the quality of service provided.

The role of dual practice is important in the context of many developing countries, including Indonesia. On the one hand, private practice is associated with supplier-induced demand,[27,28] which tends to be associated with overconsumption of healthcare services. On the other hand, private practice is associated with increased supply of healthcare.[29] The results showed that

the improvement in clinical coverage was seen among patients who sought private practice, which suggests the role of private practice in increasing patients' choice set. However, private practice is also associated with higher prices, which could be a barrier to healthcare access for poor households that are not enrolled in the programme. The interpretation of the result is limited by the cross-sectional analysis of midwives. The lack of longitudinal data did not allow us to capture quality changes over time. Nonetheless, the results suggest that the programme has reduced inequality in access, but there may still be inequality in the quality dimension.[30]

The lack of improvements in the prenatal quality rendered by healthcare providers may explain the missing link between prenatal clinical coverage received by patients and pregnancy outcomes. These results showed the impact of the CCT programme on poor households, which is representative of the relevant population. Therefore, the results may apply to similar policies in other countries. In terms of policy recommendation, combining demand-side programmes with a supply-side intervention to improve quality of care and increase the accountability of healthcare providers could be implemented to improve the effectiveness of health interventions. Programmes that incentivise healthcare workers such as pay-for-performance may improve the quality of service rendered. Further research should be conducted to better understand the link between healthcare access, quality of care, and pregnancy outcomes.

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**Footnotes**
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**Patient consent** Not applicable.

**Ethical approval** This study was a secondary analysis of the deidentified impact evaluation survey, therefore this analysis was considered exempt from approval.

**Provenance and peer review** Not commissioned.

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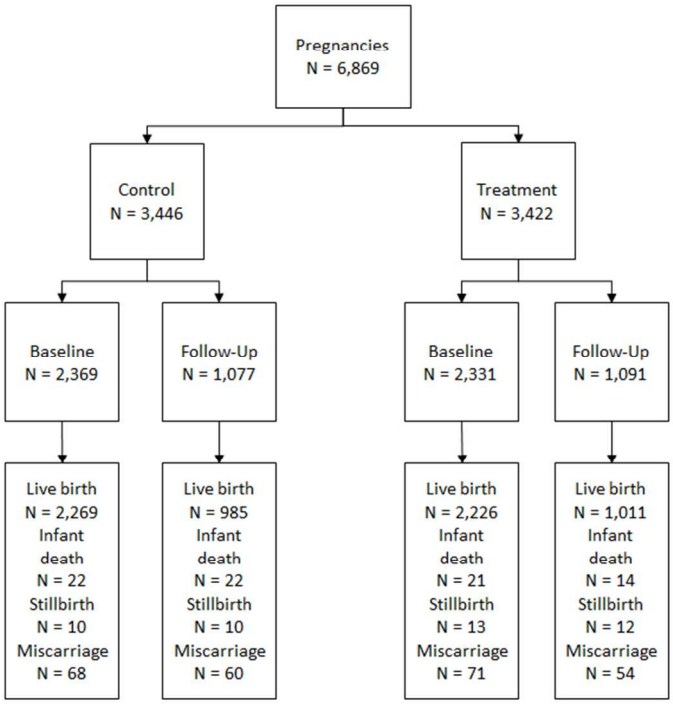


Figure 1. Study Population

71x65mm (300 x 300 DPI)

**STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology***

**Checklist for cohort, case-control, and cross-sectional studies (combined)**

| Section/Topic | Item # | Recommendation | Reported on page # |
|---|---|---|---|
| **Title and abstract** | 1 | (*a*) Indicate the study's design with a commonly used term in the title or the abstract | 1 |
| | | (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found | 2 |
| **Introduction** | | | |
| Background/rationale | 2 | Explain the scientific background and rationale for the investigation being reported | 3 |
| Objectives | 3 | State specific objectives, including any pre-specified hypotheses | 3 |
| **Methods** | | | |
| Study design | 4 | Present key elements of study design early in the paper | 3 |
| Setting | 5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection | 3 |
| Participants | 6 | (*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up<br>*Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls<br>*Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants | 5 |
| | | (*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed<br>*Case-control study*—For matched studies, give matching criteria and the number of controls per case | |
| Variables | 7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable | 4 |
| Data sources/ measurement | 8* | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group | *4* |
| Bias | 9 | Describe any efforts to address potential sources of bias | 4 |
| Study size | 10 | Explain how the study size was arrived at | 6 |
| Quantitative variables | 11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why | 7 |
| Statistical methods | 12 | (*a*) Describe all statistical methods, including those used to control for confounding | 7 |
| | | (*b*) Describe any methods used to examine subgroups and interactions | |
| | | (*c*) Explain how missing data were addressed | 7 |
| | | (*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed<br>*Case-control study*—If applicable, explain how matching of cases and controls was addressed | |

| | | | |
|---|---|---|---|
| | | *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy | |
| | | (*e*) Describe any sensitivity analyses | 10 |
| **Results** | | | |
| Participants | 13* | (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed | 6 |
| | | (b) Give reasons for non-participation at each stage | |
| | | (c) Consider use of a flow diagram | 6 |
| Descriptive data | 14* | (a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders | 7 |
| | | (b) Indicate number of participants with missing data for each variable of interest | 7 |
| | | (c) *Cohort study*—Summarise follow-up time (eg, average and total amount) | |
| Outcome data | 15* | *Cohort study*—Report numbers of outcome events or summary measures over time | 7 |
| | | *Case-control study*—Report numbers in each exposure category, or summary measures of exposure | |
| | | *Cross-sectional study*—Report numbers of outcome events or summary measures | |
| Main results | 16 | (*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included | 11 |
| | | (*b*) Report category boundaries when continuous variables were categorized | |
| | | (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period | |
| Other analyses | 17 | Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses | |
| **Discussion** | | | |
| Key results | 18 | Summarise key results with reference to study objectives | 13 |
| Limitations | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias | 14 |
| Interpretation | 20 | Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence | 14 |
| Generalisability | 21 | Discuss the generalisability (external validity) of the study results | 13 |
| **Other information** | | | |
| Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based | 14 |

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.
**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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# The effects of a household conditional cash transfer programme on coverage and quality of prenatal care: a secondary analysis of Indonesia's pilot programme



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# The effects of a household conditional cash transfer programme on coverage and quality of prenatal care: a secondary analysis of Indonesia's pilot programme

Margaret Triyana
Assistant Professor, Department of Economics
Nanyang Technological University
14 Nanyang Drive
Singapore 637332
mtriyana@nd.edu
and
Visiting fellow, Kellogg Institute for International Studies
University of Notre Dame
130 Hesburgh Center
Notre Dame, IN 46556

Anuraj H. Shankar
Senior Research Scientist,
Department of Nutrition
Harvard School of Public Health
655 Huntington Avenue
Building 2, Room 331A
Boston, Massachusetts 02115
ashankar@hsph.harvard.edu

Running title: Conditional cash transfer programme impact on prenatal care

## Abstract

### Objective

To analyse the effectiveness of a household conditional cash transfer programme (CCT) on prenatal care (PNC) coverage reported by women and PNC quality reported by midwives.

### Design

The CCT was piloted as a cluster randomised control trial in 2007. Intent-to-treat parameters were estimated using linear regression and logistic regression.

### Setting

Secondary analysis of the longitudinal CCT impact evaluation survey, conducted in 2007 and 2009. This included 6,869 pregnancies and 1,407 midwives in 180 control sub-districts and 180 treated sub-districts in Indonesia.

### Outcome measures

PNC component coverage index, a composite measure of each PNC service component as self-reported by women, and PNC provider quality index, a composite measure of PNC service provided as self-reported by midwives. Each index was created by principal component analysis (PCA). Specific PNC component items were also assessed.

### Results

The CCT was associated with improved PNC component coverage index by 0.07 standard deviation (95% CI 0.002-0.141). Women were more likely to receive the following assessments: weight [OR 1.56 (95% CI 1.25-1.95)], height [OR 1.41 (95% CI 1.247 - 1.947)], blood pressure [OR 1.36 (95% CI 1.045 - 1.761)], and fundal height measurements [OR 1.65 (95% CI 1.372 - 1.992)], fetal heart beat monitoring [OR 1.29 (95% CI 1.006 - 1.653)], external pelvic examination [OR 1.28 (95% CI 1.086 - 1.505)], receive iron-folic acid pills [OR 1.42 (95% CI 1.081 - 1.859)], and information on pregnancy complications [OR 2.09 (95% CI 1.724 - 2.551)]. On the supply side, the CCT had no significant effect on the PNC provider quality index based on reports from midwives.

### Conclusions

The CCT programme improved PNC coverage for women, but midwives did not improve PNC quality. The results suggest that enhanced PNC utilisation may not be sufficient to improve health outcomes, and steps to improve PNC quality are essential for programme impact.


### Strengths and limitations of this study

- This study takes advantage of the cluster randomisation of the CCT and the longitudinal impact evaluation survey which included near poor and poor households. The findings are therefore representative of the relevant population and may apply to similar policies in other low and middle-income countries.
- The study goes beyond assessment of simple PNC attendance or quality and accounts for coverage of specific components of PNC and quality as reported by women and midwives.
- Measurement error and recall bias limit the interpretation of the study since women with older children might not accurately recall the services received during pregnancy. However, only information on births in the two years prior to the survey was collected.

## Introduction

Maternal and child health is of global importance, and current data indicates 99% of all maternal and neonatal deaths occur in low and middle-income countries (LMICs). [1,2] To improve maternal and child health, many LMICs have widely implemented household Conditional Cash Transfer (CCT) programmes. CCT programmes provide cash transfers to poor households conditional on meeting pre-specified health and education requirements.

