CHILD IMMUNIZATION DURING COVID-19: A CASE STUDY OF PATHANAMTHITTA DISTRICT, KERALA

Dissertation submitted to Jawaharlal Nehru University in partial fulfilment of the requirements for the award of the degree of

MASTER OF PHILOSOPHY

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DECLARATION

I declare that the dissertation entitled **"Child Immunization during COVID-19: A Case Study of Pathanamthitta District, Kerala"**, submitted by me for the award of the degree of **Master of Philosophy** at Jawaharlal Nehru University is my own work. The dissertation has not been submitted for any other degree of this university or any other university.

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CERTIFICATE

We recommend that this dissertation be placed before the examiners for evaluation.

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ABSTRACT

Immunization is an essential health intervention for children that serves to boost the strength of their immune systems and ward off preventable diseases and complications as well as secures the health of the community at large. This study aims to assess the impact of the pandemic on the routine child immunization programme undertaken in the public healthcare facilities of Pathanamthitta district, Kerala, their associated immunization coverages during the lockdowns, and changes observed from the pre-COVID period. It also dwells upon the demand side elements of a rights-based approach to health for children with respect to immunization in this district, that is, recipients' socio-economic and demographic characteristics and parental responses that facilitates access to immunization.

This exploratory public health case study in a best case scenario utilizes a concurrent nested mixed methods design to uncover the quantitative and qualitative aspects of the routine immunization process from the healthcare providers and parents/guardians of beneficiaries. The results indicate a drop in immunization coverages across vaccines in March 2020 and serious catching-up efforts in the subsequent months at the selected health centres of the district. The median delays in immunization uptake in a sample of two-year-olds during the state lockdown (42 days) was found to be higher than that experienced during the national lockdown (25 days). Though socio-economic and demographic factors of the beneficiaries were not influential to a great extent, COVID-induced anxiety in parents, physical infrastructure and accessibility of the health centres determined child's right to vaccines during the pandemic.

Notwithstanding the efforts of the district's public health system, certain discrepancies in the form of decontextualized guidelines, continuation with existing micro-plans, physical infrastructural deficiencies and imprudent decision-making by parents/guardians based on poor vaccine perceptions triggered delays in vaccine uptakes and a far from perfect immunization service delivery. Therefore, it is suggested that the issues in programme planning and implementation be rectified at the earliest and the lessons learnt be carried forward to prepare for future emergencies without disrupting the immunization services.

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LIST OF ABBREVIATIONS

AEFI	Adverse Effects of Immunization
ANM	Auxiliary Nurse Midwife
ASHA	Accredited Social Health Activist
ANC	Ante-Natal Care
BCG	Bacillus Calmette-Guerin Vaccine
BP	Blood Pressure
CCDRR	Child-Centric Disaster Risk Reduction
COVID-19	Coronavirus Disease 2019
DPT (1/2/3)	Diphteria-Pertussis-Tetanus Vaccine (first/second/third dose)
DPT 1B	First booster dose of Diphteria-Pertussis-Tetanus Vaccine
EPI	Expanded Programme on Immunization
EWS	Economically Weaker Section
F	Female
FHC	Family Health Centre
GEN	General Category
GSDP	Gross State Domestic Product
HMIS	Health Management Information System
IEC	Information, Education and Communication
IERB	Institutional Ethics Review Board
IFRC	The International Federation of Red Cross and Red Crescent Societies
IPC	Infection Prevention and Control
IPV	Inactivated Poliovirus Vaccine
IPV 1 / IPV_1	First dose of Inactivated Poliovirus Vaccine
IPV 2 / IPV_2	Second dose of Inactivated Poliovirus Vaccine
IRP	International Recovery Platform
JHI	Junior Health Inspector
JPHN	Junior Public Health Nurse
LPV	Liquid Pentavalent Vaccine
LPV (1/2/3)	First/Second/Third doses of Oral Poliovirus, Liquid Pentavalent and Rotavirus Vaccines and adjoining appropriate dose of Inactivated Poliovirus Vaccine
LSG	Local Self-Government
M	Male
MCV	Measles-Containing Vaccine
MGISPA	Mahatma Gandhi State Institute of Public Administration
MoH&FW	Ministry of Health and Family Welfare
MR	Measles-Rubella
MR_1 / MR 1	First dose of Measles-Rubella Vaccine and Vitamin A supplementation
MR_2 /MR 2	Second dose of Measles-Rubella Vaccine and Vitamin A supplementation
NDMA	National Disaster Management Authority
NFHS	National Family Health Survey
NIDM	National Institute of Disaster Management
OBC	Other Backward Classes
OPD	Out Patient Department
OPV	Oral Poliovirus Vaccine
OPV_LPV_RVV (1/2/3)	First/Second/Third doses of Oral Poliovirus, Liquid Pentavalent and Rotavirus Vaccines only
OPV B	Booster dose of Oral Poliovirus Vaccine

PHC	Primary Health Centre
PCV	Pneumococcal Conjugate Vaccine
PHEIC	Public Health Emergency of International Concern
PPE	Personal Protective Equipment
PPP	Public-Private Partnership
QUAN	Quantitative
QUAL	Qualitative
RCH	Reproductive and Child Health
RI	Routine Immunization
RRT	Rapid Response Team
RVV	Rotavirus Vaccine
SC	Scheduled Caste
SCs	Sub-Centres
SMS	Short Messaging Service
SPSS	Statistical Package for Social Sciences
UIP	Universal Immunization Programme
UNDP	United Nations Development Programme
UNDRR	United Nations Office on Disaster Risk Reduction
UNICEF	United Nations Children's Fund
WHO	World Health Organization
UHSND	Urban Health Sanitation and Nutrition Day
VHSND	Village Health Sanitation and Nutrition Day
VIT A	Vitamin A Supplementation
VIT_A1 / VIT A1/ VIT-A1	First dose of Vitamin A supplementation
VIT_A2 / VIT A2/ VIT-A2	Second dose of Vitamin A supplementation
VIT_A3 / VIT A3/ VIT-A3	Third dose of Vitamin A supplementation
VIT_A4 / VIT A4/ VIT-A4	Fourth dose of Vitamin A supplementation
VPD	Vaccine-Preventable Disease

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CHAPTER 1

INTRODUCTION

1.1 Background

The utility of immunization arises from the biomedical understanding that children under the age of five in their initial stages of growth and development are highly vulnerable to life-threatening diseases, and routine immunization is the safest means of according them protection as well as preventing spread of infections among children. WHO & UNICEF (2020) reported that 23 million children missed on basic childhood vaccines via routine services with the onset of the pandemic and this was 3.7 million more than that of 2019. Around 17 million of these children living in conflict-ridden communities, underserved remote areas, or in informal and slum dwellings are more likely to have not received even a single vaccine in 2020. Among the middle income countries that have fared poorly on vaccination coverages, India has the greatest increase in children failing to receive the first dose of DPT (3,038,000 in 2020 as compared to 1,403,000 in 2019) and also a declining DPT-3 coverage from 91% in 2019 to 85% in 2020. As Henrietta Fore[1] rightly identifies, "The pandemic has made a bad situation worse" wherein existing vaccine inequities are being further perpetuated by disruptions to immunization services from yet another deadly virus.

As an unanticipated emergency situation, the pandemic and its accompanying social and economic disruptions meant to prevent virus transmission has adversely affected children and their households. Restrictions on movement and interaction, variations in socio-economic capabilities of households along with the fear and anxiety of infection have limited access to seeking timely child immunization. Fear of resurgence of vaccine-preventable diseases and delay in meeting disease elimination/eradication goals has prompted the health authorities to issue guidelines and organize catch-up campaigns. Hence, it is imperative to understand the impact of the pandemic on child immunization services in depth and discuss protection of a child's right to health during emergencies.

[1] https://www.who.int/news/item/15-07-2021-covid-19-pandemic-leads-to-major-backsliding-on-childhood-vaccinations-new-who-unicef-data-shows

People-centric policies have been the cornerstone of the development model of the state of Kerala. Despite the low GSDP[2] and sluggish industrial development[3], Kerala is hailed for its achievements in poverty reduction, literacy, health indicators and political empowerment. History of immunizations in the region go way back to 1879 when a royal proclamation mandated compulsory immunizations for students, prisoners and public servants (Panikar, 1984 as cited in Kutty, 2000). Even the COVID-19 pandemic could not dim the traction received by the 'Kerala model' of pandemic response[4]. At the same time, the focus on managing the pandemic lessened the emphasis on other health services particularly child health whereby the state recorded a drop in routine immunizations by 2.3%[5]. Therefore, an assessment of the routine immunization programme in a state with high human development indicators in an emergency context and parental attitudes towards the right of their children to this service seems to be a befitting topic of research.

This chapter begins with a background of the research and introduces the problem statement, purpose and research questions. This is followed by a brief view on the significance and nature of the study, definitions of key terms and variables deployed in quantitative analysis. The concluding section takes a look at the organization of the study into different chapters.

1.2 Problem Statement and Purpose of the Study

This is a district-based, exploratory public health case-study (in a best case scenario) in Kerala on child immunization in the context of the disaster/emergency situation of COVID-19. The first theme is to assess the impact of the pandemic on the routine child immunization programme undertaken in the public healthcare facilities of Pathanamthitta district, their associated immunization coverages during the lockdowns and the changes observed from the pre-COVID period. The second theme dwells upon the demand side elements of a rights-based approach to health for children with respect to immunization in this district. This seeks to understand how far the recipients' socio-economic and demographic characteristics and parental

[2] https://www.rbi.org.in/Scripts/PublicationsView.aspx?id=20677
[3] https://english.mathrubhumi.com/news/kerala/keralarankingindianstates-1.6207542#:~:text=24%20November%202021%2C%2008%3A11%20AM%20IST&text=Thiruvananthapuram%3A%20In%20a%20major%20blow,and%20union%20territories%20of%20India.
[4] https://www.orfonline.org/expert-speak/responses-to-the-covid-19-pandemic-what-kerala-did-differently/
[5] https://theprint.in/health/covid-year-brings-5-drop-in-routine-immunisation-but-states-throw-up-surprising-trend/713054/

responses during the health emergency may or may not have facilitated their child's access to immunization.

The purpose of this study is to explore these themes using a concurrent nested mixed methods study design in the critical realist paradigm by engaging with the quantitative outcomes and qualitative experiences of two year old children registered in five selected health centres of the district. The study will also look into aspects of planning and service delivery at these health centres as well as gather the perspectives of health workers and parents/guardians on their experiences with immunizations during the pandemic.

1.3 Research Questions

1. To understand the impact of COVID-19 pandemic on the routine child immunization programme in Pathanamthitta District, Kerala.

Q.1.1. How have public healthcare facilities dealt with the disruption of immunization services (with respect to planning, logistics, staffing, IEC and service delivery) in the selected areas of the district?

Q.1.2. How has the coverage of immunization been during the lockdown periods as compared to the same period in the previous year?

2. To understand the role of demand side elements of a rights-based approach to health of children in the selected areas during the pandemic with respect to immunization.

Q.2.1. How has the recipient's socio-economic and demographic factors affected his/her immunization uptake during the pandemic?

Q.2.2. How have parents/caregivers tackled with missed opportunities and responded to catch-up efforts?

1.4 Rationale and Significance of the Study

Children are highly vulnerable to disasters and such adverse events affect their physical, mental and social well-being. Child immunization is a critical public health intervention that aims to reduce the risk of communicable and infectious diseases. Delivery of immunization

services faced disruptions in the bid to reduce the transmission of COVID-19 increasing the risk of resurgence of VPDs. Apart from assessing the impact of the pandemic on this health service, it is crucial to understand the importance given to child's right to health by public health facilities and parents/guardians.

As an addition to research on immunization service delivery at health centres before and during COVID-19, this study seeks to fill the gaps in literature by presenting a district-based analysis of RI services during the pandemic in the Indian scenario with contextual information on planning and service delivery as well as perspectives of healthcare providers and parents/guardians who decide on behalf of children, and lessons for conducting safe vaccination sessions in a disaster/emergency context. The study further adds value by discussing the appropriateness and applicability of guidelines issued by health authorities, the process of transition and recovery observed at the health centres from lockdown to resumption, outcomes of VPD surveillance in the district and perceptions of certain vaccines among parents/guardians.

1.5 Nature of the Study

As a concurrent mixed methods study of nested design, this research considers quantitative variables pertaining to coverages and outcomes of immunization in the pandemic years and aspects of service delivery at the health centres along with qualitative data on the process, experiences and contextual factors of the immunization programme. The study employs different tools such as survey questionnaires, interview schedules and non-participant observations to gather data from primary and secondary sources. The study population consists of two-year old children (born between March and December 2019) and registered for vaccination services at five randomly selected PHC/FHCs in Pathanamthitta district. Further, the inputs of staff of these health centres and 30 parents/guardians of beneficiaries were utilized to corroborate the findings from the quantitative strand.

1.6 Definition of Key Terms and Variables

- *Fully-Immunized Child*: An infant who received one dose of BCG, three doses of OPV, three doses of pentavalent vaccines and one dose of Measles-containing vaccine before attaining one year old (World Health Organization)[6].
- Table 1.1 consists of the key variables used in quantitative data analysis of immunization coverages detailed in Sections 4.2.3 and 4.2.4 of Chapter 4.

Table 1.1: Explanation of Key Variables used in Quantitative Analysis of Immunization Coverages

Section	Variables	Explanations	Pages
Section 4.2.3: Vaccines administered simultaneously are combined together as follows for the sample of 292 children.	LPV 1	First doses of OPV, LPV, RVV and IPV	59-69
	LPV 2	Second dose of OPV, LPV and RVV	
	LPV 3	Third doses of OPV, LPV and RVV and second dose of IPV	
	MR 1	First dose of MR vaccine and Vitamin A supplementation	
	MR 2	Second dose of MR vaccine, first booster doses of DPT and OPV and second dose of Vitamin A supplementation.	
	Vaccines such as IPV (1/2) and Vitamin A (1/2/3/4) taken on days different from the days on which they would have been given with other antigens are indicated separately as such.		
Section 4.2.4: Vaccines administered simultaneously are combined together as follows to estimate overall coverages at the health centres.	OPV_LPV_RVV_ 1	First doses of OPV, LPV and RVV	69-82
	OPV_LPV_RVV_ 2	Second doses of OPV, LPV and RVV	
	OPV_LPV_RVV_3	Third doses of OPV, LPV and RVV	
	MR_1	First doses of MR vaccine and Vitamin A supplementation	
	IPV_1	First dose of IPV	
	IPV_2	Second dose of IPV	
	VIT_A1	First dose of Vitamin A supplementation	

1.7 Chapter Plan

This dissertation is divided into five chapters. The first chapter provides an overview of the background and scope of the study on child immunization during the pandemic as well as the structure of this dissertation. This is followed by a comprehensive review of existing literature on the routine immunization programme in India, conduct of vaccinations in a disaster/emergency context from around the world and in particular during the COVID-19 pandemic, as well as perspectives on child's right to health. The third chapter delves into the methodology adopted for the study in Pathanamthitta district, plans for data collection, management and analysis of

[6] https://www.who.int/data/gho/indicator-metadata-registry/imr-details/3376

quantitative and qualitative strands and ethical considerations. This is followed by the quantitative and qualitative analysis of data and the integration of these results in the fourth chapter. The fifth and final chapter discusses the results and implications of the study along with recommendations for future research.

CHAPTER 2

REVIEW OF LITERATURE

2.1. Understanding the Universal Immunization Programme in India

Immunization as a state-run programme was introduced in 1978 as the Expanded Programme on Immunization with limited momentum. The Universal Immunization Programme was adopted by the Government of India in 1985 (extending the EPI) with the objective of immunizing 85% of newborns and 100% of pregnant women against six vaccine preventable diseases (VPDs)[7] by 1990 (Kulkarni, 1992). The targets were revised to universal coverage and at present, it is one of the largest public health programme in India seeking to cover around 2.67 crore newborns and 2.9 crore pregnant women every year with free vaccines against 12 VPDs[8] via 0.9 crore sessions performed by nearly 150,000 ANMs, supported by around 27,000 cold chain points (National Health Mission[9]; Lahariya, 2015). Literature on immunization and on the programme in particular is multi-faceted and include many areas of research such as vaccine coverage, introduction of new vaccines, socio-economic determinants affecting immunization, programme assessments, cost-benefit analysis, perceptions of parents/care-givers, and policy evaluation.

