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Research Article

**EVALUATING THE EFFECTS OF THE PAKISTANI
NATIONAL POLIO IMMUNIZATION PROGRAM USING A
POPULATION BASED CALCULATION APPROACH MODEL**¹Dr. Atiya Mahmood, ²Dr. Haleema Shafique, ³Dr. Warda Shoaib¹Mayo Hospital Lahore²Ahmed Medical Complex, Rawalpindi³Mayo Hospital Lahore**Article Received:** October 2020**Accepted:** November 2020**Published:** December 2020**Abstract:**

Aim: After the re-emergence of poliovirus in Syria in 2013, Pakistan was considered at high risk of transmission due to its proximity to Syria and the high number of displaced Pakistanis. In any case, following a large-scale public immunization activity, Pakistan had the potential to prevent a possible outbreak of polio among nationals and excluded people. In this work, we used a computer model of individual replication to study the danger of poliovirus in Pakistan before and after the immunization crusade and to quantitatively assess the effect of the mission on medical services and the necessary principles that should be maintained to prevent a future outbreak.

Methods: The observation of acute polio in Pakistan ran parallel to the plan and the pace of inclusion of the ongoing public polio immunization crusade was reviewed from the records of the Pakistani Ministry of Public Health. Socio-economic data from the Pakistani population, including Syrian and Palestinian exiles, were examined to plan individual models that predict the outcome of polio spread in Pakistan and to evaluate the outcome of the immunization crusades. The model takes into account geographic, segment, and welfare strengths. Our current research was conducted at Services Hospital, Lahore from March 2019 to February 2020.

Results: Our reenactments affirmed the high danger of polio flare-ups in Pakistan inside 13 days of case presentation preceding the vaccination crusade, and indicated that the current inoculation crusade essentially diminished the speed of the contamination in the occasion poliomyelitis cases enter the nation. At least 90% public inoculation inclusion was discovered to be needed to forestall dramatic proliferation of likely transmission.

Conclusion: Both reconnaissance and vaccination endeavors ought to be kept up at elevated expectations in Pakistan and different nations in the zone to recognize and restrict any possible flare-up. The utilization of computational populace reproduction models can give a quantitative way to deal with evaluate the effect of vaccination crusades and the weight of irresistible infections even with regards to populace movement.

Keywords: National Polio Immunization Program, Pakistan.

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INTRODUCTION:

The Global Polio Eradication Initiative called for the destruction of wild poliovirus in 2000. In any case, three WPV outbreaks, Afghanistan, Pakistan, and Nigeria, are still adding to the recurrent recontamination outbreaks in insecure areas [1]. Two main types of poliovirus, WPV1 and, less significantly, WPV3, influence young people in countries where immunization is not widely available. The severity of this disease is due to the potential for casualties, the mysterious spread, and the high infectivity of fecal-oral infection. Recently, cases of WPV have been reported in territories other than the three remaining outbreaks due to the re-emergence of WPV in Pakistan, Sri Lanka, and India [2]. This is causing enormous expense for the countries where the infection has reappeared, mainly through vaccination crusades, and for the leaders of the influenced countries. The current polio outbreak in Syria is a major concern because of the difficulties of control in the midst of the conflict and the danger of introducing contamination into neighboring polio-free countries such as Pakistan [3]. The Syrian outbreak is the first in some time and has begun to identify 17 cases in Lahore and Multan. The cause of the infection is probably Pakistan, but it is also believed to be a similar infection detached from the sewage system in Egypt and Gaza. The seriousness and likely danger of this outbreak led WHO to send the largest ever fused inoculation reaction to the Middle East to consistently immunize about 25 million young people in seven different countries, including Pakistan [4]. Pakistan has been polio-free since 1999; however, given its proximity to Syria and the spread of huge numbers of Syrian pariahs, Pakistan was considered to be at risk of a further introduction of the polio virus. Here we have verified henceforth the consequences of the recognition of polio in Pakistan and the outcome of the latest public inoculation crusades. We propose a

stochastic model of a possible polio outbreak and quantitatively evaluate the effect of the inoculation crusade. Finally, we evaluate the dangers and difficulties of the re-emergence of the polio virus after the mission [5].

