Expansion of Female Job Opportunities and Child Health: Evidence From Bangladesh

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December 15, 2022

Motivation

- The developing world struggling to perform on crucial health indicators like infant mortality and neonatal mortality.
  - More than 60 countries are estimated to miss their target on neo-natal mortality under Sustainable Development Goals (SDGs) 2030 laid out by the UNDP.
  - Of the countries off track to meet the SDG target on neo-natal mortality, 84% are classified as low- or lower-middle-income countries.

Motivation

- Existing literature from other countries shows evidence of relationship between:
  - women's comparatively higher preference to allocate resources towards their children's health, education and clothing (e.g. Bobonis, 2009; Duflo, 2003; Lundberg et al., 1997).
  - female employment opportunities and woman's decision-making power within the household (e.g. Majlesi, 2016; Jensen, 2012).
- Unprecedented boom in the Bangladeshi Ready-made Garment (RMG) industry in the early 1980s $\longrightarrow$ expanded employment opportunities for women in Bangladesh.

Research Question

- Does proximity to at least one garment factory affects child health outcomes?
  - Specifically infant mortality and neonatal mortality

Preview

- We use two datasets:
  1. birth-level dataset obtained from 6 rounds of the Demographic and Health Survey (DHS) conducted during 1999-2018 and
  2. garment factory dataset sourced from Mapped-in-Bangladesh (MiB).
- Exploiting the spatial and temporal variation in garment factory expansion, we examine the impact of garment factory exposure on infant mortality and neonatal mortality.

Preview (Cont.)

- Our analysis shows that the presence of garment factories in close proximity has a positive impact on child survival.
- In particular, garment factory exposure reduces:
  1. infant mortality by 9.98 percentage points,
  2. neonatal mortality by 9.95 percentage points.
- Mechanisms broadly:
  - Garment factory exposure increases the likelihood of woman being currently employed.
  - It also increases decision-making power of woman within household.

Literature Review

- Impact of macro-economic shocks like unemployment rates, recessions and booms on child health (Dehejia and Lleras-Muney, 2004, Bhalotra, 2010).
- Emergence of new employment opportunity in the locality on child outcomes (Oster and Steinberg, 2013), Atkin, 2016).
- Impact of gender-skewed employment shocks on child outcomes (Lindo et al., 2018; Majlesi, 2016; Qian, 2008).
  - (Heath, 2014; Heath and Mobarak, 2015): uses primary survey data of 4 sub-districts in Bangladesh.

Contribution

- Creation & usage of a novel database of garment factories across Bangladesh sourced from interactive maps on the Mapped-in-Bangladesh (MiB) website.
  - Our data allows us to approximate a better measure of exposure to garment factories.
- Unlike previous studies, we use 6 rounds of nationally representative survey data of households (DHS).
- The DHS data records the birth history of children ever born to a woman (the month and year of birth, and the age at death), enabling us to examine the infant and neonatal mortality indicators using a long retrospective birth history of Bangladeshi women.

Institutional Background:

The Bangladeshi Ready-Made Garment Industry

Some features of the export-oriented Bangladesh Ready-Made Garment (RMG) Industry:

(1) **Employs pre-dominantly female labor**: 60.5% of RMG workers were women in 2018 *(Source: ILO Survey)*.

(2) **Employs young labor force**: According to the 2015 ACD survey report, the average age of workers was 24.5 years (female workers: 24.2 years)

Thus the rise of RMG sector created large-scale employment opportunities for younger women in Bangladesh.

Data

We use the following two panel datasets:

1. DHS:
   - 6 pooled Demographic and Health Survey (DHS) rounds conducted in Bangladesh in 1999-2000, 2004, 2007, 2011, 2014 & 2017-18.
   - These nationwide surveys report birth histories of women,
     - including the time of their birth (in months and years), order of birth, and age at death of deceased children.
   - GPS location of each household's cluster.
2. Mapped-in Bangladesh (MIB):
   - Operating locations (GPS coordinates) of garment factories and their founding dates.

Note: For our analysis, we exclude births of children born 10 years before the survey year.

