

Prevalence and predictors of teenage pregnancy in Pakistan: a trend analysis from Pakistan Demographic and Health Survey datasets from 1990 to 2018

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Background: Teenage pregnancies carry an increased risk of adverse obstetric and health outcomes for mothers and children.

Methods: This study assessed the prevalence and predictors of teenage pregnancies over time in Pakistan using the Pakistan Demographic and Health Survey (PDHS). Data on 400 076 ever-married pregnant women aged 15–49 y from four PDHS datasets were used. Teenage pregnancy was the outcome variable, whereas a woman's and her partner's education, occupation, wealth quintile, region, place of residence and access to knowledge on family planning were the explanatory variables. Pooled prevalence was estimated and regression analysis was undertaken to produce an adjusted prevalence ratio with 95% CIs.

Results: Although the prevalence of teenage pregnancy decreased from 54.4% in 1990–1991 to 43.7% in 2017–2018, the pooled prevalence was 42.5% (95% CI 37.9 to 49.6%). The prevalence of teenage pregnancy was significantly associated with place of residence, wealth quintile, education and occupation.

Conclusion: Despite a growing focus on women's education, access to sexual and reproductive health (SRH) services and contraception in the last decade in Pakistan, the prevalence of teenage pregnancy is still high. There is a pressing need to develop appropriate strategies for increasing access to education, SRH services and use of contraception in Pakistan.

Keywords: demographic and health survey, Pakistan, teenage pregnancy.

Introduction

Teenage pregnancies are a global public health concern and they result in a wide range of health and socioeconomic consequences for mothers and their babies.¹ Early age (i.e. 13–19 y at the first pregnancy) is referred to as teenage pregnancy and is also known as adolescent pregnancy.² Globally, approximately 21 million girls aged 15–19 y become pregnant each year and around 12 million of them give birth.³ The prevalence of teenage pregnancies is much higher (95%) in low- and middle-income countries (LMICs) compared with high-income countries.³ Globally, pregnancy and childbirth complications are the major cause of death

in adolescent girls and 99% of all adolescent maternal death occurs in LMICs.³ Teenage pregnancies carry an increased risk of adverse obstetric and health outcomes for women and their children. Nutritional anemia during pregnancy is a major health issue in teenage pregnancies: because girls experience a rapid growth spurt at the start of menstruation, their iron requirement is high, and therefore inadequate intake of iron during pregnancy may result in anemia.^{1,4–7} These mothers are not only at an increased risk of developing nutritional anemia but also obstructed labor and eclampsia.^{4,6} Further, teenage pregnancies incur adverse child outcomes such as preterm births, low birthweight,

fetal growth retardation and neonatal death.^{4,8,9} Moreover, pregnancy in teenage years affects girls emotionally because they lack family as well as financial support and sometimes leave education, and therefore not at the stage of bearing the burden of childcare.⁶

To decrease the adverse effect of teenage pregnancies on women's health, the WHO declared an indicator to improve maternal health in the Sustainable Development Goals (SDGs) by aiming to eliminate all harmful practices including a child and early marriages by 2030.¹⁰ However, a still high prevalence of teenage pregnancies occurs across the world.⁶ In South Asia, a larger proportion of women become pregnant in early life because of early marriage and the social expectation to have a child soon after marriage.² Further, knowledge gaps regarding pregnancies and misconceptions regarding contraception in teenage girls results in early pregnancies.^{11,12} Also, it has been reported, in studies conducted in South Asia, that wider sociodemographic and cultural factors, such as limited education for women, low socioeconomic status, as well as being part of an ethnic or religious minority, increase the prevalence of teenage marriages and pregnancies.^{1,5,9,13}

Pakistan is a South Asian country that is home to 40 million adolescents, who represent 22.3% of the total population.¹⁴ Even although the prevalence of marriage of girls aged <15 y has decreased, marriage at age 17–18 y is still prevalent; one in two teenage girls gets married before the age of 18 y.¹⁵ Therefore, early pregnancies are common and 7.7% of all women become pregnant before the age of 19 y.¹⁶ Further, the prevalence of teenage pregnancies varies across different regions (provinces) in Pakistan.¹⁷ Additionally, sociocultural beliefs regarding early marriage and a lack of knowledge regarding contraception are considered to be common causes for teenage pregnancies among Pakistani women; however, it appears unclear how these circumstances explain the prevalence of teenage pregnancies,¹⁵ therefore it is important to assess the dynamics and predictors of teenage pregnancies over time.