[7] Namely, Measles, Pertussis, Neonatal Tetanus, Polio, Tuberculosis and Diphteria

[8] Nationally against 9 diseases - Diphtheria, Pertussis, Tetanus, Polio, Measles, Rubella, Tuberculosis, Hepatitis B and Meningitis & Pneumonia caused by Hemophilus Influenza type B; Sub-nationally against 3 diseases - Rotavirus diarrhoea, Pneumococcal Pneumonia and Japanese Encephalitis.

[9] https://nhm.gov.in/index1.php?lang=1&level=2&sublinkid=824&lid=220

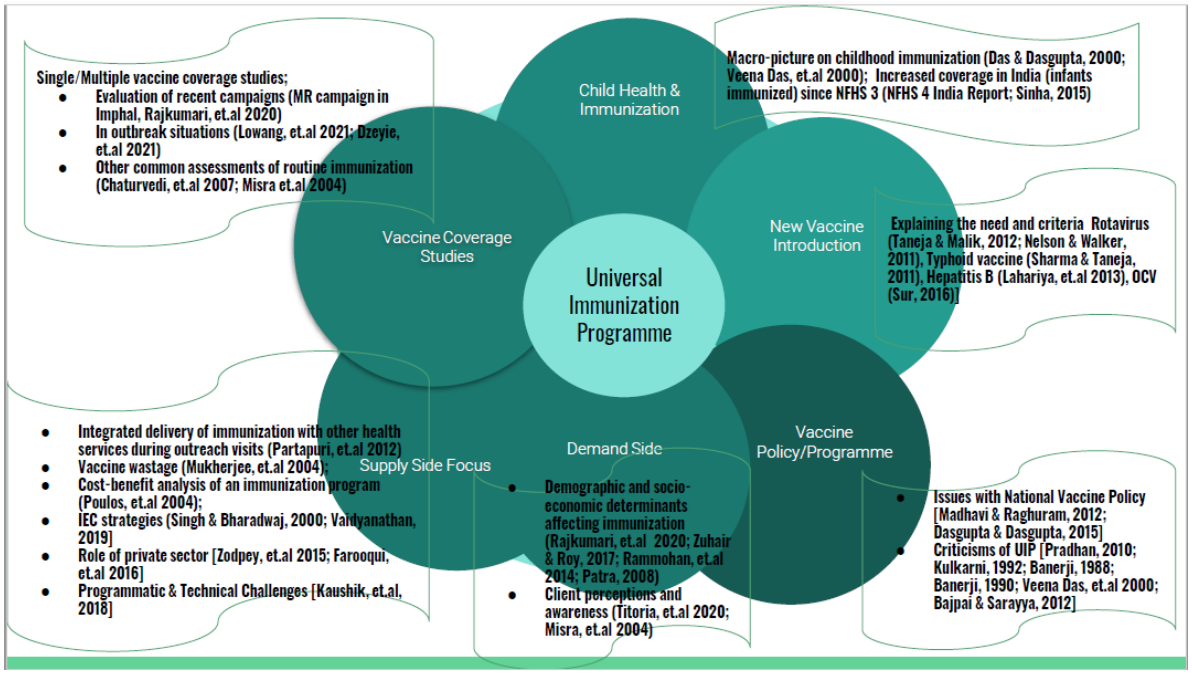

Figure 2.1: Some Important Aspects from the Review on UIP

2.1.1 Child Health and Immunization

The health benefits of vaccination for children range from reduced morbidity and mortality from serious infections, eradication of infectious diseases, inducing herd immunity; reducing the occurrence of secondary infections that can lead to VPDs, and preventing cancer and antibiotic resistance. Cost savings in terms of life years gained, improving individual productivity, and minimizing the cost of illness incurred by families are the economic benefits of vaccination (Rodrigues & Plotkin, 2020). Every one dollar invested in child immunization is estimated to give a return of $16 by averting illnesses and up to $44 if the value of living longer and healthier lives were measured [Olorunsaiye, et.al (2020); Ozawa, et.al (2016)]. As a human right, immunization promotes equity in healthcare and enhances the quality of life. It also results in other social benefits such as empowering women in the households to take decisions related to their child's health. (Rodrigues & Plotkin, 2020).

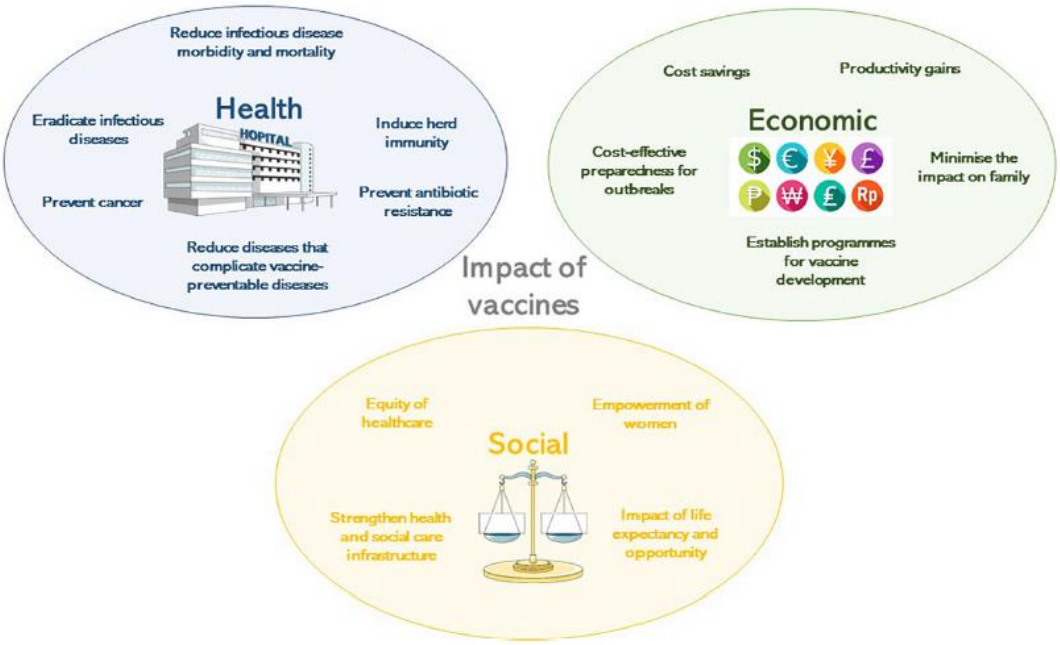

Figure 2.2: Impact of Vaccines (Source: Rodrigues & Plotkin, 2020)

The macro-picture of routine child immunization reveals that while the UIP has unequivocally improved the overall coverage, there are non-uniform results across states and years, and this has had impacts on the incidence and mortality from VPDs (Das, et.al 2000; Das & Dasgupta, 2000). Steady improvements in immunization coverage across all states were observed in the immediate aftermath of the programme modification from 1987 to 1989-'90 and even sharper improvements (some states achieving beyond targets) in 1990-'91. The decline in performance starts from 1991-'92 (though better than 1987-'88 levels) and this becomes clearly evident by 1995-'96 (Das & Dasgupta, 2000). Further, a quick glance at the NFHS data reveals that while the coverage[10] of basic vaccinations[11] has been on a rise since the first round reaching up to 62% by 2015-'16 from 35.4% in 1992-93, the unvaccinated cohort of children that had initially fallen from the first to third round has marginally increased by the fourth round.

[10] Among children of 12-23 months only
[11] 'Basic Vaccinations' include one dose of BCG and measles vaccines each, and three doses of DPT and Oral Polio vaccine each.

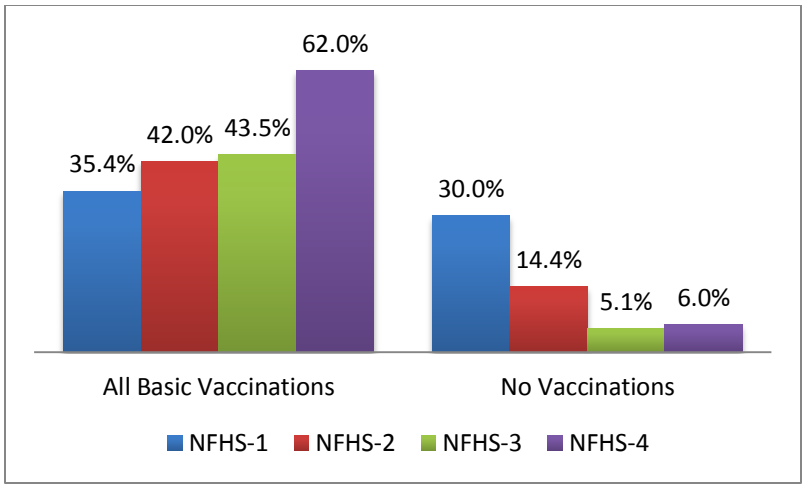

Figure 2.3: Trends in Childhood Vaccinations[12]

The global thrust by the UNICEF in 1985 to achieve universal coverage by 1990 had invoked the Indian administration to place huge impetus on the programme and subsequently as the latter's momentum reduced, the coverage of the programme was adversely affected (Das, et.al 2000). In recent times, immunization drives[13] in mission mode targeting earlier neglected or poorly performing areas are trying to achieve maximum success.

2.1.2 Introduction of New Vaccines and Vaccination Coverage

Studies advocating for new vaccines mention the need for the vaccine based on the prevailing conditions and states the criteria for their introduction. Factors such as disease burden in terms of its incidence, prevalence, absolute number of morbidity and mortality, epidemic or pandemic potential, safety and efficacy of the vaccine, affordability and financial sustainability of the vaccination programme, programme capacity to introduce a new antigen (including cold chain), production capacity (domestic and external), cost-effectiveness of the vaccination programme vis-à-vis other alternatives form the aforementioned criteria. The studies reviewed indicated: *the type of vaccine most favorable* such as the preference for a monovalent vaccine which can induce a heterotypic immunity or a polyvalent vaccine incorporating majority of serotypes prevalent in India in the case of Rotavirus Diarrhea (Taneja & Malik, 2012) or between Vi polysaccharide vaccine and Ty21a live attenuated vaccine against Typhoid (Sharma &

[12] The Chart has been compiled based on data from NFHS-3 & NFHS-4 India Reports – Chapter on Child Health.
[13] Mission Indradhanush, Intensified Mission Indradhanush (IMI & IMI 2.0): https://www.nhp.gov.in/mission-indradhanush1_pg

Taneja, 2011); *cost-effectiveness of a universal programme* against Rotavirus (ability to avert disability-adjusted life-year per US$ 200 at a price of US$ 14 per 2-dose course) [Nelson & Walker, 2011]; *dealing with operational and programmatic challenges* as in the case of Hepatitis B vaccine introduction and scaling-up in the UIP (Lahariya, et.al 2013); and even *underlying political and economic reasons for non-introduction* of new vaccines (such as Oral Cholera Vaccine) into the UIP (Sur, 2016).

Immunization coverage of single or multiple vaccines at country or local contexts are dealt with in a very large number of studies reviewed even as they dealt with other facets of the UIP. Of particular interest were a few recently published studies that exclusively dealt with evaluation of immunization campaigns. Rajkumari, et.al (2020) presents a cross-sectional study on the impact of a Measles-Rubella vaccination campaign in Imphal East district in Manipur with special focus on the Meitei and Muslim communities. They estimate the vaccination coverage to be at 68.6% with a higher level of coverage among the Meitei community as compared to Muslims. Retrospective cohort studies conducted in the aftermath of outbreaks of measles offer valuable insights into how previous immunization efforts influence the intensity of a VPD particularly in remote and border areas. In the East and West Jaintia Hills districts in Meghalaya, the actual measles vaccination coverage among 12-59 months old children was found to be much lower than reported by the administration; and those who had secured at least one dose of MCV, the attack rate was significantly lower (9%) than those unimmunized (46%) (Lowang, et.al 2021). At a remote village near the Indo-Myanmar border in Arunachal Pradesh, poor micro-planning and inadequate staffing at the local health facilities resulted in a low coverage of measles vaccination and Vitamin A supplementation that adversely affected children less than five years during the measles outbreak in 2017 (Dzeyie, et.al 2021). Strategizing against weak immunization delivery (in terms of planning, staffing, logistics and delivery), and lack of awareness perpetuated by religious and social misconceptions are key to preventing the risk of outbreaks among these remotely located populace.

Other routine assessments on the immunization coverage also invokes the need for strengthening IEC activities and ensuring gender bias does not affect immunization of girl children [Chaturvedi, et.al 2007; Misra et.al 2004]. These studies are beneficial in order to devise

contextualized solutions to the issues affecting immunization that are not evident from state or national databases.

2.1.3 Demand for Immunization

The demand for immunization is largely affected by demographic and socio-economic factors such as sex and birth order of the child, place of residence (rural/urban), religion, mothers' age and education, mothers' mass media exposure, receipt of ante-natal care during pregnancy, mothers' awareness on immunization, mothers' occupational status (working/non-working), household wealth and proximity to a health-centre. Girls were found to have a slightly lower probability of being vaccinated and also vaccinated age-appropriately, and higher birth order children are even more disadvantaged; children in urban areas, of mothers with higher education levels and have received ANC, living in households who are less resource-constrained and in the proximity of a health-centre are more likely to be immunized than their counterparts facing multiple deprivations [Rajkumari, et.al 2020; Zuhair & Roy, 2017; Rammohan, et.al 2014; Patra, 2008].

2.1.4 Supply of Immunization

The general satisfaction of clients towards the routine immunization services depends upon health workers' behavior, infrastructure and availability of other services at the facility that can be secured along with immunization like child growth monitoring, dietary advices, health education and outpatient services (Titoria, et.al 2020). Immunization sessions on Sundays or during non-working hours such as late evenings would enable children of laborer populations to avail of these services (Lowang, et.al 2021).

On the supply side, the success of an immunization programme depends on proper microplanning, ensuring availability of vaccines and minimizing wastage (Mukherjee, et.al 2004), adequate staffing and logistical facilities (storage and transportation), provision of timely information, ensuring accessibility and affordability of vaccines to all, monitoring and evaluating for AEFIs, programmatic and technical challenges and their prompt resolutions. Linking immunization with other select interventions during outreach sessions enhances equity and efficiency in resource-constrained situations. (Partapuri, et.al 2012). While immunization is acclaimed as a public health's 'best buy', cost-effectiveness of a vaccination programme will

depend on accurate identification of areas with a high incidence of the VPD and target population considering the fact that the most vulnerable are the most likely to be missed. This would necessitate adoption of a societal perspective on the economics of vaccination by the public health officials (Poulos, et.al 2004).

The need to bridge this biomedical intervention to social aspects of the community is critical in generating IEC strategies. This would involve using progressive but culturally rooted imagery and popular messaging, field testing for reactions and impact analysis. Social mobilization by way of reaching the unreached, convincing and making them aware, empowering local functionaries and garnering community support determine the sustainability of an immunization programme (Singh & Bharadwaj, 2000). An innovative approach tested by Vaidyanathan, et.al (2019) over six years in the rural and urban areas of Pune of deploying school students from a household with an under-five child to educate their parents yielded positive results on immunization coverage. Before IEC, the age-appropriate full immunization coverage for under-five children was 51% and 67% in the rural and urban experimental groups. Their post-IEC rates stood at 88% and 85% respectively. Decline in the percentage of unvaccinated children was from 24% and 19% in the pre-IEC period to 1% for both groups in the post-IEC period.

The role of the private sector in immunization in complementing the efforts of the public sector is well-known, but it comes at a cost. This 'price' factor deepens inequities in society and detrimentally affects immunization uptake. Prior to the introduction of PCV into the UIP, pediatricians of the private sector underscored the need for price regulation and indigenous production to promote its uptake among the common people [Zodpey, et.al 2015; Farooqui, et.al 2016]. Other supply-side factors affecting immunization include programmatic challenges such as reaching children in difficult-to-reach areas (remote villages, border regions and conflict areas) and hard-to-reach populations (ethnic minorities, urban slum dwellers and migrants). Technical properties of the vaccine should be factored in while implementing an immunization programme such as a well-maintained cold-chain, dosage requirements, mode of uptake (oral/injection) and effectiveness of the vaccine with respect to age, etc. (Kaushik & Kumar, 2018).

2.1.5 Analyzing the National Vaccine Policy & Programme

The National Vaccine Policy, 2011 has placed overarching emphasis on supply side factors: PPPs, innovative financing, advance market commitments, justifying usage of public money on private vaccine production without stressing on building national capacities for public immunization programmes. Absence of a mandatory enforcement of the new vaccine introduction criteria without any considerations of proven need[14], suitability[15], safety and efficacy or cost-benefit and risk analyses based on Indian evidence; hollow significance to VPD surveillance, AEFIs, and operational efficiency, exclusion of specific strategies to solve the issues of immunization coverage especially in peri-urban areas, secrecy and hurry in draft preparation are other criticisms raised against the existing policy framework [Madhavi & Raghuram, 2012; Dasgupta & Dasgupta, 2015].