CCT programmes have been shown to improve access to healthcare services, but the results are mixed with respect to health outcomes.[3,4] Benefits were seen for Brazil's CCT programme that led to lower child mortality[5] and for India's CCT programme, which targeted facility-based delivery, and reduced neonatal mortality.[6] Mexico's CCT programme led to a modest increase birthweight and a 4% decline in low birthweight. [7-9] Mexico's programme also led to a 1.1 standard deviation increase in height among children under six months, but with little effect on older children.[10] Colombia's CCT programme was associated with a 16% increase in height-for-age z-score for children under 24 months. In contrast, there were no statistically significant effects on children's health status for programmes in Nicaragua or Ecuador. [3,11-13] These data suggest that factors other than the CCT, such as health provider context or service, may influence the impact of programmes.

The Indonesian CCT programme, *Program Keluarga Harapan* (PKH, the Hopeful Family Programme), was deployed as a cluster-randomised controlled trial in 2007. The Government of Indonesia implemented PKH in response to poor health and educational outcomes among the poor.[14] In 2007, Indonesia's infant mortality was 31 per 1,000 live births and low birthweight was 9%.[15,16] One goal was to reduce infant mortality and low birthweight, as the latter adversely affects subsequent outcomes including mortality, morbidity, and educational outcomes.[17-19] PKH's CCT requirements included: at least four prenatal care (PNC) visits, delivery assistance from a doctor or midwife, postnatal care, and complete vaccination. Initial reports indicated PKH improved PNC attendance, but had no effect on low birthweight.[3,14,20] PNC can improve pregnancy outcomes, but attendance alone may be insufficient.[21,22] It is unclear whether PNC utilisation is accompanied by improved coverage of the recommended PNC service items.[14,20] One potential explanation for the lack of impact on outcomes is low PNC provider quality.[23] There is limited evidence on the link between increased PNC attendance and PNC provider quality.[20,22,24,25,26] This study extends earlier reports by exploring the link between PNC component coverage for specific service items and PNC provider quality of midwives. We therefore add to the current understanding on how CCT programmes affect PNC services as a channel to improve pregnancy outcomes.

## Methods

### *Study design and data source*

A secondary data analysis was performed using pre-existing PKH impact evaluation surveys. PKH was deployed in Jakarta, West Java, East Java, North Sulawesi, Gorontalo, and East Nusa Tenggara. Randomisation was done at the sub-district level as the smallest unit of facility management that would also reduce the risk of spillover to control areas[14]; 329 sub-districts were randomised into treatment and 259 to control. Statistics Indonesia (*Badan Pusat Statistik*) used proxy-means test for all poor households in treatment sub-districts to identify extremely poor households with expectant or lactating women, children under five, and school-aged children (6-18 years).

PKH delivered quarterly cash transfers to expectant women and mothers of the children in enrolled households. Households with pregnant or lactating mothers would receive 1,000,000 *Rupiah* (USD 100) and another 800,000 *Rupiah* (USD 80) if there were children under 6 years. The maximum transfer was 2,200,000 *Rupiah* (USD 220). The amount was 15 to 20% of estimated total monthly consumption of poor households. Verification for compliance was conducted monthly by facilitators who collected patient and service lists from healthcare providers. Households generally received the transfers conditional on meeting at least one requirement.

The PKH impact evaluation survey was conducted in 2,723 villages in 180 randomly selected treatment and 180 control sub-districts. The baseline was conducted between June and August 2007, before implementation in November 2007. The follow-up was conducted between October and December 2009, attrition was 4%. The surveys included near poor and poor households and midwives. Design details are available in the impact evaluation report.[14]

The longitudinal household survey included current pregnancies and deliveries 24 months prior to each survey wave. The baseline included pregnancies and deliveries between June 2005 and August 2007. The follow-up included pregnancies and deliveries between October 2007 and December 2009. Pregnancy history included self-reported information on each pregnancy, including delivery assistance, prenatal, and postnatal care service items. Recall bias and measurement error may have influenced data quality, but the relatively short time window of 24 months would tend to limit overall bias. At follow-up, women were asked if they received PNC in public or private practice.

The accompanying provider survey included practicing community-based midwives since they are the primary skilled delivery attendants, especially in rural areas.[27,28] Four midwives per sub-district were selected. Midwives employed by the government are allowed to hold dual practice- private practice undertaken by healthcare workers employed in the public sector. In our sample, more than 80% of midwives were in dual practice. At follow up, midwives self-reported the PNC service items provided in their public and private practice.

***Variables and covariates***

This study examined women's self-reported PNC coverage of specific service components and midwives' self-reported PNC provider quality based on service components.

At the individual client level, the outcomes of interest were PNC service items received during pregnancy. Changes in PNC component coverage were estimated using a PNC component coverage index, constructed using principal component analysis (PCA) of all prenatal service items. The items included are based on the Indonesian Ministry of Health guidelines.[29] They were the following dichotomous variables: measurement of women's weight, height, blood pressure, fundal height, fetal heartbeat, a blood test (for syphilis and HIV), external and internal pelvic examination, receiving 90 iron-folic acid pills, two tetanus toxoid vaccinations, information on signs of pregnancy complications, and being told what to do if there were signs of pregnancy complications. The survey excluded perception of quality and other social aspects. The following sociodemographic characteristics were also included: indicators for male child and first child (conditional on live birth), mother's education, mother's age at delivery, monthly household expenditure (expressed as log monthly per capita expenditure in 2007 *Rupiah*), and asset ownership at baseline.

At the provider level, the outcomes of interest were PNC service items provided by midwives in their public and private practice. The PNC provider quality index was constructed using PCA based on self-reported prenatal service items performed. The items included the following dichotomous variables: the measurements of woman's weight, height, blood pressure, blood test, urine test, internal and external pelvic examinations, fundal height, and fetal heartbeat, iron pills, information on pregnancy complications, nutrition, and the development of a facility-based delivery plan. Midwives also self-reported the average time spent per prenatal visit in the first trimester.

***Study population***

We estimated the programme's effect on PNC coverage using women's pregnancy history. We includes all reported pregnancies and deliveries at baseline and follow-up. Figure 1 presents the number of pregnancies in the analysis. At baseline, there were 2,369 pregnancies in the control group and 2,333 pregnancies in the treated group. At follow-up, there were 1,077 pregnancies in the control group and 1,091 pregnancies in the treated group.

The midwife survey was used to estimate the programme's effect on PNC provider quality. The PNC provider quality was only asked at follow-up, so the analysis was based on cross-sectional data. The analysis included 1,396 midwives to estimate differences in PNC provider quality in their public and private service.

Figure 1. Study population

***Statistical analysis***

All statistical analyses were performed using STATA MP 12.0. We exploited the cluster randomisation of PKH to estimate the Intent-to-Treat (ITT) parameters. We compared respondents in sub-districts who were randomised into treatment to those in the control sub-districts, adjusting for district-level fixed effects to capture non time-varying district characteristics and clustering all standard errors at the sub-district level to adjust for the sub-district level of cluster randomisation. We used least squares regressions for all continuous outcome variables: PNC component coverage index and PNC provider quality index. The odds ratio (OR) and 95% confidence interval (CI) for dichotomous outcomes were calculated using logistic regressions. The dichotomous items included the list of PNC service items.

At the individual client level, we used each self-reported prenatal service item as a dichotomous outcome and created a continuous PNC component coverage index using all prenatal service items. The PNC component coverage index was created using STATA's built-in command, pca. Socio-demographic characteristics were included as covariates. Bartlett's sphericity test (p-value < 0.001) and KMO index (0.736) indicate the items could be summarized using PCA. The PCA performed on the listed variables resulted in 3 components with eigenvalues greater than 1. We selected the primary component which accounted for 61% of the variance, and the component score for each woman was her PNC component coverage index. For robustness, we generated an alternative PNC component coverage index using STATA's built-in command, tetrachoric, to take into account the dichotomous items. We conducted a separate cross-sectional analysis to estimate differences in prenatal component coverage in public and private practice from the follow-up survey.

At the midwife level, we used each self-reported prenatal service item in public and private practice at follow up. While a longitudinal analysis would be preferred, as mentioned above, the data are only available as a cross-section, and this may limit interpretation of the results. However, the sub-district randomisation showed that other characteristics at baseline were balanced, thereby suggesting the analysis would permit valid inference. We coded each item as a dichotomous outcome and created a continuous PNC provider quality index using all prenatal care items. The PNC provider quality index at the midwife level was created using the same built-in command, pca. Bartlett's sphericity test (p-value < 0.001) and KMO index (0.796) indicate the items could be summarized by PCA. The PCA performed on the listed variables resulted in 2 components with eigenvalues greater than 1. We selected the primary component which accounted for 84% of the variance in public practice and 80% in private practice. For robustness, we also generated an alternative PNC provider quality index using STATA's built-in command, tetrachoric, to take into account the dichotomous items.

## Results

***Baseline characteristics***

Table 1 presents women's characteristics at baseline. Baseline characteristics were similar across treatment and control groups. The majority of women in the sample were under 30 years of age in 2007. Since PKH targeted poor households, the majority were indeed low socio-economic status. About 70% of women in the sample had 6 years of education or less. Per capita total household expenditure was 160,000 *Rupiah* per month (USD 16) at baseline. Land ownership was around 35% and home ownership was 86% in the control group. The low asset ownership and household expenditure were consistent with high poverty rates in the analysed sample. Baseline pregnancy outcomes were similar across the treatment and control

groups. About 48% of women delivered a male child, and 22% had their first child in our analysed sample at baseline.