Data

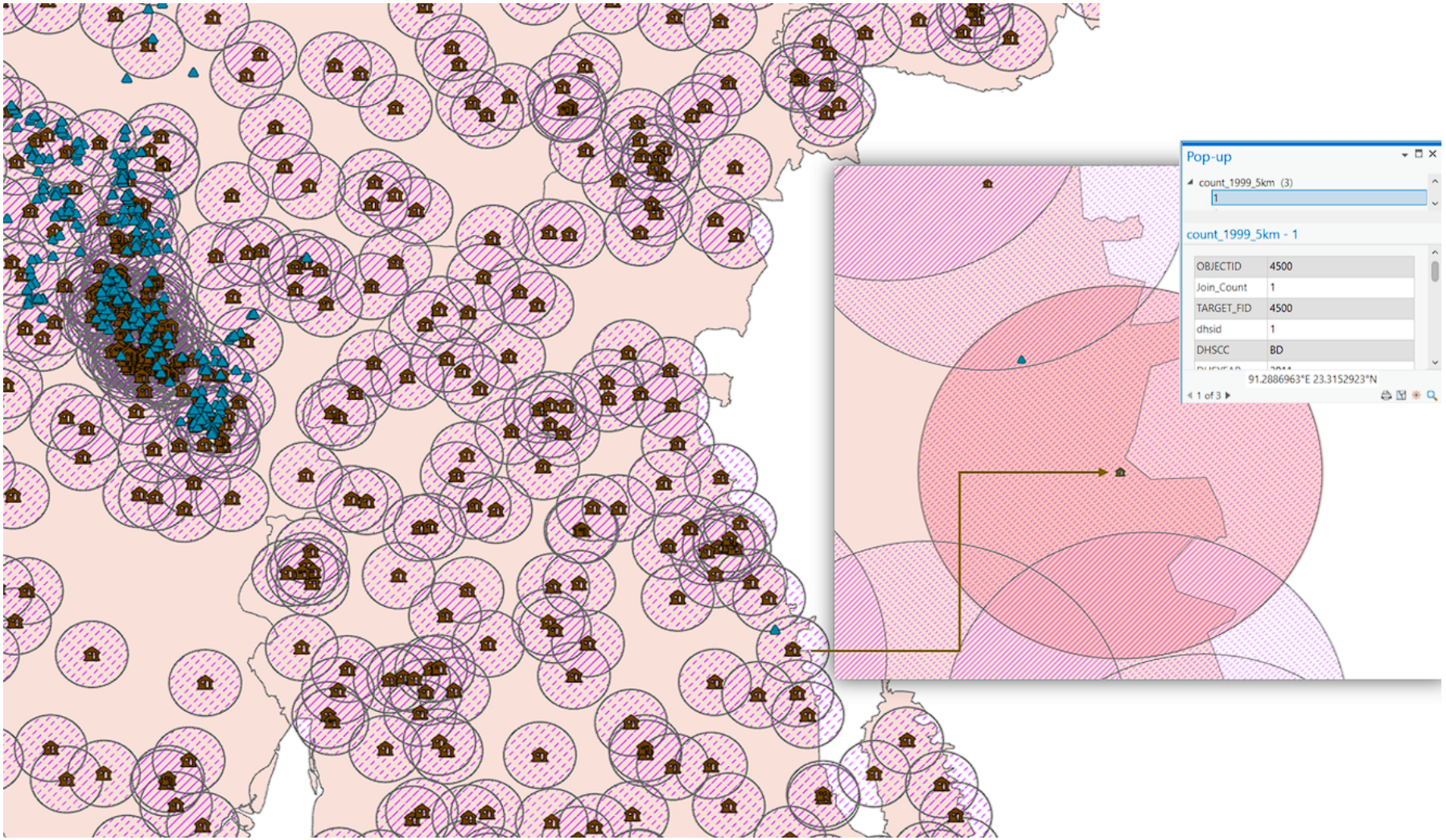

Figure 1: 5 km exposure zones around each child's GPS location, who was born in 1999 and corresponding factories established up till 1999