The UIP has faced censures from its beginning as a 'western-imposed technocentric programme based on the selective primary healthcare approach' (Banerji, 1988). This massive, expensive and complicated programme had been criticized on account of its introduction without any understanding of the epidemiological aspects of diseases in India (particularly with regard to regional and temporal variations in disease rates, ecological, social and cultural factors affecting the disease rates and efficacy of the vaccines) resulting in uniform implementation and centrality in approach. Some state health systems[16] were too weak to absorb the programme. The introduction of this health technology to bring forth visible and dramatic results tended to divert attention from the basic needs required for survival [Banerji, 1990; Banerji, 1988]. Bajpai & Sarayya (2012) have clearly stated that vaccines cannot single-handedly resolve the burden of reducing infectious diseases without economic and social development and improvements in provision of healthcare. VPDs continue to prevail despite the good vaccination coverage, and they do not occupy the top ranks in leading to under-five or infant mortality in India. Das, et.al (2000) attributes the adoption of UIP to be an integral part of the process of globalization and commerce wherein higher immunization coverage could be portrayed as a success story to convince international donors of effective fund utilization.

[14] Proven need implies considering the actual disease burden with respect to burdens of other diseases.
[15] Suitability for local strains and variants
[16] This includes the states of Uttar Pradesh, Madhya Pradesh, Bihar, Rajasthan, Assam and Orissa (Banerji, 1990).

Apart from the ineffectiveness of a pure technocratic solution to a public health problem, UIP has faced criticisms on human resource gaps, poor micro-planning, irregular sessions, absence of monitoring and supervision, delay in corrections, improper records-keeping, poor voluntary participation and IEC strategies, unsuitable session timings, lack of integration with the private sector and with other health programmes, missed opportunities, high dropout rates and lack of programme evaluation [Pradhan, 2010; Kulkarni, 1992].

2.2. Immunization in the Context of Disasters/Emergencies

Immunization serves as a critical public health measure against the risk of communicable diseases among displaced and affected populations in the wake of a disaster or emergency. Emergencies result in major and continuous disruption to the provision of immunization services via the primary healthcare system leading to a drop in vaccination coverage. A health cluster approach provides a common platform for all participating organizations dealing with the emergency/disaster to harmonize their efforts, use available resources efficiently and prevent duplication of efforts. The creation and interaction between an Immunization Task Force and Health Cluster ensures alignment of international responses with national structures during an emergency (WHO, 2017b; Bile, et.al 2010).

2.2.1 Impact of Disasters on Children

Disasters affect the physical and mental health of children and interrupt their education. Child health is highly vulnerable to a disaster due to their biophysical aspects such as higher respiratory rates, immature immune systems and of being in the stage of growth and development. They are subject to risk of injury, death, inadequate intake of a balanced diet, and communicable diseases as they have restricted access to healthcare infrastructure, sanitation, clean drinking water and income which affects their food intake. Psychological trauma from death of their loved ones, damage to their possessions, neglect and abuse and breakdowns in social networks, neighborhoods and local economies cause mental harm. When children are at their critical points of growth and development (be it, under-five children or fetuses), negative effects on their health can persist for long periods in their lifetimes and may even be passed onto the next generation. Further, disruptions to their education push them into the labor-force which

exposes them to ill-health and renders them as poor human capital [Kousky, 2016; Toole & Waldman, 1997].

2.2.2 Child-Centric Disaster Risk Reduction and Immunization Preparedness

Child-centric disaster risk reduction (CCDRR) refers to a long term strategy which seeks to ensure the sustainable and resilient development of current and future generations in coping with climate change exigencies[17]. Immunization services are one such commitment to children as the frequency and intensity of disasters increase. de Goyet (2007) mentions that emergency preparedness in the health sector is a concept which goes beyond providing medical care to mass casualties during a disaster. The risk of four communicable diseases (i.e., diarrheal diseases, acute respiratory infections, measles and malaria) along with malnutrition looms large among children and women leading to 50-95% of deaths during an emergency (UNICEF, 2005).

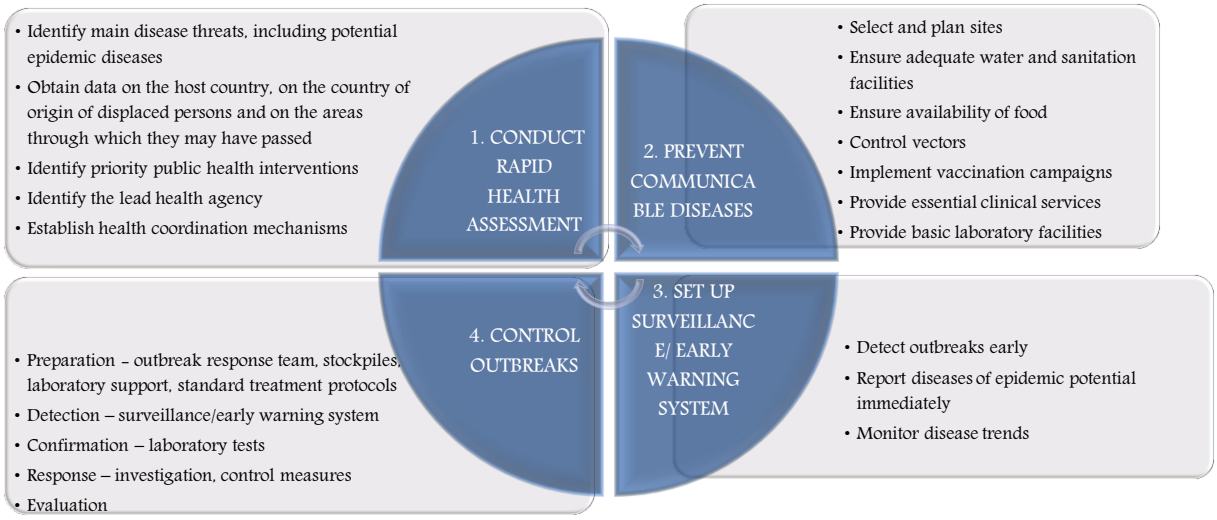

Figure 2.4: Steps in ensuring communicable disease control in emergencies (Based on Connolly, 2005)

Vaccination forms part of the second step of Preventing Communicable Diseases. In these situations, the major vaccine provided with respect to the phase of the emergency differs. In the immediate aftermath of a disaster or after the onset of a VPD outbreak, vaccines against measles, polio and tetanus (for those with open wounds) can be administered. Vaccines against meningococcal meningitis, Hepatitis A, cholera and yellow fever which can cause an epidemic

[17] UNICEF Viet Nam: https://www.unicef.org/vietnam/child-centred-disaster-risk-reduction

are given after the onset of an outbreak. When the coverage rates of measles vaccination in the disaster-affected population is less than 90%, MCV is given in the acute phase of the emergency to prevent any outbreak of the disease. The use of DPT vaccine is recommended only after conditions stabilize. Once the acute phase of the emergency is over, routine immunization programmes must be resumed. Influenza and typhoid vaccines are strictly not recommended to be given at all irrespective of the phase (Walldorf, et.al 2017; WHO, 2012; Toole & Waldman, 1997). The important steps to be followed while planning a vaccination campaign are:

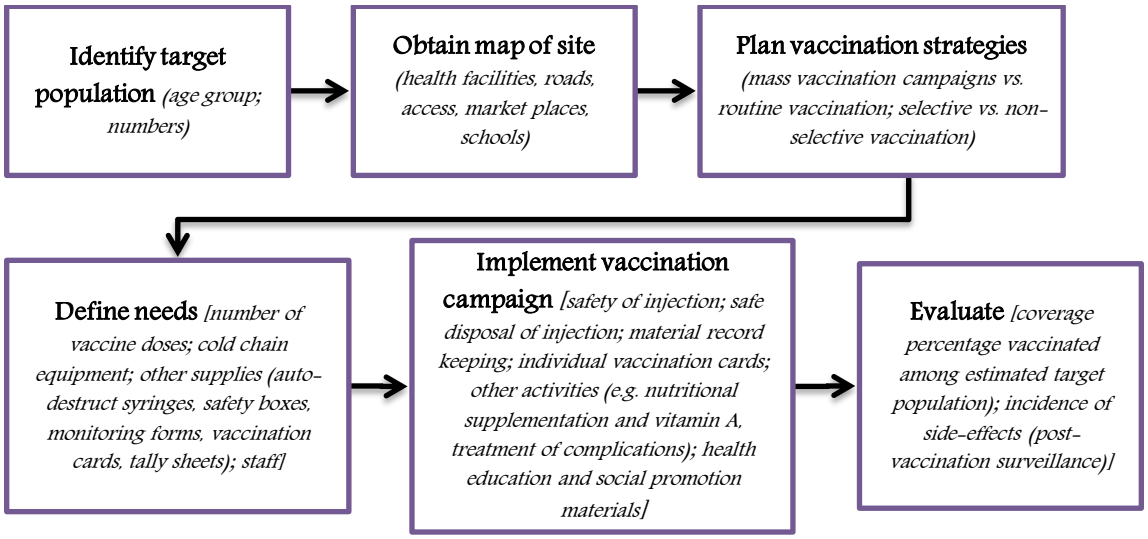

Figure 2.5: Steps in Planning a Vaccination Campaign (Based on Connolly, 2005)

Mainstreaming disaster risk reduction to health entails developing strategies for providing promotive, preventive and curative care by strengthening existing and building new capacities to minimize risks of mortality and morbidity. This holistic approach warrants contextualized emergency health preparedness. Public health preparedness goes beyond investing in advanced technology and equipment, and involves developing institutional and human resources further strengthened by local coping capacity, good governance, evidence-based management, needs and experiences.

2.2.3 On-ground Implementation

WHO (2017a) provides a transparent, evidence-based and consistent approach for implementing vaccination programme in emergencies/disasters. This entails assessing the local epidemiological risk of VPDs in the affected population, characteristics of vaccine selection and

local contextual constraints[18] (Figure 4). The key considerations during vaccination implementation are: geographical factors and accessibility, target population characteristics (age, number, and mobility), timing of vaccination, strategy (fixed site or mobile post), planning and logistics (human and material resources, transportation, and fuel), social mobilization, informed consent and monitoring and evaluation.

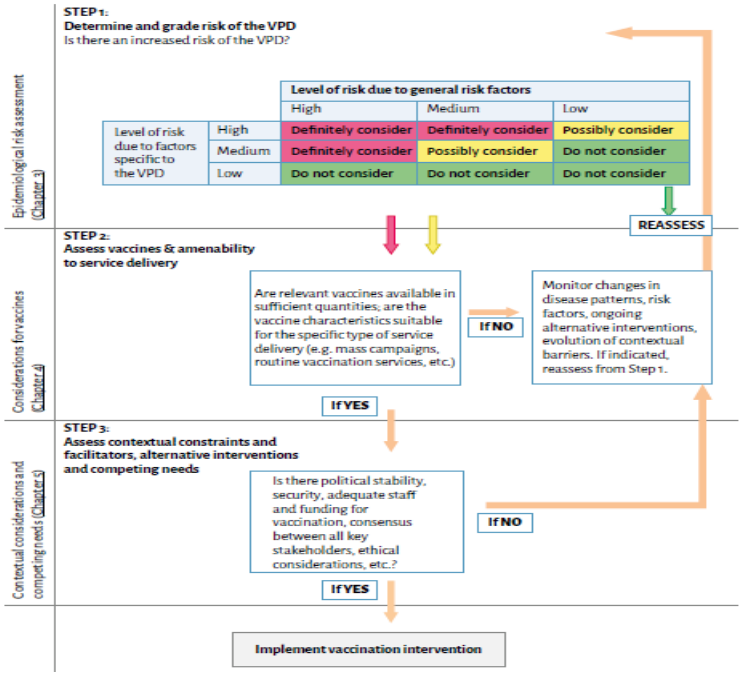

Figure 2.6: Decision-making steps on vaccine use in emergencies (Source: WHO, 2017a)

Based on the studies detailing mass vaccination campaigns in disaster and emergency contexts [Rainey, et.al 2013; Warraich, et.al 2011; Mohan, et.al 2006; WHO, 2006a; Dadgar, et.al 2003; Talley & Salama, 2003], it can be reckoned that the biggest challenge to implementation arises from the displacement of the population and their mobility from/to relief or refugee camps. These population fluctuations results in susceptible children moving through the camps without receiving protection against VPDs. Absence of previous immunization records and surveillance data, manpower shortages, difficulties in identifying the target population, cold chain maintenance issues, restricted vaccine supply, collapsed health infrastructure are other challenges affecting the service delivery. Due to population mobility and

[18] These include ethical constraints such as community opposition, lack of informed consent, etc.; Political constraints such laws or policies limiting vaccination activity or specific vaccines; Security constraints of conflict situations, threat to healthcare workers etc.; and Financial or operational constraints like inadequate funding, vaccine availability, cold chain infrastructure, human resources etc.

supply chain disruptions, delivery of the full course of a recommended vaccine may not be possible (WHO, 2017a). In most emergencies, 'to vaccinate or not' becomes a political question which often weighs over objective evidences in the decision-making process and a lack of political will and accountability to the people affects immunization.

2.2.4 Vaccine Safety & AEFIs

Managing safety during vaccination campaigns is challenging as more than usual adverse reactions may be reported, and in these settings with less experienced or over-worked health workers more errors in administering vaccines may occur. A surveillance system is mandatory for identifying and responding to serious AEFIs. Such a system in place also assures the public. An outbreak of diseases like smallpox and Ebola requires ring vaccination of contacts, and an enhanced AEFI surveillance system before the vaccination campaign. Concerns were expressed on diversion of funds towards vaccine safety monitoring when vaccine deployment itself records a poor progress in the developing countries. However, in the period of rapid media and internet connectivity, an immunization safety crisis can derail an immunization programme. Thus, safety surveillance systems which do not require resources beyond what is required for an existing immunization are warranted. [Walldorf, et.al 2017; Pless, et.al 2003; Ivinson, 2000]

2.2.5 Recommended Action

While providing nutritional support, shelter, and medical assistance are the preliminary priorities on the face of an emergency/disaster, the risk of epidemics exacerbated by malnutrition, poor sanitation and hygiene necessitates the need for immunization (Feldstein & Weiss, 1982). Koop, et.al (2001) outlines two approaches to vaccination in refugee camps:

A. Mass vaccinate the target population at a screening facility upon the population's arrival at the camp.
B. Use immunization teams located at a variety of vaccination sites within the camp.

The second approach is the most effective after population of the camp has stabilized. Mop-up vaccination campaigns are required for those children who may have missed the earlier opportunity.

Active case-finding and passive surveillance in the affected areas using the latest technology, early detection of cases and appropriate management of outbreaks are critical activities [Warraich, et.al 2011; Kouadio, et.al 2010; Mohan, et.al 2006]. In the case of measles

outbreaks, non-selective mass vaccination of children of age six months to fifteen years remains the most prudent option. By immunizing older children who are more mobile and would have missed opportunities to get vaccinated as dire conditions linger on for years (as during an armed conflict), infections in the younger age groups can be averted (Grais, et.al 2011). While planning or justifying the need for an immunization campaign, it is vital to adopt an evidence-based approach that will require assessing the epidemiological situation particularly, the risk of VPDs and likely increase in cases, determine the target population and age, type of vaccine, vaccine efficacy, etc. [WHO, 2012; Grais, et.al 2011; Warraich, et.al 2011].

Strategies ought to be adopted based on the prevailing situation in the area under consideration, local community profile (acceptance and trust) and level of support from national and local governments. Interventions to create demand for vaccination in these special circumstances should be designed based on the historical data on population acceptance and vaccine demand. Gathering support from community and religious leaders and involving a Community Reference Group to participate in conceptualizing and implementing vaccination camps are crucial steps of the social mobilization strategy (WHO, 2017b). Finally, the exit strategy to ensure the smooth transition from crisis mode to regular routine immunization should encompass sustaining and strengthening from the application of innovative interventions and experiences gained along with retaining the additional staff and infrastructure (WHO, 2017b).

2.3. Immunization during the COVID-19 Pandemic

An inflection point in history, the COVID-19 pandemic has demanded of drastic changes to the existing clinical care, public health, social policy, and research agenda critical to the protection of health and development of children. WHO & UNICEF (2020) undoubtedly states that newborn vaccination should remain a priority and be given as per national immunization schedules during the pandemic. School-based campaigns are to be avoided when mass vaccination campaigns are temporarily suspended and alternate means to reach these children ought to be developed.