METHODOLOGY:

Polio is a reportable infection in Pakistan and the updated surveillance framework allows for the detection of the disease by examining all cases of severe loss of mobility (LMD) in children under 15 years of age, as suggested by the WHO. The framework consists of three monitoring parts: mandatory disclosure of PMA cases by physicians, zero week reporting by clinics, and dynamic observation by dynamic sentinel systems at medical clinics. We have developed a computer model adapted to the Pakistani context to assess the burden of likely polio outbreaks. Our current research was conducted at Lahore Services Hospital from March 2019 to February 2020. We have previously created a recreated population on the distinctive Pakistani areas. We then reconstructed the presentation of polio cases during the national polio immunization campaign. Demographic data of the Pakistani occupants are reproduced based on information from the latest measures of UNDP for Pakistani nationals and UNHCR for exiles. The vaccination status of the different populations and access to medical services were also obtained through LMPH. In our model, we recreated the Pakistani inhabitants through a multilevel structure (Fig. 1). Each individual is characterized as a vector of strengths $Ind = \langle s, p, hc, h, n, I, a, m \rangle$ which signify site or region, subpopulation (Pakistani, Syrian, Palestinian), family unit size, family unit, number of people, vaccination status (fully, somewhat, or not at all invulnerable), age grouping, and clinical access, individually (Fig. 1).

Figure 1:

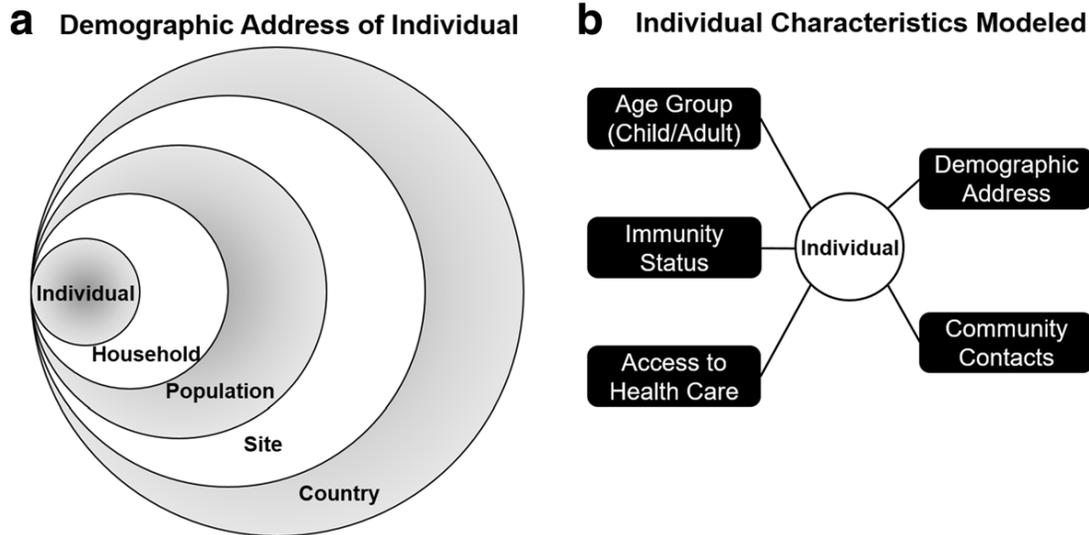


Table 1:

Year Reported	Bites				Vaccine (Verorab)	
	Domestic dogs	Stray dogs	Other animals*	Total	Total distributed	Vaccines per bite
2001	237 (54%)	167 (38%)	32 (7%)	436	780	1-8
2002	221 (51%)	181 (42%)	30 (7%)	432	1655	3-8
2003	234 (52%)	182 (40%)	36 (8%)	452	1397	3-1
2004	353 (58%)	204 (34%)	50 (8%)	607	2028	3-3
2005	304 (61%)	140 (28%)	51 (10%)	495	1168	2-4
2006	321 (67%)	29 (6%)	131 (27%)†	481	1570	3-3
2007	224 (57%)	133 (34%)	35 (9%)	392	1170	3
2008	261 (52%)	211 (42%)	30 (6%)	502	1265	2-5
2009	261 (53%)	213 (43%)	20 (4%)	494	1780	3-6
2010	188 (50%)	165 (44%)	26 (7%)	379	847	2-2
2011	175 (52%)	143 (42%)	21 (6%)	339	1223	3-6
2012	125 (46%)	133 (49%)	13 (5%)	271	1421	5-2
Total	2904 (55%)	1901 (36%)	475 (9%)	5280	16322	n.a.
Annual average	242	158	39	440	1360	3-15