Data

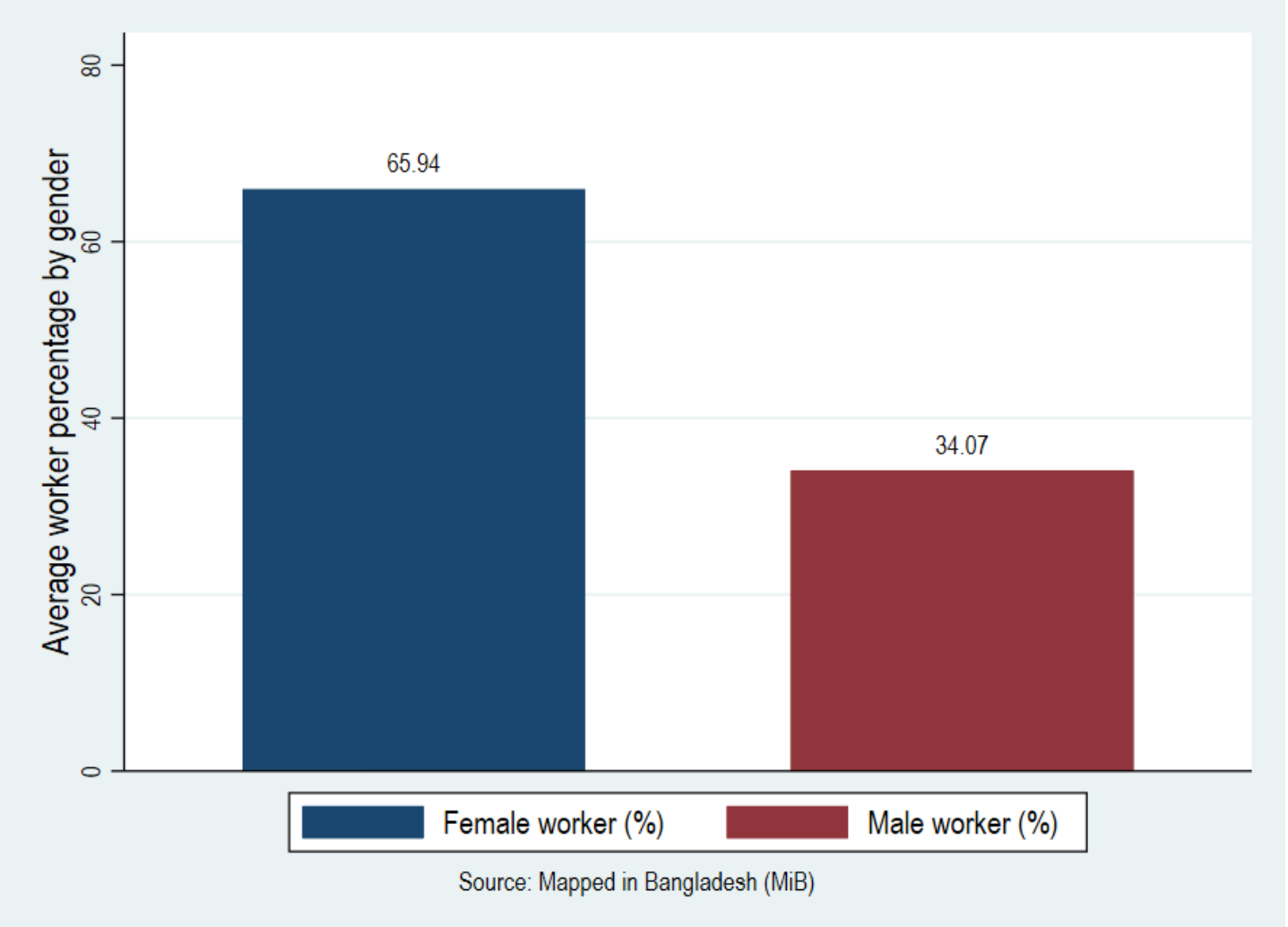

Figure 2: Average worker (%) by gender in the garment factories.

Descriptive Statistics

Table 1: Descriptive Statistics

	(1)	
	Mean	*Std.-Dev.*
Infant Mortality × 100	5.403	22.607
Neo-Natal Mortality × 100	3.796	19.109
Factory (5kms) in the Birth Year	0.121	0.326
Female	0.488	0.500
First-Born Child	0.459	0.498
Mother's Age at Birth	19.772	3.125
Rural	0.774	0.418
Muslim	0.912	0.283
Observations	52,747	