Materials and Methods

This study used datasets from the Pakistan Demographic and Health Survey (PDHS). Demographic and Health Surveys (DHS) provide the health, demographic and socioeconomic characteristics of a representative sample of the population. From 1984 onwards, more than 90 LMICs participated in rounds of DHS.^{17,18} Pakistan implemented four DHS from 1990 to 2018 under the aegis of the National Institute of Population Sciences and Pakistan Bureau of Statistics.¹⁷ The PDHS dataset targeted ever-married women of reproductive age (MWRA) aged 15–49 y. The data regarding teenage pregnancy were obtained by secondary data analysis of all the DHS conducted in Pakistan.

In each PDHS, women were approached using a multistage stratified cluster systematic sampling technique. Initially, urban and rural stratification of all the provinces was carried out, followed by a selection of enumeration blocks (EBs). Each EB was a cluster of 200 to 250 households (HH), and from each EB, 20 to 30 HH were selected randomly. More specifically, the number of ever-MWRA was 6428 in the 1990–1991 PDHS; 9177 in the 2006–

2007 PDHS; 11 763 in the 2012–2013 PDHS; and 12 708 in the 2017–2018 PDHS. Thus, the total sample size in four waves of the PDHS was 400 076. Factors such as ineligibility and a refusal to participate were considered in the sample size calculation beforehand.^{17,19}

The outcome variable of this study was teenage pregnancy. Teenage pregnancy was defined by using the information on age at first childbirth. Women aged ≤ 20 y were considered to have a teenage pregnancy. The information regarding maternal age was collected verbally by the interviewers of the PDHS. Each respondent's and their partner's education were coded into four categories: no education, primary, secondary or higher. Both a respondent's and their partner's occupation were coded as not working, professional, services/sales, agricultural, skilled or unskilled. To avoid a small cell count, the occupation categories for respondents were merged into working and not working; for their partners, these were merged into not working, unskilled and professional categories. Place of residence was coded as either urban or rural; the regions were coded as Punjab, Sindh, Khyber Pakhtunkhwa (KPK), Baluchistan and Islamabad Capital Territory (ICT). The wealth index was constructed using principal component analysis on assets ownership including land and livestock with a range of socioeconomic factors, including household construction, utilities, source of drinking water and sanitation facilities: these were categorized as five wealth quintiles, namely, poorest, poorer, middle, richer and richest; also, access to knowledge regarding family planning via radio, TV and newspaper was merged and categorized as either yes and no to avoid small cell counts.

Frequency and percentage of categorical variables are reported. Collinearity was assessed with no variables needing to be excluded due to weak associations. The rate of teenage pregnancy was determined for each year (1990–1991, 2007–2008, 2012–2013 and 2017–2018) separately and later collated to estimate the total pooled prevalence. Bivariate associations between teenage pregnancy, sociodemographics and media exposure were tested for statistical significance using Cox regression. All variables with borderline statistical significance ($p < 0.25$) were considered as either a potentially confounding or an interacting variable. The determinant of teenage pregnancy is reported as the prevalence ratio (PR) with a 95% CI. Multivariable regression models were used to produce covariate-adjusted PRs and 95% CIs. At this level, different categories were merged to avoid a small cell count problem. To select the final variables, we included all candidate variables (sociodemographics and media exposure) in the model then applied purposeful backward elimination, until the model contained only variables significant at $p < 0.05$. All analyses were undertaken in SPSS version 26 (Developed by Norman H. Nie, Dale H. Bent, and C. Hadlai Hull, USA) and pooled prevalence was estimated using Joanna Briggs Institute software, SUMARI (Developed by the Joanna Briggs Institute, Australia).^{20,21}

Results

Data on 40 076 MWRA who have ever been pregnant were analyzed and are reported in Table 1. Of the total, more than half (57.4%) were from rural areas, almost half were either from the