Table 1. Baseline characteristics*

| | Treatment N= 2,331 | | Control N= 2,369 | | Adjusted difference 95% CI | |
|---|---|---|---|---|---|---|
| Age: | | | | | | |
| <25 | 27.23% | 44.52% | 26.68% | 44.24% | 0.0066 | (-0.0198 - 0.0330) |
| 26-30 | 25.30% | 43.48% | 25.12% | 43.38% | 0.0022 | (-0.0213 - 0.0258) |
| 31-35 | 24.14% | 42.80% | 24.31% | 42.91% | -0.0031 | (-0.0274 - 0.0213) |
| >35 | 23.33% | 42.30% | 23.89% | 42.65% | -0.0058 | (-0.0305 - 0.0190) |
| Education: | | | | | | |
| 6 years or less | 73.02% | 44.40% | 72.40% | 44.71% | 0.0099 | (-0.0188 - 0.0387) |
| 6-9 years | 19.06% | 39.28% | 20.17% | 40.14% | -0.0141 | (-0.0383 - 0.0101) |
| 9 years or more | 7.92% | 27.02% | 7.44% | 26.24% | 0.0042 | (-0.0117 - 0.0201) |
| Asset ownership: | | | | | | |
| Land ownership | 34.35% | 47.50% | 36.22% | 48.07% | -0.0188 | (-0.0486 - 0.0110) |
| Home ownership | 88.16% | 32.31% | 86.41% | 34.28% | 0.0168 | (-0.00341 - 0.0370) |
| Per capita household expenditure† | 158,320 | 89,709 | 164,114 | 89,709 | -6,093 | (-11,397 - -789.7) |
| Child characteristics: | | | | | | |
| Male child | 47.47% | 49.95% | 47.53% | 49.95% | -0.0002 | (-0.0278 - 0.0274) |
| First child | 22.56% | 41.80% | 21.53% | 41.11% | 0.0094 | (-0.0141 - 0.0329) |
| Outcome variables: | | | | | | |
| Any prenatal service | 74.44% | 43.63% | 73.62% | 44.08% | 0.0075 | (-0.0219 - 0.0367) |
| Prenatal care component coverage index | 0.101 | 0.967 | 0.068 | 0.986 | 0.0317 | (-0.0324 - 0.0958) |
| Prenatal care service components: | | | | | | |
| Weight | 83.19% | 37.40% | 82.06% | 38.38% | 0.0100 | (-0.0143 - 0.0342) |
| Missing | 257 | | 289 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Height | 40.18% | | 49.04% | 41.71% | | 49.32% | -0.0181 | (-0.0495 - 0.0133) |
| Missing | | 267 | | | 299 | | | |
| Blood pressure | 83.62% | | 37.02% | 83.07% | | 37.51% | 0.0042 | (-0.0188 - 0.0273) |
| Missing | | 293 | | | 261 | | | |
| Blood test | 33.15% | | 47.08% | 33.43% | | 47.19% | -0.0016 | (-0.0306 - 0.0274) |
| Missing | | 271 | | | 304 | | | |
| Fundal height | 45.45% | | 49.80% | 44.24% | | 49.68% | 0.0107 | (-0.0211 - 0.0424) |
| Missing | | 270 | | | 304 | | | |
| Fetal heartbeat | 76.03% | | 42.70% | 73.62% | | 44.08% | 0.0239 | (-0.00260 - 0.0505) |
| Missing | | 262 | | | 293 | | | |
| Internal examination | 20.11% | | 40.09% | 20.22% | | 40.17% | -0.0011 | (-0.0251 - 0.0230) |
| Missing | | 272 | | | 312 | | | |
| External examination | 23.97% | | 42.70% | 24.65% | | 43.11% | -0.0063 | (-0.0314 - 0.0188) |
| Missing | | 314 | | | 274 | | | |
| Received >90 iron pills | 12.78% | | 33.39% | 12.11% | | 32.64% | 0.0043 | (-0.0181 - 0.0266) |
| Missing | | 33 | | | 51 | | | |
| Complete tetanus toxoid | 58.19% | | 49.34% | 57.58% | | 49.43% | 0.0086 | (-0.0227 - 0.0399) |
| Missing | | 695 | | | 599 | | | |
| Information on signs of pregnancy complications | 33.40% | | 47.18% | 31.57% | | 46.49% | 0.0182 | (-0.0122 - 0.0487) |
| Missing | | 257 | | | 286 | | | |
| Told what to do in case of pregnancy complications | 31.09% | | 46.30% | 28.66% | | 45.23% | 0.0246 | (-0.00514 - 0.0543) |
| Missing | | 950 | | | 946 | | | |

* Baseline differences adjusted for district fixed effects, and clustered randomization at the sub-district level.

† 1 USD was approximately 10,000 *Rupiah*. Real prices and expenditures were obtained based on the Consumer Price Index from Statistics Indonesia.

Prenatal coverage was high at baseline: about 75% of women reported receiving any prenatal care (74.4% in treatment vs. 73.6% control). The PNC component coverage index of women was also similar (0.10 in treatment vs. 0.07 control). About 80% of women had their weight measured at least once during pregnancy, 40% had their height measured, 83% had their blood pressure taken, 33% underwent a blood test, 45% had their fundal height measured, and more than 70% had at least one fetal heartbeat examination. Only 20% of women received at least one internal and external pelvic examinations. This low proportion is may be due to the infrastructure of the healthcare facility and cultural norms. About 30% of women reported receiving information on signs of pregnancy complications, and about 30% were also told what to do if there were signs of pregnancy complications. Almost 60% of women reported receiving the complete set of two tetanus toxoid vaccinations during pregnancy. Only 12% of women reported receiving at least 90 iron-folic acid pills during pregnancy, although about 80% of women received iron-folic acid pills at least once during pregnancy. This large discrepancy suggests poor compliance to PNC visits and iron supplementation. Consequently, compliance with PNC visit guidelines became part of the CCT programme's requirements.

***Prenatal care component coverage***

One of the objectives of PKH was to increase healthcare access and utilisation among poor households, including PNC. Table 2 presents changes in PNC component coverage, which came from women's self-report. Women living in treated communities received a 0.072 standard deviation increase in PNC component coverage index (95% CI 0.002-0.141; p=0.057). Similarly, using an alternative PNC component coverage index to take into account dichotomous variables, the results were similar (0.090; 95% CI 0.0646-0.116; p<0.001).

Compared to women living in control communities, women living in treated communities were more likely to receive the following services during pregnancy: weight measurement (OR 1.56; 95% CI 1.247 to 1.947; p<0.001), height measurement (OR 1.41; 95% CI 1.164 to 1.700; p<0.001), blood pressure measurement (OR 1.36; 95% CI 1.045 to 1.761; p = 0.023), fundal height measurement (OR 1.65; 95% CI 1.372 to 1.992; p < 0.001), fetal heartbeat measurement (OR 1.29; 95% CI 1.006 to 1.653; p = 0.001), external examination (OR 1.28; 95% CI 1.086 to 1.505; p < 0.001), receiving more than 90 iron-folic acid pills (OR 1.42; 95% CI 1.081 to 1.859; p < 0.001). Women were also more likely to receive information on pregnancy complications (OR 2.10 ; 95% CI 1.724 to 2.551; p < 0.001) and information on what to do if there were signs of complications (OR 1.97 ; 95% CI 1.605 to 2.407; p < 0.001). There were no statistically significant changes on the probability of receiving a blood test, internal examination, or the probability of receiving two tetanus toxoid vaccinations during pregnancy. For sensitivity, we created an alternative PNC component coverage index that excluded items that were either targeted by PKH or rarely received by women. When indicators for iron-folic acid pills, pelvic examinations, and pregnancy complications were excluded, the estimated change in coverage was qualitatively similar. These results suggest that the CCT programme was successful in increasing the PNC component coverage during pregnancy.

Table 2. The effects of PKH on prenatal care coverage*

| | Pooled N= 6,869 | | Public practice, cross-sectional data from follow-up survey N= 1,378 | | Private practice, cross-sectional data from follow-up survey N= 581 | |
|---|---|---|---|---|---|---|
| | OR | 95% CI | OR | 95% CI | OR | 95% CI |
| PNC component coverage index† | 0.072 | (0.002-0.141) | -0.005 | (-0.131 - 0.120) | 0.022 | (-0.113 - 0.158) |
| PNC service components: | | | | | | |
| Weight | 1.558 | (1.247 - 1.947) | 0.594 | (0.352 - 1.005) | 1.690 | (0.576 - 4.958) |
| Height | 1.407 | (1.164 - 1.700) | 0.897 | (0.675 - 1.192) | 1.391 | (0.966 - 2.003) |
| Blood pressure | 1.356 | (1.045 - 1.761) | 1.197 | (0.731 - 1.959) | 0.364 | (0.148 - 0.894) |
| Blood test | 1.058 | (0.871 - 1.285) | 0.985 | (0.715 - 1.356) | 0.878 | (0.560 - 1.377) |
| Fundal height | 1.654 | (1.372 - 1.992) | 1.012 | (0.745 - 1.374) | 1.584 | (1.049 - 2.393) |
| Fetal heart beat | 1.290 | (1.006 - 1.653) | 1.104 | (0.722 - 1.688) | 0.828 | (0.425 - 1.611) |
| Internal examination | 0.875 | (0.708 - 1.080) | 0.869 | (0.641 - 1.177) | 1.022 | (0.592 - 1.766) |
| External examination | 1.279 | (1.086 - 1.505) | 0.815 | (0.625 - 1.064) | 1.175 | (0.789 - 1.750) |
| >90 iron pills | 1.418 | (1.081 - 1.859) | 1.055 | (0.721 - 1.542) | 0.769 | (0.404 - 1.465) |
| Tetanus vaccinations | 0.897 | (0.746 - 1.077) | 1.035 | (0.796 - 1.346) | 0.945 | (0.600 - 1.488) |
| Pregnancy complications: | | | | | | |
| Information on signs | 2.097 | (1.724 - 2.551) | 1.119 | (0.842 - 1.488) | 0.907 | (0.588 - 1.399) |
| Told what to do | 1.970 | (1.605 - 2.417) | 1.091 | (0.839 - 1.419) | 0.857 | (0.559 - 1.316) |

*Pooled analysis included pregnancies from baseline and follow-up, cross-sectional analysis came from follow-up. Covariates included were: indicators for male child and first child, mother's education, mother's age, log per capita expenditure and indicators for home and land ownership at baseline. District fixed effects included in all specifications. Confidence intervals in parentheses, clustered at the sub-district level.
†Continuous variable.

