UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

**WORKING PAPERS IN ECONOMICS**

**No 590**

# Bridging the Gap for Roma Women: The Effects of a Health Mediation Program on Roma Prenatal Care and Child Health

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**April 2014**

**ISSN 1403-2473 (print)**
**ISSN 1403-2465 (online)**

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**Bridging the Gap for Roma Women:**

**The Effects of a Health Mediation Program on Roma Prenatal Care and Child Health**[*]

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This version: April 2014

## Abstract

Roma, Europe's largest minority, face poverty, social exclusion and life-long inequalities, despite the intensified efforts to alleviate their plight. Surprisingly, despite substantial funding aimed at improving Roma outcomes, there is a very little evidence on the effectiveness of these programs. This is the first paper to analyze the Roma Health Mediation Program (RHM), a large-scale public health program implemented first in Romania and developed further in other countries, whose main aim was to improve the health status of pregnant and postpartum Roma women and children, with the help of specially trained Roma health mediators. Using unique registered data from Romania, we exploit the spatial and temporal variation in implementation dates of the program to investigate the effects of the RHM on prenatal care take-up rates and child health. We find that the program had a very large impact on the take-up of prenatal care services, but this improvement was not reflected in the health outcomes at birth of Roma children. However, we do find evidence of decreased stillbirths and infant deaths after the program implementation.

**JEL classification codes:** J13; J15; I14

**Keywords:** Roma; exclusion; poverty; program take-up; health at birth

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We thank the Roma Center for Health Policies (SASTIPEN) for kindly providing the data on the program implementation and other helpful comments. We also thank Kristian Bolin, Randi Hjalmarsson, Björn Lindgren, Mikael Svensson, Måns Söderbom and seminar participants at University of Gothenburg and SWEGPEC for very helpful comments on earlier versions of this paper.

# 1. Introduction

Roma ethnics, Europe's largest minority with over 8 million individuals, face poverty, social exclusion and life-long inequalities, despite the intensified institutional efforts to alleviate their plight. Relative to non-Roma, Roma minority in Europe are more likely to live in poverty, as about 90 percent of the Roma live below national poverty lines. They have significantly less schooling: Roma enrollment in primary education does not exceed 50 percent; and worse labor market outcomes: less than one-third of Roma have a paid job. They also have lower health status and less access to health services; Roma are more likely to suffer from chronic illness, and their average life expectancy at birth is, on average, ten years less than other European citizens (UNDP 2011).

While up to €26.5 billion of EU funding is currently available for programs aimed at improving the situation of Roma ethnics, there is little evidence on these programs' effects on the targeted outcomes. Moreover, although a growing body of literature investigates the causes of low take-up rates of social programs despite high need and eligibility, to our knowledge there is no study which has addressed the issue in the context of an ethnically targeted program. This paper attempts to provide evidence on these matters by analyzing the effects of a major public health program designed for improving the health outcomes of Roma ethnics, and especially Roma women and children: the Roma Health Mediation program (RHM). The RHM program was implemented gradually starting in 2002 in Romania, a country hosting one of the largest Roma minorities in Europe.[1] Despite the continued growth of the program in Romania and in several other countries with a large Roma minority,[2] the effectiveness of this program has not yet been established. In this paper, we investigate the effects of the RHM program on prenatal care take-up rates and child health at birth using unique data of all registered live births, still births and infant mortality in Romania over the period 2000-2008.

The main goal of the RHM was to improve the health status of pregnant and postpartum Roma women, infants and children by providing basic health education and better communication between the Roma ethnics and healthcare practitioners, with the help of the Roma health mediators –women from the local community trained and employed by the Romanian Ministry of Health. Mostly through direct home visits, the mediators assisted Roma women in seeking primary care from family physicians, usually by accompanying them during the medical visit. For pregnant women, the mediators explained the necessity of prenatal care and informed them about the right to free preventive care during the prenatal period, but they were not allowed to provide any direct medical assistance. Their main aims were to stimulate the demand side of medical care by increasing the take-up of health

[1] The Roma Health Mediation program was subsequently implemented in Bulgaria (2003), Slovakia (2005), Moldova (2006), Serbia (2008), Macedonia (2009) and Ukraine (2010), following the Romanian RHM model. The Roma minority is the third largest ethnic group in Romania, with 619,000 (3.2% of the total population) self-identifying as Roma in the 2011 census, while unofficial estimates put the number of Roma in Romania at 2 million (European Commission, 2011).

[2] The Roma Health Mediation program was subsequently implemented in Bulgaria (2003), Slovakia (2005), Moldova (2006), Serbia (2008), Macedonia (2009) and Ukraine (2010), following the Romanian model.

services to which Roma ethnics were already entitled to; facilitate communication with family physicians; and increase awareness and knowledge of health-related issues among the Roma community.

Understanding the impact of the program on maternal and child health outcomes is especially important as the economic literature has established that health status and health behaviors have causal impacts on education, employment, income and earnings and even criminal activity. Moreover, there is a growing body of evidence suggesting that health-induced inequalities start even before birth, in the prenatal period, and widen as the individual ages. For example, birth weight, which is a crude indicator of fetal health, has been shown to be a strong predictor of human capital and labor market outcomes (Black et al. [2007]; Currie and Moretti [2007]; Royer [2009]; Bharadwaj et al. [2010]). In addition, *in utero* insults that affect fetal health have large and persistent effects on later life outcomes (see Almond and Currie [2011a] and [2011b] for comprehensive reviews of this literature). Given this evidence, by promoting effective prenatal care, the RHM is expected to reduce the health inequalities which Roma children face from birth, which, in turn, would weaken the intergenerational transmission of poor health and other associated outcomes.

Our analysis also contributes to the literature regarding the causes of the low-take up of governmental programs. There is a growing literature that argues that factors such as lack of knowledge about the program, hassle costs (complicated application process or long wait time) and procrastination are important barriers which explain the low take-up of welfare programs (see Bertrand et al. [2006] for a review). Asuming [2013] finds that lack of information is an important deterrent of social health insurance take-up and utilization of healthcare services among the poorest households in Ghana. Aizer [2007] shows that outreach programs are successful in increasing the take-up rate of Medicaid among already eligible individuals, especially for minorities that face language barriers, and improve health status by increased use of preventive care and lower hospitalization rates for preventable diseases. Currie and Grogger [2002] find that administrative measures to encourage the use of prenatal care among Medicaid-eligible women were successful in increasing prenatal care take-up rates and reduced fetal deaths, especially for Black ethnics. These finding stress the importance of outreach programs for marginalized groups which increase the information about already available services, by reducing the non-price barriers to care.

Information and health education, especially for disadvantaged groups, have also been shown to be effective means of increasing health status and reducing disease burden. Dupas [2011] showed that school information campaigns about HIV prevalence by age significantly reduced teenage childbearing rates with older partners, consistent with an information transmission model of health education. However, the bulk of the evidence points towards the existence of complementarities between health education and subsidies, with the effect of the information being stronger in the presence of price effects (Ashraf et al. [2013]; Duflo et al. [2006]).

In our empirical exercise we seek to answer two questions related to the impact of the RHM program: (1) whether the program increased prenatal care take-up rates for Roma ethnics, a highly disadvantaged population and (2) whether the program affected Roma children's health outcomes at birth.

As the RHM program was not randomly implemented in localities, we employ a difference-in-difference strategy in which we exploit the spatial and temporal variation in implementation dates of the program. Because the official data about the program contains information on the Roma health mediators employed in each area starting in 2002 when the program was first initiated, at the locality level, our estimates need to be interpreted as Intended to Treat. This encourages us to analyze our results separately for urban and rural areas, as we are more likely to uncover the true effects at the village level. Our main source of register data are the Vital Statistics Natality files, which contain all registered births in Romania, with information on mothers ethnicity, their prenatal behavior and the health outcomes at birth of their children, leading to a sample size of about 14000 children declared of Roma ethnicity. Additionally, we also use locality level information on still births and infant mortality.

Our findings indicate that the RHM program successfully improved the prenatal health-seeking behavior of Roma women. For rural areas, there was a 7 percentage point increase (13% of the mean) in the prenatal care rate for children born up to two years after the implementation of the program relative to children born before the program implementation in their locality of residence, and a 30 percentage point increase (56% of the mean) in prenatal care rates for children born more than two years after the program initiation in their locality. Similarly the effect on the number of months under prenatal supervision show a half month increase (16% of the mean) for the children born up to two years after the program initiation, but a roughly two month increase (52% of the mean) for the children born more than two years afterward. However, these very large improvements in prenatal care related outcomes are not reflected in an improvement in the health at birth of children, as measured by multiple indicators. In urban areas the effects are largely in the same direction, but much smaller in magnitude and not statistically significant. These effects do not appear to be driven by a sample selection in terms of mothers' observable characteristics. We find significant decreases in the numbers of stillborn children and infant mortality at locality level. Finally, using additional survey data we attempt to explore the mechanisms underlying the observed effects.

The rest of the paper is structured as follows. Section 2, presents the Roma Health Mediation program, with focus on the implementation process at the locality level. Section 3 describes the data and our identification strategy, while Section 4 presents our main results and indirect program effects. Section 5 provides a series of robustness and falsification tests and Section 6 discusses the potential channels which could explain the results. Finally, Section 7 concludes our paper.

## 2. The Roma Health Mediators Program

### *2.1 The program's aims*

The Roma Health Mediation (RHM) program was initiated in 2002 by the Romanian Ministry of Health as part of a National Strategy for Improving the Roma Situation, which focused primarily on improving Roma's health and education, and was rolled out gradually in localities with high Roma populations, starting with only 42 localities in 2002 and reaching about 300 in 2008.[3]

The program aimed to improve the health of Roma ethnics, and especially of pregnant and postpartum Roma women, infants and children, by facilitating access to health care services and providing them basic health education, through mediation provided by specially trained Roma women (mediators) from the local communities.[4] More specifically, one of the main aims of the RHM program was to increase pre- and post-natal care among Roma women as, just before the program was implemented, only about 40% of Roma mothers attended prenatal health care appointments compared to more than 70% of Romanian mothers. The mediators explained the necessity of prenatal appointments and also accompanied Roma women to the healthcare practitioners (if necessary), facilitating their communication with the doctors. Social norms, lack of financial resources and language barriers are often cited as the main reasons for not attending prenatal health appointments.[5]

Additionally, the mediators were trained to inform pregnant Roma women and women with children about their right to free public medical insurance, which entitles children less than 18 years of age and pregnant women with no income to free preventive medical care (as well as emergency care) without the payment of an insurance contribution. This is particularly important because most Roma women, especially in rural areas, are housewives with no formal employment and often no identification papers (birth certificates and IDs). For pregnant and postpartum women, the RHM promoted the

[3] The program ran at a much smaller scale under the coordination of an NGO from 1996 until 1998, and expanded as a pilot program during 1999-2001. The implementation continued after 2009 but at a slow speed, largely because of the decentralization process - in which the program was transferred from the authority of the Ministry of Health to the Local Councils of the localities in which it operated. Also, following the drastic austerity wage cut measure implemented in Romania (Bejenariu and Mitrut, 2013) many health mediators have left their jobs.

[4] For a detailed description of the program and its implementation see the RHM case study by WHO (2013). However, it is important to mention that both the gender and ethnic component of the mediators were essential for the program: health mediators were expected to approach sensitive issues (such as prenatal care), whereas in many Roma castes strong social norms forbid these discussions with/in the presence of men. Additionally, having a Roma woman from within the community would increase her acceptability and effectiveness through a higher level of trust toward the mediator and an in-depth knowledge of the mediator about specific local social norms, culture and circumstances

[5] Language is often a barrier in seeking and receiving medical assistance, as a considerable share of Roma ethnics speak only Romani *chib*, the traditional language, unrelated to the official Romanian language spoken by family physicians.

importance of breastfeeding, healthy nutrition and basic information about reproductive health.[6] It is important to note that the mediators were not authorized to perform any medical act.

The mediators mostly engaged in fieldwork, providing home outreach services by conducting house visits to the Roma ethnics. This reduces the potential self-selection of the individuals who received RHM counseling, which would have occurred had the program not been designed as a home outreach program. Finally, one Roma woman health mediator served a population of 500 to 750 Roma individuals, counted as children up to 16 years of age and fertile age women.[7] For more information about the RHM please see Appendix C.

### *2.2 Program implementation*

In 2002, implementation of the RHM program started in 42 localities and reached 281 localities in 2008, served by 419 employed RHM.[8] Figure 1 shows the evolution of the number of localities in which the program was implemented. Although the program formally continued after 2009, in our empirical analysis we will only consider the 2002-2008 time span because in 2009 the RHM program was transferred from the authority of the Ministry of Health to the Local Councils of the localities in which it operated. As a consequence, the initiation rate decreased significantly and there is evidence that lack of funding related to the economic crisis affected program efficiency (and even operation) in the localities which had previously entered the program.[9]

Because the program implementation was not randomized, with local authorities choosing to apply for their locality to enter the RHM program, a methodological concern is that locality characteristics which determine selection are not orthogonal to unobservable factors that also affect prenatal care take-up and child health outcomes. Understanding the selection of localities into the program and the timing of implementation among the localities that do enter the program is important for our identification strategy. Figure 2 presents the timing and the geographical distribution of the localities in which the program was implemented.