Table 1. Sociodemographic characteristics of pregnant women

Sociodemographic characteristics	Total pregnant women N=40 076 Frequency (%)	Teenage pregnancy n=17 037 Frequency (%)	Adult pregnancy n=23 039 Frequency (%)	p
Place of residence				
Urban	17 057 (42.6)	6733 (39.5)	10 324 (44.8)	<0.001
Rural	23 019 (57.4)	10 304 (60.5)	12 715 (55.2)	
Regions				
Punjab	11 941 (29.8)	4351 (25.5)	7590 (32.9)	<0.001
Sindh	9130 (22.8)	4266 (25.0)	4864 (21.1)	
KPK	12 128 (30.3)	5491 (32.2)	6637 (28.8)	
Baluchistan	5358 (13.4)	2518 (14.8)	2840 (12.3)	
ICT	1519 (3.8)	411 (2.4)	1108 (4.8)	
Wealth index*				
Poorest	7801 (23.2)	3974 (28.9)	3827 (19.2)	<0.001
Poorer	7249 (21.5)	3416 (24.9)	3833 (19.2)	
Middle	6632 (19.7)	2802 (20.4)	3830 (19.2)	
Richer	6079 (18.1)	2134 (15.5)	3945 (19.8)	
Richest	5887 (7.5)	1404 (10.2)	4483 (22.5)	
Woman's education				
No education	24 338 (60.7)	12 118 (71.1)	12 220 (53.0)	<0.001
Primary	5288 (13.2)	2362 (13.9)	2926 (12.7)	
Secondary	6718 (16.8)	2167 (12.7)	4551 (19.8)	
Higher	3732 (9.3)	390 (2.3)	3342 (14.5)	
Partner's education				
No education	13 389 (33.6)	6619 (39.1)	6770 (29.6)	<0.001
Primary	6039 (15.2)	2921 (17.3)	3118 (13.6)	
Secondary	13 227 (33.2)	5222 (30.9)	8005 (35.0)	
Higher	7136 (17.9)	2164 (12.8)	4972 (21.7)	
Partner's occupation				
Not working	1260 (3.2)	578 (3.4)	682 (3.0)	<0.001
Professional	4520 (11.4)	1402 (8.3)	3118 (13.7)	
Services	4737 (12.0)	1953 (11.6)	2784 (12.2)	
Sales	5589 (14.1)	2295 (13.6)	3294 (14.4)	
Agricultural	6457 (16.3)	2944 (17.5)	3513 (15.4)	
Skilled	7633 (19.3)	3274 (19.4)	4359 (19.1)	
Unskilled	9443 (23.8)	4397 (26.1)	5046 (22.1)	
Woman's occupation				
Not working	32 525 (81.2)	13 512 (79.3)	19 013 (82.6)	<0.001
Professional	821 (2.0)	130 (0.8)	691 (3.0)	
Services/sales	2121 (5.3)	1031 (6.1)	1090 (4.7)	
Agricultural	2544 (6.4)	1334 (7.8)	1210 (5.3)	
Skilled	1242 (3.1)	620 (3.6)	622 (2.7)	
Unskilled	804 (2.0)	403 (2.4)	401 (1.7)	
Heard about family planning on the radio				
Yes	3047 (7.6)	1378 (8.1)	1669 (7.3)	0.002
No	36 992 (92.4)	15 643 (91.9)	21 439 (92.7)	
Heard about family planning on TV				
Yes	8494 (25.3)	10 827 (78.9)	14 300 (71.9)	<0.001
No	25 127 (74.7)	2895 (21.1)	5599 (28.1)	
Heard about family planning from a newspaper**				
Yes	895 (3.7)	202 (2.1)	693 (4.7)	<0.001
No	23 549 (96.3)	9345 (97.9)	14 204 (95.3)	
Year of data collection				
1990–1991	6428 (16.0)	3307 (19.4)	3121 (13.5)	<0.001
2007–2008	9177 (22.9)	4176 (24.5)	5001 (21.7)	
2012–2013	11 763 (29.4)	4701 (27.6)	7062 (30.7)	
2017–2018	12 708 (31.7)	4853 (28.5)	7855 (34.1)	

*data not available for 1990–1991.