With high levels of dual practice among midwives, we used the follow-up survey to examine the relationship between PNC services in public and private practice. Compared to women in control communities, we found that PKH had no statistically significant effect on PNC component coverage index in public or private practice. Among women who went to public services, women in treated areas were less likely to have their height measured (OR 0.59; 95% CI 0.352 to 1.005; p=0.052). Among women who went to private practice, women in treated areas were more likely to receive the following: height measurement (OR 1.391; 95% CI 0.966 to 2.003; p = 0.076) and fundal height measurement (OR 1.58; 95% CI 1.049 to 2.393; p=0.029). Women who chose private over public practice for PNC may differ in their observed and unobserved characteristics, so these estimates cannot be interpreted causally. Nonetheless, the results suggest differences that warrant future research.

***Prenatal care provider quality***

A potential explanation for the poor impact of PKH on pregnancy outcomes is that improvements in PNC attendance or service component coverage only reflected better access to PNC at the current standards, but the actual care provided or follow-up actions by healthcare providers may have remained ineffective. Women from poor households may have limited access to PNC prior to PKH, and with increased access through PKH women were able to obtain PNC, but midwives may still provide suboptimal care. To explore this, we compared the differences in the PNC component coverage index to midwives' self-reported PNC provider quality index.

Table 3 presents differences in PNC provider quality. Compared to midwives in the control group, PKH had no statistically significant effect on PNC provider quality index in public (-0.036; 95% CI -0.352-0.281; p-value=0.161) or private practice (-0.048; 95% CI -0.344-0.247; p-value=0.150). The results were qualitatively similar using the alternative PNC provider quality index (0.0021 in public practice, -0.0324 in private practice). Compared to midwives in the control group, PKH had no statistically significant effect on each service provided in either public or private practice. Midwives reported spending 2 minutes less per prenatal visit (95% CI -3.332 to 0.263; p=0.094) in private practice. These results suggest that PNC provider quality in control and treated areas are similar. Therefore, improvements in PNC component coverage are likely driven by increased PNC utilisation.

Table 3. The effects of PKH on prenatal care provider quality*

| | Public practice N= 1,396 | | Private practice N= 1,269 | |
|---|---|---|---|---|
| | OR | 95% CI | OR | 95% CI |
| Quality index† | -0.036 | (-0.352 - 0.281) | -0.048 | (-0.344 - 0.247) |
| Service provided: | | | | |
| Weight | 1.097 | (0.767 - 1.570) | 0.976 | (0.637 - 1.497) |
| Height | 0.910 | (0.734 - 1.128) | 0.898 | (0.716 - 1.127) |
| Blood pressure | 0.948 | (0.667 - 1.347) | 0.905 | (0.590 - 1.388) |
| Blood test | 1.049 | (0.819 - 1.344) | 0.790 | (0.613 - 1.018) |
| Fundal height | 0.954 | (0.697 - 1.306) | 0.953 | (0.674 - 1.348) |
| Fetal heartbeat | 1.009 | (0.733 - 1.389) | 1.107 | (0.774 - 1.582) |
| Internal examination | 0.959 | (0.702 - 1.310) | 0.980 | (0.718 - 1.340) |
| External examination | 0.835 | (0.653 - 1.067) | 0.875 | (0.686 - 1.115) |
| Iron pills | 1.024 | (0.759 - 1.380) | 1.031 | (0.739 - 1.439) |
| Tetanus toxoid | 0.999 | (0.703 - 1.418) | 0.931 | (0.647 - 1.340) |
| Information on: | | | | |
| Signs of complications | 0.925 | (0.693 - 1.234) | 0.947 | (0.686 - 1.308) |
| Nutrition during pregnancy | 0.953 | (0.685 - 1.326) | 0.913 | (0.619 - 1.346) |
| Facility-based delivery | 0.997 | (0.741 - 1.341) | 0.985 | (0.714 - 1.358) |
| Time spent per prenatal visit | -0.253 | (-1.955 - 1.449) | -1.534 | (-3.332 - 0.263) |

* Cross-sectional analysis from follow-up survey. District fixed effects included in all specifications. Confidence intervals in parentheses, adjusted for clustered randomization at the sub-district level.
† Continuous variable.

**Discussion**

This study compared the PNC component coverage received by women and the PNC provider quality rendered by midwives, the primary provider in this setting. The results of our study are consistent with the evidence showing the effectiveness of CCT programmes to improve health seeking behaviour, including increasing PNC coverage.[3,4,14] This study also showed that the CCT programme did not increase PNC provider quality. Taken together, the discrepancy in PNC component coverage and the PNC provider quality suggested that the improvements in PNC clinical coverage were likely associated with improved access because of the programme requirements.

Programmes that incentivise women such as CCT programmes have been shown to increase the number of patients at healthcare facilities. Higher demand for services may burden providers, which in turn may lead to lower quality of care.[14,30] Fortunately, we found no significant evidence of lower quality of care provided in response to the programme since PKH was rolled out in supply-ready communities, i.e. communities had sufficient health care providers and facilities. In this case, healthcare providers respond to higher demand on the price dimension in private practice, instead of the quality dimension.[20] When incentives are only provided to patients, healthcare providers have no incentive to improve the quality of service provided.

The role of dual practice is important in the context of many LMICs, including Indonesia. Private practice is associated with supplier-induced demand,[31,32] which tends to be associated with overconsumption of healthcare services. However, private practice is associated with

increased supply of healthcare.[27] The results showed that the improvement in PNC component coverage was seen among women who sought private practice, which suggests the role of private practice in increasing women's choice set. However, private practice is also associated with higher prices, which could be a barrier to healthcare access for poor households that are not enrolled in the programme. As PKH continues to expand and the implementation of Indonesia's universal health coverage, quality of care continues to be policy-relevant.[33] The interpretation of the results is limited by the cross-sectional analysis. The absence of longitudinal data on PNC provider quality did not allow us to capture quality changes over time. Nonetheless, the results suggest that the programme reduced inequality in access, but there may still be discrepancies in the quality dimension.[23,34,35]

The lack of improvements in the prenatal quality rendered by healthcare providers may explain the missing link between PNC clinical coverage received by women and pregnancy outcomes. These results showed the impact of the CCT programme on near-poor and poor households, which is representative of the relevant population. Therefore, the results may apply to similar policies in other LMICs. In terms of policy recommendation, combining demand-side programmes with a supply-side intervention to improve quality of care and increase the accountability of healthcare providers in providing better quality of care and action linked to specific PNC service components could be implemented to improve the effectiveness of health interventions. Programmes that incentivise healthcare workers such as pay-for-performance may improve the quality of service rendered. Further research should be conducted to better understand the link between healthcare access, quality of care, and pregnancy outcomes.

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**Footnotes**
**Contribution to authorship** MT was involved in formulating the hypotheses, design of the analysis and conducted the analyses, and drafted the manuscript. AS contributed to formulating the hypotheses and the design of the analyses, assisted with interpretation of results, and finalised the manuscript. Both authors had full access to all of the data in the study and can take responsibility for the accuracy of the data analysis.

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**Disclosure of interest** None declared.

**Patient consent** Not applicable.

**Ethical approval** This study was a secondary analysis of the deidentified impact evaluation survey, therefore this analysis was considered exempt from approval.

**Provenance and peer review** Not commissioned.

**Data sharing statement** Data request can be made through TNP2K Indonesia: http://www.tnp2k.go.id/en/data-indicators/-14/tnp2k-microdata-catalogue/

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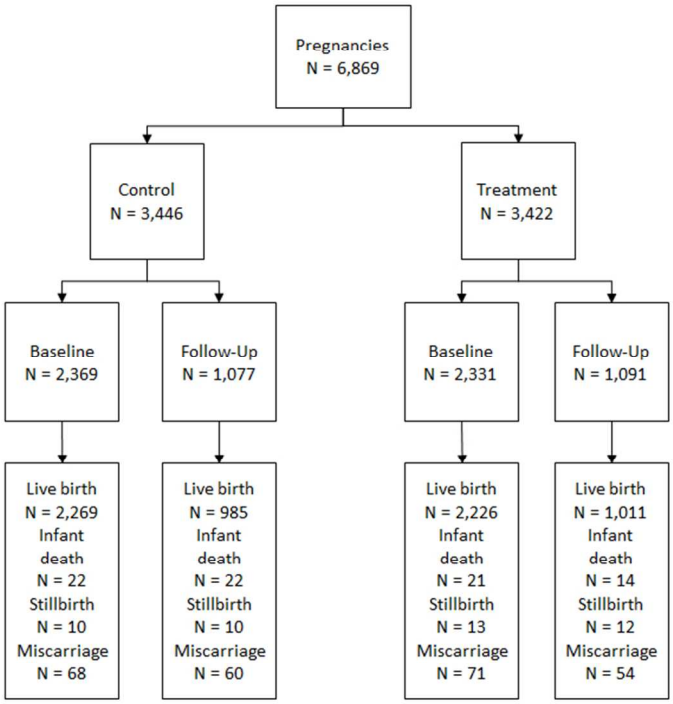


Figure 1. Study Population

71x65mm (300 x 300 DPI)

**STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology***

**Checklist for cohort, case-control, and cross-sectional studies (combined)**

| Section/Topic | Item # | Recommendation | Reported on page # |
|---|---|---|---|
| **Title and abstract** | 1 | (*a*) Indicate the study's design with a commonly used term in the title or the abstract | 1 |
| | | (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found | 2 |
| **Introduction** | | | |
| Background/rationale | 2 | Explain the scientific background and rationale for the investigation being reported | 3 |
| Objectives | 3 | State specific objectives, including any pre-specified hypotheses | 3 |
| **Methods** | | | |
| Study design | 4 | Present key elements of study design early in the paper | 3 |
| Setting | 5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection | 3 |
| Participants | 6 | (*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up<br>*Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls<br>*Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants | 5 |
| | | (*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed<br>*Case-control study*—For matched studies, give matching criteria and the number of controls per case | |
| Variables | 7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable | 4 |
| Data sources/ measurement | 8* | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group | *4* |
| Bias | 9 | Describe any efforts to address potential sources of bias | 4 |
| Study size | 10 | Explain how the study size was arrived at | 6 |
| Quantitative variables | 11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why | 7 |
| Statistical methods | 12 | (*a*) Describe all statistical methods, including those used to control for confounding | 7 |
| | | (*b*) Describe any methods used to examine subgroups and interactions | |
| | | (*c*) Explain how missing data were addressed | 7 |
| | | (*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed<br>*Case-control study*—If applicable, explain how matching of cases and controls was addressed | |

| | | | |
|---|---|---|---|
| | | *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy | |
| | | (*e*) Describe any sensitivity analyses | 10 |
| **Results** | | | |
| Participants | 13* | (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed | 6 |
| | | (b) Give reasons for non-participation at each stage | |
| | | (c) Consider use of a flow diagram | 6 |
| Descriptive data | 14* | (a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders | 7 |
| | | (b) Indicate number of participants with missing data for each variable of interest | 7 |
| | | (c) *Cohort study*—Summarise follow-up time (eg, average and total amount) | |
| Outcome data | 15* | *Cohort study*—Report numbers of outcome events or summary measures over time | 7 |
| | | *Case-control study*—Report numbers in each exposure category, or summary measures of exposure | |
| | | *Cross-sectional study*—Report numbers of outcome events or summary measures | |
| Main results | 16 | (*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included | 11 |
| | | (*b*) Report category boundaries when continuous variables were categorized | |
| | | (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period | |
| Other analyses | 17 | Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses | |
| **Discussion** | | | |
| Key results | 18 | Summarise key results with reference to study objectives | 13 |
| Limitations | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias | 14 |
| Interpretation | 20 | Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence | 14 |
| Generalisability | 21 | Discuss the generalisability (external validity) of the study results | 13 |
| **Other information** | | | |
| Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based | 14 |

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.
**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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# The effects of a household conditional cash transfer programme on coverage and quality of antenatal care: a secondary analysis of Indonesia's pilot programme

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# The effects of a household conditional cash transfer programme on coverage and quality of antenatal care: a secondary analysis of Indonesia's pilot programme

Running title: Conditional cash transfer programme impact on antenatal care

## Abstract

### Objective

To analyse the effectiveness of a household conditional cash transfer programme (CCT) on antenatal care (ANC) coverage reported by women and ANC quality reported by midwives.

### Design

The CCT was piloted as a cluster randomised control trial in 2007. Intent-to-treat parameters were estimated using linear regression and logistic regression.

### Setting

Secondary analysis of the longitudinal CCT impact evaluation survey, conducted in 2007 and 2009. This included 6,869 pregnancies and 1,407 midwives in 180 control sub-districts and 180 treated sub-districts in Indonesia.

### Outcome measures

ANC component coverage index, a composite measure of each ANC service component as self-reported by women, and ANC provider quality index, a composite measure of ANC service provided as self-reported by midwives. Each index was created by principal component analysis (PCA). Specific ANC component items were also assessed.

### Results

The CCT was associated with improved ANC component coverage index by 0.07 standard deviation (95% CI 0.002-0.141). Women were more likely to receive the following assessments: weight [OR 1.56 (95% CI 1.25-1.95)], height [OR 1.41 (95% CI 1.247 - 1.947)], blood pressure [OR 1.36 (95% CI 1.045 - 1.761)], fundal height measurements [OR 1.65 (95% CI 1.372 - 1.992)], fetal heart beat monitoring [OR 1.29 (95% CI 1.006 - 1.653)], external pelvic examination [OR 1.28 (95% CI 1.086 - 1.505)], receive iron-folic acid pills [OR 1.42 (95% CI 1.081 - 1.859)], and information on pregnancy complications [OR 2.09 (95% CI 1.724 - 2.551)]. On the supply side, the CCT had no significant effect on the ANC provider quality index based on reports from midwives.

### Conclusions

The CCT programme improved ANC coverage for women, but midwives did not improve ANC quality. The results suggest that enhanced ANC utilisation may not be sufficient to improve health outcomes, and steps to improve ANC quality are essential for programme impact.


### Strengths and limitations of this study

- This study takes advantage of the cluster randomisation of the CCT and the longitudinal impact evaluation survey which included near-poor and poor households. The findings are therefore representative of the relevant population and may apply to similar policies in other low and middle-income countries.
- The study goes beyond assessment of simple ANC attendance or quality and accounts for coverage of specific components of ANC and quality as reported by women and midwives.
- Measurement error and recall bias may limit the interpretation of the study since women with older children might not accurately recall the services received during pregnancy.

## Introduction

Maternal and child health is of global importance, and current data indicates 99% of all maternal and neonatal deaths occur in low and middle-income countries (LMICs). [1,2] To improve maternal and child health, many LMICs have widely implemented household Conditional Cash Transfer (CCT) programmes. CCT programmes provide cash transfers to poor households conditional on meeting pre-specified health and education requirements.

CCT programmes have been shown to improve access to healthcare services, but the results are mixed with respect to health outcomes.[3,4] Benefits were seen for Brazil's CCT programme that led to lower child mortality[5] and for India's CCT programme, which targeted facility-based delivery, and reduced neonatal mortality.[6] Mexico's CCT programme led to a modest increase birthweight and a 4% decline in low birthweight. [7-9] Mexico's programme also led to a 1.1 standard deviation increase in height among children under six months, but with little effect on older children.[10] Colombia's CCT programme was associated with a 16% increase in height-for-age z-score for children under 24 months. In contrast, there were no statistically significant effects on children's health status for programmes in Nicaragua or Ecuador. [3,11-13] These data suggest that factors other than the CCT, such as health provider context or service, may influence the impact of programmes.

The Indonesian CCT programme, *Program Keluarga Harapan* (PKH, the Hopeful Family Programme), was deployed as a cluster-randomised controlled trial in 2007. The Government of Indonesia implemented PKH in response to poor health and educational outcomes among the poor.[14] In 2007, Indonesia's infant mortality was 31 per 1,000 live births and low birthweight was 9%.[15,16] One goal was to reduce infant mortality and low birthweight, as the latter adversely affects subsequent outcomes including mortality, morbidity, and educational outcomes.[17-19] PKH's CCT requirements included: at least four antenatal care (ANC) visits, delivery assistance from a doctor or midwife, postnatal care, and complete vaccination. Initial reports indicated PKH improved ANC attendance, but had no effect on low birthweight.[3,14,20] ANC can improve pregnancy outcomes, but attendance alone may be insufficient.[21,22] It is unclear whether ANC utilisation is accompanied by improved coverage of the recommended ANC service items.[14,20] One potential explanation for the lack of impact on outcomes is low ANC provider quality.[23] There is limited evidence on the link between increased ANC attendance and ANC provider quality.[20,22,24,25,26] This study extends earlier reports by exploring ANC component coverage for specific service items and ANC provider quality of midwives. We therefore add to the current understanding on how CCT programmes affect ANC services as a channel to improve pregnancy outcomes.

## Methods

### *Study design and data source*

A secondary data analysis was performed using pre-existing PKH impact evaluation surveys. PKH was deployed in Jakarta and West Java, East Java, North Sulawesi, Gorontalo, and East Nusa Tenggara provinces. Randomisation was done at the sub-district level as the smallest unit of facility management that would also reduce the risk of spillover to control areas[14]; 329 sub-districts were randomised into treatment and 259 to control. Statistics Indonesia (*Badan Pusat Statistik*) used proxy-means test for all poor households in treatment sub-districts to identify extremely poor households with expectant or lactating women, children under five, and school-aged children (6-18 years).

PKH delivered quarterly cash transfers to expectant women and mothers of the children in enrolled households. Households with pregnant or lactating mothers would receive 1,000,000 *Rupiah* (USD 100) and another 800,000 *Rupiah* (USD 80) if there were children under 6 years. The maximum transfer was 2,200,000 *Rupiah* (USD 220). The amount was 15 to 20% of estimated total monthly consumption of poor households. Verification for compliance was conducted monthly by facilitators who collected patient and service lists from healthcare providers. Households generally received the transfers conditional on meeting at least one requirement.

The PKH impact evaluation survey was conducted in 2,723 villages in 180 randomly selected treatment and 180 control sub-districts. The baseline was conducted between June and August 2007, before implementation in November 2007. The follow-up was conducted between October and December 2009, attrition at the household level was 4%. The surveys included near poor and poor households and midwives. Design details are available in the impact evaluation report.[14]

The longitudinal household survey included current pregnancies and deliveries 24 months prior to each survey wave. The baseline included 4,700 pregnancies and deliveries between June 2005 and August 2007. The follow-up included 2,168 pregnancies and deliveries between October 2007 and December 2009. Pregnancy history included self-reported information on each pregnancy, including delivery assistance, prenatal, and postnatal care service items. Recall bias and measurement error may have influenced data quality, but the relatively short time window of 24 months would tend to limit overall bias. At the follow-up survey in 2009, women were asked if they received PNC in public or private practice.