According to official information from the Ministry of Health, the selection of localities was drawn up by the Commission of Roma Minority (within the Ministry of Health) and considered: 1) the Ministry's budget constraint, 2) the requests from the District Public Health Authorities and, most importantly, 3) the collaboration capacity of Roma civil society in the localities targeted. Overall, it is

[6] Starting in 2005, the RHM also aimed at educating Roma women on basic notions about family planning and contraceptive use. However, the RHM did not have the authorization to perform any medical procedure or to distribute contraceptives. In our regressions, we will control for the counties in which the mediators had some additional training for family planning.
[7] This norm was often inapplicable, with health mediators serving larger communities.
[8] These numbers are likely to be slightly higher because the original database we used to identify the localities in which the program was implemented (provided by SASTIPEN), did not record the year of initiation of the program for 43 localities and the date of employment for 96 trained health mediators; either they were not employed, or their date of employment is missing from the records.
[9] The negative effects of the economic crisis were beginning to show and, due to the tightened budgets of the local authorities, a large number of health mediators were not re-employed by the local councils (WHO Regional Office for Europe, 2013).

commonly agreed that the civic engagement of the local Roma communities and the involvement of the main political party representing the Roma minority (*Partida Romilor*) played the most significant role in the selection of the localities and the timing of the implementation of the mediation program.[10] In Appendix A, Table A1, we show the main characteristics of the localities which were included in the RHM program and those which were not included.

To understand the selection of localities and the timing of implementation, we use a discrete-time hazard model of the probability of a locality being included in the RHM program and the timing of implementation, as a function of a broad set of time-varying and time-invariant covariates (see also Galiani, Gertler and Schargrodsky 2005), presented in detail in Appendix B. We set up the hazard rate as a Cox proportional hazard. The event (hazard) we are modeling is RHM program implementation; "failure" is thus represented by the RHM program starting in a given year, and "survival" implies that the locality did not implement/was not selected to implement the RHM program in a given year.[11]

Table 1 presents the maximum likelihood estimation results for the Cox proportional hazard model, where the coefficients are exponentiated for ease of interpretation, and are to be read as hazard ratios, for all localities in columns (1)-(2), and separately for rural and urban communities in columns (3)-(4) and (5)-(6) respectively. In the even columns we include time invariant community characteristics (as measured at the 2002 Census) reflecting Roma civic participation, the development level of the locality, the population, the share of Roma ethnics, and the socio-economic composition of the residents at the locality level. In the odd columns we add time-varying characteristics (at the locality level) related to fertility, maternal socio-economic status, infant health, the provision of medical services, such as the number of family physicians and the number of medical units. Standard errors are clustered at the county level.

The results confirm that the variables reflecting Roma civic involvement and the Roma population are important in determining the introduction and timing of the Roma Health Mediation program, especially so in the rural communities. The Roma civic involvement is an important characteristics because, according to the information obtained from the SASTIPEN NGO, the RHM was implemented indeed in active and large Roma communities, not based on official statistics as Roma population may be underreported. Local social development index (as defined in Appendix B) plays only a marginally significant role in determining the program initiation rate. Also, localities with a larger share of inactive population have a significantly higher hazard rate indicating that more disadvantaged localities introduced the RHM earlier. Next, we add time-varying covariates such as Roma prenatal care rates, Roma birth rate and stillbirth rates, the share of Roma mothers with any

[10] Information was provided by the Roma NGO SASTIPEN, the Roma Center for Health Policies.

[11] Cox proportional hazard, as a semi-parametric model, imposes no restrictions on the functional form of the baseline hazard, and makes no assumptions about the shape of the hazard over time. The only assumption is that, regardless of the shape of the hazard, it is the same for all subjects, which in our case are the localities; given the nature of the RHM program and the implementation criteria, this assumption appears to hold.

schooling and other variables that capture the supply side of health care: the number of family physicians, the number of doctors, or the number of medical facilities. These time-varying covariates, and especially those related to infant health, are not significant determinants of the hazard rate; this alleviates, to a certain extent, the concern that program implementation is correlated with some time-varying unobserved characteristics of the localities which also influence our outcomes of interest. Thus, an identification strategy that includes locality and year fixed effects and locality-specific time trends can plausibly retrieve the causal effects of the program on the outcomes of interest.

# 3. Data and methodology

## *3.1 Data*

In our empirical exercise we use information from several data sources. The two main sources of data are the 2000-2008 Vital Statistics Natality (VSN) files and the Roma health mediators' registry. In addition, we use the 2000-2008 Vital Statistics Mortality files to identify stillbirths and the 2000-2008 Mortality files to identify infant deaths.

The VSN records cover the universe of births from individual birth certificates, with detailed information about the newborns and the socio-economic characteristics of the parents, including ethnicity and the locality of residence at the time of birth, identified through a *SIRUTA superior code.*[12] In particular, we know: (a) child characteristics: day, month and year of birth, gender, ethnicity, whether single or multiple birth, birth weight and duration of gestation in number of weeks; (b) information about the mother: day, month and year of birth, occupational status, education, marital status and date of marriage, county and locality of residence, together with detailed information about her fertility history, such as number of births (children born alive and fetal deaths), the number of prenatal visits and an indicator for home delivery; (c) some information about the father: day, month and year of birth and his occupational status. Because the RHM program was designed to help Roma ethnics exclusively, in our main analysis we restrict the VSN sample to children whose ethnicity is registered as Roma. Ethnicity is declared by the parents when the birth is registered at the local authority. One concern here is that we may not capture the entire Roma population.[13] We will come back to this issue later.

The Vital Statistics Mortality files register all pregnancies carried to term ending in still births, and have a similar informational structure to the VSN files, except the ethnicity variable. The Mortality files register all deceased individuals and record several individual characteristics, but does not record

[12] The SIRUTA superior code identifies the lowest level of administrative unit, equivalent to the LAU level 2, formerly NUTS level 5, as defined by Eurostat

[13] The 2001 Barometer of Interethnic Relations revealed that around 30% of the ethnics self-identify as Roma and 33% declare themselves Romanians, while the remainder identify themselves according to regions in which they live. Given that ethnic identification according to the region where the family lives is not possible when registering the birth at the Population Registry Office, we conclude that VSN records capture the majority (close to 70%) of true Roma ethnics.

any information about the parents and their ethnicity; we define infant deaths as deaths occurring before and including the age of one year.

To identify the localities in which the Roma Health Mediation program was implemented we use registries provided by the Roma NGO SASTIPEN,[14] which contain information on all Roma health mediators ever employed in the program starting in 2002, with their date of employment and the community in which they operate, recorded at the lowest geographical level. For urban settlements, the database registers the city, whereas, for rural settlements, the database registers the village, identified through a *SIRUTA inferior* code (several villages are administratively organized in a commune, identified by the *SIRURA superior* code; we henceforth refer to all administrative units identified through a *SIRUTA superior code* as localities).[15] Using the *SIRUTA inferior* code of the village, we can identify the locality to which the village belongs, which we can then match with the VSN data, and we define the treatment at the locality level. On average, localities in Romania comprise 6.3 geographical units (typically villages), with an average population of 800 in each unit (village). The treated localities, as defined, comprise, on average, 5.5 units. We retrieve the initiation date of the program at the locality level as the earliest date a mediator is employed in the locality.[16]

Given that there is no record on whether the mother received counseling from a Roma health mediator, our estimates need to be interpreted as Intended to Treat (ITT). Moreover, given that we define treatment at the locality rather than the village level, they are also lower bounds - there may be Roma ethnics residing in villages within a treated locality who were not in fact served by a Roma health mediator. Because we observe only the ITT, we will show our results separately for rural and urban communities, as the results for the rural areas are more likely to uncover the true effect, while the results for the urban sample are expected to be biased toward zero. This is because, in large cities, it is more likely that the reported Roma in VSN are not treated by the RHM. Moreover, previous qualitative studies analyzing the RHM program suggest that the success of the RHM program hinged on the receptiveness of the community. These studies suggest heterogeneous effects based on the type of locality (rural vs. urban areas). Additionally, one possible concern is related to the ethnic self-identification in the VSN data. A large body of evidence in different social sciences discusses the self-

[14] The public authorities do not have a centralized official list of the health mediators, even though the health mediators were public employees employed by the District Public Health Authorities between 2002 and 2008.

[15] The village, identified through its SIRUTA inferior code, is defined as a rural human settlement that is not a legal local administrative unit, but is assigned to a superior administrative unit, the locality (commune), which is the local administrative unit identified through the SIRUTA superior code.

[16] Two issues arise: unknown employment dates (for 17% of the listed mediators) and incomplete employment dates, in which we only know year of employment, but not the exact month (23% of the listed mediators). For the localities for which we cannot retrieve the initiation date due to unknown employment dates of the mediators, we verify whether they differ in a wide array of socio-economic characteristics and from the localities for which we do know the initiation date; they do not, and hence we exclude them from the analysis. For the localities in which we only know the year of initiation, we either adjust the initiation date at the locality level by using additional data sources or impute an initiation date of July 1. Our results are not sensitive to these adjustments.

identification issues in studies that look at the Roma population (Kligman 2001; Ladanyi and Szelenyi 2001; Csepeli and Simon, 2004). The evidence so far (see Ladanyi and Szelenyi 2001) indicates that self-identification among Roma is indeed more problematic in large cities, where self-identification under-estimates the Roma population, especially among the more educated people, but is of less concern in smaller, more traditional communities, where people speak the Romani language and have more traditional social norms.

For our empirical exercise we restrict our sample to Roma children born between 2000 and 2008 in the localities in which the RHM program is initiated until 2008, leading to a sample size of 13,685 observations for most of the analysis except when we look at the prenatal control and month of first prenatal check-up, which were not recorded in VSN for 2 years, leaving us with a sample of 10,885 observations for these outcomes.

### *3.2 Outcomes*

We will evaluate the effect of the RHM program on several individual level outcomes: (i) prenatal medical supervision take-up and, in particular: a prenatal care indicator equal to one if the mother had any prenatal care (and 0 otherwise), the month of the first prenatal medical check-up, and two indicators for whether the birth occurred in a hospital and a doctor was present at the birth; (ii) child health at birth measured by: birth weight, a low birth weight indicator (birth weight below 2,500 grams), gestation length (in number of weeks) and premature delivery (defined as birth before week 37 of gestation); (iii) the probability that the child is female, given that the sex ratio at birth may be influenced by in utero development conditions via the selection in utero mechanism.[17]

Table 2 presents the average difference between pre-treatment and post-treatment outcomes and maternal characteristics at the locality level, for all treated localities and also separately for rural and urban communities. From these simple differences the program appears to have improved prenatal care rates and increased the number of months under prenatal supervision, especially for rural localities, but the improvements in child health do not appear large.

Finally, we also investigate several outcomes measured at the locality level, which may have been affected by the RHM program: (iv) cohort size (number of live births), (v) stillbirths and (vi) infant mortality.

### *3.3 Identification strategy*

Because the RHM program was not randomly implemented, we will use a difference-in-difference strategy in an attempt to retrieve the causal effect of the programs on the outcomes of interest. We

[17] The selection in utero theory hypothesizes that weaker fetuses are spontaneously aborted because of significant maternal stress(ors) during early prenatal development, and that the weak male fetuses are being aborted more often than weak female fetuses as they are more predisposed to abnormalities than female fetuses [Kraemer 2000]. Improving the prenatal conditions may lead to lower levels of spontaneous abortion, which could be reflected in an increase in the number of live male births.

have shown in the previous section that the RHM implementation was not correlated with time-varying characteristics of the locality or outcomes of interest in the pre-implementation period and the selection into the program and the timing of the initiation was determined by what we consider time-invariant characteristics. These findings prompt us to employ an identification strategy in which we exploit both the timing and the geographical variation in the program implementation, controlling simultaneously for year fixed effects and locality fixed effects. By comparing outcomes between localities within same year, we control for unobserved cohort characteristics, whereas by comparing outcomes within the same locality between years we circumvent issues created by unobserved heterogeneity at the locality level. In our specifications, we also control for locality-specific time trends to allow for a differential development of the outcomes of interest and to control for unobserved locality characteristics that evolve differently over time between localities and that may affect our outcomes.[18]

The specification we estimate is the following:

$$y_{ilt} = \alpha + \beta_1 Exposure02_{ilt} + \beta_2 Exposure24_{ilt} + \beta_3\, Exposure47_{ilt} + \gamma' X_{ilt} + \theta_l + \theta_t + \theta_m + \theta_l t + \varepsilon_{ilt} \qquad (1)$$

where *i* indexes a child, born in locality *l,* in year *t*. $y_{ilt}$ is our outcome of interest at the individual level (as defined before). The exposure variable reflects whether or not there was at least one mediator active in the locality at the time of birth.[19] To account for non-linear effects of the length of exposure, we use three indicators: $Exposure02_{ilt}$, $Exposure24_{ilt}$ and $Exposure47_{ilt}$ , which show whether the program was implemented up to two years before birth, between two and four years before birth, or between four and seven years before birth, respectively.[20, 21]

$X_{ilt}$ is a vector of background characteristics: child's gender, mother's age at birth and its square, whether the mother has any education, marital status, whether the mother is a housewife (as opposed to employed outside the home), child's parity, number of children alive, an indicator for home delivery, an indicator if father's information is registered (proxy for the father's legal recognition of the child), and the father's age and its square together with indicators for his employment status. We also include an indicator for conception after January 2007 in counties where the Roma health

[18] When we do not include locality-specific time trends, our results are very similar in terms of significance, but slightly smaller in magnitude.