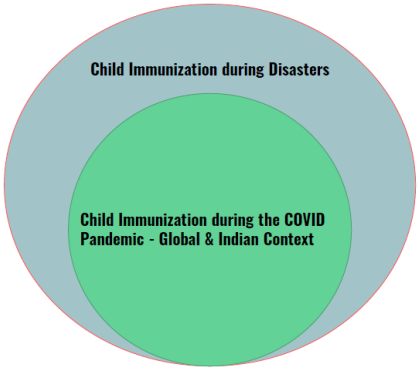

Figure 2.7: Situating the literature on child immunization during COVID-19 in the larger context of disasters

Though recognized, one of the least publicized consequences of the pandemic has been its impact on immunization among other healthcare services especially in the low and middle income countries (Nelson, 2020). In India, maximal brunt of the negative externalities of the pandemic has been on maternal and child health services which had high levels of national coverage in recent times and on the treatment of illnesses that require a continuity of services [Bisht, et.al 2020; Prinja & Pandav, 2020; Vora, et.al 2020].

2.3.1 On-ground Implementation and Challenges

WHO (2020a) had put forth a decision-making framework to ensure the conduct of preventive and outbreak response campaigns: epidemiological risk assessment of the VPD, assessment of potential benefits of mass vaccination and country capacity and safety measures, consideration of potential risk of increased COVID transmission due to mass vaccination campaign, and appropriate actions to be taken based on the risk-benefit analysis.

Table 2.1: Key considerations when assessing the risk-benefit for implementing mass vaccination campaigns, irrespective of COVID-19 transmission scenarios (Source; WHO, 2020a)

Risk-benefit criteria	Key considerations
Assess the impact of the mass vaccination campaign on VPD transmission	Estimate the potential effect on interruption of VPD transmission Estimate the level of potential morbidity and mortality reduction Estimate the potential to induce herd protection Consider the impact of COVID-19 on VPD surveillance
Determine country's capacity to implement a high-quality mass vaccination campaign	Assess human resources capacity and availability Determine material resource needs and evaluate procurement and logistics capabilities: availability of sufficient and adequate resources including masks, PPEs. Consider potential disruptions in supply freight transportation due to COVID-19 restrictions. Estimate economic and financial capacity including funds needed and available. Determine monitoring needs for surveillance of adverse events following immunization, and for COVID-19 surveillance post-vaccination campaigns
Estimate the public health impact of NOT conducting a mass vaccination campaign	Estimate risk of excess morbidity and mortality and increased risk of rapid amplification and spread. Consider the strain on health services due to excess VPD disease burden and the indirect effect on mortality from other diseases Consider disruption of essential health services and diversion of resources away from routine programs and from COVID-19 response. Estimate increased risk of exposure to COVID-19 infection because of increased demand on health care by VPD cases.
Assess the strength of community engagement	Determine how the community and target population perceive the risks associated with COVID-19 and with the VPD outbreak. Consider engaging community representatives on the decision-making process and on planning and implementation of interventions. Consider tailoring community engagement and communication strategies to inform the public on the potential benefits and potential risks associated with the adopted control measures. Understand the risk-communication needs in case of an adverse event following immunization or an aggravation of COVID-19.

In India, immunization recognized as an essential service is intended to be undertaken in a staggered approach depending upon the prevailing COVID condition in the administrative units divided into 'zones'. The strategies to be operational in these zones are given in Table 2.2.

Table 2.2: Immunization Services in Zones during COVID-19 (Based on MoHFW Guidelines, 2020)

	Immunization Strategies		
Zones	**Birth Dose**	**Health facility based Session**	**Outreach Session**
Containment & Buffer Zones	Continued	No (only on demand to walk-in beneficiaries in facility)	No
Beyond Buffer Zone & Green Zone	Continued	Yes	Yes [Modified outreach (VHND and UHSND) in areas beyond buffer zone]

There are variations in resumption of immunization services across countries. Some countries with their aggressive catch-up campaigns have tried to reach their baseline pre-COVID vaccination coverages while other countries are experiencing slower recoveries[19]. Severe disruptive events like COVID unfold and evolve which calls for continuous re-adjustment of immunization plans[20]. Jain, et.al (2021) observes that despite resuming immunization services in Rajasthan, relatively older children who had missed their doses well-beyond the mandated timeline[21] could not be fully reached via catch-up efforts even as children in the younger cohorts increased.

As the pandemic began to cross borders and spread panic, the demand for child immunization could not be sustained. Imposition of restrictive lockdowns and creation of containment zones [Khatiwada, et.al 2021; Singh, et.al 2021] as protective measures of physical distancing paused all routine immunization activities. Parents and care-givers became reluctant to take their children to health centres over fear of contracting COVID [Phillips, et.al 2020; Chandir, et.al 2020; Alsuhaibani, & Alaqeel, 2020; Zhong, et.al 2020]. As public transport system on which middle-class and poor primarily rely upon was disrupted, visits to immunization centres became difficult [Patel, et.al 2020; Chandir, et.al 2020]. The lack of

[19] WHO (2020). Meeting of the Strategic Advisory Group of Experts on Immunization– Conclusions and Recommendations. *Weekly Epidemiological Record,* 95(48), pp.585 – 607. Retrieved from: https://apps.who.int/iris/handle/10665/337109

[20] WHO (2020). Immunization as an Essential Health Service: Guiding Principles for Immunization Activities during the COVID-19 Pandemic and Other Times of Severe Disruption. Retrieved from: https://www.who.int/publications/i/item/immunization-as-an-essential-health-service-guiding-principles-for-immunization-activities-during-the-covid-19-pandemic-and-other-times-of-severe-disruption

[21] For instance, in the case of MCV-1, children in 9-12 months of age are supposed to receive the dose.

insurance (Alsuhaibani & Alaqeel, 2020), poor socio-economic conditions and lower awareness levels (Chandir, et.al 2020) have also affected demand. Further, many parents and care-givers underestimated the longevity of the pandemic and decided to put off vaccination for a later date or began to perceive it as a 'non-essential' health service (Brooks, et.al 2021).

On the supply side, the pandemic exposed the inherent weaknesses of the system in dealing with a health emergency of this intensity and transmission capability. Immunization programmes had to be suspended [Khatiwada, et.al 2021; Patel, et.al 2020; Phillips, et. al 2020] and the staff was remobilized to COVID care services [Parodi, et.al 2021; Singh, et.al 2021; Khatiwada, et.al 2021; Bisht, et.al 2020; Bharadwaj, et.al 2020; Roberton, et.al 2020] and health systems became overwhelmed with COVID patients. Supply chain disruptions and vaccine stock-outs were widely reported [Khatiwada, et.al 2021; Patel, et.al 2020; Phillips, et.al 2020; Chandir, et.al 2020]. The fear of contracting COVID among health workers [Singh, et.al 2021; Chandir, et.al 2020; Phillips, et.al 2020] amidst the shortage of PPEs (Khatiwada, et.al 2021) prevented them from conducting mass vaccination campaigns and outreach services.

2.3.2 Impact

Children missed their opportunities for immunization as per schedule, invoking fears of resurgence of VPDs. Long standing efforts on eliminating and eradicating VPDs such as Polio, Measles, and Tuberculosis have been affected wherein their targets became redundant (Ali, 2020). A substantial fall in child immunization due to the pandemic as compared to the previous years was reported in multiple international and few studies in India [Jain,et.al 2021; Parodi, et.al 2021; Singh, et.al 2021; Patel, et. al 2020; Gera, et.al 2020; Masresha, et.al 2020]. Out of the 97 local health agencies in Italy considered in Parodi, et.al (2021), 94 agencies reported a decline in immunization in comparison to the same period of the previous year and this decline was the highest at the peak of the epidemic. Thirteen of the 15 African nations considered by Masresha, et.al (2020) showed a fall in the monthly average vaccine doses provided and a greater than 10% decline was reported from six countries.

From India, in Sant Kabir District in Uttar Pradesh, the drop in coverage of different vaccines ranged from 12.24% for BCG vaccine to 31.56% for second dose of MR vaccine (Singh, et.al 2021). In one of the largest tertiary hospitals in North India, a reduction of 70.8% in

immunization visits was reported during the lockdown period of April 1 to June 30, 2020 when compared with the pre-lockdown period (January 1 – March 31, 2020) [Gera, et.al 2020]. Socio-spatial injustices aggravate the risk of marginalized children (migrants, homeless, street-connected) who may be excluded from securing immunization (Kusumaningrum, et.al 2021). This fact was re-affirmed from Rajasthan wherein children of less educated, poorer and lower caste households who already had lower pre-COVID immunization levels experienced larger declines in vaccination during the lockdown (Jain, et.al 2021).

The single positive impact of COVID put forth by Ali (2020) is that the pandemic accords a likely change in perceptions of people towards the process of immunization. As a reliable, efficient vaccine against COVID is regarded to be the silver bullet of protection, vaccine hesitancy, refusal and anxieties in general is expected to decline and more children will be covered as soon as routine immunization programmes resume.

2.3.3 Recommended Actions

WHO & UNICEF (2020) recommends few simple measures to be followed during immunization delivery amidst the pandemic. These include introducing mechanisms to take immunization appointments, bundling immunization with other essential preventive health services to limit number of visits to a health facility, using outdoor spaces and following physical distancing measures, separate sessions for those with co-morbidities, strict separation of immunization from curative care services, and planning of catch-up activities. Along with this, surveillance of VPDs with epidemic potential such as influenza, meningococcus, yellow fever, typhoid, cholera, and diphtheria ought to be prioritized. If surveillance process faces disruptions, then there is a need to identify and maintain critical functions like active surveillance for acute flaccid paralysis cases, polio environmental surveillance, outbreak surveillance, and shipment of urgent specimens and laboratory confirmation of priority VPDs. At the same time, all forms of community-based surveillance are strictly discouraged. In the case of mass vaccination campaigns, the recommendations include adhering to good IPC practices such as adequate access of masks, hand sanitizer or hand washing units with soap and water; increasing the time-frame and the number of vaccination sites; house-to-house vaccinations if adequate human resources, logistics and IPC supplies are available, and directly observed self-administration of certain vaccines such as oral cholera vaccine (WHO, 2020a).

2.3.4 Safeguarding Child's Right to Health

Das, et.al (2000) had rightly pointed out that in the political culture of India, epidemics become occasions for the exercise of citizens' rights in the field of health. An epidemic presents a crisis situation and is discerned to be of great danger to the legitimacy of the State. As evident from our experiences during the pandemic, this political culture has played out in the form of denials and secrecy maintained by the ruling forces on the intensity and effects of the pandemic and their management failures. The resultant spike in rumours and panic among the public has created an infodemic on its own. Political parties and public health officials have been quick to blame the health practices of the public rather than acknowledge the deficiencies of the public health system. In this context, a child's right to health attains greater significance as they are most vulnerable to the ill-effects of a disaster/emergency and may not always possess the agency to secure their rights on their own.

McIntosh, et.al (2020) discusses a rights-based approach to healthcare crucial for the well-being of children and protection of their rights in the event of the pandemic. Children's health has been affected by social isolation, school closures, delayed or missed medical care, family stress, and absence of state safeguarding structures. Discontinued or limited pediatric services and in particular, treatment disruptions of rare diseases among children raise concerns. Bharadwaj, et.al (2020) states that apart from being a societal need, protection from VPDs is a child's basic right. Remobilization of ASHA workers to pandemic surveillance activities has affected immunization outreach services among children in rural areas. One or two home visits by the health workers in the first year of the child are discovered to have significant association with a higher full immunization in the community (Sreedevi, 2019). Any widespread disruption to the health system and reduced access to food during the pandemic in low and middle income nations is predicted to cause large number of maternal and child deaths (Roberton, et.al 2020).

Lahariya (2015) advocates a 'health system approach' for immunization in India which looks at all the components of a health system such as stewardship, resource creation in the form of investment and training, service delivery and health financing to achieve quality and equity in health, responsiveness, financial protection and good performance. States such as Goa, Punjab, and south Indian states with better functioning health systems have higher immunization coverage. Limited focus to systematic approaches and weak health systems has been cited as one

of the prime reasons for the sub-optimal immunization coverage in India. This requires greater attention in the wake of the pandemic that has overstretched the healthcare systems, perpetuates health inequalities and has been disrupting the Right to Health.

The real world is a complex adaptive system and according to Adamu, et.al (2020), this calls for a transfer from a reductionist philosophy to systems science which can better explain the relation between COVID-19 and immunization.

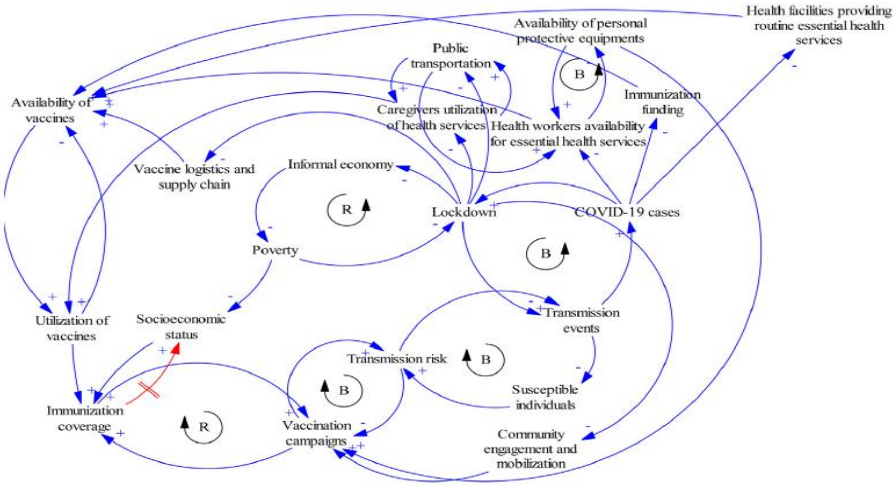

Figure 2.8: A Causal Loop Diagram showing the Relationship between COVID-19 and the Immunization System (B: Balancing Loop; R: Reinforcing Loop) [Source: Adamu, et.al 2020]

This causal loop diagram offers qualitative interpretation of the linkages between elements of a system and feedback loops (balancing and reinforcing) present between them. The link between COVID cases and lockdown is given as a balancing loop wherein a surge in cases will lead to the imposition of lockdown that may reduce transmission of the disease and lead to a fall in cases. If cases do not decline, these restrictions will prevent health workers from conducting vaccination campaigns (also due to redeployment of staff and infrastructure to COVID care) and will result in low availability of immunization services and ultimately, poor coverage. Other direct effects of lockdown will be on affecting vaccine supply chain and movement of health workers. An indirect effect of the lockdown strategy on immunization follows from the pause to economic activities and livelihoods of people dependent on the informal sector. Effects of poverty and widening socio-economic inequalities arising from loss of income detrimentally impacts immunization coverage. Implementation Science is considered to

have the ability to re-design immunization strategies to adjust to the new normal and pressures that the pandemic has brought with it by using multi-faceted evidence based strategies in policy and practice. Starting a special transportation scheme for health workers to reach underserved communities and also allowing care-givers to visit health centres by using child-immunization card as a 'pass' during a lockdown can be one such strategy (Adamu, et.al 2020). This science also encourages the use of differentiated models for communities and socio-economic groups contextualizing interventions. In this manner, Systems thinking provide a nuanced and comprehensive understanding of the interrelationships between COVID-19, its control strategies and childhood immunization.

2.4. Discussion

In the light of the broad framework outlined and implementation of immunization activities during a disaster/emergency, it is imperative to analyze the issues that could and could not be addressed in the COVID pandemic based on the literature reviewed. While most natural disasters are of a shorter duration, the pandemic has been continuing for more than a year now. Specific vaccines according to the phase of the disaster/emergency are recommended to be administered to the affected communities and immunization remains a mandatory public health activity. This could not be replicated during the pandemic wherein all immunization activities had to be suspended to prevent spread of the coronavirus. Even in this dire scenario, newborn vaccinations remained a priority across containment, buffer and green zones as in disaster situations.

Catch-up immunization efforts after the restrictions eased in India does not appear to have yielded significant improvements as older children continue to be missed while the number of younger children rose. As lockdown restrictions became decentralized and inter-state and intra-state differences in COVID cases became more evident, mass vaccination campaigns across the country could not be fully materialized. It has been reported that population mobility and supply chain disruptions prevent the delivery of the recommended full course of a vaccine during disasters/emergencies. Due to fluctuations in COVID cases and resultant containment/lockdown restrictions, children miss out on receiving all the doses of a vaccine according to the schedule.