Empirical Strategy

$$Y_{icmtbdr} = \alpha_0 + \alpha_1 Treat_{cdt} + \boldsymbol{X'}_{icdt}\boldsymbol{\delta} + \gamma_t + \eta_m + \theta_{mt} + \lambda_b + \mu_d + \nu_{dt} + \rho_r + \gamma_{rd} + \epsilon_{icmtbdr}$$

where,

- $Y_{icmtbdr}$ is the mortality indicator of child i born in DHS cluster c, month m, year t, of birth order b, division d and DHS round r
- $Treat_{cdt}$ is a dummy which takes a value 1 if there exists at least one factory within 0-5 kms of the DHS cluster a child i born in year t, otherwise 0.
- γ_t, η_m, θ_{mt}, λ_b, μ_d, ν_{dt}, ρ_r, γ_{rd} are birth year, birth month, year-month, birth order, division, division-year, round and division-round fixed effects, respectively.
- $\boldsymbol{X'}_{icdt}$ is a vector of controls.
- Standard errors are clustered at DHS cluster coordinates level.

Results

Table 2: Effect of At Least One Garment Factory (within 5 Kms) on Infant and Neo-natal Mortality

	Infant Mortality×100			Neo-Natal Mortality×100		
	(1) All Sample	(2) Mothers Age at Birth <= 25	(3) Mothers Age at Birth > 25	(4) All Sample	(5) Mothers Age at Birth <= 25	(6) Mothers Age at Birth > 25
Factory (5kms) in the Birth Year	-0.640*	-0.998**	0.432	-0.757***	-0.995***	0.009
	(0.333)	(0.400)	(0.567)	(0.283)	(0.350)	(0.425)
Observations	76,511	52,736	23,774	76,511	52,736	23,774
Mean of Dependent Variable	5.189	5.402	4.701	3.523	3.795	2.902

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Effect Sizes

- Exposure to a garment factory within 5 km of a HH reduces:
  - Col(2): Infant Mortality Rate (IMR) by 0.998 percentage points, which is 18.47% of the sample mean (5.403),
  - Col(5): deaths before age of one month by 0.995 percentage points, which is 14.54% of the sample mean (3.796).
- Our estimates imply:
  - that approx 36.6 thousand less infant deaths per year due to the exposure of garment factory.
  - Similarly, approx 35.5 thousand less neo-natal deaths per year due to the exposure of garment factory.

Robustness Checks

(I) Varying radii of the exposure variable

Table 3: Effect of At Least One Garment Factory (within X Kms) Across Varying Radii

	(1) Infant Mortality×100	(2) Neo-Natal Mortality×100
Factory (2kms) in the Birth Year	-1.062**	-1.159***
	(0.422)	(0.364)
Factory (3kms) in the Birth Year	-0.992**	-1.032***
	(0.412)	(0.357)
Factory (5kms) in the Birth Year	-0.998**	-0.995***
	(0.400)	(0.350)
Factory (8kms) in the Birth Year	-1.144***	-1.073***
	(0.384)	(0.341)
Factory (10kms) in the Birth Year	-0.894**	-0.875***
	(0.380)	(0.325)
Observations	52,736	52,736

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Robustness Checks

(II) Varying mother's age at birth sample restrictions

Table 4: Robustness to Differing Age Cut offs for Mother's Age at Birth

	Infant Mortality×100				
	(1) Mothers Age at Birth <= 25	(2) Mothers Age at Birth <= 30	(3) Mothers Age at Birth <= 35	(4) Mothers Age at Birth <= 40	(5) Mothers Age at Birth <= 49
Factory (5kms) in the Birth Year	-0.998**	-0.739**	-0.684**	-0.668**	-0.640*
	(0.400)	(0.340)	(0.329)	(0.324)	(0.333)
Observations	52,736	66,677	73,460	76,054	76,511
	Neo-Natal Mortality×100				
	(1) Mothers Age at Birth <= 25	(2) Mothers Age at Birth <= 30	(3) Mothers Age at Birth <= 35	(4) Mothers Age at Birth <= 40	(5) Mothers Age at Birth <= 49
Factory (5kms) in the Birth Year	-0.995***	-0.865***	-0.748***	-0.735***	-0.757***
	(0.350)	(0.297)	(0.286)	(0.282)	(0.283)
Observations	52,736	66,677	73,460	76,054	76,511

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Robustness Checks

(III) Controlling for mother's years of education

Table 5: Controlling for Mother's Education

	Infant Mortality×100	Neo-Natal Mortality×100
	(1)	(2)
Factory (5kms) in the Birth Year	-0.966**	-0.977***
	(0.397)	(0.349)
Observations	52,699	52,699