[19] We also test additional indicators: 1 if there was a health mediator in the locality of residence at the conception date of the child and 0 if the mediation program in the locality started after the birth of the child; and 1 if there was a health mediator in the locality at least a year before the conception date of the child and 0 if the mediation program in the locality started after the birth of the child. The results are in line with our findings using our preferred treatment indicator. Please note that because of the nature of the data, we do not know whether more than one mediator was employed in the same time in a locality and we cannot estimate a "dose-response" relationship.

[20] In an alternative specification we define treatment at the conception-month level. Instead of birth-year fixed effects, we have conception month-year fixed effects, with all the other covariates the same. The results are virtually unchanged compared to our main specification.

[21] In Appendix A, we present the results when the treatment is defined as a single binary exposure indictor that equals 1 if the child is born in a locality where the RHM program was implemented at any point before the birth of the child and 0 if the RHM program started after the birth of the child.

mediators received extra training on reproductive health. $\theta_l$ and $\theta_t$ are locality and year of birth fixed effects, while $\theta_l t$ represents locality-specific trends. $\theta_m$ represents month of birth fixed effects. We cluster standard errors at the locality level. Finally, as explained in section 3.1 we will show our main results separately for the rural and urban sample.

# 4. Results

## *4.1. Individual level outcomes*

We show the results for the medical take-up rates (in Table 3) and for the child health outcomes at birth (Table 4), for the rural localities in Panel A and for urban localities in Panel B (results for the full sample are presented in Appendix A). For each outcome, we first present the baseline estimates, with only locality fixed effects and locality time trends, without controlling for individual level characteristics and month of birth indicators, whereas in the second column we include the full set of controls.

In Table 3, shows that for the rural subsample, there are large and significant increases in the two outcomes related to prenatal supervision take-up: whereas there is a 7 percentage points increase (13% of the mean) in the prenatal care rate for children born up to two years after the implementation of the program relative to children born before the program implementation in their locality of residence, there is a 30 percentage points increase (56% of the mean) in prenatal care rates for children born more than 2 years after the program initiation in their locality. The same pattern is observed in the effect on the number of months under prenatal supervision: a one-half month increase (16% of the mean) for the children born up to two years after the program initiation and a roughly two month increase (52% of the mean) for the children born more than two years after the program started. These are very large effects, both in absolute terms and relative to the mean, suggesting a very large impact of the program on prenatal care take-up, which increases over time. Given that prenatal maternal supervision was free of charge both before and after the RHM program implementation, an increase in the take-up rate is likely mediated through the enhanced awareness and the information provided by the RHM. For the hospital delivery and the doctor at birth outcomes, there are no significant changes, with the exception of hospital delivery of children born more than five years after the program initiation, which appears to have decreased.

For the urban subsample, even if the pattern is generally similar to that observed for the rural subsample, the effects are smaller in magnitude and less significant. A small improvement in prenatal care take-up seems to have also occurred in urban areas, but only for children born between two and four years after program implementation, which is not significantly different from the corresponding effect in the rural sample. The number of months under prenatal supervision seems to have been affected more significantly, but only at half the magnitude relative to the rural areas (albeit due to the large standard errors in both samples, the effects in the urban and the rural sample are not statistically

different at the 5%, but significant at the 10% level for the first two exposure dummies). This is not surprising because, as we explained before, the RHM program in urban areas targeted only certain neighborhoods, and so the treated population was only a small share of the total Roma population residing in the city, which would bias these results toward zero. This is supported by the fact that we find significant effects, very close in magnitude to those uncovered in the rural sample, when we restrict the sample to births occurring in localities with fewer than 50,000 inhabitants (accounting for about 80% of our sample of small and medium localities).

Table 4 presents the program effects on child health at birth. Despite the significant improvements in prenatal care take-up in the rural areas, there are no significant changes in the health at the birth of children.[22] Although not significant, the low birth weight indicator is positive, while the preterm delivery indicator seems to suggest an improvement at birth. Finally, we also observe a lower, but not significant, probability that a live birth is female. The same holds for the urban subsample, where child health at birth does not seem affected by the RHM program. The effects for the rural and urban samples are not significantly different for any of the outcomes relating to child health.

### *4.2. Further outcomes of the program*

In addition to increasing maternal and child health by promoting prenatal care, the health mediators were also trained in offering basic information about contraceptive use and reproductive health,[23] which could lead to a change in the composition of the women who become mothers and/or to changes in fertility and cohort size. Understanding whether and how fertility changes occurred could provide an explanation for the absence of effects on child health at birth despite the significant improvements in prenatal care take-up rates. Finally, the RHM program could have affected child health via the channels of fetal mortality (stillbirths) and infant mortality (deaths within the first year after birth).

#### *4.2.1. Characteristics of mothers giving birth*

We first investigate whether there are significant changes in the observable maternal characteristics of the women giving birth after the program was initiated in their locality of residence by estimating a model analogous to our main specification, in which the outcome variables are observable maternal characteristics. We analyze age, age at first birth, early motherhood (age of mother below 19) and very early motherhood (age of mother below 16), schooling (whether the mother has any education), marital status at birth, housewife versus employed status, number of births, known father of the child and whether the child's parents were married to each other. These results are presented in Table 5.

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[22] Conway and Deb [2005] suggest that although research frequently finds at best only weak effects of prenatal care on infant health, this is because the regular approach models infant health bimodal, whereas an approach in which birth weight would be estimated using a finite mixture model would yield estimates revealing that prenatal care has a substantial effect on 'normal' pregnancies.

[23] Survey evidence from 2004 indicates that a very low share of Roma women use contraceptives and that their main family planning method is abortion (source: Romania Reproductive Health Survey Report 2004).

In rural areas (Panel A), Roma women seem to be giving birth at higher ages the longer the RHM is implemented. This effect seems to hold particularly for first-time mothers. Additionally, although not significant, the effects indicate that Roma women are less likely to give birth before 18 years of age, more likely to have some schooling, and less likely to be unmarried, which would suggest a positive selection of women giving birth. Also, they are more likely to be housewives, i.e., not engaged in any income generating activity. In urban areas (Panel B), Roma women giving birth are significantly less likely to be teens the longer RHM is implemented, but are more likely to be unmarried. The other characteristics are not significant and do not show a clear pattern. Overall, these results suggest that the RHM program did not have a clear and significant influence on the composition of Roma women giving birth, and that the improvement of the outcomes related to prenatal care are most likely not driven by a positive selection of Roma women who give birth.

### *4.2.2. Locality level outcomes: cohort size, stillbirths and infant mortality*

Next, we consider some further outcomes which we can only measure at the locality level: the cohort size, stillbirths and infant mortality. Because stillbirths and infant mortality data do not include information about ethnicity we determine cohort size at locality level for all ethnicities. While the estimates should be interpreted with reservations (as upper bounds of the true effects), we believe that this is not a major issue for the rural areas, given that the RHM targeted large Roma communities. In particular, we estimate the following equation:

$$Y_{lt} = \alpha + \beta_1 Exposure02_{lt} + \beta_2 Exposure24_{lt} + \beta_3 Exposure47_{lt} + \theta_l + \theta_t + \theta_l t + X_c + \varepsilon_{lt} \quad (2)$$

where $Y_{lt}$ is: (1) the cohort size measured as the number of children born in locality l year t, (2) the number of stillbirths (fetuses declared dead at birth) in locality l year t or (3) the number of infant deaths (death in the first year after birth) in locality l year t. As before, $Exposed02_{lt}$, $Exposed24_{lt}$ and $Exposed47_{lt}$ are indicators of whether the RHM program had been implemented up to two years, between two and four years and respectively between four and seven years in year t. We cluster standard errors at the locality level. $\theta_l, \theta_t$ and $\theta_l t$ have the same interpretation as in our main specification, whereas $X_c$ is an indicator variable for extra training on reproductive health having been conducted in the year and the county to which locality l belonged to.

Results are shown in Table 6. Panel A presents the results on (live) cohort size, and shows no significant change in cohort size after the RHM program implementation, although there is an (insignificant) decrease of the live cohort size in the rural localities. Panel B reveals significant decreases in the numbers of stillborn children at the locality level, both for rural and urban localities, which would indicate a positive effect of the RHM program on average child heath. Finally, in Panel C we observe a decrease in the annual number of infant deaths, significant for the rural areas, and especially for the communities with the longest exposure to the program: on average, 1.5 fewer infant deaths per year for localities in which the program was implemented for more than four years. These

results seem to indicate an improvement in child health induced by the RHM program, which, as the pattern of the earlier results has shown, increases with time since program initiation.

## 5. Robustness and falsification tests

We conduct several robustness checks to test whether the changes we have uncovered, especially for the rural subsample, are indeed attributable to the RHM program. Potential threats are time varying unobserved characteristics of the localities (e.g., improvements in the quality of the medical control act, infrastructure upgrades) or other national public health programs targeting the general population, which would benefit all residents of the locality and not Roma ethnics exclusively. To this end, we test: (1) whether we observe the same effects for Romanian mothers and children residing in the treated localities, and (2) whether such effects were likely to emerge under a random date of initiation of the program. All these robustness tests support our main findings. Finally, we also show that our results are robust to defining the treatment variable as a continuous variable, capturing the number of years between the birth of the child and the initiation date of the program in the locality of residence of the child.

### *5.1. Romanians in treated localities*

We estimate the main specification for the sample of Romanian ethnics in the treated localities. Table 7 presents the effects of the RHM program on the take-up of prenatal care of Romanian ethnics in the treated localities and Table 8 shows the effects on the child health outcomes at birth for children registered as Romanian ethnics.

Overall, there is no significant change in take-up rate of prenatal medical services. In rural areas, the effects are weakly significant and much smaller relative to the Roma sample in the baseline specifications and not significant after controlling for individual characteristics,[24] suggesting that the previously found take-up effects for Roma mothers are indeed attributable to the RHM program. The same holds for the Romanian urban subsample, but the magnitudes are even lower.

Regarding child health outcomes at birth, we find that in rural localities, there is an increase in the duration of pregnancies, especially for children born more than two years after the implementation of the RHM program. In addition, there is a significant but small increase in the probability of low birth weight. Given the overall absence of significant effects, we believe this effect on the low birth weight of Romanian children in urban areas is not worrisome.

[24] The composition of the Romanian sample of mothers is much more heterogeneous compared to the Roma mothers, so it is not surprising that individual control have a larger impact for this sample and the effect disappears after we include these controls.

### *5.2. Random allocation of initiation date among treated localities*

In this robustness test we randomly allocate the actual initiation dates among the treated localities and estimate our main specification defining the treatment according to a placebo initiation date. We repeat the procedure 500 times and plot histograms of the coefficients on the placebo-treatment indicator for each of our outcomes of interest obtained from the Roma sample, overlaid with the estimated coefficient of treatment from our main specification in which we used the true initiation date. Figure 3 presents the simulation results for the first set of outcomes related to medical take-up, and Figure 4 for the outcomes related to child health at birth, both for the sample of births occurring in rural localities.

For the outcomes for which we previously found significant improvements after the initiation on the RHM program, namely the prenatal care indicator and number of months under prenatal medical supervision, the histograms of the coefficients obtained using the placebo initiation dates indicate that it is very unlikely that the estimated coefficient on the (true) treatment indicator could have been drawn from these distributions; moreover, the empirical distributions obtained are centered on 0, as expected, which validates our test.

### *5.3. Alternative definition of the treatment variable*

Finally, we redefine our main variable of interest as a continuous variable, capturing the number of years between the birth of the child and the initiation date of the program in the locality of residence of the child.[25] The results are shown in Appendix A, Tables A4 and A5. In particular, the results in Table A4 indicate that the program induced higher rates of prenatal care and earlier registration with a physician, but at a decreasing rate. The average effects which would be obtained using these estimates are in fact close to those we obtain in the main specification. For the effect on child health outcomes, the results in Table A5 indicate that, in rural areas, there is a marginally significant and positive effect on the probability of low birth weight, in line with the effect that we uncover in the main specification, although the effect in the main specification is insignificant. This suggests that average child health appears to worsen after the RHM implementation, despite the increased take-up of medical services in the prenatal period. We will provide a potential explanation for this counter-intuitive result in the next section.