Children from marginalized community remain excluded from immunization services as in the pre-COVID period enhancing inequities in vaccination outcomes. As health workers are focused on COVID care and COVID vaccinations, the delay in childhood vaccination persists and this is furthered by additional restrictions on number of children to be vaccinated in a given session and the limited number of sessions per day in a health centre. In order to generate demand for immunization, digital means of social mobilization have been sought after, discouraging all forms of community participation. This is in stark contrast to the suggested utility of community reference groups to conceptualize and implement mass vaccination campaigns in a disaster/emergency scenario. Lastly, evaluation of the progress of child immunization has been limited across the country and updates to the national database has been quite slow and delayed as the pandemic continues.

2.5 Gaps in Existing Literature

There are continuing evaluations on the UIP in India, and plenty of research studies on aspects of the programme during normal circumstances as discussed in the first section of the review. But, there are very few studies in the Indian context dealing with immunization in a disaster/emergency situation. This limits our understanding of how our health systems re-orient themselves to deal with immunization in a crisis scenario. While there are handbooks and manuals on planning and implementing immunization campaigns during emergencies released by international agencies such as the UNICEF and WHO, the presence of such documents specific to Indian context could not be found. The NDMA guidelines on Medical Preparedness and Mass Casualty Management (2007)[22] have outlined management of epidemics with immunization as a means to offer active protection to the disaster victims, without providing any further outline on actual conduct of such vaccination camps that can be situated in the Indian context. In the Child-Centric Disaster Risk Reduction training session[23] while disruption to immunization services during the pandemic was mentioned in passing, the issue was not given much emphasis.

[22] https://ndma.gov.in/sites/default/files/PDF/Guidelines/medical-preparedness.pdf

[23] This author had participated in the three-day Online Training on Process Orientation Training Programme on Child Centric Disaster Risk Reduction conducted by MGISPA, Chandigarh & NIDM on 14-16 July, 2021.

Studies on dealing with patient safety and AEFIs in the context of disasters or COVID in particular could not be found. While the literature that could be accessed stressed on strengthening surveillance mechanisms, no further information on estimates of AEFIs in different emergency situations or actual implementation of mitigation measures could be obtained.

Literature on the effects of COVID-19 on immunization is evolving. While most studies in India are either based in a hospital setting, comprehensive national or regional analysis is not available to date. We are yet to understand the actual intensity of impact on the immunization programme in India, the effects of catch-up efforts, re-orientation of strategies in the midst of a public health emergency, and perceptions of parents/care-givers. A systems understanding to deal with this crisis situation with respect to immunization needs to be validated in the Indian context. As the pandemic continues, a study which will try to understand the resilience of our existing system, its inherent challenges and re-oriented strategies adopted will serve as a document of reference for future emergency preparedness and response.

CHAPTER 3

METHODOLOGY

This study aimed to understand the impact of COVID-19 pandemic on the routine child immunization programme in Pathanamthitta district in Kerala with the first theme to assess this impact on the programme undertaken in the public sector, their associated immunization coverage during the lockdowns and the changes observed from the pre-COVID period. The second theme dwelled upon the implementation of a rights-based approach to health for children with respect to immunization in the district. This sought to understand how far the recipients' socio-economic and demographic factors, and parental response during this health emergency may or may not have facilitated children's access to immunization services.

The first two sections of this chapter discuss the methodological paradigm, research design and rationale for their adoption in this study. Following this, the sampling framework, participant selection, data collection and management under quantitative and qualitative methods are examined in detail. Further, the process of data analysis of quantitative and qualitative strands, data integration, methods of verification of results and ethical considerations are reviewed.

3.1 Research Methodology

3.1.1 Methodological Paradigm

This study is situated in the Critical Realist Paradigm that gives importance to 'context' which triggers certain mechanisms in turn producing social action. Reality is divided into three domains: empirical, actual and real. The Real domain involves entities/structures with properties offering them the power to trigger mechanisms to impact other structures (causal mechanisms). Events and their consequences from the working of causal mechanisms form the Actual domain, and the Empirical domain comprises of actual events-effects that are experienced or observed (Haigh, et.al 2019).

Critical realism considers social reality to be independent of social actors but accepts their interpretation of reality to exert influence on the nature of the social change. In short, actors influence and are influenced by pre-existing structures and processes of the society. Between cause and effect are a range of mediating mechanisms linked to actors and their contexts. This

paradigm seeks to identify those mechanisms that expound the outcomes of interventions (Gilson, 2013). Since the paradigm emphasizes on ontic depth, it is possible to create a conceptual map of the system/world with multiple layers, complexity and dynamic interactions between parts of the world. Retroduction prevalent in critical realism enables moving from what is experienced towards gathering knowledge of what really exists (Olsen, 2009). From the perspective of health policy and systems research, the dominant question asked in this paradigm is 'what works for whom in which conditions'? (Pawson & Tilley, 1997). With a pragmatic approach to methodology and methods, this paradigm promotes methodological pluralism because reality consists of different layers and understanding these multilevel relationships will require utilizing perspectives from different disciplines and methodological approaches (Haigh, et.al 2019).

3.1.2 Rationale

Literature indicates that the overwhelmed health systems during the pandemic have not been able to accord priority to child immunization affecting child's right to health. There is a further rise in the risk of VPDs and parental reluctance to get their children vaccinated. Through this paradigm, an attempt is made to theorize explanations for these disruptive tendencies in seeking immunization as observed or experienced during this time period in the study location. These explanations focus on the mechanisms underlying the major entities involved in the immunization system (healthcare service and community) that responds to crisis and the properties of these entities that empower them with such mechanisms. Further, this paradigm aids in gauging the relationship between child rights and social determinants of health and develop what could be done to improve child rights during a pandemic.

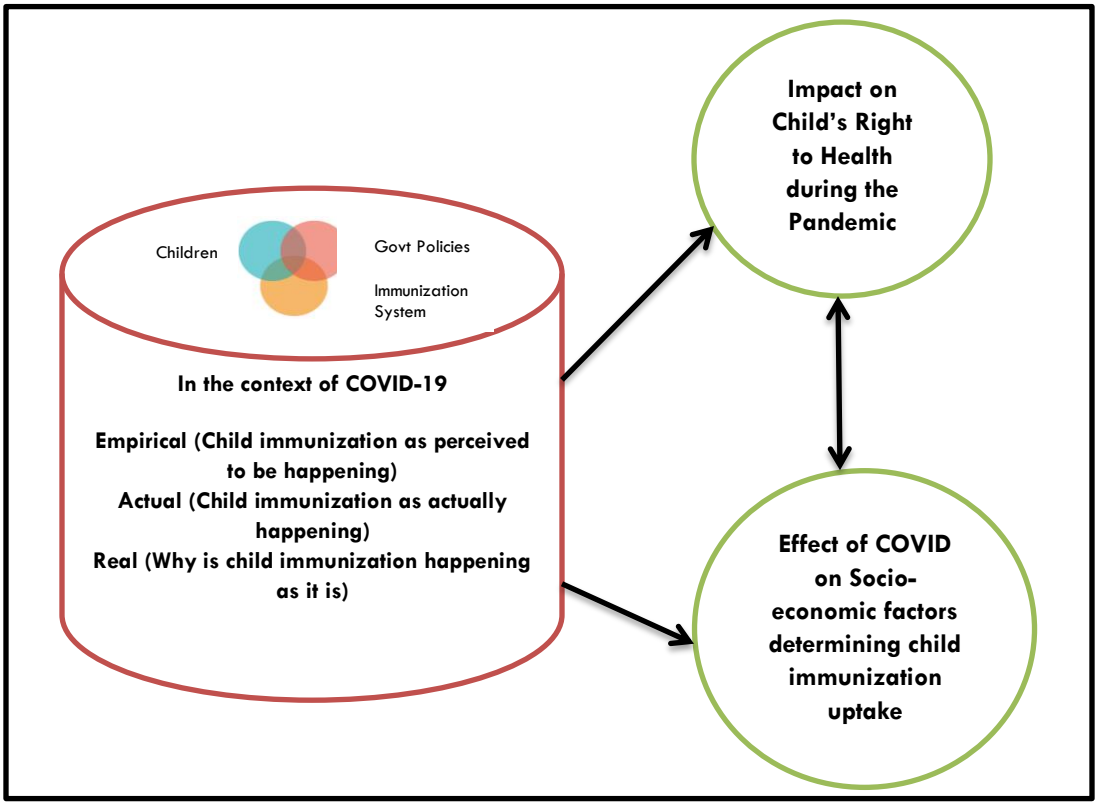

Figure 3.1: Placing the Research Objectives of this Study in a Critical Realist Framework (based on the framework in Haigh, et.al 2019)

3.2 Research Design

3.2.1 Research Questions

1. To understand the impact of COVID-19 pandemic on the routine child immunization programme in Pathanamthitta District, Kerala.

Q.1.1. How have public healthcare facilities dealt with the disruption of immunization services (with respect to planning, logistics, staffing, IEC and service delivery) in the selected areas of the district?

Q.1.2. How has the coverage of immunization been during the lockdown periods as compared to the same period in the previous year?

2. To understand the role of demand side elements of a rights-based approach to health of children in the selected areas during the pandemic with respect to immunization.

Q.2.1. How has the recipient's socio-economic and demographic factors affected his/her immunization uptake during the pandemic?

Q.2.2. How have parents/caregivers tackled with missed opportunities and responded to catch-up efforts?

3.2.2 Study Design

The realist paradigm promotes the adoption of methodological pluralism which involves the use of quantitative and qualitative methods in research (Haigh, et.al 2019). This study was envisaged as an exploratory exercise in the district and therefore, a case study approach was preferred wherein the objectives at hand could be analyzed based on multiple sources of evidence to develop a holistic picture of child immunization in the COVID-19 context. It is possible to examine experiences with outcomes in-depth via this approach. The study design selected for this research is Mixed-Methods Case Study of Concurrent Nested Design.

Concurrent mixed methods design permits triangulation of results from the quantitative and qualitative components enabling confirmation, cross-validation and corroboration of findings in a single study. In this study, this design allowed utilization of probability sampling techniques to generate data for the quantitative part, and purposive sampling technique to generate data for the qualitative part separately. With the nested/embedded strategy, both quantitative and qualitative data could be collected simultaneously in one data collection phase (Creswell, 2009). Separate rounds of data collection were not practical considering the busy schedules of the respondents (health workers and parents/guardians) and the dynamic nature of the pandemic.

In this nested study design, the primary method of data collection was quantitative with the secondary qualitative method embedded within the predominant method [QUAN(qual)][24]. This was preferred because the quantitative method addressed the outcomes (coverage, delays, and vaccination-specific indicators) of the immunization programme in the selected health centres, while the qualitative data explored the process of immunization and contextual experiences of parents and health workers. Using different methods, this design allowed gaining

[24] Parentheses indicate that qualitative form of data collection is embedded within the quantitative design (Creswell & Creswell, 2018, p.316).

broader perspectives of the child immunization conundrum during the pandemic and identifies discrepancies on the part of different actors involved in the system.

3.3 Population and Sample Selection

3.3.1 Study Location

This study is a district-based, exploratory public health case-study (on a best case scenario) of child immunization service in the context of the emergency situation of COVID-19. The region selected is the district of Pathanamthitta in South Kerala which is a 90% rural-based, landlocked district (2642 sq.km) with an overall Multidimensional Poverty Index of 0.004[25], has a negative population growth rate[26], attained 99.1% institutional deliveries[27], and 99.7% female literacy[28]. Very few public health studies have been conducted in this district as most of the chikd immunization researches are based in North Kerala. The initial cases of COVID-19 in the state reported from Pathanamthitta had created great furore but eventually the district was hailed for its model of COVID management[2930]. As per NFHS-4 District Fact Sheet, the percentage of children fully immunized (12-23 months old) in Pathanamthitta is estimated at 78%[31] while the State average is 82.1%[32]. In NFHS-5, while India's full immunization coverage rose from 62% to 76.4%[33], Kerala experienced a decline from 82.1% to 77.8%[34]. Surprisingly, the District Fact Sheet of Pathanamthitta had no data to substantiate on its immunization coverage[35]. As the home-district of the researcher, this location was the most convenient and safe choice for undertaking a study during the pandemic.

3.3.2 Study Population

The target population consists of children born between March and December 2019, registered with public health facilities for immunization and would have faced disruptions in

[25] https://www.niti.gov.in/sites/default/files/2021-11/National_MPI_India-11242021.pdf (p.118)
[26] https://pathanamthitta.nic.in/demography/
[27] http://rchiips.org/nfhs/NFHS-5_FCTS/KL/Pathanamthitta.pdf
[28] http://rchiips.org/nfhs/NFHS-5_FCTS/KL/Pathanamthitta.pdf
[29] https://www.newindianexpress.com/states/kerala/2020/oct/03/kerala-to-replicate-pathanamthitta-model-to-bring-down-covidmortality-among-60-plus-age-group-2205248.html
[30] https://www.thequint.com/coronavirus/kerala-pathanamthitta-hotspot-coronavirus-model-handling-covid-19-hospitals-trace#read-more
[31] http://rchiips.org/nfhs/FCTS/KL/KL_Factsheet_599_Pathanamthitta.pdf
[32] http://rchiips.org/nfhs/NFHS-5_FCTS/FactSheet_KL.pdf
[33] http://rchiips.org/nfhs/NFHS-5_FCTS/India.pdf
[34] http://rchiips.org/nfhs/NFHS-5_FCTS/Kerala.pdf
[35] http://rchiips.org/nfhs/NFHS-5_FCTS/KL/Pathanamthitta.pdf

access to the service during the lockdowns. As per the Annual Vital Statistics Report – 2019[36], total live births in Pathanamthitta between March and December 2019 is 13,699 (p. 68). A disaggregated picture on the number of children from this population utilizing public or private health facilities for immunization is not available.

Inclusion criteria:

- Children born between 01 March 2019 and 31 December 2019 (inclusive of these dates), AND
- Registered with and securing immunization services at the selected PHC/FHCs in Ranny, Mallappally and Thiruvalla taluks of the district.
- Children who are immunized at the aforementioned public health centres as per the government policy of vaccination.

Exclusion Criteria:

- Children born before 01 March 2019 and after 31 December 2019, OR
- Children securing immunization from private health centres in the district, AND
- Children not registered with the selected PHC/FHC and/or being immunized differently from the government policy of vaccination.

3.3.3 Sampling Framework

3.3.3.1 Sampling

For this case study, a concurrent mixed methods sampling design involving both Multi-stage Random Sampling and Purposive Sampling was undertaken. Three out of six taluks (viz. Mallappally, Ranni and Thiruvalla) were selected as these taluks had diverse terrain covering a large area of the district (1199.05 sq.km). While Ranni has a highland topography with dense forests and hills, Mallappally is a mid-land region and Thiruvalla is a low-lying area of 27 metres elevation from the sea level.

[36] http://www.ecostat.kerala.gov.in/images/pdf/publications/Vital_Statistics/data/vital_statistics_2019.pdf

While the ideal sample size for the study was estimated to be 310 children[37], complete immunization data of only 292 children was obtained. Of the 20 PHC/FHCs in these three taluks, five PHC/FHCs were randomly selected. With atmost five sub-centres under each PHC/FHC, there were a total of around 20 sub-centres. Up to 10 children of the target age-group registered with the PHC/FHC for immunization were further considered and therefore, the sample of 292 children was obtained. Of this sample, parents/guardians of 30 children [against the original target of 35-40] were purposively interviewed based on the criteria of geographical terrain in which they reside (high-land, mid-land or low-land) that determined their accessibility to the nearest health centre.