The accompanying provider survey included practicing community-based midwives since they are the primary skilled delivery attendants, especially in rural areas.[27,28] Four midwives per sub-district were selected. Midwives employed by the government are allowed to hold dual practice, i.e. private practice undertaken by healthcare workers employed in the public sector. In our sample, more than 80% of midwives were in dual practice. At baseline, 2,800 midwives were interviewed. At follow up, midwives self-reported the ANC service items provided in their public and private practice. There were 1,396 observations from midwives in public practice and 1,269 observations from private practice.

***Variables and covariates***

This study examined women's self-reported ANC coverage of specific service components and midwives' self-reported ANC provider quality based on service components.

At the individual client level, the outcomes of interest were ANC service items received during pregnancy. Changes in ANC component coverage were estimated using an ANC component coverage index, constructed using principal component analysis (PCA) of all prenatal service items. The items included are based on the Indonesian Ministry of Health guidelines.[29] They were the following dichotomous variables: measurement of women's weight, height, blood pressure, fundal height, fetal heartbeat, a blood test (for syphilis and HIV), external and internal pelvic examination, receiving 90 iron-folic acid pills, two tetanus toxoid vaccinations, information on signs of pregnancy complications, and being told what to do if there were signs of pregnancy complications. The survey excluded perception of quality and other social aspects. The following sociodemographic characteristics were also included: indicators for child sex and first child (conditional on live birth), mother's education, mother's

age at delivery, monthly household expenditure (expressed as log monthly per capita expenditure in 2007 *Rupiah*), and asset ownership at baseline.

At the provider level, the outcomes of interest were ANC service items provided by midwives in their public and private practice. The ANC provider quality index was constructed using PCA based on self-reported prenatal service items performed. The items included the following dichotomous variables: the measurements of woman's weight, height, blood pressure, blood test, urine test, internal and external pelvic examinations, fundal height, and fetal heartbeat, iron pills, information on pregnancy complications, nutrition, and the development of a facility-based delivery plan. Midwives also self-reported the average time spent per prenatal visit in the first trimester.

***Study population***

We estimated the programme's effect on ANC coverage using women's pregnancy history. We include all reported pregnancies and deliveries at baseline and follow-up. Figure 1 presents the number of pregnancies in the analysis. At baseline, there were 2,369 pregnancies in the control group and 2,333 pregnancies in the treated group. At follow-up, there were 1,077 pregnancies in the control group and 1,091 pregnancies in the treated group.

The midwife survey was used to estimate the programme's effect on ANC provider quality. The ANC provider quality was only asked at follow-up, so the analysis was based on cross-sectional data. The analysis included 1,396 midwives to estimate differences in ANC provider quality in their public and private service.

Figure 1. Study population

***Statistical analysis***

All statistical analyses were performed using STATA MP 12.0. We exploited the cluster randomisation of PKH to estimate the Intent-to-Treat (ITT) parameters. We compared respondents in sub-districts who were randomised into treatment to those in the control sub-districts, adjusting for district-level fixed effects to capture non time-varying district characteristics and clustering all standard errors at the sub-district level to adjust for the sub-district level of cluster randomisation. We used least squares regressions for all continuous outcome variables: ANC component coverage index and ANC provider quality index. The odds ratio (OR) and 95% confidence interval (CI) for dichotomous outcomes were calculated using logistic regressions. The dichotomous items included the list of ANC service items.

At the individual client level, we used each self-reported prenatal service item as a dichotomous outcome and created a continuous ANC component coverage index using all antenatal service items. The ANC component coverage index was created using STATA's built-in command, pca. Socio-demographic characteristics were included as covariates. Bartlett's sphericity test (p-value < 0.001) and KMO index (0.736) indicate the items could be summarized using PCA. The PCA performed on the listed variables resulted in 3 components with eigenvalues greater than 1. We selected the primary component which accounted for 61% of the variance, and the component score for each woman was her ANC component coverage index. For robustness, we generated an alternative ANC component coverage index using STATA's built-in command, tetrachoric, to take into account the dichotomous items. We conducted a separate cross-sectional analysis to estimate differences in prenatal component coverage in public and private practice from the follow-up survey.

At the midwife level, we used each self-reported prenatal service item in public and private practice at follow up. While a longitudinal analysis would be preferred, as mentioned above, the data are only available as a cross-section, and this may limit interpretation of the results. However, the sub-district randomisation showed that other characteristics at baseline were balanced, thereby suggesting the analysis would permit valid inference. We coded each item as a dichotomous outcome and created a continuous ANC provider quality index using all antenatal care items. The ANC provider quality index at the midwife level was created using the same built-in command, pca. Bartlett's sphericity test (p-value < 0.001) and KMO index (0.796) indicate the items could be summarized by PCA. The PCA performed on the listed variables resulted in 2 components with eigenvalues greater than 1. We selected the primary component which accounted for 84% of the variance in public practice and 80% in private practice. For robustness, we also generated an alternative ANC provider quality index using STATA's built-in command, tetrachoric, to take into account the dichotomous items.

## Results

***Baseline characteristics***

Table 1 presents women's characteristics at baseline. Baseline characteristics were similar across treatment and control groups. The majority of women in the sample were under 30 years of age in 2007. Since PKH targeted poor households, the majority were indeed low socio-economic status. About 70% of women in the sample had 6 years of education or less. Per capita total household expenditure was 160,000 *Rupiah* per month (USD 16) at baseline. Land ownership was around 35% and home ownership was 86% in the control group. The low asset ownership and household expenditure were consistent with high poverty rates in the analysed sample. Baseline pregnancy outcomes were similar across the treatment and control groups. About 48% of women delivered a male child, and 22% had their first child in our

analysed sample at baseline. In all our analyses, an indicator for missing covariate is included to take into account the missing observations.

Table 1. Baseline characteristics*

| | Treatment N= 2,331 | | Control N= 2,369 | | Adjusted | |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | difference | 95% CI |
| Age: | | | | | | |
| <25 | 27.23% | 44.52% | 26.68% | 44.24% | 0.0066 | (-0.0198 - 0.0330) |
| 26-30 | 25.30% | 43.48% | 25.12% | 43.38% | 0.0022 | (-0.0213 - 0.0258) |
| 31-35 | 24.14% | 42.80% | 24.31% | 42.91% | -0.0031 | (-0.0274 - 0.0213) |
| >35 | 23.33% | 42.30% | 23.89% | 42.65% | -0.0058 | (-0.0305 - 0.0190) |
| Missing observations | 2 | | 2 | | | |
| Education: | | | | | | |
| 6 years or less | 73.02% | 44.40% | 72.40% | 44.71% | 0.0099 | (-0.0188 – 0.0387) |
| 6-9 years | 19.06% | 39.28% | 20.17% | 40.14% | -0.0141 | (-0.0383 – 0.0101) |
| 9 years or more | 7.92% | 27.02% | 7.44% | 26.24% | 0.0042 | (-0.0117 – 0.0201) |
| Missing observations | 141 | | 117 | | | |
| Asset ownership: | | | | | | |
| Land ownership | 34.35% | 47.50% | 36.22% | 48.07% | -0.0188 | (-0.0486 – 0.0110) |
| Home ownership | 88.16% | 32.31% | 86.41% | 34.28% | 0.0168 | (-0.00341 – 0.0370) |
| Missing observations | 1 | | 2 | | | |
| Per capita household expenditure† | 158,320 | 89,709 | 164,114 | 89,709 | -6,093 | (-11,397 - -789.7) |
| Missing observations | 2 | | 2 | | | |
| Child characteristics: | | | | | | |
| Male child | 47.47% | 49.95% | 47.53% | 49.95% | -0.0002 | (-0.0278 – 0.0274) |
| Missing observations | 58 | | 73 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| First child | 22.56% | | 41.80% | 21.53% | | 41.11% | 0.0094 | (-0.0141 - 0.0329) |
| Missing observations | 68 | | | 49 | | | | |
| Outcome variables: | | | | | | | | |
| Any antenatal service | 74.44% | | 43.63% | 73.62% | | 44.08% | 0.0075 | (-0.0219 - 0.0367) |
| Antenatal care component coverage index | 0.101 | | 0.967 | 0.068 | | 0.986 | 0.0317 | (-0.0324 - 0.0958) |
| Antenatal care service components: | | | | | | | | |
| Weight | 83.19% | | 37.40% | 82.06% | | 38.38% | 0.0100 | (-0.0143 - 0.0342) |
| Missing observations | | 257 | | | 289 | | | |
| Height | 40.18% | | 49.04% | 41.71% | | 49.32% | -0.0181 | (-0.0495 - 0.0133) |
| Missing observations | | 267 | | | 299 | | | |
| Blood pressure | 83.62% | | 37.02% | 83.07% | | 37.51% | 0.0042 | (-0.0188 - 0.0273) |
| Missing observations | | 293 | | | 261 | | | |
| Blood test | 33.15% | | 47.08% | 33.43% | | 47.19% | -0.0016 | (-0.0306 - 0.0274) |
| Missing observations | | 271 | | | 304 | | | |
| Fundal height | 45.45% | | 49.80% | 44.24% | | 49.68% | 0.0107 | (-0.0211 - 0.0424) |
| Missing observations | | 270 | | | 304 | | | |
| Fetal heartbeat | 76.03% | | 42.70% | 73.62% | | 44.08% | 0.0239 | (-0.00260 - 0.0505) |
| Missing observations | | 262 | | | 293 | | | |
| Internal examination | 20.11% | | 40.09% | 20.22% | | 40.17% | -0.0011 | (-0.0251 - 0.0230) |
| Missing observations | | 272 | | | 312 | | | |
| External | 23.97% | | 42.70% | 24.65% | | 43.11% | -0.0063 | (-0.0314 - 0.0188) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| examination | | | | | | | |
| Missing observations | | 314 | | | 274 | | |
| Received >90 iron pills | 12.78% | | 33.39% | 12.11% | | 32.64% | 0.0043 (-0.0181 - 0.0266) |
| Missing observations | | 33 | | | 51 | | |
| Complete tetanus toxoid | 58.19% | | 49.34% | 57.58% | | 49.43% | 0.0086 (-0.0227 - 0.0399) |
| Missing observations | | 695 | | | 599 | | |
| Information on signs of pregnancy complications | 33.40% | | 47.18% | 31.57% | | 46.49% | 0.0182 (-0.0122 - 0.0487) |
| Missing observations | | 257 | | | 286 | | |
| Told what to do in case of pregnancy complications | 31.09% | | 46.30% | 28.66% | | 45.23% | 0.0246 (-0.00514 - 0.0543) |
| Missing observations | | 950 | | | 946 | | |

* Baseline differences adjusted for district fixed effects, and clustered randomization at the sub-district level.
† 1 USD was approximately 10,000 *Rupiah*. Real prices and expenditures were obtained based on the Consumer Price Index from Statistics Indonesia.