**data not available for 1990–1991 and 2003–2004.

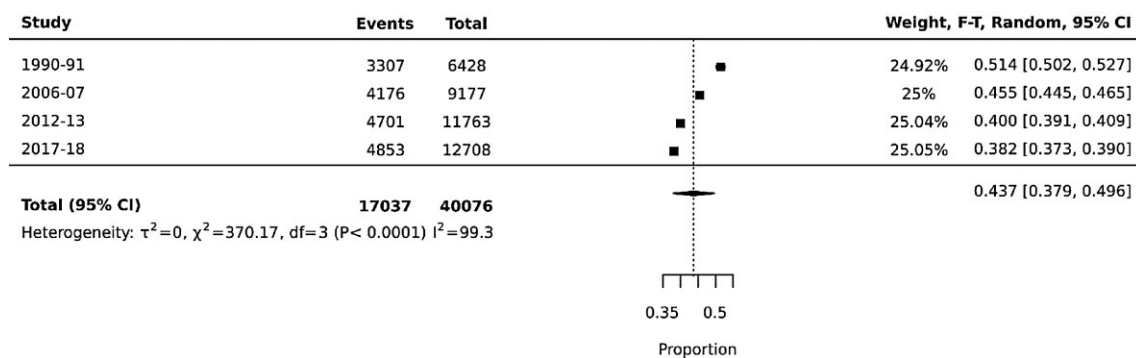


Figure 1. Rates of adolescent pregnancy.

poorer (21.5%) or poorest (23.2%) wealth quintile and approximately one third (30.3%) were from either KPK or Punjab (29.8%). More than half of the women were not educated (60.7%) and 81.2% were not working. Almost one third (33.6%) of MWRA's partners were not educated and almost all of them were working in different capacities (96.8%). Of all the women, about a quarter heard about family planning on the TV (25.3%), while less heard about it via radio (7.6%) or newspapers (3.7%).

Of the total number of pregnant women, 42.5% had teenage pregnancies. The rates of teenage pregnancy were 51% (95% CI 50 to 53%) during 1990–1991 and since then the rates have declined to 46% (95% CI 45 to 47%) in 2006–2007, 40% (95% CI 39 to 41%) in 2012–2013 and 38% (95% CI 37 to 39%) in 2017–2018. The overall pooled prevalence of teenage pregnancy is 44% (95% CI 38 to 50%) (Figure 1).

Of the total number of 17 037 teenage pregnant women, around two-thirds (61%) were from rural areas; about a quarter were from each of the provinces of Punjab (26%) and Sindh (25%), followed by Baluchistan (22%); and more than half belonged to either the poorest or the poorer wealth quintiles (54%). More than two-thirds of women were not educated (71%) and not working (79%). Almost a quarter of their partners were uneducated (34%), but almost all of them were working (97%). More than three-quarters of teenage mothers had heard about family planning on TV (79%), while a few had heard about it on the radio (8%), although even fewer read about it in a newspaper (2%) (Table 1).

Upon bivariate analysis, the PR of teenage pregnancy was significantly higher among women from rural areas compared with those living in urban areas. Likewise, the PR was significantly higher among women who were from Sindh, KPK and Baluchistan compared with women from Punjab; however, the rates were significantly lower among the women of ICT. The PR of teenage pregnancy was significantly higher among women who were from the poorest quintile followed by the poor quintile, middle quintile and richer quintile compared with women from the richest quintile. The PR of teenage pregnancy was significantly higher among those who were not educated compared with those who were educated; similarly, rates were also higher among those women whose partners were not educated (Table 2). The prevalence of teenage pregnancy was higher among women whose partners were not working or who were unskilled workers compared with those working as professionals. How-

ever, rates of teenage pregnancy were significantly lower among women who were not working women. The PR of teenage pregnancy was significantly higher among those women who had not heard about family planning via any medium (radio, newspaper or TV).

Upon multivariate analysis, region, wealth index, women's education and working status were significant determinants of teenage pregnancy. The PR for teenage pregnancy was significantly higher among women who were from Sindh (adjusted PR [aPR] 1.20; 95% CI 1.14 to 1.26), KPK (aPR 1.27; 95% CI 1.21 to 1.33) and Baluchistan (aPR 1.14; 95% CI 1.08 to 1.21) compared with women from Punjab; among those who belonged to the poorest quintile (aPR 1.26; 95% CI 1.17 to 1.35) followed by the poorer quintile (aPR 1.22; 95% CI 1.14 to 1.31), middle quintile (aPR 1.20; 95% CI 1.12 to 1.28) and richer quintile (aPR 1.10; 95% CI 1.03 to 1.18) compared with women who belonged to the richest quintile; and among those who were uneducated (aPR 3.93; 95% CI 3.53 to 4.38) compared with women with a higher education. Regarding occupation, the PR was significantly lower among women who were not working (aPR 0.89; 95% CI 0.85 to 0.93) compared with women who were working (Table 2).