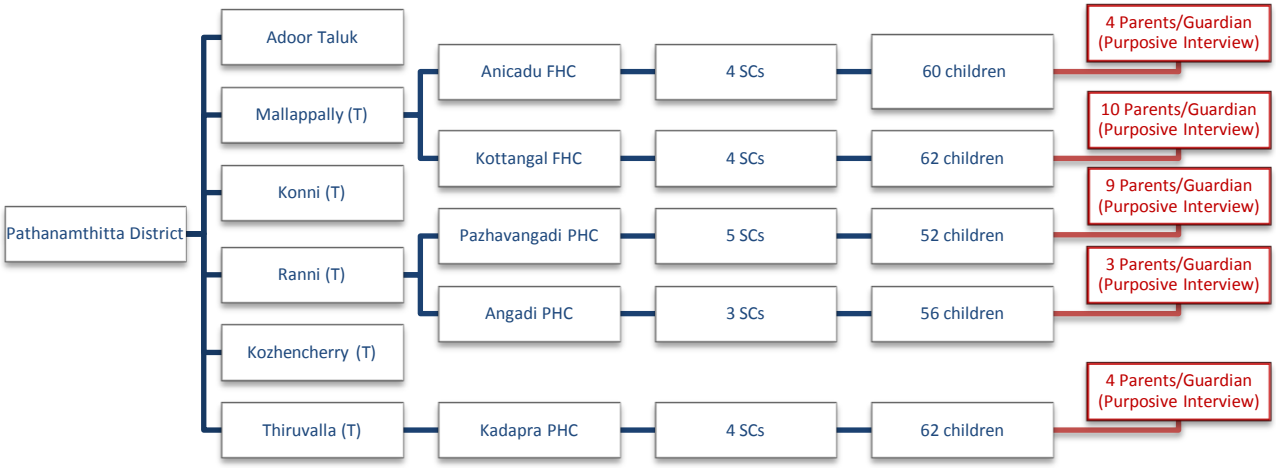

Figure 3.2: Concurrent Mixed Methods Sampling of this Case Study Research

3.3.3.2 Quantitative Survey Participant Selection

For the quantitative survey on the delays in immunization uptakes during this time period, 292 children born between March and December 2019, registered with these public health centres and following the National Immunization Schedule were randomly selected from the immunization registers. Other quantitative information on immunization planning and service delivery was obtained from the five selected PHC/FHCs.

3.3.3.3 Qualitative Survey Participant Selection

[37] Based on population size = 13699 [95% CI, 5% Margin of error, Population proportion of 50% and Design effect of 0.83]

Of the sample of 292 children selected for the quantitative survey, 30 parents/guardians were selected for purposive interviews as they visited these health centres for their child's immunization. The criterion of purposive sampling was the kind of geographical terrain of residence that determined their accessibility to the nearest health centre. Further, qualitative information on the planning and implementation of routine immunization programme in these health centres was secured from the health workers.

3.4 Data Collection Procedures & Management

In the last week of November 2021, the District Medical Officer granted permission to conduct this research in five PHC/FHCs and their adjoining sub-centres of Pathanamthitta district. The process of data collection took place between December 2021 and March 2022. Prior to this, a pilot test was conducted at the nearest health centre and initial observations were noted of the kind of information available and would be divulged to the researcher. Repetitive and irrelevant questions were omitted from the questionnaire and interview schedules. Further, instruments/tools were corrected and appropriate data was collected from the health centres and parents/guardians of the beneficiaries simultaneously.

Informed consent was sought in the local language, Malayalam from the respondents before taking interviews. The health workers were interviewed during the relatively less busy working hours or during their break. Parents/guardians were interviewed at the health centres either before or after their child's immunization. Upon completion of the initial data collection process in January 2022, consenting Medical Officers were interviewed to understand the process of micro-planning during the pandemic in detail. Audio recording of interviews were not taken without consent. All responses and notes secured from the field work were typed in a Microsoft Excel document with separate sheets for each instrument/tool. Both paper-based and audio data are stored safely until the end of the period of research and these files will be deleted thereafter.

3.4.1 Quantitative Inquiry

The following table describes the quantitative variables under each research question, sources of data and instruments used to elicit information.

Table 3.1: Description of Quantitative Parameters, Data Sources, Respondents and Instruments in the Study

Research Questions	Parameters	Sources of Data	Respondents	Instruments
1. To understand the impact of COVID-19 pandemic on the routine child immunization programme in Pathanamthitta District, Kerala.				
Q.1.1. How have public healthcare facilities dealt with the disruption of immunization services (with respect to planning, logistics, staffing, IEC and service delivery) in the selected areas of the district?	<u>Planning & Service Delivery</u> i. Number of immunization Sessions planned and held during the lockdowns ii. Number of children attending an immunization session in health facilities and outreach centres of different zones iii. Number of caregivers allowed per beneficiary iv. Priority age groups	i. Secondary ii. Secondary iii. Primary iv. Primary	Immunization Registers JPHNs	Survey Questionnaire
	<u>Logistics</u> i. Timing of vaccine delivery to PHC/FHCs ii. Transportation delays iii. Timing of cold chain repairs iv. Percentage of vaccine wastage reported	Primary	JPHNs	Survey Questionnaire
	<u>Staffing</u> i. Number of sessions attended by ASHAs during the lockdowns ii. Number of health workers present per session at health facilities and outreach centres iii. Number of additional vaccinators hired	Primary	JPHNs	Survey Questionnaire
	<u>Outcomes</u> i. Maximum number of doses of vaccines administered per session ii. Length of disruption of routine services during lockdowns	Secondary	Immunization Registers	Survey Questionnaire

	iii. Number of AEFI (serious/severe) cases reported			
	<u>Assessment of immunization uptake of the sample of two-year old children:</u> i. Date of birth of the child ii. Date and type of last immunization received in 2019 iii. Date and type of immunization due during the national lockdown iv. Date and type of immunization received for those due during the national lockdown v. Date and type of immunization due during the state lockdown vi. Date and type of immunization received for those due during the state lockdown	Secondary	Immunization Registers	Survey Questionnaire
Q.1.2. How has the coverage of immunization been during the lockdown periods as compared to the same period in the previous year?	i. Coverage of vaccines (given from birth to 18 months of life) during: a. March to June 2019 b. March to June 2020 c. May & June 2021 ii. Live birth data of children (March 2018 to June 2021) iii. Number of immunization sessions planned and held in the selected months iv. iv. Number of AEFIs reported in the selected months	Secondary	Reproductive and Child Health Records Immunization Registers	Survey Questionnaire
2. To understand the implementation of a rights-based approach to health for children with respect to immunization in the selected areas during the pandemic.				
Q.2.1 How has the	i. Age and birth order of	Primary	Parents/guardians	Semi-

recipient's socio-economic and demographic factors affected his/her immunization uptake during the pandemic?	the beneficiary ii. Distance of PHC/Sub-Centre from home (in kilometers)		of the beneficiaries	structured Interview Schedule (I)
Q.2.2 How have parents/caregivers tackled with missed opportunities and responded to catch-up efforts?	i. Delays experienced by the beneficiary in receiving vaccinations due during the lockdowns (in days)	Primary	Parents/guardians of the beneficiaries	Semi-structured Interview Schedule (I)

A mixed survey questionnaire was administered to the JPHNs (for primary data) and for noting secondary data from the immunization registers and RCH records from 2019 to 2021. Access to official administrative data was provided by the Medical Officers and the JPHNs oversaw the process. A semi-structured interview schedule (I) was prepared to gather a few quantitative characteristics of the beneficiary households from parents/guardians. Both these tools consisted of close-ended questions. These in-person data collection methods allowed for a higher response rate, building rapport and securing trust of the health workers and clarification of responses.

The questions set in the survey questionnaire and interview schedule (I) focused on different aspects of the immunization programme during the pandemic as mentioned in the guidelines released by the government health authorities. Face and content validity of both instruments were assessed by the Supervisor. The pilot test also facilitated removal of weak and repetitive questions. It was not possible to check for test-retest reliability in this study. Consistency was maintained in administering these tools in a uniform manner and recording the responses/official data in a promptly.

3.4.2 Qualitative Inquiry

The following table describes the qualitative variables under each research question, sources of data and tools used to elicit information.

Table 3.2: Description of Qualitative Parameters, Data Sources, Respondents and Tools in the Study

Research Questions	Parameters	Sources of Data	Respondents	Tools
1. To understand the impact of COVID-19 pandemic on the routine child immunization programme in Pathanamthitta District, Kerala.				
Q.1.1. How have public healthcare facilities dealt with the disruption of immunization services (with respect to planning, logistics, staffing, IEC and service delivery) in the selected areas of the district?	<u>Planning & Service Delivery</u> i. Process of microplanning (stakeholders involved, area demarcation, sensitization and review meetings, local COVID-risk assessment, modification of micro-plans, site selection, preparation of line lists, emergency plans, modified supervision/monitoring frameworks etc.) ii. Service delivery (time slot allotment, beneficiary mobilization, safety measures, private sector & local self-government engagements, priority vaccines, health education, etc.)	Primary	Medical Officers JPHNs	Semi-structured Interview Schedule (II) Survey Questionnaire Non-Participant Observation
	<u>Logistics</u> i. Issues experienced with transportation of vaccines ii. Issues experienced with storage of vaccines (cold chain system)	Primary	JPHNs	Survey Questionnaire
	<u>Staffing</u> i. Availability of safety equipment for health workers (PPEs, masks, gloves, sanitizers, etc.)	Primary	JPHNs	Survey Questionnaire
	<u>IEC</u> i. Methods of IEC used ii. Categories of people who were unreachable	Primary	JPHNs	Survey Questionnaire
	<u>Assessment of immunization uptake of the sample of two-year old children:</u> i. Sex of the child	Secondary	Immunization Registers	Survey Questionnaire
2. To understand the implementation of a rights-based approach to health for children with respect to immunization in the selected areas during the pandemic				
Q.2.1 How has the recipient's socio-economic and demographic factors	i. Gender, Household ration card status, Caste, Place of residence of the beneficiary	Primary	Parents/guardians of the beneficiaries	Semi-structured Interview Schedule (I)

affected his/her immunization uptake during the pandemic?	ii. Mother's level of education and working status at the time of the interview iii. Parents' working status during the lockdowns iv. Mode of commute from home to the nearest PHC/Sub-centre			
Q.2.2 How have parents/caregivers tackled with missed opportunities and responded to catch-up efforts?	i. Instances of disruption to child's immunization during the pandemic ii. Mode of receipt of information on resumed immunization services iii. Type of vaccine delayed during the lockdowns iv. Safety measures adopted v. Personal responses to catch-up efforts vi. Personal observations on the immunization process during and after lockdown	Primary	Parents/guardians of the beneficiaries	Semi-structured Interview Schedule (I)

The mixed survey questionnaire consisted of questions on different aspects of planning and service delivery of immunization services in 2020 and 2021. The semi-structured interview schedule (I) grasped the experiences and responses of the parents/guardians to the resumed immunization services in the district. In order to get an in-depth understanding of the process of micro-planning during the pandemic years, a semi-structured interview schedule (II) was administered to the consenting Medical Officers of the PHC/FHCs. All these tools consisted of open-ended questions for eliciting qualitative information.

Questions set in the questionnaire and interview schedules dwelled on multiple facets of the programme during the pandemic indicated in the guidelines released by the government health authorities. The in-person administration of these tools resulted in gaining diverse perspectives on the programme implementation, some even un-thought of at the time of conceptualization of the study. The respondents could express their thoughts and feelings with great flexibility. Preparing the questions in advance allowed the researcher to stay focused and be consistent throughout the interviews. Audio recordings were not possible due to paucity of time and lack of

consent from the respondents. All responses were manually written down during the interviews along with notes on non-verbal cues.

Non-participant observations were taken on days of visit to the health centre. The focus of the observation was on the service delivery of immunization, physical infrastructure of the health centres, available staffing, adoption of safety measures, and interaction between caregivers and health workers. These observations were recorded when interviews were not being conducted. In order to maintain credibility in findings, similar queries were posed to different respondents such as Medical Officers, JPHNs and parents/guardians. The contexts of the five PHC/FHCs and their adjoining sub-centres in diverse terrains were observed in detail and methodological triangulation was employed in the study.

3.5 Data Analysis

3.5.1 Quantitative Data Analysis

Quantitative data recorded in the Microsoft Excel document was entered and analyzed in SPSS 16.0 software for descriptive statistics such as measures of central tendency, percentages, and cross-tabulations. For calculation and comparison of immunization coverages (in percentages) in the selected health centres, the following time periods and vaccines that qualify children as 'fully immunized' are considered:

- State Lockdown – May 2021 and June 2021
- National Lockdown – March, April and May 2020 + June 2020 (to compare with June 2021)
- Corresponding months in the last non-COVID year – March, April, May and June 2019

The coverage of Rotavirus vaccine introduced in November 2019 in Kerala is examined jointly with the Oral Poliovirus and Pentavalent vaccines in the selected months of 2020 and 2021[38]. Therefore, vaccines administered simultaneously as per the National Immunization Schedule are combined together in a single variable across the study. For instance, the first dose of Oral Poliovirus, Pentavalent and Rotavirus and Inactivated Poliovirus vaccines (given in the sixth week of life) is denoted as 'LPV_1' in Section 4.2.3. However in Section 4.2.4,

[38] This implies that Rotavirus vaccine is not considered in OPV_LPV_RVV_dose or LPV_dose variables in vaccine coverages for months before November 2019.

'OPV_LPV_RVV_1' refers to intake of these vaccines only, and intake of the first dose of IPV is denoted separately as 'IPV_1'. This difference is assigning variables arose due to the fact that the data was collected from two different sources: the former directly from child immunization registers of PHC or outreach sessions maintained separately, and the latter from a monthly vaccine administration register (consists of a total of those given at the main centres and sub-centres in a month).

The immunization coverage attained per vaccine in the selected month has been calculated as:

$$Coverage\ attained\ per\ vaccine\ (\%) = \frac{Number\ of\ doses\ of\ the\ vaccine\ administered\ in\ the\ selected\ month}{Number\ of\ children\ eligible\ to\ take\ the\ vaccine\ in\ the\ selected\ month\ (based\ on\ monthly\ live\ birth\ data)} * 100$$

The outcome of maximum number of doses of vaccines administered per session at a PHC/FHC in the beyond buffer and green zones has been estimated as the product of number of children attending a session and the maximum possible doses of vaccines that can be given at a time based on the inputs received from the JPHNs. Graphical representation of data via bar charts, pie diagrams, line graphs, box-plots, and population-pyramid have also been deployed in the study. Categorical variables such as the beneficiary's sex, caste, ration card status, etc. from the Interview Schedule (I) were transformed into quantitative variables and analyzed using cross-tabulations. Overall, descriptive statistics was deemed to be appropriate for quantitative analysis in this mixed methods exploratory study.

3.5.2 Qualitative Data Analysis

The qualitative data on planning and service delivery of routine immunization obtained using the mixed survey questionnaire and interview schedule (II) were entered in an Excel sheet along with observation and field notes. This set of data under different sub-heads/questions was used to build a narrative of the immunization programme from the healthcare providers' perspective across the district with the variations across centres indicated.

A simple thematic analysis was used to weave the narratives of the parents/guardians. By way of open coding, interview extracts of each parent/guardian was entered into a table in a

Microsoft Word document. Phrases/sentences of relevance in the extracts were highlighted and codes were assigned to describe their content. All these codes gathered were transferred to a Microsoft Excel sheet where patterns were identified among them and themes generated.

Table 3.3: Thematic Analysis of the Parents/Guardians' Responses

Common Phrases/Sentences	Codes	Themes
▪ Fear of contracting COVID ▪ Physical distancing ▪ Deliberate delaying by parents out of fear ▪ Children unwilling to wear face masks ▪ Unsafe environment of health centres ▪ Rising COVID cases ▪ Visited PHC only for immunization service ▪ Crowding ▪ Limited waiting area ▪ Visits to alternative facilities ▪ Delayed immunization ▪ General services not offered at sub-centres alongside immunization ▪ Cleanliness and hygiene of health centres	• Anxiety and fear of high-risk environments • Difficulties in child management • Preference to alternative health facilities • Deliberate delays • Infrastructural deficiencies • Provision of general services with immunization	**Fear, Mistrust and Disappointment with Public Health Facilities**
▪ Absence of fear ▪ Concern over disruptions to immunization services ▪ Acknowledges vaccination as essential health intervention ▪ Aware of child health ▪ Completed all immunizations ▪ Teaching children protective measures ▪ Superiority of care at public facilities ▪ Trust in health workers ▪ Received timely information ▪ Unchanged quality of care	• Trust in public health system • Awareness and understanding of health interventions • Physical Accessibility to health services • Behavioral changes and acceptance	**Accessibility, Awareness & Acceptability**
▪ Streamlined process ▪ Short queues ▪ Reduced waiting time ▪ Continuation of safety measures after lockdowns ▪ Adapting to new circumstances ▪ Timeliness of immunization services ▪ Screening for flu ▪ Convenient location ▪ Slot based appointment system	• Streamlined service delivery • Adaptability and Responsiveness • Communication and Education • Timeliness of Information • Uncompromised care	**Coping with Challenges**

▪ Individual health education ▪ Services disrupted upon listing as containment zone		

3.5.3 Data Integration

In this concurrent nested study, the embedded qualitative data supports the quantitative data in interpretation of results. At first, both quantitative and qualitative data were analyzed separately. The final integration of results was undertaken in the analysis phase wherein both set of results are compared and an integrated summary presented in a side-by-side joint display table. This is a discussion of the themes in the context of the outcomes of the immunization process.