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Robustness Checks

(IV) Relaxing sample restrictions

Table 6a: Robustness: Relaxing Sample Restrictions on IMR

	(1)	(2)	(3)	(4)
Factory (5kms) in the Birth Year	-0.998**	-1.141***	-1.151**	-0.996**
	(0.400)	(0.310)	(0.473)	(0.398)
Under-13 Birth Restriction	yes	yes	yes	no
Multiple Birth Restriction	yes	yes	no	yes
Born within 10 Years of Interview Restriction	yes	no	yes	yes
Observations	52,736	162,432	54,126	52,866

Table 6b: Robustness: Relaxing Sample Restrictions on NNMR

	(1)	(2)	(3)	(4)
Factory (5kms) in the Birth Year	-0.995***	-0.865***	-1.118***	-0.992***
	(0.350)	(0.255)	(0.423)	(0.349)
Under-13 Birth Restriction	yes	yes	yes	no
Multiple Birth Restriction	yes	yes	no	yes
Born within 10 Years of Interview Restriction	yes	no	yes	yes
Observations	52,736	162,432	54,126	52,866

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Robustness Checks

(V) Alternative definition of the infant mortality variable (0-11 months)

Table 7: Robustness to Alternative Definition of IMR (excluding children who died in 12 months)

	(1) Infant Mortality (0-12 months) $\times$ 100	(2) Infant Mortality (0-11 months) $\times$ 100
Factory (5kms) in the Birth Year	-0.998**	-0.930**
	(0.400)	(0.401)
Observations	52,736	52,736

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Threats to Identification

1. Migration
   - Sample restriction: births of children born to mothers residing in the place of interview for more than or equal to 1-year before the birth of the child.
   - Sample restriction: births of children whose household's never migrated.
2. Selection of type of children born in garment proximate areas
   - Probability of being a female child in the treated area.

Threats to Identification

(I) Migration

Table 8: Robustness to Migration

	Infant Mortality×100			Neo-Natal Mortality×100		
	(1) Main Sample	(2) Born After Migration	(3) Always Resident	(4) Main Sample	(5) Born After Migration	(6) Always Resident
Factory (5kms) in the Birth Year	-0.998**	-1.262**	-1.296	-0.995***	-1.283***	-2.213*
	(0.400)	(0.602)	(1.566)	(0.350)	(0.495)	(1.219)
Observations	52,736	26,896	4,355	52,736	26,896	4,355

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Threats to Identification

(II) Probability of being a female child in the treated area

Table 9: Effect of At Least One Garment Factory on the Probability of Being a Female Child (within 5 Kms)

	(1) Female Child
Factory (5kms) in the Birth Year	-0.006
	(0.010)
Observations	52,736

Mechanisms

Table 10: Effect of At Least One Garment Factory (within 5 kms) on Women's Work Status

	(1) Currently Working
Factory (5km) in the Year of Interview	0.084***
	(0.017)
Division Fixed Effects	Yes
Year Fixed Effects	Yes
Division×Year Fixed Effects	Yes
Round Fixed Effects	Yes
Division×Round Fixed Effects	Yes
Individual and Household Controls	Yes
Observations	22,510

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Mechanisms

Table 11: Effect of At Least One Garment Factory (within 5 kms) on Women's Say in Household Decision Making

	(1) Her Health Care	(2) Visit to Relatives	(3) Large HH Purchases
Factory (5km) in the Year of Interview	0.047***	0.057***	0.058***
	(0.017)	(0.017)	(0.018)
Division Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Division×Year Fixed Effects	Yes	Yes	Yes
Round Fixed Effects	Yes	Yes	Yes
Division×Round Fixed Effects	Yes	Yes	Yes
Individual and Household Controls	Yes	Yes	Yes
Observations	22,135	22,086	22,063

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Conclusion

- Exploiting spatial and geographical variation in garment factories across Bangladesh, we examine the impact of exposure to garment factory on child survival.
- We find that, on average, children who were born close (within 5 kms) to at least one garment factories in their birth year are faced with lower infant and neo-natal mortality compared those who were not.
- We also find evidence for increased probability of working status of women and comparatively higher decision making power amongst the exposed women.
- In sum, our results indicate that unprecedented increase in female job opportunities via the expansion of the Bangladeshi garment sector
  - $\Longrightarrow$ increase in female autonomy and relative bargaining power within the household.
  - $\Longrightarrow$ improvement in the chances of survival of their children.

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