## 6. Potential Mechanisms and Discussion

### *6.1. Potential mechanisms*

Our findings indicate that the RHM program successfully increased prenatal care rates for Roma ethnics, especially in rural areas, but that this was not accompanied by improvements in child health at

[25] For children born prior to program initiation, the variable takes the value 0. To account for non-linear effects, we also include a squared term for our main variable of interest.

birth. Moreover, we find a significant decrease in the number of stillborn children and infant mortality at the locality level. Also, our results do not show a clear compositional change in the observable characteristics of women giving birth. Overall, these results may be consistent with the following potential *scenarios*:

i) In one scenario, the RHM do not influence the family planning and reproductive behavior of Roma women, confirmed by the lack of compositional changes in the observable characteristics of women giving birth and the unchanged cohort size, but they are effective in inducing higher take-up rates and earlier prenatal supervision for the Roma women who conceive, as revealed by Table 3. However, as medical evidence indicates (see Jewell and Triunfo [2006]; Rous et al. [2004]), prenatal supervision per se, especially late in pregnancy, does not improve pregnancy outcomes or child health at birth but it is beneficial to the unborn child to the extent that they encourage the mother-to-be to make health-improving changes in behavior during pregnancy such as better nutrition, reduced smoking and drinking. Given the high poverty levels which most Roma women face, pregnant mothers may not have been able to improve their behavior during pregnancy, even after receiving this information during prenatal medical visits. We have no means of testing whether Roma mothers changed their health-damaging behavior during pregnancy such that we would expect improvements in child health.

ii) The second scenario postulates that, in its first stage, the RHM program effectively influenced the reproductive behavior of Roma women, for example through increased use of modern contraceptives. This would lead to a decrease in the number of conceived children, and hence a reduced cohort size, and would be expected to change the composition in observable characteristics of women giving birth, which we do not observe clearly in our analysis. On the other hand, by significantly increasing prenatal care rates and by shortening the time between conception and the first prenatal health visit, the program may have improved the survival rate of the marginal children of the presumably worse-off mothers who conceived after not having taken up contraceptive use. In the absence of prenatal care, these marginal children would have not survived the prenatal period or would have died at birth. On one hand, this could lead to an increase in the cohort size of live births and would also decrease the number of stillborn children. If this increase in survival would be sufficient (or close) to offset the decrease in cohort size induced by the increased use of fertility control methods by the presumably better-off Roma women, we would not observe any overall effect on the cohort size. In the case of our findings, there appears to be an insignificant decrease in cohort size, which would be consistent with a slightly larger reduction in fertility than the increase in the survival of marginal children. Additionally, these marginal children would have a lower average health status than those born before the program implementation, which would explain the slight (and insignificant) increase in low birth weight rates in the post-implementation period.

A remaining concern at this stage is the self-reporting of ethnicity. A potential scenario would thus entail that the RHM program did not have any effect on the take-up rates, nor did it influence the family planning of Roma women, but changed the propensity of Roma women of declaring the ethnicity of their child as Roma on the birth certificate. Because we measure the outcomes using official data, such a problem would occur if the mediators also increased the ethnic consciousness of the Roma women and decreased discrimination perceptions so that they are now more likely to self-identify as Roma. If the better-off Roma women become more likely to declare their newborn children as Roma ethnics but have no behavioral changes during pregnancy due to the RHM program, then the observed increase in the prenatal care take-up would be a mechanical result due to observing more women in the Roma sample, who would have had more and earlier prenatal care regardless of the program. Yet, if that was the case, it should be accompanied by at least an improvement in the observable characteristics of the registered mothers, and an improvement in child health outcomes at birth. Moreover, given the evidence on ethnic self-identification in rural vs. urban areas discussed earlier, we would expect that this issue of increased propensity to self-declare as Roma would be more prevalent in urban areas, whereas our largest results are for the rural areas. If the worse-off Roma women would become more likely to declare their newborn children as Roma ethnics, then, given their lower prenatal care take-up rates (which remain uninfluenced by the RHM program, as per our assumption), the prenatal care take-up rate would be mechanically lowered in the post-initiation period. This is contradicted by our findings. Overall, we believe that this mechanism it is not likely to drive our main observed effects.

### *6.2 Further evidence of the RHM program using alternative data*

To probe further the potential mechanisms through which the RHM program affected maternal and child health at birth we make use of the Roma Inclusion Barometer 2006.[26] Of the 1,417 Roma individuals in the sample, 641 (45.24%) reside in localities in which the RHM program was, or was going to be, implemented; of these 641 individuals, 308 (48.05%) lived in localities in which the RHM program had already been initiated prior to November 2006, and so can be considered treated under the program. Given the nature of the data, we are reserved in claiming any causality between program implementation and differences in outcomes, but the results may offer further indicative evidence on the prevailing mechanism at play.

We analyze several outcomes which could plausibly be influenced by the program by comparing Roma individuals in localities in which the program was already implemented by 2006, and Roma

[26] The interview-based data were collected by the Soros Foundation Romania in November 2006; the Roma sample (1,417 observations) is representative for the Roma population in Romania, and the national sample (1,185 observations) is representative for the entire population of Romania. Subsequent waves were, unfortunately, not conducted. The questionnaire addresses social inclusion, perceived discrimination, living and economic conditions, family composition and fertility decisions, and human and social capital.

individuals in localities in which the program was going to be implemented after 2006. The functional form we are estimating is:

$$y_{il} = \alpha + \beta_1 RHM_{active02_l} + \beta_1 RHM_{active25_l} + \gamma' X_{il} + \theta_l + \varepsilon_{ilt} \qquad (3)$$

$Y_{il}$ are the outcomes of interest for individual i from locality l: 1) whether the individual felt that she was discriminated against, 2) whether she felt discriminated against in a hospital or medical clinic, 3) whether she was registered with a family physician, 4) whether she had any medical check-up in the past year, 5) whether she has had an abortion, 6) whether she uses modern contraception, 7) whether she has a clear gender preference for her children, and 8) number of months of exclusive breastfeeding of the youngest child. $RHM_{active02_l}$ is a binary variable, taking the value 1 if the RHM program was active in 2006 in locality l for at most two years, or 0 otherwise, and $RHM_{active25_l}$ is a binary variable, taking the value 1 if the RHM program was active in 2006 in locality l for more than two years, or 0 otherwise. We control for individual characteristics and locality fixed effects, and cluster standard errors at the locality level. The results are presented in Table 9.

Relative to the Roma in localities in which the program was going to be implemented after 2006, Roma in localities in which the program was active for more than two years feel significantly less discrimination in general, and even less discrimination in hospitals and medical facilities, but not so in localities in which the program had just recently been implemented. This could reflect the mediation and social integration role that the health mediators had as part of their jobs, but also the duration of the process, with effects visible over time rather than immediately. Although they are not more likely to be registered with a family physician, Roma in treated localities are initially less likely, but subsequently more likely to have had a visit with their physician over the past year. Roma women in the localities in which the program was already active, irrespective of the length of time since initiation, are significantly less likely to have an abortion, but not more likely to use modern contraceptives (pill, injections, condoms). This may be explained by the fact the Roma health mediators were specially trained in family planning and reproductive health only after 2006. In a culture where there is a strong preference toward sons, Roma families in treated localities also report significantly less gender preference; this effect is significantly greater in localities in which the program had been implemented for over two years. Importantly, we also find that mothers exclusively breastfeed their children an average of two months longer in localities where the program had been active the longest, relative to localities in which the program had not yet been implemented or localities which had just started the program at most two years prior to the survey. This indicates that Roma in early-implementing localities experience less discrimination and have better reproductive health behavior, and also have better infant rearing practices (longer exclusive breastfeeding) than late implementers. Given the evidence we have uncovered, we would be inclined to say that these differences at least partially reflect the effect of the RHM program. In terms of the potential scenarios

outlined in Section 6.1, it would seem that the evidence from this dataset is more in line with the first scenario.

## 7. Conclusions

In spite of an increasing awareness of the social problems related to the Roma ethnics that go beyond the lack of material resources, EU member states governments have achieved little in alleviating the plight of the most marginalized ethnic minority. To improve the condition of the Roma, it is essential to assess the true causal impact of the strategies implemented to address the community's challenges. While a large amount of EU funding is currently available for programs that improve the Roma situation (especially in terms of health and education), there is surprisingly little empirical evidence on the effectiveness of these programs. In this paper, we have investigated the effects of the Roma Health Mediation (RHM) program, a major public health initiative that was implemented in Romania starting in 2002 and was subsequently introduced in several other countries with a large Roma minority.

We find that the RHM program achieved one of its main goals and significantly increased prenatal maternal care rates and the period of prenatal medical supervision, narrowing the gap in prenatal care take-up between Roma and non-Roma ethnics, which is an encouraging and highly positive achievement of the program. In turn, this finding indicates that provision of information and direct support in communication can significantly increase the take-up rates of medical services to which the highly disadvantaged population was entitled. Furthermore, the increased take-up of prenatal care may also indicate a possible reduction in segregation (and perhaps discrimination) to which Roma ethnics, and in particular Roma women, were subjected.

Yet, the positive effects we observe for the prenatal care were not directly reflected in improvements in indicators of health at birth, such as low birth weight and preterm delivery. However, the increased prenatal supervision rate may be accompanied by improvements in outcomes which we do not observe in our register data, such as breastfeeding and vaccination rates for the newborn children, which may in fact reduce the inequalities in health outcomes which affect Roma children starting from a very early age. This is in line with our results showing significant a decrease in the number of stillbirths and infant mortality, particularly in the rural communities targeted by the program. Furthermore, understanding the lack of significant improvements in birth weight and preterm delivery despite the improvements in prenatal care rates remains an important puzzle. These effects may be truly absent, as postulated by one of our scenarios in the previous section, or there may in fact be two effects on the cohort size going in different directions which cancel out, and the absence of significant effects on child health is actually a "blessing in disguise". This question is of great importance for policymaking and further research is needed to clarify the underlying mechanisms.