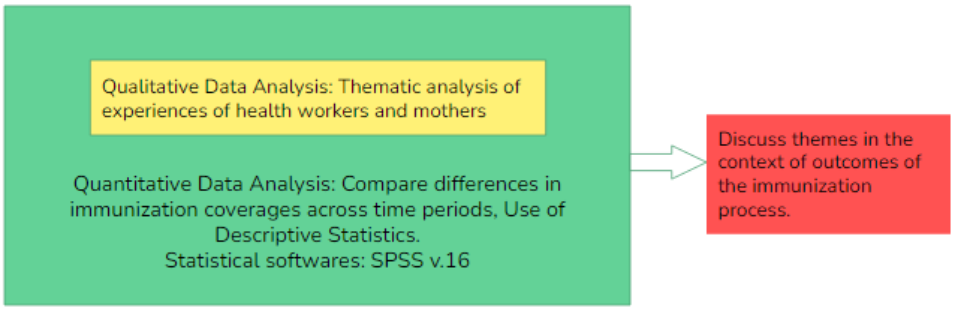

Figure 3.3: Analysis of Data in this Case Study

3.6 Methods of Verification

1. Validity and Reliability

The concurrent nested design of the study ensured that triangulation of evidence was possible as different tools (survey, purposive interviews and non-participant observations) were used to gather data from different sources (healthcare providers and parents/guardians of beneficiaries) and this process confirmed the validity of synchronized findings. Non-participant observations of the immunization service delivery at the health centres as the pandemic continued, expert reviews and an impartial nature of researching ensured that the research data and findings had internal validity. By offering a comprehensive evaluation of the programme in the selected health centres of the district, this study has utility for the concerned health authorities to bring in changes. External validity of the findings of this research is limited as it

relates to this district (a best-case scenario) and pertains to the COVID-19 pandemic in particular.

Internal reliability in the study has been maintained by the use of easily observable and quantifiable variables, recruiting and involving multiple respondents, referring to methods and findings of peer studies, writing down the responses promptly during the interviews, and by maintaining distance from pre-conceived notions in data interpretation. Based on the information on study respondents, social conditions, methods of data collection and analysis provided in this chapter, this research can be replicated in other locations as well (external reliability).

2. Dependability and Trustworthiness

All the respondents of the study were apprised of the details of the research and use of the data for academic purposes. Audio recordings of the interviews were not taken without consent. These factors ensured that the respondents were convinced of the importance of the study and remained cooperative. Dependability and credibility was attained by collecting data from different sources (official data and individual perspectives) to get a comprehensive view on routine immunization in the district. Using different tools also permitted cross-validating findings from quantitative methods against those obtained via qualitative methods thereby according dependability to the overall results of the study. By describing the context of the study apart from the experiences and outcomes of the immunization programme, it is believed that the study attains transferability.

3. Role of the Researcher

Apart from the information obtained from the existing literature on routine immunization and a few conversations with caregivers and ASHAs, this researcher did not possess any pre-conceived notions on the functioning of the immunization services at the PHC/FHCs. Not having been a resident in this district for a very long period of time enabled the researcher to work with an unbiased mindset open to information gathering and experiences from all willing respondents.

3.7 Ethical Considerations

A small pilot test was conducted to ensure the appropriateness and timing of the questions. An Informed Consent Statement in the local language, Malayalam and in English was

prepared for the respondents with the details of the research, the institution and the researcher, assurances of confidentiality, freedom to withdraw from participation any time and permission for audio recordings. Prior permission to conduct the study in PHC/FHCs was obtained from the District Medical Officer, Pathanamthitta and concerned Medical Officers were informed of the same.

During data collection, no personal contact information of beneficiary parents/guardians was sought and these interviews were taken by attending multiple immunization sessions at the health centres. Whenever it was observed that children were not getting vaccinated as per the immunization schedule or parents exhibited vaccine hesitancy, the researcher tried to encourage them to get their children immunized. All COVID-19 related guidelines were followed by the researcher such as getting two doses of vaccine against COVID-19 before data collection, trying to keep the interviews as short as possible, interviewing the caregiver not carrying the beneficiary if two caregivers accompanied, adhering to face-masking, physical distancing and regular sanitizing after each interview. Interviews were not voice-recorded without consent.

In data analysis, the names of respondents were dissociated from their responses and unique case numbers were accorded to each of them. Attempts were made to re-verify data collected by contacting the JPHNs after data collection phase to ensure maximum accuracy of findings. Data from the paper files were transferred to electronic files and along with the audio recordings are stored safely with the researcher. These data files will be deleted upon completion of the study. This study has secured ethical approval from the Institutional Ethics Review Board of Jawaharlal Nehru University, New Delhi (IERB Ref No. 2021/M.Phil Student/282).

CHAPTER 4

ANALYSIS OF RESULTS

4.1 Introduction

This chapter presents the results of this exploratory mixed methods case study on the impact of the COVID-19 pandemic on the child immunization programme in the selected health centres of Pathanamthitta District, Kerala and analyzes the experiences and outcomes of the programme from the perspective of healthcare providers and parents/guardians of the beneficiaries. The first section deals with the description of the study participants and health centres, aspects of service delivery, and an assessment of vaccine uptakes of a sample of 292 two-year old children during the pandemic. This is followed by an analysis of the immunization coverages of vaccines from birth doses to MR 1 across the five selected health centres in individual and cumulative terms. The third section discusses the demand-side factors affecting child's right to immunization during a pandemic and presents a thematic analysis of parental responses. Finally, a summary of the results obtained from quantitative and qualitative analyses presented in a joint display mode concludes the chapter.

4.2 Results & Analysis

4.2.1 Description of Study Participants & Health Care Facilities

The study was primarily conducted in the selected five rural PHC/FHCs in the district with three to five sub-centres[39] under each health centre. Apart from the official data, the Medical Officers and JPHNs in charge of immunization provided critical information on the service during the COVID-19 period. Data on 292 children born between March and December 2019 and registered with these health centres was obtained from the immunization registers and used to assess the regularity of seeking the service. Parents/guardians of 30 two year old beneficiaries were interviewed as they visited the centre for immunization services.

4.2.2 Immunization Service Delivery

[39] Number of sub-centres under each PHC/FHC: Ranni Pazhavangadi = 5, Ranni Angadi = 3, Mallappally Anicadu = 4, Mallappally Kottangal = 4 , Thiruvalla Kadapra = 4.

These centres are located in rural areas and the immunization services are primarily conducted under the supervision of the Medical Officer and a Health Inspector, with two JPHNs involved in administering the vaccines and keeping records, and two to three ASHAs responsible for guiding the parents and children through the process. All PHC/FHCs have their weekly immunization session on Wednesdays and the sub-centres have one session per month usually in the third week. Records of immunization are maintained at the centre and beneficiary's immunization cards are assessed for missed and upcoming vaccine doses. Children are brought for vaccinations based on the schedule given in the immunization card or as per the information provided by their ASHA.

After the COVID-19 pandemic broke out in 2020, the immunization service delivery at the health centres underwent a sea-change. On an average, around six sessions[40] could not be held as planned during the months of March to May 2020 across these centres. The situation was better during the state lockdown as immunization services were not interrupted[41].

Table 4.1: Number of immunizations sessions planned and held across the health centres during the national lockdown and state lockdown

		Number of Planned Immunization Sessions during National Lockdown	Number of Sessions Held during National Lockdown	Number of Planned Immunization Sessions during State Lockdown	Number of Sessions Held during State Lockdown
Name of Primary/Family Health Centre	Mallappally Anicadu	16	10	10	10
	Mallappally Kottangal	16	10	10	10
	Ranni Angadi	14	10	9	9
	Ranni Pazhavangadi	18	10	10	10
	Thiruvalla Kadapra	16	12	10	10

As per the guidelines received from the Central Ministry[42] and State Government's Health and Family Welfare Department[43], depending upon the risk of COVID-19 spread, areas

[40] See Table A.4.1 in the Appendix
[41] See Table A.4.1 in the Appendix
[42] https://www.mohfw.gov.in/pdf/3ImmunizationServicesduringCOVIDOutbreakSummary150520202.pdf

were classified into: Containment & Buffer Zones, Beyond Buffer & Green Zones for the purpose of undertaking immmunization sessions. A context-specific advisory[44] was released by the state government on 16th April 2020 and the district administration decided to restart child vaccinations at government and private health facilities[45]. Accordingly, sessions resumed from 22nd April across PHCs in the district. Birth dose vaccinations continued to be provided at the delivery points irrespective of any lockdown restrictions.

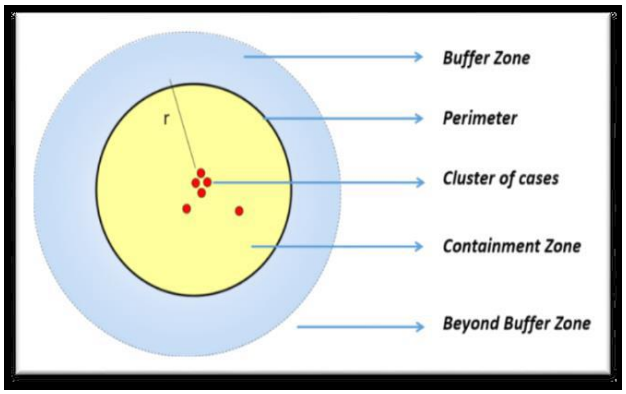

Figure 4.1: Area Categorization used for Immunization Services during and post COVID-19 Outbreak (Source: Ministry of Health & Family Welfare[46])

4.2.2.1 Immunization in Containment & Buffer Zones of the Selected Health Centres

No sessions were held at the health facilities or outreach centres listed under the containment and buffer zones. At Mallappally Anicadu FHC, over 60 cases of COVID-19 were reported in the first week of April 2021 turning it into a containment zone. Sessions resumed after a month in May 2021 (after a gap of 14 days of delisting as a containment zone). Beneficiary mobilization or alternative vaccination solutions were not available in these zones.

4.2.2.2 Immunization in Beyond Buffer & Green Zones of the Selected Health Centres

While the number of children allowed per immunization session varied (depending on the health centre infrastructure) from a minimum of 15 to a maximum of 35 (Table 4.2), around 23 and 24 children[47] on an average were allowed to receive their scheduled vaccines respectively at

[43] https://dhs.kerala.gov.in/wp-content/uploads/2020/03/COVID-19-Guidelines-for-Routine-Vaccination.pdf
[44] https://arogyakeralam.gov.in/wp-content/uploads/2020/03/Advisory-for-restarting-Immunisation-activities-regarding-Universal-Immunisation-Programme.pdf
[45] https://www.thehindu.com/news/national/kerala/no-new-case-in-pathanamthitta/article31360152.ece
[46] https://www.mohfw.gov.in/pdf/3ImmunizationServicesduringCOVIDOutbreakSummary150520202.pdf
[47] See Table A.4.2 in the Appendix

the health facilities and in outreach centres in the Beyond Buffer and Green Zones. During the lockdown months, sessions were largely held at the main centre as compared to the sub-centres.

Table 4.2: Number of children allowed per session for immunization in the selected health facilities and outreach centres during the COVID-19 pandemic induced lockdown

		Number of Children Immunized in the Health Facility in Containment and Buffer Zones	Number of Children Immunized at the Outreach Centres in Containment and Buffer Zones	Number of Children Immunized in the Health Facility in Beyond Buffer and Green Zones	Number of Children Immunized at the Outreach Centres in Beyond Buffer and Green Zones
		Mean	Mean	Mean	Mean
Name of Primary/Family Health Centre	Mallappally Anicadu	0	0	15	25
	Mallappally Kottangal	0	0	25	25
	Ranni Angadi	0	0	20	20
	Ranni Pazhavangadi	0	0	35	30
	Thiruvalla Kadapra	0	0	20	20

Time slots were allotted based on a line list of unimmunized and partially immunized children prepared by the JPHNs prioritizing those below five years. At Thiruvalla Kadapra PHC, older children were immunized in separately conducted sessions. Beneficiaries were mobilized by the ASHAs over phone and asked to attend the session according to the turn of the ward in which the beneficiary resided in. Visiting their homes was strictly avoided by the ASHAs. In three health centres, walk-in beneficiaries were also administered with the appropriate vaccines in limited numbers.

4.2.2.3 Status of Safety Measures against COVID-19

1. Local COVID-19 Assessment

All the PHC/FHCs took account of the COVID-19 cases, Test Positivity Rates and containment area restrictions in their territory of operation prior to the conduct of an immunization session.

2. Seating & Post Vaccination/Observation Areas

The infrastructural facilities varied across the PHC/FHCs and Sub-Centres and no uniform pattern can be observed apart from the strict maintenance of physical distancing which implied that the sessions were conducted away from the OP/IP area of the main health centre, except for one PHC.

Ranni Pazhavangadi PHC has an open, well-ventilated seating area, and the routine immunization sessions were held away from the main centre on account of the weak roofing of the vaccination room inside the PHC (where COVID-19 vaccines were administered). The sub-centres of this PHC usually in rented buildings were more congested and mostly a single room, with very limited space for waiting and observation. Ranni Angadi PHC has a large hall-like room for the purpose and is partitioned into a vaccination room, and an observation area. People maintained queues to receive vaccines, and this mode of waiting sometimes, even outside the centres is a common phenomenon across sub-centres. At the FHCs in Mallappally taluk, while one centre had an indoor system of waiting and observation, the other centre had an outdoor waiting area and narrow corridor leading up to the vaccination room. The vaccination rooms in the FHCs were larger than the ones at the PHCs with an attached toilet facility. The main centre of the Thiruvalla Kadapra PHC was shifted to a new building after the previous location was flood-hit in 2020. This new structure offers limited area for waiting within and outside the centre. A common entrance leading to the doctor for OP treatment and the vaccination room resulted in a larger risk of exposure of the beneficiaries to the general patients. The sub-centres reportedly had better spatial area reducing the scope of congestion.

Overall, there is no clear difference or structural demarcation between waiting and observation area in most of the health centres. They interchangeably serve the purpose of 'waiting' before and after sessions.

3. Beneficiary Screening

In some PHC/FHCs, all children were screened for flu-like symptoms and then immunized appropriately, while in other health facilities, the JPHNs would enquire of any flu-like symptoms exhibited by the beneficiary in the past week, any COVID-19 cases reported in the family, whether the beneficiary or their parents were primary or secondary contacts to the COVID-affected family member, etc. and would accordingly be referred to the doctor if required.

4. Availability of Handwashing Units / Sanitizers

All PHC/FHCs and sub-centres had bottles of sanitizers kept for the use of immunization staff as well as the beneficiary and care-givers.

5. Disinfection after sessions

The immunization rooms and waiting areas were disinfected and cleaned on the previous day or prior to the sessions and after the sessions regularly at all the health facilities and outreach centres.

6. Restrictions on Accompanying Care-givers

Only one care-giver, preferably the mother was allowed to enter the immunization room and be with the child during the process. By minimizing crowding at the centres, more beneficiaries were sought to be vaccinated.

7. Health Education

Though group counselling sessions were recommended, it seemed more practical for the vaccinators to provide individual health education to the care-givers after the child received the appropriate vaccines. They were apprised on the vaccines presently taken, infant-care, breast-feeding, mild adverse effects after immunization and necessary care, next immunization date and information on upcoming pulse polio or Vitamin A campaigns.

4.2.2.4 Staffing, Supportive Infrastructure, and IEC

1. Staffing

At the health facilities, every immunization session was held in the near availability of a Medical Officer, and primarily managed by two JPHNs (one for vaccine administration, and the other for record-keeping) and one Junior Health Inspector. Two ASHAs would facilitate the entry and exit of beneficiaries and their caregivers from the immunization room based on their slot and mobilize them for the next visit. At the outreach centres, the sessions were manned by a Medical Officer, a Junior Health Inspector, a JPHN and an ASHA.

The JPHNs reported that adequate supply of surgical masks, face shields, gloves and sanitizers was maintained during the lockdowns and at other times. In the health centres visited, no additional vaccinators were hired. Since none of these health centres had hard-to-reach areas under their purview, there was no requirement to send in mobile teams for vaccinations. The nursing staff attended training sessions on COVID-19 management and prevention during the lockdowns in a virtual mode, but these sessions did not have any modules on conduct of child

immunization during the pandemic. Rather, they received the governmental instructions and guidelines on routine immunization through emails from the concerned higher health authorities.