Antenatal coverage was high at baseline: about 75% of women reported receiving any antenatal care (74.4% in treatment vs. 73.6% control). The ANC component coverage index of women was also similar (0.10 in treatment vs. 0.07 control). About 80% of women had their weight measured at least once during pregnancy, 40% had their height measured, 83% had their blood pressure taken, 33% underwent a blood test, 45% had their fundal height measured, and more than 70% had at least one fetal heartbeat examination. Only 20% of women received at least one internal and external pelvic examinations. This low proportion may be due to the possibility of limited examination rooms at healthcare facilities (only 54% of facilities have a separate maternal and child health or family planning examination room) and cultural norms on reproductive health.[30,31] About 30% of women reported receiving information on signs of pregnancy complications, and about 30% were also told what to do if there were signs of pregnancy complications. Almost 60% of women reported receiving the complete set of two tetanus toxoid vaccinations during pregnancy.

A 30-day supply of iron-folic acid pills should be given to women as part of every ANC visit. Only 12% of women reported receiving at least 90 iron-folic acid pills during pregnancy, although about 80% of women received iron-folic acid pills at least once during pregnancy. This large discrepancy suggests women received iron supplementation at least once during their ANC visit, but women may show poor compliance to ANC visits, causing them to not receive the iron supplementation, or women do not receive iron supplementation during their ANC visit due to providers' omission or insufficient stocks. To address both ANC visits and iron supplementation, compliance with ANC visit guidelines became part of the CCT programme's requirements.[14]

***Antenatal care component coverage***

One of the objectives of PKH was to increase healthcare access and utilisation among poor households, including ANC. Table 2 presents changes in ANC component coverage, which came from women's self-report. Women living in treated communities received a 0.072 standard deviation increase in PNC component coverage index (95% CI 0.002-0.141; p=0.057). Using an alternative ANC component coverage index to take into account dichotomous variables yielded similar results (0.090; 95% CI 0.0646-0.116; p<0.001).

Compared to women living in control communities, women living in treated communities were more likely to receive the following services during pregnancy: weight measurement (OR 1.56; 95% CI 1.247 to 1.947; p<0.001), height measurement (OR 1.41; 95% CI 1.164 to 1.700; p<0.001), blood pressure measurement (OR 1.36; 95% CI 1.045 to 1.761; p = 0.023), fundal height measurement (OR 1.65; 95% CI 1.372 to 1.992; p < 0.001), fetal heartbeat measurement (OR 1.29; 95% CI 1.006 to 1.653; p = 0.001), external examination (OR 1.28; 95% CI 1.086 to 1.505; p < 0.001), or receiving more than 90 iron-folic acid pills (OR 1.42; 95% CI 1.081 to 1.859; p < 0.001). Women were also more likely to receive information on pregnancy complications (OR 2.10 ; 95% CI 1.724 to 2.551; p < 0.001) and information on what to do if there were signs of complications (OR 1.97 ; 95% CI 1.605 to 2.407; p < 0.001). There were no statistically significant changes on the probability of receiving a blood test, internal examination, or the probability of receiving two tetanus toxoid vaccinations during pregnancy. For sensitivity analysis, we created an alternative PNC component coverage index that excluded items that were either targeted by PKH or rarely received by women. When indicators for iron-folic acid pills, pelvic examinations, and pregnancy complications were excluded, the estimated change in coverage was qualitatively similar. These results suggest that the CCT programme was successful in increasing the ANC component coverage during pregnancy.

Table 2. The effects of PKH on antenatal care coverage*

| | Pooled N= 6,869 | | Public practice, cross-sectional data from follow-up survey N= 1,378 | | Private practice, cross-sectional data from follow-up survey N= 581 | |
|---|---|---|---|---|---|---|
| | OR | 95% CI | OR | 95% CI | OR | 95% CI |
| ANC component coverage index† | 0.072 | (0.002-0.141) | -0.005 | (-0.131 - 0.120) | 0.022 | (-0.113 - 0.158) |
| ANC service components: | | | | | | |
| Weight | 1.558 | (1.247 - 1.947) | 0.594 | (0.352 - 1.005) | 1.690 | (0.576 - 4.958) |
| Height | 1.407 | (1.164 - 1.700) | 0.897 | (0.675 - 1.192) | 1.391 | (0.966 - 2.003) |
| Blood pressure | 1.356 | (1.045 - 1.761) | 1.197 | (0.731 - 1.959) | 0.364 | (0.148 - 0.894) |
| Blood test | 1.058 | (0.871 - 1.285) | 0.985 | (0.715 - 1.356) | 0.878 | (0.560 - 1.377) |
| Fundal height | 1.654 | (1.372 - 1.992) | 1.012 | (0.745 - 1.374) | 1.584 | (1.049 - 2.393) |
| Fetal heart beat | 1.290 | (1.006 - 1.653) | 1.104 | (0.722 - 1.688) | 0.828 | (0.425 - 1.611) |
| Internal examination | 0.875 | (0.708 - 1.080) | 0.869 | (0.641 - 1.177) | 1.022 | (0.592 - 1.766) |
| External examination | 1.279 | (1.086 - 1.505) | 0.815 | (0.625 - 1.064) | 1.175 | (0.789 - 1.750) |
| >90 iron pills | 1.418 | (1.081 - 1.859) | 1.055 | (0.721 - 1.542) | 0.769 | (0.404 - 1.465) |
| Tetanus vaccinations | 0.897 | (0.746 - 1.077) | 1.035 | (0.796 - 1.346) | 0.945 | (0.600 - 1.488) |
| Pregnancy complications: | | | | | | |
| Information on signs | 2.097 | (1.724 - 2.551) | 1.119 | (0.842 - 1.488) | 0.907 | (0.588 - 1.399) |
| Told what to do | 1.970 | (1.605 - 2.417) | 1.091 | (0.839 - 1.419) | 0.857 | (0.559 - 1.316) |

*Pooled analysis included pregnancies from baseline and follow-up, cross-sectional analysis came from follow-up. Covariates included were: indicators for male child and first child, mother's education, mother's age, log per capita expenditure and indicators for home and land ownership at baseline. District fixed effects included in all specifications. Confidence intervals in parentheses, clustered at the sub-district level.
†Continuous variable.

With high levels of dual practice among midwives, we used the follow-up survey to examine the relationship between ANC services in public and private practice. Compared to women in control communities, we found that PKH had no statistically significant effect on ANC component coverage index in public or private practice. However, for women who went to public services, women in treated areas tended to be less likely to have their height measured (OR 0.59; 95% CI 0.352 to 1.005; p=0.052). Among women who went to private practice, women in treated areas tended to be more likely to receive the following: height measurement (OR 1.391; 95% CI 0.966 to 2.003; p = 0.076) and fundal height measurement (OR 1.58; 95% CI 1.049 to 2.393; p=0.029). Women who chose private over public practice for ANC may differ in their observed and unobserved characteristics, so these estimates cannot be interpreted causally. Nonetheless, the results suggest differences that warrant future research.

***Antenatal care provider quality***

A potential explanation for the poor impact of PKH on pregnancy outcomes is that improvements in ANC attendance or service component coverage only reflected better access to ANC at the current standards, but the actual care provided or follow-up actions by healthcare providers may have remained ineffective. Women from poor households may have limited access to ANC prior to PKH, and with increased access through PKH women were able to obtain ANC, but midwives may still provide suboptimal care. To explore this, we compared the differences in the ANC component coverage index to midwives' self-reported ANC provider quality index.

Table 3 presents differences in ANC provider quality. Compared to midwives in the control group, PKH had no statistically significant effect on ANC provider quality index in public (-0.036; 95% CI -0.352-0.281; p-value=0.161) or private practice (-0.048; 95% CI -0.344-0.247; p-value=0.150). The results were qualitatively similar using the alternative ANC provider quality index (0.0021 in public practice, -0.0324 in private practice). Compared to midwives in the control group, PKH had no statistically significant effect on each service provided in either public or private practice. Midwives reported spending 2 minutes less per antenatal visit (95% CI -3.332 to 0.263; p=0.094) in private practice. These results suggest that ANC provider quality in control and treated areas are similar. Therefore, improvements in ANC component coverage are likely driven by increased ANC utilisation.