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## *Figures*

**Figure 1. Program implementation – number of localities by year of implementation of the RHM program**

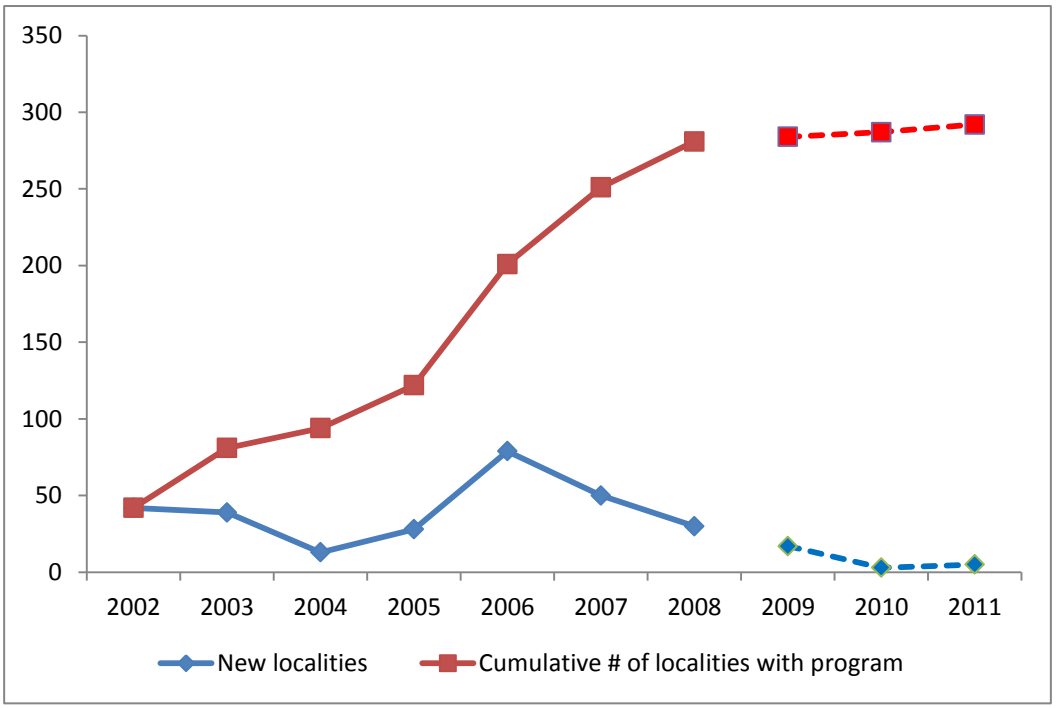

**Figure 2. Geographic disposition of localities in which the program was implemented, by year of implementation**

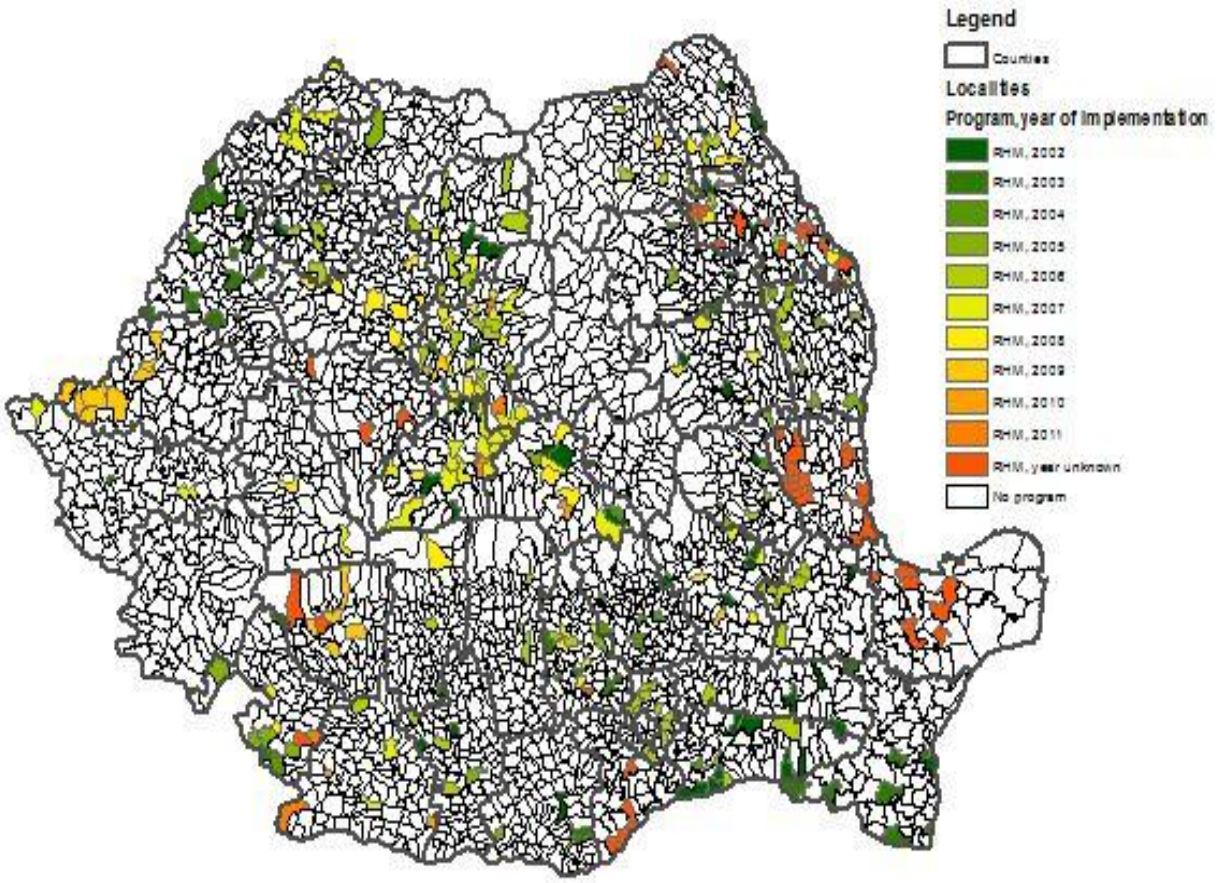

**Figure 3. Simulation: Placebo program initiation date, rural subsample, take-up of prenatal medical care**

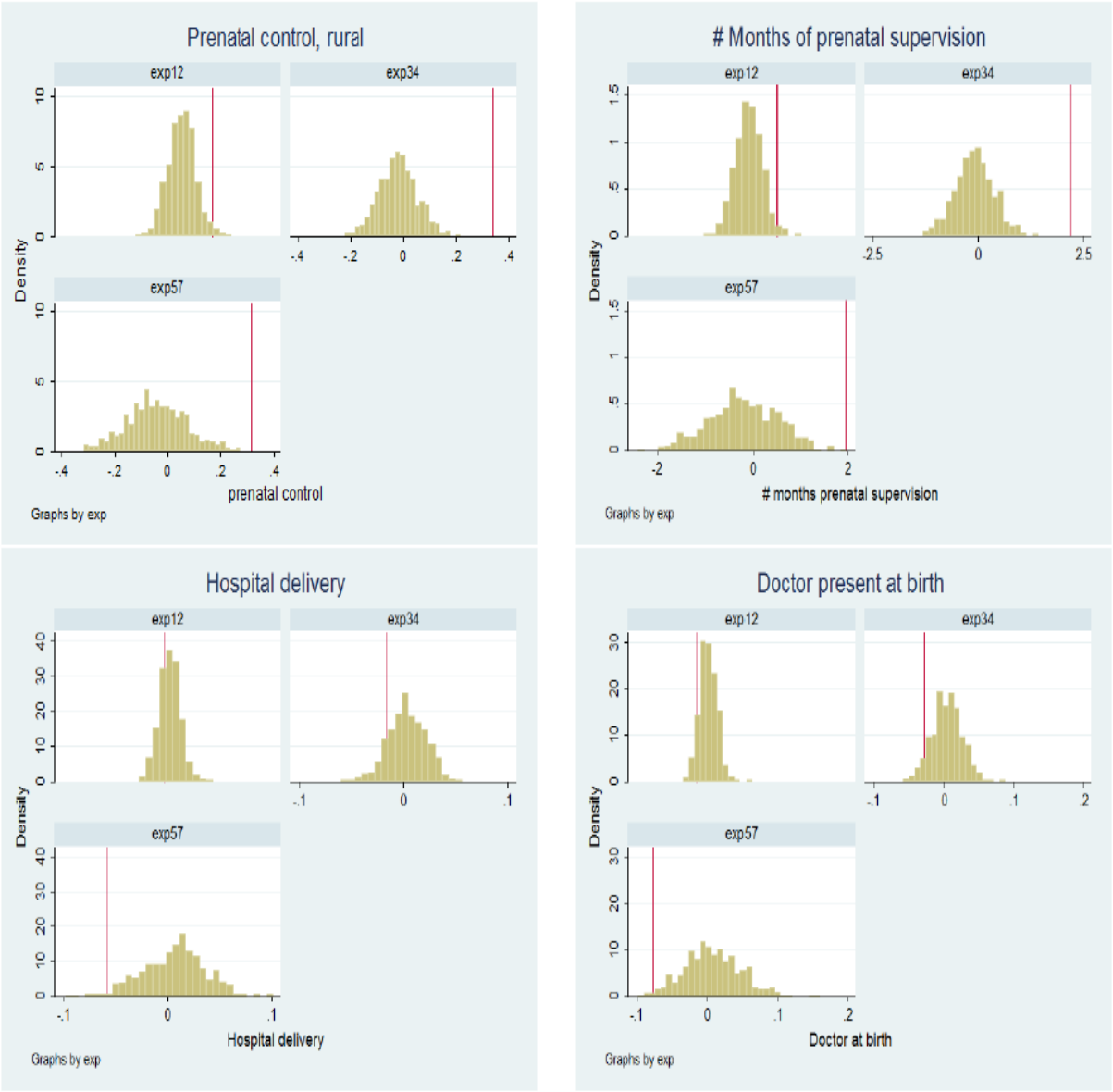

**Figure 4. Simulation: Placebo program initiation date, rural subsample, child health outcomes at birth**

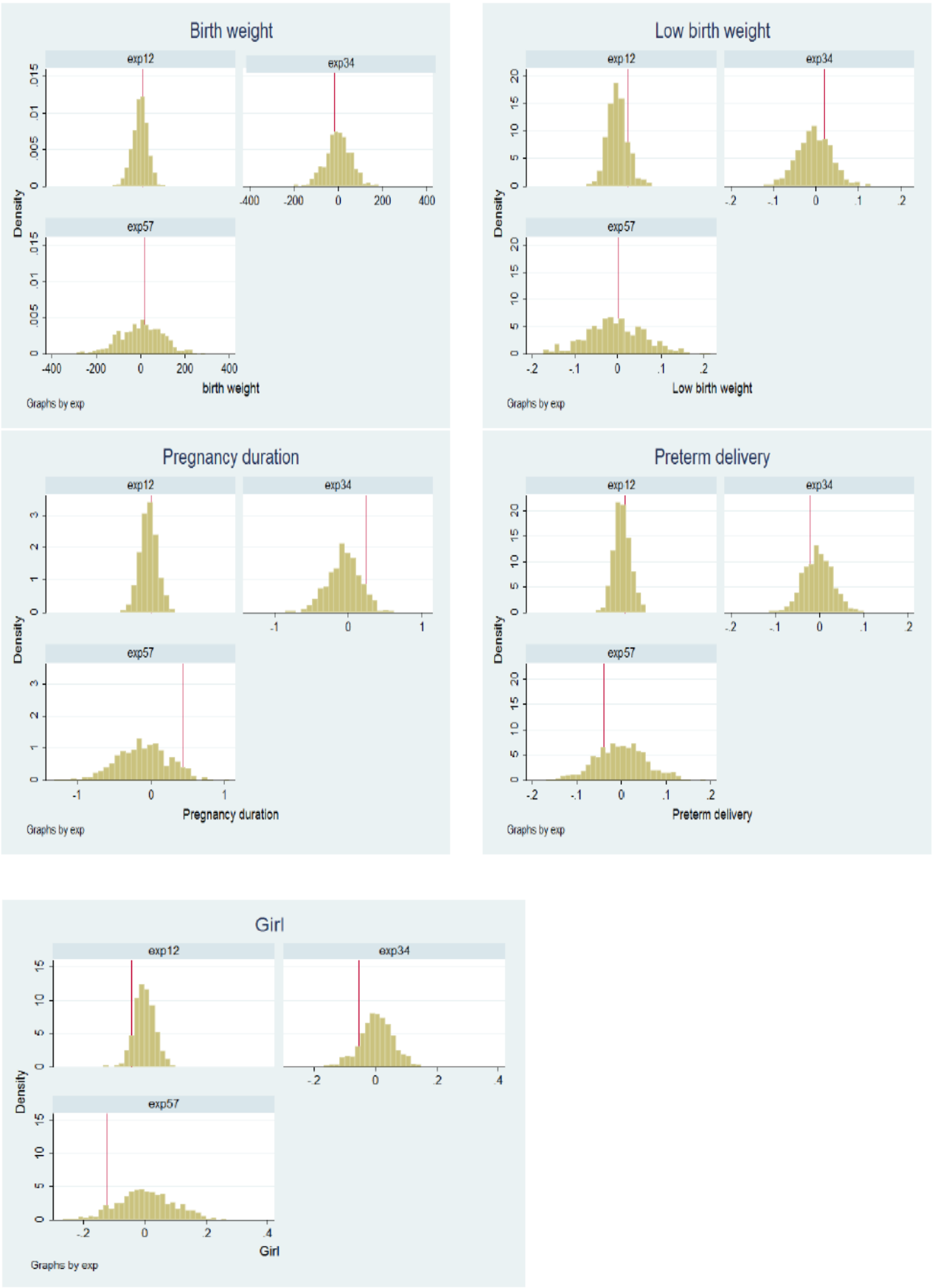

**Table 1. Duration analysis**

| VARIABLES | (1) All | (2) All | (3) Rural | (4) Rural | (5) Urban | (6) Urban |
|---|---|---|---|---|---|---|
| Roma population | 1.152*** | 1.064* | 1.238*** | 1.076* | 1.043 | 1.032 |
| | (0.036) | (0.034) | (0.049) | (0.045) | (0.039) | (0.043) |
| Roma candidates at local election 2000 | 1.608*** | 1.500*** | 1.917*** | 2.146*** | 1.263 | 1.137 |
| | (0.170) | (0.156) | (0.280) | (0.296) | (0.184) | (0.181) |
| Roma elected in local council 2000 | 2.143*** | 2.245*** | 1.784*** | 1.813*** | 2.152 | 2.245 |
| | (0.342) | (0.364) | (0.267) | (0.292) | (1.029) | (1.112) |
| Log population | 1.743*** | 2.499*** | 1.446 | 1.022 | 1.950*** | 2.769*** |
| | (0.256) | (0.489) | (0.477) | (0.407) | (0.283) | (0.799) |
| Development index | 1.024** | 1.023* | 1.033** | 1.030 | 0.999 | 1.003 |
| | (0.010) | (0.012) | (0.015) | (0.022) | (0.016) | (0.018) |
| Share employed | 0.076*** | 0.101*** | 0.058*** | 0.088*** | 0.021* | 0.213 |
| | (0.056) | (0.075) | (0.049) | (0.078) | (0.045) | (0.509) |
| Share unemployed | 1.304 | 0.307 | 1.704 | 0.467 | 0.009 | 0.015 |
| | (1.440) | (0.480) | (1.828) | (0.709) | (0.031) | (0.062) |
| Share agricultural workers | 0.106** | 0.081** | 0.143* | 0.136* | 0.001* | 0.029 |
| | (0.111) | (0.088) | (0.145) | (0.148) | (0.003) | (0.112) |
| Share inactive population | 12.544** | 23.080** | 8.204* | 10.939* | 12.242 | 17.562 |
| | (15.295) | (30.279) | (9.631) | (15.465) | (30.075) | (48.678) |
| Share females with primary education | 2.935 | 7.506 | 3.388 | 10.021 | 39.999 | 188.638 |
| | (3.965) | (11.126) | (5.462) | (18.241) | (121.634) | (631.838) |
| Live births | | 1.000 | | 1.012*** | | 1.000 |
| | | (0.000) | | (0.003) | | (0.001) |
| Live births Roma ethnicity | | 0.998 | | 1.007 | | 1.000 |
| | | (0.009) | | (0.020) | | (0.009) |
| Avg. share mothers with any schooling | | 0.164** | | 0.594 | | 0.010*** |
| | | (0.123) | | (0.595) | | (0.017) |
| Avg. share Roma mothers with any schooling | | 1.658 | | 1.169 | | 1.734 |
| | | (0.649) | | (0.683) | | (0.787) |
| Avg. prenatal care rate | | 1.134 | | 1.414 | | 0.742 |
| | | (0.698) | | (1.414) | | (0.464) |
| Avg. prenatal care rate Roma | | 0.634 | | 0.481 | | 1.005 |
| | | (0.312) | | (0.275) | | (0.525) |
| Avg. share of housewife mothers | | 2.280 | | 1.030 | | 0.927 |
| | | (1.607) | | (0.825) | | (0.977) |
| Avg. share of housewife mother, Roma | | 0.775 | | 1.169 | | 0.393** |
| | | (0.267) | | (0.427) | | (0.169) |
| Avg. low birth weight rate | | 3.012 | | 6.622 | | 0.049 |
| | | (3.899) | | (11.537) | | (0.164) |
| Avg. low birth weight rate Roma | | 1.120 | | 1.870 | | 0.600 |
| | | (0.438) | | (0.876) | | (0.432) |
| Stillbirths per 1000 live births | | 1.003 | | 1.002 | | 1.010 |
| | | (0.005) | | (0.006) | | (0.014) |
| Family physicians | | 0.992* | | 1.011 | | 0.994 |
| | | (0.005) | | (0.103) | | (0.004) |
| Publicly employed doctors | | 1.000 | | 1.047** | | 1.000 |
| | | (0.000) | | (0.020) | | (0.000) |
| No. medical units | | 1.000 | | 0.932 | | 1.000 |
| | | (0.000) | | (0.061) | | (0.001) |
| Observations | 32,464 | 19,136 | 27,821 | 15,091 | 2,767 | 2,714 |