Discussion

This study investigated the prevalence and predictors of teenage pregnancy in Pakistan using data from the PDHS (1990–2018). Almost half of all women in Pakistan became pregnant before the age of 19 y. Although the rates of teenage pregnancies have decreased from 51% to 38% in 28 y, this is not sufficient to reach the targets set by SDGs to improve maternal and child morbidity and mortality rates. The current study identified that region and socioeconomic status, including education, occupation and wealth index, were the key determinants of teenage pregnancy.

This study found an association between education and teenage pregnancy. Teenage girls who have higher education or who remain in school longer generally have lower rates of early pregnancy compared with girls who have little or no education or who are not in school at all.²² This was also true regarding the impact of a partner's education on teenage pregnancy. This could be because less educated women and their partners lack adequate knowledge regarding early pregnancy and contraception, including misconceptions about the short- and

Table 2. Social determinant of adolescent pregnancy

Determinants	PR	p	95% CI	APR	95% CI
Place of residence					
Rural	1.13	<0.001	1.10 to 1.17		
Urban	Ref				
Region					
Sindh	1.28	<0.001	1.23 to 1.34	1.20	1.14 to 1.26
KPK	1.24		1.19 to 1.29	1.27	1.21 to 1.33
Baluchistan	1.29		1.23 to 1.36	1.14	1.08 to 1.21
ICT	0.74		0.67 to 0.82	1.06	0.96 to 1.18
Punjab	Ref				
Wealth index					
Poorest	2.14	<0.001	2.01 to 2.27	1.26	1.17 to 1.35
Poorer	1.98		1.86 to 2.10	1.22	1.14 to 1.31
Middle	1.77		1.66 to 1.89	1.20	1.12 to 1.28
Richer	1.47		1.38 to 1.57	1.10	1.03 to 1.18
Richest	Ref				
Woman's education					
No education	4.77	<0.001	4.31 to 5.27	3.93	3.53 to 4.38
Primary	4.27		3.84 to 4.76	3.85	3.44 to 4.30
Secondary	3.09		2.77 to 3.44	2.90	2.59 to 3.23
Higher	Ref				
Partner's education					
No education	1.63	<0.001	1.55 to 1.71		
Primary	1.60		1.51 to 1.69		
Secondary	1.30		1.24 to 1.37		
Higher	Ref				
Partner's occupation					
Not working	1.12	<0.001	1.03 to 1.22		
Unskilled	1.14		1.10 to 1.18		
Professional	Ref				
Woman's occupation					
Not working	0.89	<0.001	0.86 to 0.92	0.89	0.85 to 0.93
Working	Ref				
Access to knowledge on family planning					
No	1.12	<0.001	1.07 to 1.17		
Yes	Ref				

long-term adverse effects of using contraceptives, lack of exposure to mass media and lack of knowledge concerning the negative consequences of early childbearing on their own health, as well as that of their children.^{5,7,23,24} Previous studies reported that exposure to mass media exerts a strong positive impact in reducing teenage pregnancy as it contributes to creating awareness about the negative consequences of early childbearing and is very influential in motivating couples to adopt family-planning methods.^{25,26} Our finding of a higher risk of pregnancy among uneducated women is consistent with studies conducted in LMICs.^{7,22,24,27,28}

The current study also found that the prevalence of teenage pregnancy was high among girls who had not heard about family planning, although this finding was not significant upon multivariable analysis. Young girls in LMICs who may want to avoid pregnancies may not be able to do so due to knowledge gaps and

misconceptions about where to obtain contraceptives and how to use them.²⁹ Adolescent girls in Pakistan face barriers to accessing contraception due to restrictive laws and policies regarding the provision of contraceptives based on age or marital status, health worker bias and/or lack of willingness to acknowledge adolescents' sexual health needs, as well as the inability of adolescents to access contraceptives because of knowledge, transportation and financial constraints.²⁴ Additionally, young girls also lack the autonomy to ensure the correct and consistent use of contraceptive methods.^{24,29} These factors are further aggravated by low socioeconomic status and poor wealth indexes. Poverty in Pakistan is a serious issue and it plays a significant cyclical and compounding role in the level of education and rates of teenage pregnancy.²⁴ The rate of child marriage is higher among poor females, which eventually leads to early childbearing among millions of young females in Pakistan.²⁴ Additionally, many young girls living