RESULTS:

Prior to 2013, a normal 16 AFP cases are reviewed each year in Pakistan (Table 3), ranging from 0.78 to 3.36 per 100,000. Approximately 32.9% of these cases involve young people under age 5, the group most vulnerable to polio. Nevertheless, between 2019 and 2020, 38 to 117 annual AFP cases were examined, with a rate ranging from 5.3 to 15.8 per 100,000. Of these reported AFP cases, 39 cases involved children under 5 years of age (Table 3). Only one AFP case was reported as polio in 2003, and subsequent developments revealed that the case was imported.

Four models of public immunization have been carried out by WHO with the assistance of non-legislative and global associations, including WHO and UNICEF [21]. The mission included vaccination of all Pakistani occupants, as well as reaching Syrian youth through special campaigns in the Syrian-Pakistani suburbs starting in October 2019. The mission concealed young people up to the age of five, and included visits to evacuation camps, schools, nurseries and homes. Vaccination of registered and unregistered displaced persons was also considered.

Figure 2:

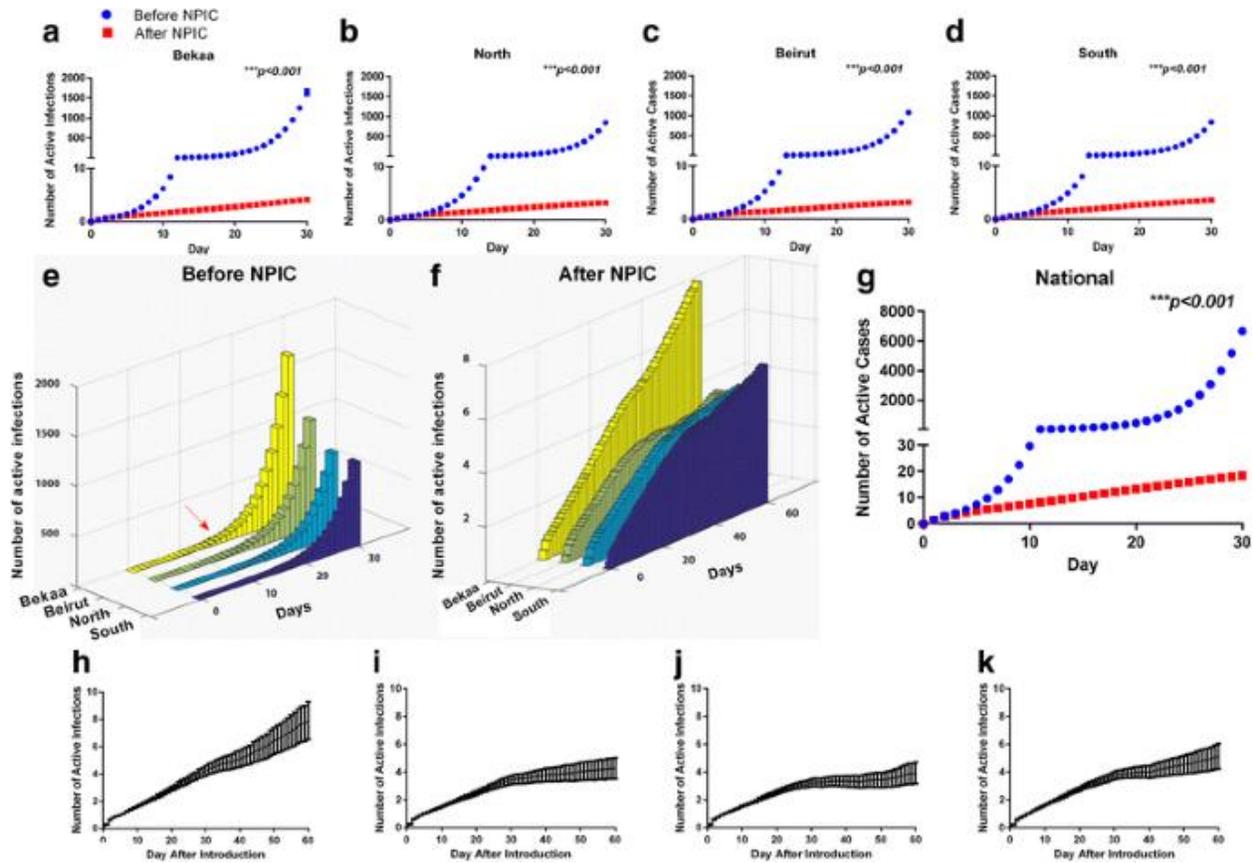


Table 2:

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Age, yr												
0-4	22	22	14	20	23	15	16	9	13	7	8	9
5-14	121	118	129	166	143	140	92	153	130	96	71	67
15-24	101	89	97	142	108	108	88	105	87	69	82	53
25-44	118	128	124	143	133	120	108	125	139	110	98	80
45-65	44	53	65	96	61	74	58	76	84	60	60	46
>65	29	21	23	39	26	23	29	32	39	35	20	15
n.a.	1	1	0	1	1	1	1	2	2	2	0	1
Region												
North	166	108	90	148	91	133	105	140	122	96	84	35
Bekaa	41	68	90	144	94	91	71	86	81	51	84	16
Nabatiye	26	37	35	31	38	23	18	40	23	42	16	33
South	28	42	48	53	67	54	41	54	56	39	42	25
Mount Lebanon	132	118	136	172	169	144	120	130	162	117	82	80
Beirut	35	57	52	57	33	29	33	46	40	29	25	36
n.a.	8	2	1	2	3	7	4	6	10	5	6	46
Total	436	432	452	607	495	481	392	502	494	379	339	271

DISCUSSION:

Following its confirmation as a polio-free nation, the government of Pakistan implemented a daily immunization schedule using an essential portion of inactivated polio vaccine followed by two doses of oral polio vaccine, with the last dose used to supplement subsequent doses [6]. DMPH received a syndromic approach to AFP observation with a comprehensive review of reported cases [7]. The side effects of AFP recognition show the absence of any polio virus contamination in recent years (Table 3) [8]. From 2019 onwards, the Pakistani medical services framework has experienced some difficulties related to the presence of huge numbers of Syrian pariahs in the country, given the danger of polio reoccurrence after the Syrian episode. This has caused a higher number of AFP cases reported in 2017 and 2018 (37 and 50 cases) due to increased suspicion among health professionals [9]. The danger of polio has led the Pakistani government to take measures to prevent an expected episode by strengthening the hidden clinical bases, observing, avoiding and treating the cases of cadres. Beginning in October 2018, the LMPH amplified dynamic reconnaissance in evacuated areas and sent a four-phase Public Polio Immunization Programme (NPIC). Mission results show the inclusion of approximately 98.4% of the target population [10].

CONCLUSION:

This work presents a new way to address the predictable movement of poliovirus in Pakistan by using simultaneous display of socio-economic data of the population and the spread of the disease. We have also demonstrated that the use of computer models for population re-creation can be extended beyond predicting the weight of infection to provide a quantitative means of assessing the effect of inoculation crusades, even with respect to population movement. While the danger of a presentation of infection in Pakistan has completely diminished given the negligible flood of displaced persons to Pakistan since 2019, the Government of Pakistan should continue to improve observation of suspected poliovirus diseases, and adopt advantageous observation exercises, for example, by collecting tests from sewage systems and AFP case contacts. In addition, this latest outbreak, as well as other comparable outbreaks in conflict areas, underscores the importance of complete eradication of polio in the remaining pockets. An important prerequisite for this is to restore harmony and serenity.

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