**Table 2. Average difference in post and pre-treatment outcomes and maternal characteristics at locality level**

| | All treated localities | | Rural treated localities | | Urban treated localities | |
|---|---|---|---|---|---|---|
| | Mean | Std. Dev. | Mean | Std. Dev. | Mean | Std. Dev. |
| Avg. diff. prenatal care share | 0.128 | 0.313 | 0.140 | 0.323 | 0.101 | 0.293 |
| Avg. diff. number of months of prenatal supervision | 0.911 | 2.060 | 0.961 | 2.079 | 0.805 | 2.039 |
| Avg. diff. hospital delivery share | -0. 018 | 0.165 | -0.032 | 0.184 | 0.007 | 0.121 |
| Avg. diff. doctor assisted delivery share | 0.014 | 0.200 | -0.021 | 0.195 | 0.077 | 0.195 |
| Avg. diff. birth weights | 58.837 | 333.784 | 84.046 | 329.490 | 14.401 | 339.473 |
| Avg. diff. low birth weight share | -0.016 | 0.261 | -0.041 | 0.271 | 0.029 | 0.239 |
| Avg. diff. preterm delivery share | 0.017 | 0.283 | -0.009 | 0.258 | 0.062 | 0.320 |
| Avg. diff. share of girls | -0.010 | 0.361 | 0.017 | 0.375 | -0.058 | 0.333 |
| Avg. diff. maternal age | 0.211 | 3.404 | -0.053 | 3.450 | 0.677 | 3.299 |
| Avg. diff. any schooling share | 0.048 | 0.350 | 0.079 | 0.297 | -0.006 | 0.424 |
| Avg. diff. housewife mothers share | -0.019 | 0.278 | 0.001 | 0.279 | -0.055 | 0.273 |
| Avg. diff. unmarried mothers share | -0.057 | 0.216 | -0.076 | 0.215 | -0.025 | 0.215 |
| Avg. diff. legitimate child share | 0.081 | 0.213 | 0.097 | 0.217 | 0.052 | 0.202 |
| Avg. diff. share of children with father's information | 0.132 | 0.347 | 0.194 | 0.304 | 0.022 | 0.391 |

**Table 3. Main results, take-up of prenatal medical supervision**

| VARIABLES | (1) Prenatal control | (2) Prenatal control | (3) Months of prenatal supervision | (4) Months of prenatal supervision | (5) Hospital delivery | (6) Hospital delivery | (7) Doctor present at birth | (8) Doctor present at birth |
|---|---|---|---|---|---|---|---|---|
| **Panel A: RURAL** | | | | | | | | |
| exp02 | 0.079** | 0.072* | 0.532*** | 0.478** | 0.003 | -0.004 | -0.014 | -0.017 |
| | (0.033) | (0.038) | (0.189) | (0.230) | (0.008) | (0.008) | (0.011) | (0.011) |
| exp24 | 0.340*** | 0.328*** | 2.238*** | 2.152*** | -0.005 | -0.017 | -0.024 | -0.029 |
| | (0.083) | (0.099) | (0.528) | (0.643) | (0.016) | (0.017) | (0.020) | (0.022) |
| exp47 | 0.302*** | 0.307** | 1.964*** | 1.926** | -0.033 | -0.057** | -0.050 | -0.078 |
| | (0.103) | (0.132) | (0.656) | (0.843) | (0.023) | (0.027) | (0.038) | (0.047) |
| Observations | 5,449 | 5,449 | 5,449 | 5,449 | 6,888 | 6,888 | 6,888 | 6,888 |
| R-squared | 0.340 | 0.360 | 0.316 | 0.342 | 0.385 | 0.398 | 0.398 | 0.406 |
| **Panel B: URBAN** | | | | | | | | |
| exp02 | -0.035 | -0.036 | -0.152 | -0.126 | 0.004 | 0.003 | 0.021 | 0.019 |
| | (0.041) | (0.037) | (0.278) | (0.255) | (0.012) | (0.012) | (0.015) | (0.015) |
| exp24 | 0.075 | 0.073* | 0.744* | 0.788** | -0.011 | -0.012 | -0.000 | -0.002 |
| | (0.050) | (0.043) | (0.373) | (0.340) | (0.018) | (0.018) | (0.022) | (0.022) |
| exp47 | 0.191*** | 0.110 | 1.510*** | 1.112** | 0.035 | 0.033 | 0.049 | 0.038 |
| | (0.070) | (0.070) | (0.463) | (0.474) | (0.029) | (0.028) | (0.032) | (0.033) |
| Observations | 5,436 | 5,436 | 5,436 | 5,436 | 6,794 | 6,794 | 6,794 | 6,794 |
| R-squared | 0.228 | 0.277 | 0.216 | 0.273 | 0.157 | 0.198 | 0.350 | 0.370 |
| Individual controls | No | Yes | No | Yes | No | Yes | No | Yes |
| Locality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Locality time trends | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Controls include: child gender, gestational age at birth in weeks; mother's age at birth and its square, mother's education dummies, marital status dummy, child's parity, number of children alive, number of antenatal visits, gestation month of the first gynaecological visit, an indicator for home delivery, father's age and its square, father's employment status dummies; 42 county dummies, 9 month of birth dummies. Robust standard errors clustered at the locality level shown in parentheses. *** p<0.01, ** p<0.05, * p<0.

**Table 4. Main results, child health at birth**

| VARIABLES | (1) Birth weight | (2) Birth weight | (3) Low birth weight | (4) Low birth weight | (5) Duration of pregnancy | (6) Duration of pregnancy | (7) Preterm delivery | (8) Preterm delivery | (9) Girl | (10) Girl |
|---|---|---|---|---|---|---|---|---|---|---|
| **Panel A: RURAL** | | | | | | | | | | |
| exp02 | 8.910 | -0.674 | 0.026 | 0.029 | -0.014 | -0.036 | 0.007 | 0.015 | -0.030 | -0.028 |
| | (31.044) | (30.229) | (0.022) | (0.023) | (0.102) | (0.109) | (0.018) | (0.019) | (0.027) | (0.029) |
| exp24 | -12.552 | -30.463 | 0.024 | 0.028 | 0.226 | 0.192 | -0.026 | -0.011 | -0.039 | -0.037 |
| | (47.923) | (50.662) | (0.035) | (0.035) | (0.179) | (0.195) | (0.027) | (0.030) | (0.045) | (0.049) |
| exp47 | 0.164 | 1.461 | 0.046 | 0.013 | 0.185 | 0.315 | -0.021 | -0.026 | -0.098 | -0.101 |
| | (75.925) | (81.203) | (0.064) | (0.067) | (0.282) | (0.269) | (0.049) | (0.050) | (0.071) | (0.076) |
| Observations | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 |
| R-squared | 0.072 | 0.110 | 0.058 | 0.075 | 0.097 | 0.116 | 0.113 | 0.132 | 0.042 | 0.043 |
| **Panel B: URBAN** | | | | | | | | | | |
| exp02 | -0.667 | 0.958 | 0.031 | 0.026 | -0.132 | -0.134 | 0.009 | 0.008 | 0.012 | 0.002 |
| | (32.737) | (33.760) | (0.019) | (0.020) | (0.134) | (0.133) | (0.020) | (0.021) | (0.023) | (0.022) |
| exp24 | 28.762 | 23.780 | -0.002 | -0.007 | -0.184 | -0.210 | -0.010 | -0.008 | -0.015 | -0.033 |
| | (54.721) | (54.531) | (0.033) | (0.036) | (0.191) | (0.193) | (0.030) | (0.030) | (0.030) | (0.029) |
| exp47 | 81.615 | 68.417 | 0.003 | -0.012 | -0.165 | -0.258 | -0.033 | -0.011 | -0.011 | -0.032 |
| | (97.758) | (91.937) | (0.057) | (0.056) | (0.265) | (0.251) | (0.037) | (0.038) | (0.042) | (0.042) |
| Observations | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 |
| R-squared | 0.052 | 0.078 | 0.037 | 0.050 | 0.103 | 0.117 | 0.225 | 0.235 | 0.021 | 0.024 |
| Individual controls | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Locality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Locality time trends | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Controls include: child gender, (gestational age at birth in weeks); mother's age at birth and its square, mother's education dummies, marital status dummy, child's parity, number of children alive, number of antenatal visits, gestation month of the first gynaecological visit, an indicator for home delivery, father's age and its square, father's employment status dummies; 42 county dummies, 9 month of birth dummies. Robust standard errors clustered at the locality level shown in parentheses. *** p<0.01, ** p<0.05, * p<0.

**Table 5. Mother's characteristics**

| VARIABLES | (1) Age | (2) Age if first birth | (3) Teen mother | (4) Very teen mother | (5) First birth | (6) No. births | (7) Any school | (8) Unmarried | (9) House wife | (10) Father information |
|---|---|---|---|---|---|---|---|---|---|---|
| **Panel A: RURAL** | | | | | | | | | | |
| exp02 | 0.446 | 0.467 | -0.027 | -0.013 | 0.006 | 0.039 | 0.016 | -0.011 | 0.033 | -0.019 |
| | (0.352) | (0.376) | (0.032) | (0.020) | (0.032) | (0.130) | (0.020) | (0.024) | (0.023) | (0.033) |
| exp24 | 0.493 | 1.006 | -0.034 | -0.043 | 0.025 | 0.084 | 0.022 | 0.012 | 0.027 | 0.014 |
| | (0.563) | (0.611) | (0.055) | (0.033) | (0.048) | (0.212) | (0.056) | (0.050) | (0.044) | (0.045) |
| exp47 | 2.172** | 1.961* | -0.124 | -0.083 | 0.017 | 0.314 | 0.026 | -0.106 | 0.057 | 0.057 |
| | (1.073) | (1.111) | (0.089) | (0.062) | (0.070) | (0.332) | (0.082) | (0.090) | (0.050) | (0.060) |
| Observations | 6,888 | 2,187 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 |
| R-squared | 0.059 | 0.245 | 0.086 | 0.080 | 0.051 | 0.065 | 0.201 | 0.104 | 0.221 | 0.289 |
| **Panel B: URBAN** | | | | | | | | | | |
| exp02 | 0.004 | 0.090 | -0.043** | -0.015 | 0.003 | -0.089 | 0.022 | 0.048** | 0.030 | -0.054* |
| | (0.280) | (0.409) | (0.019) | (0.015) | (0.030) | (0.114) | (0.022) | (0.019) | (0.021) | (0.028) |
| exp24 | -0.042 | -0.166 | -0.081** | -0.001 | -0.006 | 0.016 | 0.019 | 0.076*** | 0.024 | -0.056 |
| | (0.485) | (0.492) | (0.032) | (0.021) | (0.038) | (0.151) | (0.054) | (0.027) | (0.031) | (0.044) |
| exp47 | 0.742 | 0.692 | -0.179*** | -0.039 | -0.012 | 0.026 | -0.021 | 0.066 | -0.045 | -0.063 |
| | (0.756) | (0.703) | (0.037) | (0.025) | (0.049) | (0.178) | (0.059) | (0.056) | (0.053) | (0.052) |
| Observations | 6,794 | 2,395 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 |
| R-squared | 0.053 | 0.200 | 0.081 | 0.057 | 0.040 | 0.064 | 0.124 | 0.043 | 0.144 | 0.219 |
| Locality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Locality time trends | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Controls include: child gender, (gestational age at birth in weeks); mother's age at birth and its square, mother's education dummies, marital status dummy, child's parity, number of children alive, number of antenatal visits, gestation month of the first gynaecological visit, an indicator for home delivery, father's age and its square, father's employment status dummies; 42 county dummies, 9 months of birth dummies. Robust standard errors clustered at the locality level shown in parentheses. *** p<0.01, ** p<0.05, * p<0.