in rural areas drop out from school when they feel that marriage is a better option in their socioeconomic conditions and this in turn contributes to teenage pregnancy.³⁰ Young females with a lower educational level have a lack of knowledge about the negative consequences of early childbearing; they are financially dependent on their husbands, have lower levels of empowerment within the family and society and have a limited to no role in the decision-making process, which essentially restricts their capability to postpone their childbearing to older ages.⁶ Lower education level and poorer wealth indexes were found to be associated predictors with a higher prevalence of teenage pregnancies in earlier studies from LMICs such as Pakistan, India, Bangladesh and Nepal.^{5,7,22,24,31}

The bivariant analysis also revealed that teenage pregnancy was significantly higher among women who resided in rural areas compared with those who resided in urban areas. This finding is consistent with previous studies conducted in Bangladesh and Nepal.^{5,7} First, in Pakistan in particular, young women residing in rural areas are forcefully married because parents believe that this will save their daughters from unacceptable relationships and sexual abuse. Second, poverty and low literacy rates prompt early marriages and consequently teenage pregnancies. Third, because Pakistani society is patriarchal, females are excluded from decision-making and the husband has the authority over conception. There are also social expectations to have a child during the first year of marriage.²⁴ Although teenagers represent a large proportion of the population in Pakistan, still relatively little is known about their sexual knowledge and experience and the risk associated with teenage pregnancy.

Although the findings of the current study represent the prevalence and predictors of teenage pregnancy at the national level, due to the secondary nature of the dataset, certain limitations need to be considered. First, as these data are of a cross-sectional nature, it is difficult to determine the temporal relationships between the dependent and explanatory variables. Second, a self-reported questionnaire was used to collect information on most of the variables, therefore it is subject to recall bias. Third, the data were collected from some clusters in each DHS due to security constraints and non-participation. Moreover, Azad Jammu and Kashmir, Federally Administered Tribal Regions, as well as Gilgit and Baltistan regions, were not covered in all the PDHS (except for PDHS 2017–2018), and for that reason were merged with KPK because those regions were all part of North-West Frontier Province.

Conclusions

Teenage pregnancies can be a major threat to the growth and development of the upcoming generation. They can have devastating health, economic and social implications for individuals, families and the entire country. Pakistan needs to strengthen female child education to support their empowerment and to limit their exposure to early marriages. School and community health programs must target adolescent girls and boys and their parents regarding awareness about sexual and reproductive health services and the disadvantages of early marriages. Education at the rural community level should be promoted. Policymakers should focus on interventions that ensure the enrolment of girls in schools in rural areas, provide opportunities for them to be able to attend school and promote continued enrolment and attendance

as young girls become teenagers. In addition to this, support services should be offered to teenage mothers who have dropped out of school so that they can re-enroll and gain a higher education. This could expand their future financial and career opportunities. Social and health services need to identify the population that is vulnerable to early marriage; the role of nurses and community midwives is crucial in identifying these cases and generating referrals according to their needs. Furthermore, the involvement of males should not be ignored at any level. Their education about these issues should also be prioritized, and frontline health-care providers such as community midwives and female health workers need to consider their involvement to sensitize them to these issues. Finally, all these competencies must be included in lady health worker (LHW) and community midwife (CM) curricula to enhance the role of LHWs/CMs in preventing adolescent pregnancies and in supporting adolescent parents in their healthy transition to parenthood. Efforts should also be directed to develop strategies to address poverty, promoting gender equality and the empowerment of women/girls to improve the ability of girls to remain in school and become economically independent members of society.

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Ethical approval: The DHS program is the global repository body for DHS datasets. Although access to the DHS datasets is not freely available to the public, the DHS program can provide access to DHS datasets after formal registration and application. The permission to the PDHS datasets was obtained from <https://dhsprogram.com/data>. The data received were password-protected and anonymous. Due to the secondary nature of data, institutional ethical clearance was neither required nor obtained.

Data availability: The original data, including all epidemiological data, used in this work will be made available upon requesting the DHS.

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