Table 3. The effects of PKH on antenatal care provider quality*

| | Public practice N= 1,396 | | Private practice N= 1,269 | |
|---|---|---|---|---|
| | OR | 95% CI | OR | 95% CI |
| Quality index† | -0.036 | (-0.352 - 0.281) | -0.048 | (-0.344 - 0.247) |
| Service provided: | | | | |
| Weight | 1.097 | (0.767 - 1.570) | 0.976 | (0.637 - 1.497) |
| Height | 0.910 | (0.734 - 1.128) | 0.898 | (0.716 - 1.127) |
| Blood pressure | 0.948 | (0.667 - 1.347) | 0.905 | (0.590 - 1.388) |
| Blood test | 1.049 | (0.819 - 1.344) | 0.790 | (0.613 - 1.018) |
| Fundal height | 0.954 | (0.697 - 1.306) | 0.953 | (0.674 - 1.348) |
| Fetal heartbeat | 1.009 | (0.733 - 1.389) | 1.107 | (0.774 - 1.582) |
| Internal examination | 0.959 | (0.702 - 1.310) | 0.980 | (0.718 - 1.340) |
| External examination | 0.835 | (0.653 - 1.067) | 0.875 | (0.686 - 1.115) |
| Iron pills | 1.024 | (0.759 - 1.380) | 1.031 | (0.739 - 1.439) |
| Tetanus toxoid | 0.999 | (0.703 - 1.418) | 0.931 | (0.647 - 1.340) |
| Information on: | | | | |
| Signs of complications | 0.925 | (0.693 - 1.234) | 0.947 | (0.686 - 1.308) |
| Nutrition during pregnancy | 0.953 | (0.685 - 1.326) | 0.913 | (0.619 - 1.346) |
| Facility-based delivery | 0.997 | (0.741 - 1.341) | 0.985 | (0.714 - 1.358) |
| Time spent per antenatal visit | -0.253 | (-1.955 - 1.449) | -1.534 | (-3.332 - 0.263) |

* Cross-sectional analysis from follow-up survey. District fixed effects included in all specifications. Confidence intervals in parentheses, adjusted for clustered randomization at the sub-district level.
† Continuous variable.

**Discussion**

This study compared the ANC component coverage received by women and the ANC provider quality rendered by midwives, the primary provider in this setting. The results of our study are consistent with the evidence showing the effectiveness of CCT programmes to improve health seeking behaviour, including increasing ANC coverage.[3,4,14] This study also showed that the CCT programme did not increase ANC provider quality, a finding that may account for the low impact on outcomes as previously reported. Limitations of the study include recall bias from clients and providers, and the cross sectional versus a more robust longitudinal design. Nevertheless, taken together, the gap in ANC component coverage and the ANC provider quality suggests that the improvements in coverage were likely associated with improved access because of the programme requirements, but that additional action is needed to enhance quality and outcomes.

Programmes that incentivise women such as CCTs have been shown to increase the number of patients at healthcare facilities. Higher demand for services may burden providers, which in turn may lead to lower quality of care.[14,32] Fortunately, we found no significant evidence of lower quality of care provided in response to the programme since PKH was rolled out in supply-ready communities, i.e. communities had sufficient health care providers and facilities. In this case, healthcare providers respond to higher demand on the price dimension in private practice, instead of the quality dimension.[20] When incentives are only provided to patients, we find improved health-seeking behaviour, but not improved health outcomes. In this setting, healthcare providers have no incentive to improve the quality of service

provided, and this may partly explain the limited health improvements as previously mentioned.

The role of dual practice is important in the context of many LMICs, including Indonesia. Private practice is associated with supplier-induced demand,[33,34] which tends to be associated with overconsumption of healthcare services. However, private practice is associated with increased supply of healthcare.[27] The results showed that the improvement in ANC component coverage was seen among women who sought private practice, which suggests the role of private practice in increasing women's choice set. However, private practice is also associated with higher prices, which could be a barrier to healthcare access for poor households that are not enrolled in the programme. As PKH continues to expand and the implementation of Indonesia's universal health coverage (UHC) grows, quality of care continues to be policy-relevant.[35] The interpretation of the results herein is limited by the cross-sectional analysis. The absence of longitudinal data on ANC provider quality did not allow us to capture quality changes over time. Nonetheless, the results suggest that the programme reduced inequality in access, but there may still be discrepancies in the quality dimension.[23,36,37]

The lack of improvements in the antenatal quality rendered by healthcare providers may explain the missing link between ANC clinical coverage received by women and pregnancy outcomes. These results showed the impact of the CCT programme on near-poor and poor households, which is representative of the relevant population. The Indonesia PKH CCT approach and the context in which it was deployed is similar to other programs and frontline health worker systems in LMICs, i.e. frontline midwives or skilled birth attendants providing ANC and delivery services. Moreover, as UHC programs are increasingly engaged in reimbursement of midwives and skilled birth attendants, issues of quality are increasingly emerging as potential constraints.[38] Therefore, our results may apply to similar policy settings globally. In terms of specific policy recommendation, combining demand-side programmes with a supply-side intervention to improve quality of care and increase the accountability of healthcare providers in providing better quality of care and action linked to specific ANC service components could be implemented to improve the effectiveness of health interventions. Programmes that incentivise healthcare workers such as pay-for-performance may improve the quality of service rendered. Further research should be conducted to better understand the link between healthcare access, quality of care, and pregnancy outcomes.

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**Footnotes**
**Contribution to authorship** MT was involved in formulating the hypotheses, design of the analysis and conducted the analyses, and drafted the manuscript. AHS contributed to formulating the hypotheses and the design of the analyses, assisted with interpretation of results, and revising and finalising the manuscript. Both authors had full access to all of the data in the study and can take responsibility for the accuracy of the data analysis.

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**Disclosure of interest** None declared.

**Patient consent** Not applicable.

**Ethical approval** This study was a secondary analysis of the deidentified impact evaluation survey, therefore this analysis was considered exempt from approval.

**Provenance and peer review** Not commissioned.

**Data sharing statement** Data request can be made through TNP2K Indonesia: http://www.tnp2k.go.id/en/data-indicators/-14/tnp2k-microdata-catalogue/

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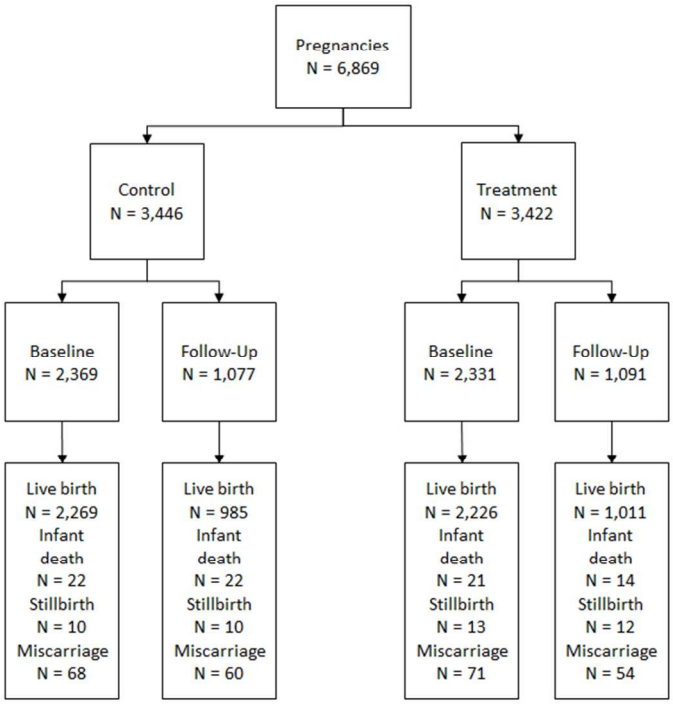


Figure 1. Study Population

71x65mm (300 x 300 DPI)

**STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology***

**Checklist for cohort, case-control, and cross-sectional studies (combined)**

| Section/Topic | Item # | Recommendation | Reported on page # |
|---|---|---|---|
| **Title and abstract** | 1 | (*a*) Indicate the study's design with a commonly used term in the title or the abstract | 1 |
| | | (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found | 2 |
| **Introduction** | | | |
| Background/rationale | 2 | Explain the scientific background and rationale for the investigation being reported | 3 |
| Objectives | 3 | State specific objectives, including any pre-specified hypotheses | 3 |
| **Methods** | | | |
| Study design | 4 | Present key elements of study design early in the paper | 3 |
| Setting | 5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection | 3 |
| Participants | 6 | (*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up<br>*Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls<br>*Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants | 5 |
| | | (*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed<br>*Case-control study*—For matched studies, give matching criteria and the number of controls per case | |
| Variables | 7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable | 4 |
| Data sources/ measurement | 8* | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group | *4* |
| Bias | 9 | Describe any efforts to address potential sources of bias | 4 |
| Study size | 10 | Explain how the study size was arrived at | 6 |
| Quantitative variables | 11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why | 7 |
| Statistical methods | 12 | (*a*) Describe all statistical methods, including those used to control for confounding | 7 |
| | | (*b*) Describe any methods used to examine subgroups and interactions | |
| | | (*c*) Explain how missing data were addressed | 7 |
| | | (*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed<br>*Case-control study*—If applicable, explain how matching of cases and controls was addressed | |

| | | | |
|---|---|---|---|
| | | *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy | |
| | | (*e*) Describe any sensitivity analyses | 10 |
| **Results** | | | |
| Participants | 13* | (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed | 6 |
| | | (b) Give reasons for non-participation at each stage | |
| | | (c) Consider use of a flow diagram | 6 |
| Descriptive data | 14* | (a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders | 7 |
| | | (b) Indicate number of participants with missing data for each variable of interest | 7 |
| | | (c) *Cohort study*—Summarise follow-up time (eg, average and total amount) | |
| Outcome data | 15* | *Cohort study*—Report numbers of outcome events or summary measures over time | 7 |
| | | *Case-control study*—Report numbers in each exposure category, or summary measures of exposure | |
| | | *Cross-sectional study*—Report numbers of outcome events or summary measures | |
| Main results | 16 | (*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included | 11 |
| | | (*b*) Report category boundaries when continuous variables were categorized | |
| | | (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period | |
| Other analyses | 17 | Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses | |
| **Discussion** | | | |
| Key results | 18 | Summarise key results with reference to study objectives | 13 |
| Limitations | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias | 14 |
| Interpretation | 20 | Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence | 14 |
| Generalisability | 21 | Discuss the generalisability (external validity) of the study results | 13 |
| **Other information** | | | |
| Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based | 14 |

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.
**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.