**Table 6. Further outcomes at the locality level: live births, stillbirths, infant deaths**

| VARIABLES | (6) Rural sample | (4) Urban sample |
|---|---|---|
| **Panel A: LIVE BIRTHS** | | |
| exp02 | -0.231 | 0.270 |
| | (0.436) | (0.920) |
| exp24 | -0.948 | 0.216 |
| | (0.812) | (1.647) |
| exp47 | -0.473 | 0.323 |
| | (1.461) | (2.754) |
| Observations | 1,286 | 671 |
| R-squared | 0.913 | 0.948 |
| **Panel B: STILLBIRTH** | | |
| exp02 | -0.450*** | -0.532* |
| | (0.089) | (0.309) |
| exp24 | -0.743*** | -1.322** |
| | (0.162) | (0.546) |
| exp47 | -1.274*** | -1.909** |
| | (0.293) | (0.946) |
| Observations | 1,170 | 684 |
| R-squared | 0.364 | 0.836 |
| **Panel C: INFANT DEATHS** | | |
| exp12 | -0.213 | -0.215 |
| | (0.168) | (0.865) |
| exp34 | -0.495* | -1.251 |
| | (0.296) | (1.430) |
| exp57 | -1.539*** | -1.549 |
| | (0.500) | (2.316) |
| Observations | 883 | 499 |
| R-squared | 0.582 | 0.838 |
| Locality FE | Yes | Yes |
| Locality time trends | Yes | Yes |

Notes: Robust standard errors clustered at the locality level shown in parentheses. *** p<0.01, ** p<0.05, * p<0.

**Table 7. Robustness checks: Romanian ethnics sample, take-up of prenatal medical supervision**

| VARIABLES | (1) Prenatal control | (2) Prenatal control | (3) Months of prenatal supervision | (4) Months of prenatal supervision | (5) Hospital delivery | (6) Hospital delivery | (7) Doctor present at birth | (8) Doctor present at birth |
|---|---|---|---|---|---|---|---|---|
| **Panel A: RURAL** | | | | | | | | |
| exp02 | 0.014 | 0.006 | 0.136 | 0.053 | -0.004 | -0.004 | -0.002 | -0.005 |
| | (0.014) | (0.015) | (0.093) | (0.095) | (0.003) | (0.003) | (0.004) | (0.004) |
| exp24 | 0.050** | 0.031 | 0.444*** | 0.225 | -0.003 | -0.004 | -0.004 | -0.011 |
| | (0.023) | (0.025) | (0.155) | (0.164) | (0.005) | (0.005) | (0.009) | (0.009) |
| exp47 | 0.022 | -0.013 | 0.360* | -0.021 | -0.007 | -0.008 | -0.009 | -0.020 |
| | (0.032) | (0.034) | (0.205) | (0.212) | (0.007) | (0.008) | (0.012) | (0.013) |
| Observations | 66,136 | 66,136 | 66,136 | 66,136 | 87,352 | 87,352 | 87,352 | 87,352 |
| R-squared | 0.243 | 0.289 | 0.240 | 0.301 | 0.042 | 0.056 | 0.328 | 0.335 |
| **Panel B:URBAN** | | | | | | | | |
| exp02 | -0.012 | -0.017 | -0.037 | -0.089 | 0.001 | 0.001 | -0.002 | -0.003 |
| | (0.015) | (0.016) | (0.118) | (0.125) | (0.002) | (0.002) | (0.003) | (0.003) |
| exp24 | 0.044 | 0.031 | 0.393* | 0.263 | 0.001 | 0.000 | -0.001 | -0.005 |
| | (0.031) | (0.031) | (0.217) | (0.217) | (0.004) | (0.004) | (0.008) | (0.008) |
| exp47 | 0.042 | 0.025 | 0.305 | 0.129 | -0.003 | -0.004 | 0.000 | -0.004 |
| | (0.033) | (0.033) | (0.228) | (0.230) | (0.004) | (0.004) | (0.007) | (0.007) |
| Observations | 299,660 | 299,660 | 299,660 | 299,660 | 381,520 | 381,520 | 381,520 | 381,520 |
| R-squared | 0.312 | 0.382 | 0.316 | 0.406 | 0.015 | 0.071 | 0.281 | 0.299 |
| Individual controls | No | Yes | No | Yes | No | Yes | No | Yes |
| Locality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Locality time trends | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Controls include: child gender, gestational age at birth in weeks; mother's age at birth and its square, mother's education dummies, marital status dummy, child's parity, number of children alive, number of antenatal visits, gestation month of the first gynaecological visit, an indicator for home delivery, father's age and its square, father's employment status dummies; 42 county dummies, 9 months of birth dummies. Robust standard errors clustered at the locality level shown in parentheses. *** p<0.01, ** p<0.05, * p<0.

**Table 7. Robustness checks: Romanian ethnics sample, child health outcomes at birth**

| VARIABLES | (1) Birth weight | (2) Birth weight | (3) Low birth weight | (4) Low birth weight | (5) Duration of pregnancy | (6) Duration of pregnancy | (7) Preterm delivery | (8) Preterm delivery | (9) Girl | (10) Girl |
|---|---|---|---|---|---|---|---|---|---|---|
| **Panel A: RURAL** | | | | | | | | | | |
| exp02 | 3.289 | -4.209 | -0.001 | 0.004 | 0.051 | 0.040 | -0.002 | -0.000 | -0.006 | -0.007 |
| | (8.739) | (8.777) | (0.005) | (0.005) | (0.033) | (0.034) | (0.006) | (0.006) | (0.008) | (0.008) |
| exp24 | 20.203 | 3.382 | -0.003 | 0.007 | 0.146*** | 0.116** | -0.015 | -0.009 | 0.004 | 0.001 |
| | (14.112) | (14.025) | (0.008) | (0.009) | (0.052) | (0.056) | (0.010) | (0.011) | (0.013) | (0.014) |
| exp47 | 24.633 | -6.949 | 0.005 | 0.022 | 0.175* | 0.123 | -0.014 | -0.005 | 0.005 | 0.000 |
| | (24.536) | (25.066) | (0.016) | (0.017) | (0.092) | (0.100) | (0.016) | (0.017) | (0.022) | (0.023) |
| Observations | 87,352 | 87,352 | 87,352 | 87,352 | 87,352 | 87,352 | 87,352 | 87,352 | 87,352 | 87,352 |
| R-squared | 0.028 | 0.075 | 0.012 | 0.027 | 0.067 | 0.086 | 0.142 | 0.167 | 0.005 | 0.005 |
| **Panel B: URBAN** | | | | | | | | | | |
| exp02 | -5.098 | -10.667** | 0.002 | 0.005*** | 0.002 | -0.016 | -0.004 | -0.001 | -0.005 | -0.005 |
| | (4.724) | (4.461) | (0.002) | (0.002) | (0.023) | (0.024) | (0.003) | (0.004) | (0.003) | (0.003) |
| exp24 | -7.229 | -18.295* | 0.001 | 0.007** | -0.010 | -0.048 | -0.005 | 0.001 | -0.004 | -0.006 |
| | (9.792) | (9.675) | (0.003) | (0.003) | (0.039) | (0.043) | (0.005) | (0.006) | (0.005) | (0.005) |
| exp47 | -19.676 | -31.799** | 0.003 | 0.012** | -0.041 | -0.093* | 0.002 | 0.010 | -0.003 | -0.006 |
| | (12.431) | (12.438) | (0.005) | (0.005) | (0.053) | (0.054) | (0.008) | (0.009) | (0.009) | (0.009) |
| Observations | 381,520 | 381,520 | 381,520 | 381,520 | 381,520 | 381,520 | 381,520 | 381,520 | 381,520 | 381,520 |
| R-squared | 0.019 | 0.072 | 0.007 | 0.025 | 0.076 | 0.088 | 0.144 | 0.154 | 0.000 | 0.000 |
| Individual controls | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Locality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Locality time trends | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Controls include: child gender, (gestational age at birth in weeks); mother's age at birth and its square, mother's education dummies, marital status dummy, child's parity, number of children alive, number of antenatal visits, gestation month of the first gynaecological visit, an indicator for home delivery, father's age and its square, father's employment status dummies; 42 county dummies, 9 months of birth dummies. Robust standard errors clustered at the locality level shown in parentheses. *** p<0.01, ** p<0.05, * p<0.

**Table 8 Roma Inclusion Barometer outcomes, localities with RHM already implemented vs localities with future RHM implementation**

| VARIABLES | (1) Feels discriminated | (2) Feels discriminated in hospitals | (3) Registered at family physician | (4) Medical control | (5) Any abortion | (6) Modern contraceptive use | (7) Gender preference | (8) Exclusive breastfeeding youngest child |
|---|---|---|---|---|---|---|---|---|
| Active RHM 0-2years | 0.020 | -0.086 | -0.085 | -0.259*** | -0.446** | -0.028 | -0.103 | 0.501 |
| | (0.084) | (0.106) | (0.090) | (0.066) | (0.169) | (0.068) | (0.083) | (0.703) |
| Active RHM 2-5years | -0.259*** | -0.373*** | -0.012 | 0.196** | -0.579*** | 0.034 | -0.089* | 2.332*** |
| | (0.061) | (0.051) | (0.037) | (0.073) | (0.167) | (0.045) | (0.044) | (0.602) |
| Observations | 476 | 476 | 476 | 397 | 313 | 313 | 476 | 233 |
| R-squared | 0.289 | 0.367 | 0.393 | 0.369 | 0.507 | 0.358 | 0.469 | 0.624 |

Notes: Controls include: respondent's age, educational level dummies, income level dummies, occupational status dummies, number of children under 7 and locality FE. Robust standard errors clustered at the locality level shown in parentheses. *** p<0.01, ** p<0.05, * p<0.

## *Appendix A*

**Appendix Table A1. Descriptive statistics of localities, by implementation status**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Non implementers | | | Implementers | | |
| VARIABLES | Mean | sd | N | Mean | sd | N |
| Roma candidates local council elections 2000 | 0.247 | 0.507 | 2,771 | 0.940 | 0.716 | 348 |
| Roma elected local council elections 2000 | 0.0303 | 0.178 | 2,771 | 0.184 | 0.417 | 348 |
| Voter turnout local council elections 2000 | 0.604 | 0.0876 | 2,596 | 0.564 | 0.0967 | 334 |
| Medical units 2000 | 5.393 | 76.77 | 1,604 | 35.88 | 100.7 | 257 |
| Medical units 2001 | 5.196 | 67.69 | 1,604 | 37.54 | 106.0 | 257 |
| Medical units 2002 | 5.252 | 73.58 | 1,604 | 35.53 | 105.9 | 257 |
| Share Roma population | 0.0262 | 0.0521 | 2,710 | 0.0817 | 0.106 | 316 |
| Share employed | 0.471 | 0.234 | 2,804 | 0.580 | 0.267 | 349 |
| Share workers in agriculture | 0.277 | 0.181 | 2,804 | 0.176 | 0.170 | 349 |
| Share unemployed | 0.0507 | 0.0533 | 2,804 | 0.0616 | 0.0579 | 349 |
| Share inactive population | 0.614 | 0.103 | 2,804 | 0.628 | 0.0863 | 349 |
| Average low birth weight rate 2000 | 0.114 | 0.0647 | 2,619 | 0.126 | 0.0479 | 335 |
| Average low birth weight rate, Roma, 2000 | 0.196 | 0.281 | 674 | 0.198 | 0.238 | 162 |
| Stillbirth per 1000 live births 2000 | 6.241 | 14.77 | 2,619 | 5.943 | 9.834 | 335 |
| Development index 2008 | 48.78 | 13.03 | 2,813 | 59.75 | 17.24 | 353 |
| Population | 4,308 | 8,583 | 2,826 | 20,924 | 48,714 | 353 |
| Doctors 2000 per 10,000 inhabitants | 7.49 | 6.46 | 2,500 | 11.83 | 12.30 | 332 |
| Doctors 2001 per 10,000 inhabitants | 7.534 | 6.419 | 2,538 | 11.710 | 11.911 | 334 |
| Doctors 2002 per 10,000 inhabitants | 7.363 | 6.155 | 2,485 | 11.975 | 12.125 | 332 |

**Appendix Table A2. Single binary exposure indicator, take-up of prenatal medical care**

| VARIABLES | (1) Prenatal control | (2) Prenatal control | (3) Months of prenatal supervision | (4) Months of prenatal supervision | (5) Hospital delivery | (6) Hospital delivery | (7) Doctor present at birth | (8) Doctor present at birth |
|---|---|---|---|---|---|---|---|---|
| Panel A: RURAL | | | | | | | | |
| Treated | 0.069** | 0.038 | 0.474*** | 0.275* | 0.011 | 0.006 | -0.006 | -0.006 |
| | (0.030) | (0.027) | (0.167) | (0.154) | (0.008) | (0.008) | (0.009) | (0.008) |
| Observations | 5,449 | 5,449 | 5,449 | 5,449 | 6,888 | 6,888 | 6,888 | 6,888 |
| R-squared | 0.331 | 0.352 | 0.306 | 0.333 | 0.385 | 0.398 | 0.398 | 0.405 |
| Panel B: URBAN | | | | | | | | |
| Treated | -0.064 | -0.048 | -0.340 | -0.228 | -0.008 | -0.007 | 0.009 | 0.011 |
| | (0.050) | (0.046) | (0.330) | (0.311) | (0.010) | (0.011) | (0.013) | (0.013) |
| Observations | 5,436 | 5,436 | 5,436 | 5,436 | 6,794 | 6,794 | 6,794 | 6,794 |
| R-squared | 0.225 | 0.275 | 0.212 | 0.270 | 0.154 | 0.195 | 0.348 | 0.369 |
| Individual controls | No | Yes | No | Yes | No | Yes | No | Yes |
| Locality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Locality time trends | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Controls include: child gender, gestational age at birth in weeks; mother's age at birth and its square, mother's education dummies, marital status dummy, child's parity, number of children alive, number of antenatal visits, gestation month of the first gynaecological visit, an indicator for home delivery, father's age and its square, father's employment status dummies; 42 county dummies, 9 months of birth dummies. Robust standard errors clustered at the locality level shown in parentheses. *** p<0.01, ** p<0.05, * p<0.

**Appendix Table A3. Single binary exposure indicator, child health outcomes**

| VARIABLES | (1) Birth weight | (2) Birth weight | (3) Low birth weight | (4) Low birth weight | (5) Duration of pregnancy | (6) Duration of pregnancy | (7) Preterm delivery | (8) Preterm delivery | (9) Girl | (10) Girl |
|---|---|---|---|---|---|---|---|---|---|---|
| Panel A: RURAL | | | | | | | | | | |
| Treated | 7.438 | -2.424 | 0.020 | 0.031 | -0.024 | -0.089 | 0.008 | 0.022 | -0.014 | -0.016 |
| | (33.909) | (31.408) | (0.022) | (0.022) | (0.104) | (0.104) | (0.016) | (0.016) | (0.028) | (0.028) |
| Observations | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 |
| R-squared | 0.072 | 0.110 | 0.058 | 0.075 | 0.096 | 0.116 | 0.112 | 0.132 | 0.041 | 0.043 |
| Panel B: URBAN | | | | | | | | | | |
| Treated | -15.667 | -10.646 | 0.030* | 0.029 | -0.135 | -0.119 | 0.016 | 0.010 | 0.011 | 0.003 |
| | (27.779) | (29.573) | (0.018) | (0.018) | (0.117) | (0.123) | (0.020) | (0.021) | (0.024) | (0.023) |
| Observations | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 |
| R-squared | 0.051 | 0.078 | 0.036 | 0.050 | 0.103 | 0.117 | 0.225 | 0.235 | 0.020 | 0.024 |
| Individual controls | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Locality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Locality time trends | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Controls include: child gender, (gestational age at birth in weeks); mother's age at birth and its square, mother's education dummies, marital status dummy, child's parity, number of children alive, number of antenatal visits, gestation month of the first gynaecological visit, an indicator for home delivery, father's age and its square, father's employment status dummies; 42 county dummies, 9 months of birth dummies. Robust standard errors clustered at the locality level shown in parentheses. *** p<0.01, ** p<0.05, * p<0.

**Appendix Table A4. Years of exposure, take-up of prenatal medical supervision**

| VARIABLES | (1) Prenatal control | (2) Prenatal control | (3) Months of prenatal supervision | (4) Months of prenatal supervision | (5) Hospital delivery | (6) Hospital delivery | (7) Doctor present at birth | (8) Doctor present at birth |
|---|---|---|---|---|---|---|---|---|
| **Panel A: RURAL** | | | | | | | | |
| Years of exposure | 0.123*** | 0.095** | 0.844*** | 0.695*** | 0.005 | 0.002 | -0.000 | 0.002 |
| | (0.035) | (0.041) | (0.212) | (0.250) | (0.010) | (0.010) | (0.011) | (0.013) |
| Years of exp. squared | -0.016*** | -0.013** | -0.106*** | -0.085** | -0.003** | -0.003* | -0.002 | -0.003 |
| | (0.006) | (0.006) | (0.035) | (0.035) | (0.001) | (0.002) | (0.002) | (0.002) |
| Observations | 5,449 | 5,449 | 5,449 | 5,449 | 6,888 | 6,888 | 6,888 | 6,888 |
| R-squared | 0.334 | 0.354 | 0.309 | 0.335 | 0.385 | 0.398 | 0.398 | 0.406 |
| **Panel B: URBAN** | | | | | | | | |
| Years of exposure | 0.073 | 0.078** | 0.641 | 0.714*** | -0.017 | -0.020 | -0.009 | -0.016 |
| | (0.000) | (0.033) | (0.000) | (0.224) | (0.000) | (0.017) | (0.000) | (0.020) |
| Years of exp. squared | 0.006 | 0.002 | 0.021 | -0.003 | 0.003 | 0.002** | 0.001 | 0.001 |
| | (0.000) | (0.005) | (0.000) | (0.033) | (0.000) | (0.001) | (0.000) | (0.001) |
| Observations | 5,436 | 5,436 | 5,436 | 5,436 | 6,794 | 6,794 | 6,794 | 6,794 |
| R-squared | 0.228 | 0.277 | 0.216 | 0.272 | 0.155 | 0.196 | 0.348 | 0.369 |
| Individual controls | No | Yes | No | Yes | No | Yes | No | Yes |
| Locality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Locality time trends | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Controls include: child gender, gestational age at birth in weeks; mother's age at birth and its square, mother's education dummies, marital status dummy, child's parity, number of children alive, number of antenatal visits, gestation month of the first gynaecological visit, an indicator for home delivery, father's age and its square, father's employment status dummies; 42 county dummies, 9 months of birth dummies. Robust standard errors clustered at the locality level shown in parentheses. *** p<0.01, ** p<0.05, * p<0.

**Appendix Table A5. Years of exposure, child health outcomes at birth**

| VARIABLES | (1) Birth weight | (2) Birth weight | (3) Low birth weight | (4) Low birth weight | (5) Duration of pregnancy | (6) Duration of pregnancy | (7) Preterm delivery | (8) Preterm delivery | (9) Girl | (10) Girl |
|---|---|---|---|---|---|---|---|---|---|---|
| **Panel A: RURAL** | | | | | | | | | | |
| Years of exposure | -29.893 | -44.287* | 0.028* | 0.033** | 0.048 | 0.020 | -0.009 | -0.002 | 0.012 | 0.014 |
| | (27.169) | (26.553) | (0.015) | (0.016) | (0.123) | (0.131) | (0.016) | (0.018) | (0.028) | (0.030) |
| Years of exp. squared | 1.900 | 5.349 | -0.003 | -0.006* | -0.015 | -0.004 | 0.001 | -0.001 | -0.001 | -0.001 |
| | (5.035) | (5.194) | (0.003) | (0.003) | (0.019) | (0.019) | (0.003) | (0.003) | (0.005) | (0.005) |
| Observations | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 | 6,888 |
| R-squared | 0.072 | 0.110 | 0.058 | 0.075 | 0.097 | 0.116 | 0.112 | 0.132 | 0.041 | 0.043 |
| **Panel B: Urban** | | | | | | | | | | |
| Years of exposure | 28.864 | 32.184 | 0.001 | -0.005 | 0.041 | 0.052 | -0.015 | -0.016 | 0.001 | -0.005 |
| | (0.000) | (27.572) | (0.016) | (0.018) | (0.113) | (0.128) | (0.000) | (0.019) | (0.000) | (0.029) |
| Years of exp. squared | -1.864 | -2.226 | 0.001 | 0.001 | 0.002 | 0.001 | -0.000 | 0.000 | 0.002 | 0.002 |
| | (0.000) | (2.899) | (0.002) | (0.002) | (0.017) | (0.016) | (0.000) | (0.003) | (0.000) | (0.004) |
| Observations | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 | 6,794 |
| R-squared | 0.052 | 0.078 | 0.036 | 0.050 | 0.103 | 0.117 | 0.225 | 0.235 | 0.021 | 0.024 |
| Individual controls | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Locality FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Locality time trends | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Notes: Controls include: child gender, (gestational age at birth in weeks); mother's age at birth and its square, mother's education dummies, marital status dummy, child's parity, number of children alive, number of antenatal visits, gestation month of the first gynaecological visit, an indicator for home delivery, father's age and its square, father's employment status dummies; 42 county dummies, 9 months of birth dummies. Robust standard errors clustered at the locality level shown in parentheses. *** p<0.01, ** p<0.05, * p<0.

## *Appendix B*. Data sources for the discrete time hazard model

For fixed pre-treatment characteristics:

- A 10% random sample from the 2002 Population Census to determine the ethnic composition at the locality level, and calculate the share of Roma in each locality.
- The 2002 Local Election Results database to determine Roma political representation at locality level: whether any Roma representative parties ran in the election for Local Council; whether any Roma representative parties were elected in the Local Council; voter turnout.
- The Index of Social Development of Localities, developed by Prof. Dumitru Sandu in collaboration with the National Institute of Statistics. This is a composite index at locality level calculated for 2008 which reflects the human, physical and social capital in each locality; it is comprised of (1) the educational stock at locality level in 2002; (2) average age of inhabitants over 14 years old in 2008; (3) life expectancy at birth between 2006-2008; (4) (log) vehicles per 1000 inhabitants in 2007; (5) average surface of dwelling units in 2008; (6) natural gas consumption per inhabitant; (7) category of locality residence size (source: Dumitru Sandu -Social Disparities in the Regional Development and Policies of Romania).

For time-varying characteristics

- Time-series at locality level provided by the National Statistics Institute: number of medical staff 2000-2008, number of medical units 2000-2008.
- Child natality and mortality rates from Vital Statistics Natality files 2000-2010.
- We look at the characteristics that proxy the formal and main criteria for selection into the program: the share of Roma at the locality level, at the 2002 Census, the number of Roma candidates at the 2000 local elections and whether there were any Roma representatives elected in the local council (to proxy for the local Roma engagement in the community, which seemed to have been crucial for the program). Additionally, we proxy for the overall locality civic and economic development with the Local Social Development Index from the year 2008. Finally, we include some further characteristics of the locality, such as the population size, occupational structure and educational level by gender at the 2002 Census. To account for the fact the localities could have been selected based on pre-existing trends in the health outcomes or natality rate, given the aim of the program (for example, localities fairing especially poorly in outcomes such as infant health might have been included earlier in the program), we also verify whether time-varying characteristics influence the probability and timing of program implementation; these time-varying covariates are the number of live births and stillbirths (rates), share of Roma children, average maternal education (all mothers and Roma mothers), average maternal occupation (all mothers and Roma mothers), prenatal care rates (all mothers and Roma mothers), and the supply of formal medical care, as reflected in the number of family physicians and the total number of doctors in the locality.

## *Appendix C (not intended for publication).*
## The Roma Health Mediator Program

The Roma mediators were Roma women from the local communities trained and subsequently employed to act as a liaison between healthcare practitioners and the Roma community. Both the gender and ethnic component of the mediators were essential for the program: health mediators were expected to approach sensitive issues (such as prenatal care), whereas in many Roma castes strong social norms forbid these discussions with/in the presence of men. Additionally, having a Roma woman from within the community would increase her acceptability and effectiveness through a higher level of trust toward the mediator and an in-depth knowledge of the mediator about specific local social norms, culture and circumstances.[27] An additional requirement was that the mediators have completed at least secondary education (eight grades), which is more than the average educational attainment of Roma women in Romania (only about 20% have more than secondary education).[28]

The initial training to become a health mediator included theoretical courses and practical preparation alongside family physicians. The theoretical courses were run by the large Roma NGO SASTIPEN, the Roma Center for Health Policies, which also provided technical assistance to the local authorities for implementation of the program. The training courses covered health mediation, focused on communication skills, knowledge about the functioning of the medical system in Romania and the general right of access to preventive and curative services, information regarding the process of enrolling in the health insurance system, and first aid concepts. The practical training required that the mediator spend three months alongside the family physician from the locality she would serve. At the end of the training period, the person received a health mediator certificate and started her job in the Roma community, supervised by the family physician working in the community for which they were employed.[29]

For a detailed description of the program and its implementation, see WHO (2013): "Roma health mediation in Romania: case study."

[27] There are very strong and different social norms among different Romani castes. E.g., in some Romani castes a woman is considered impure during pregnancy and up to two month after birth and is forbidden to undertake a wide range of activities, including leaving the house because of the shame produced by her condition (source: Introduction to Roma Culture).
[28] In the unusual case of more than one candidate for a locality, the employee was chosen on a competitive basis.
[29] In 2002, the Roma health mediators became a legally recognized profession in Romania. They were employed on a fixed term contract (one year, renewable) by the Ministry of Health through the District Public Health Authorities. In addition to their regular duties, the monthly priority activities of the health mediators are established by the District Public Health Authorities according to the current public health campaigns; the health mediator presents weekly activity reports to the medical practitioner to whom she is assigned and monthly reports to the District Public Health Authorities representative.