The number of ASHAs varied across the centres depending upon their requirement and their attendance depended on the turn of beneficiaries from their respective wards for immunization. Those ASHAs who did not show any symptoms of flu or other illnesses were preferred to be present at the session sites.

2. Supportive Infrastructure

All the health centres remained well-equipped to deal with unanticipated cold chain system disruptions during the lockdowns and kept the emergency trays and cold boxes with ice packs ready. The JPHNs indicated that the usual maintenance plans were followed (no new plans prepared), and that the system was assessed for any malfunctioning on a daily basis. The cold chain systems functioned without requiring any repairs during the lockdown periods.

No new emergency plans were formulated to deal with vaccine shortages at the PHC/FHCs. The vaccines were delivered to the PHC/FHCs from the block level once in a month or once in three months as the vaccine requirements may be, and were stored for three months. Two health centres without own transportation facilities had to hire vehicles to secure their stock of vaccines during the lockdown resulting in inconveniences. Vaccinators at three health centres declared zero wastage of vaccines as they took count of children before opening the vials. Without stating the exact figures, the other two centres reported very negligible levels of vaccine wastage during the pandemic imposed lockdowns.

3. Information, Education and Communication

Due to the restrictions imposed on interpersonal contacts and movement, the primary mode of IEC comprised use of telephones and SMS[48] technology to reach parents and caregivers of the beneficiaries during the lockdowns. As the COVID-19 situation eased, ASHAs began to visit the homes of the beneficiaries when required. None of the PHC/FHCs reported any groups of people as hard-to-reach in their area of operation. Thus, it is assumed that information on the vaccination services under the novel circumstances was conveyed to the caregivers on a regular basis.

4.2.2.5 Role of Local Self-Government and Private Sector Engagement

1. Role of Local Self-Government

[48] Short Messaging Service

Arogya Jagratha Samitis (Vigilance Committees) were formed at the panchayat/municipality and ward levels for COVID-19 prevention and control (supporting persons in home quarantine, monitoring their health and isolation practices). The LSG level committees consisted of the LSG President/Mayor, LSG secretary, Medical Officer of concerned Hospital/PHC, Sub Inspector/Station House Officer of the concerned police station, Village and Tribal Extension Officers, staff involved in COVID-19 prevention activities etc. At the ward level, the committee comprised of the Ward Member, ASHA worker, Anganwadi worker, Kudumbashree Area Development Society Member, Scheduled Caste/Scheduled Tribe Promoter, Rapid Response Team (RRT) member, Jana Maitry Police member, LSG Secretary and other members as required. Thus, the local self-governments worked in tandem with the health officials to attend to the needs of the COVID-affected and/or quarantined in disease control efforts. However, these committees were not involved in the planning or support of child immunization services during the lockdowns or at other times during the pandemic. The overall supervision and monitoring of the child immunization services rested with the Medical Officers of the health centres, and the supervisory frameworks remained unchanged.

2. Engagement with the Private Sector

The private sector did not collaborate with the public facilities in vaccination, awareness generation or identification of missing children in their areas during the pandemic. Private facilities provided immunization services on their own, and the JPHN at one PHC communicated that the nearest private hospital secured their stock of birth dose vaccines (BCG, Hepatitis B and OPV zero dose) from the PHC and this continued uninterrupted during the pandemic.

4.2.2.6 Microplanning

Preparation of new micro-plans for each year is usually performed during the months of February and March, and upon completion is submitted in April. The sub-centre plans are merged with the PHC/FHC action plans for the year along with estimates on achievements of the previous year and targets for the coming year. Other monthly action plans are prepared by the PHC/FHC and submitted to the block level centres.

Accordingly, the health centres prepared annual plans in February-March 2020 prior to the national lockdown. New plans were not formulated to account for the changed circumstances during the year. The additional pandemic related guidelines were incorporated in the service

delivery without documenting their contextual plan for implementation. A Medical Officer admitted to the lapses in planning for the routine immunization as more emphasis was given to COVID-19 management. They opined that the delayed trend in immunizations was realized about seven to eight months after resumption of services. This delay was found to be prevalent among beneficiaries irrespective of their socio-economic backgrounds as they feared exposure to the coronavirus disease in the health centres.

4.2.2.7 Outcomes

The outcomes of the immunization process are assessed in terms of maximum doses administered during a session, the length of disruption faced by the health centres in providing these services and the number of severe/serious cases of AEFIs reported.

The maximum number of doses administered per session ranges from 45 in Mallappally Anicadu FHC to 105 in Ranni Pazhavangadi PHC (Figure 4.2). Infrastructural, geographical accessibility, and COVID-19 zone based restrictions would have determined the provision of immunization services during the lockdowns.

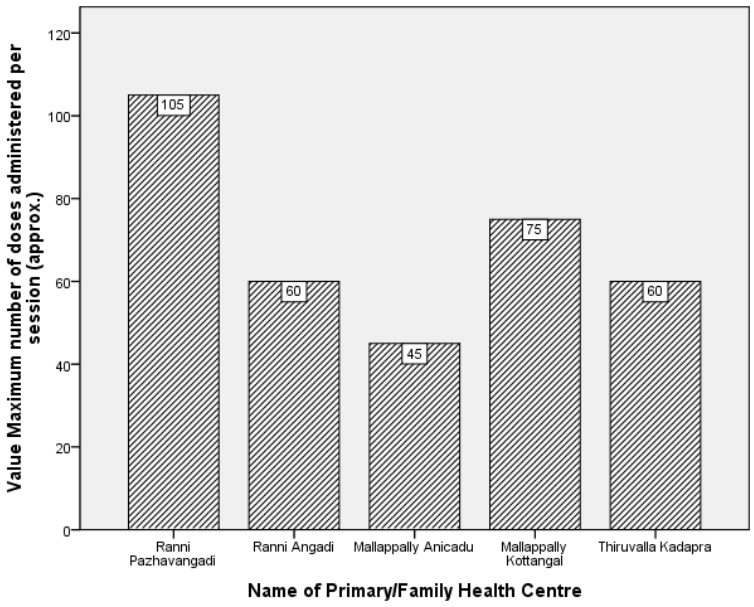

Figure 4.2: Estimated Maximum Number of Doses Administered Per Immunization Session at the PHC/FHCs during the Lockdowns

The average length of disruption of services was calculated to be 4.2 weeks (Table 4.3) across all the health centres[49] during the national lockdown. Apart from the mandated suspension

[49] See Table A.4.3 in the Appendix for the length of disruption (in weeks) faced by each individual health centre.

in March 2020, one PHC had to halt services due to heavy rains that resulted in flooding of the main centre itself.

Table 4.3: Average Disruption in Immunization during the National Lockdown across the PHC/FHCs

	N	Mean	Std. Deviation
Av_Disruption_Imm_NL	5	4.2000	.44721
Valid N (listwise)	5		

By the time of the state lockdown in May-June 2021, services became regularized and disruptions did not occur in any of the health centres under consideration.

4.2.2.8 Additional Observations

Advices beyond the official guidelines were given to the parents/guardians of the beneficiaries on the immunization process mostly on account of geographical and infrastructural issues as well as the need to curb the spread of coronavirus. For instance, the vaccinators of a PHC in Ranni taluk advised parents not to take their children to visit other places on the latter's immunization days. They ought to avoid such visits prior to arriving at the health centre to avoid exposing their child to any risk of COVID-infection. They were also reminded to come by private vehicles as much as possible and avoid travelling in groups.

The system of prior appointments and time-slot allocation for immunization resulted in preventing over-crowding at the health centres to a great extent. Parents and sometimes even the younger beneficiaries were observed to be cautious about hygiene and distancing measures. While allaying fears of the parents, vaccinators of a health centre expressed that they did not compel the over-anxious parents, and preferred them coming on their own will with the beneficiaries. Moreover across the centres, the JPHNs found it more effective to offer health education and clarify queries of the parents on an individual basis.

4.2.3 Assessment of Immunization Coverages of Study Participants[50]

Immunization patterns of 292 two-year old children born between March and December 2019 and registered with these five PHC/FHCs in Pathanamthitta District have been collated and assessed for a period of two years (2019 to 2021). The data consists of their last immunization in 2019, vaccinations taken in 2020 and 2021 particularly if they were due during the lockdowns. Of these children who were randomly selected, a little more than half (51.71%) in the sample were males and 48.29% were females[51]. The health centre wise distribution of male and female children is depicted in Figure 4.3. While the majority of 49 children (M = 26, F = 23) were born in the month of December, only 20 children in the sample were born in April (M = 10, F = 10) [Figure 4.4].

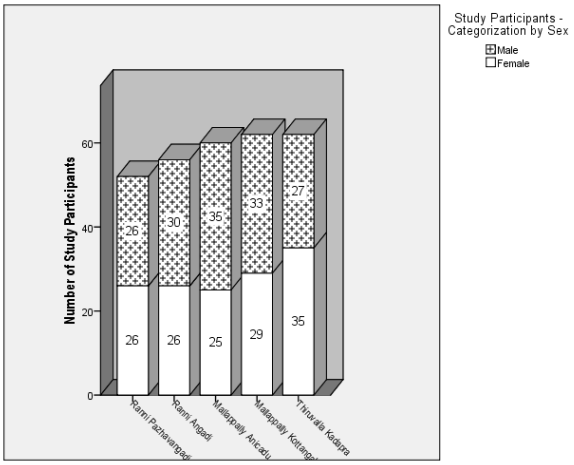

Figure 4.3: Number of male and female children in the study from the PHC/FHCs

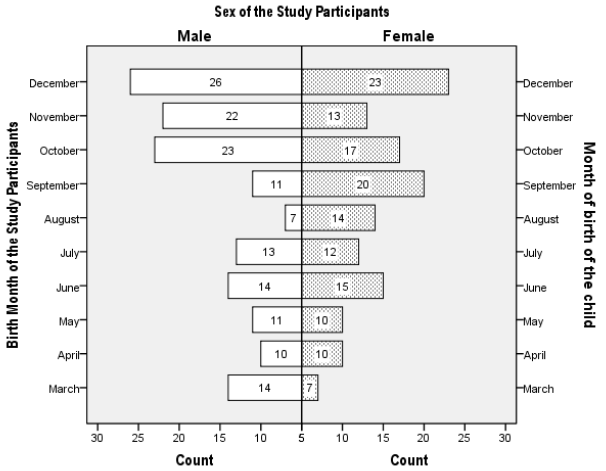

Figure 4.4: Population Pyramid representation of Study Participants based on their Sex and Month of Birth

[50] See Table 1.1 in Chapter 1 for explanation of variables used in the Section (inclusive of tables and graphs)
[51] See Table A.4.4 in the Appendix

4.2.3.1 Immunization Trends – Last Immunization Received in 2019

Among the 292 study participants, seven different set of vaccines were administered as their last vaccine received in the year 2019[52]. Of these, 211 children faced delays in their immunization uptake. The median delay experienced by them was estimated to be 98 days, with a minimum of 16 days and a maximum of 287 days, the latter bring an outlier (Table 4.4).

Table 4.4: Case Summary of Differences between Immunization Scheduled & Actual Dates of Last Vaccination in 2019 (in days)

Name of the vaccine last taken in 2019	N	Mean	Median	Minimum	Maximum	Range	Std. Deviation
Birth Doses	2	41.50	41.50	16	67	51	36.062
LPV 1	44	50.64	47.00	35	137	102	17.259
IPV 1	2	46.50	46.50	43	50	7	4.950
LPV 2	41	80.68	76.00	41	199	158	22.755
LPV 3	114	110.49	106.00	94	227	133	16.699
MR1	8	267.50	272.50	245	287	42	14.668
Total	211	96.91	98.00	16	287	271	45.666

While there were no records of early vaccinations, the largest number of children (114) had defaulted on timely uptake of LPV 3 and its adjoining vaccines for more than 100 days[53]. Of the nine children who missed their scheduled doses by over 200 days, 8 were supposed to take MR 1 and Vitamin A first dose[54].

Assessing the health centre specific trends of the last immunization received in 2019[55], the largest delay was exhibited in securing MR 1 and Vitamin A vaccines by a female child at Mallappally Anicadu FHC after a gap of 287 days. As birth doses are usually given at the delivery points on the same day or the next day after birth, these vaccines were given with less delay except in the case of one female child registered in Thiruvalla Kadapra PHC who took the doses after 67 days. Both male and female children across PHC/FHCs experienced similar median delays of 98 days[56].

[52] See Table A.4.5 in the Appendix
[53] See Table A.4.6 in the Appendix
[54] See Table A.4.7 in the Appendix
[55] See Table A.4.8 in the Appendix
[56] See Table A.4.8 in the Appendix

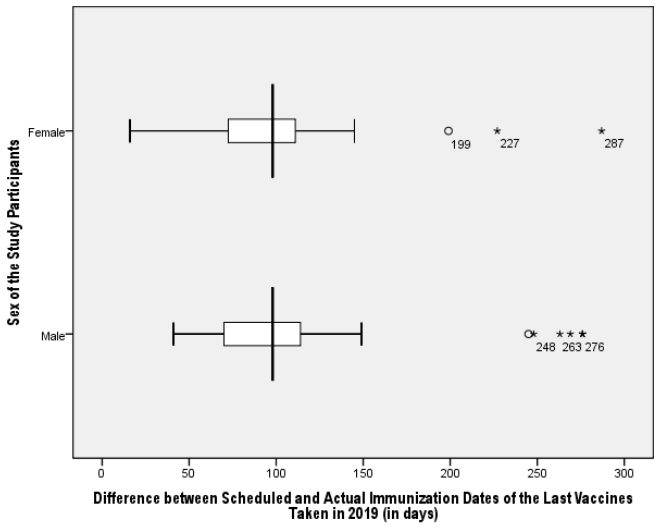

Figure 4.5: Delays Experienced during the Last Immunization in 2019 By Sex of the Study Participants (in days)

4.2.3.2 Immunization Status of Study Participants in 2020

Following up with the immunization status of the study participants from the five PHC/FHCs in 2020, it was observed that they can be divided into two groups:

i. Those who had immunizations scheduled to be taken during the National Lockdown
ii. Those who had immunizations scheduled before the National Lockdown or in the Unlock Phases 1.0 to 7.0 in 2020

Table 4.5: Immunization Status of Study Participants in 2020 (National Lockdown and Unlock Phase 1.0 to 7.0)

Name of the vaccine(s)	Number of Study Participants who had Immunizations Due during the National Lockdown	Number of Study Participants who had Immunizations due before the Lockdown or during the Unlock Phases 1.0 to 7.0 in 2020	Total
LPV 1		1	1
LPV 2		6	6
LPV 3	13	22	35
IPV 2		1	1
MR 1	56	106	162
VIT A1		1	1
MR 2		41	41
DPT 1B		1	1
NONE DUE		31	31
NO RECORD	9	4	13
Total	**78**	**214**	**292**

While 248 children had vaccinations due in 2020, no information was available of 13 children and 31 others did not have any scheduled immunization (Table 4.5). Around 65% of those who attended immunization sessions received MR 1 vaccine and Vitamin A supplementation[57] in 2020, and 56 of them had these vaccines due during the national lockdown.

i. Of the 69 children (M = 32, F = 37)[58] who had a vaccine due during the national lockdown, 63 of them experienced delays with a median gap of 25 days (Table 4.6). For these 63 children (M = 30, F = 33)[59], the delay in their vaccine uptakes from the scheduled dates ranged between 7 to 255 days, and five had outlying values (Figure 4.6). Three children had to wait for more than 100 days to receive their MR and Vitamin A first doses[60]. There were no reports of early vaccinations[61]. While Mallappally Kottangal FHC experienced the largest median delay of 34.5 days, Thiruvalla Kadapra had the least delay of 14 days[62]. Female children experienced a larger median delay of 27 days as compared to their male counterparts (21 days).[63]

Table 4.6: Difference between immunization scheduled and taken dates for children who had vaccines due during the national lockdown (in days)

Name of the vaccine(s) due during national lockdown	N	Mean	Median	Minimum	Maximum	Std. Deviation	% of Total N
LPV 3	13	33.85	21.00	13	90	23.720	20.6%
MR 1	50	34.42	26.00	7	255	41.160	79.4%
Total	63	34.30	25.00	7	255	38.051	100.0%

[57] Calculated from Table 4.5 as (162/248)*100 = 65.32%
[58] See Table A.4.9 in the Appendix
[59] See Table A.4.10 in the Appendix
[60] See Table A.4.11 in the Appendix
[61] See Table A.4.12 in the Appendix
[62] See Table A.4.10 in the Appendix
[63] See Table A.4.10 in the Appendix

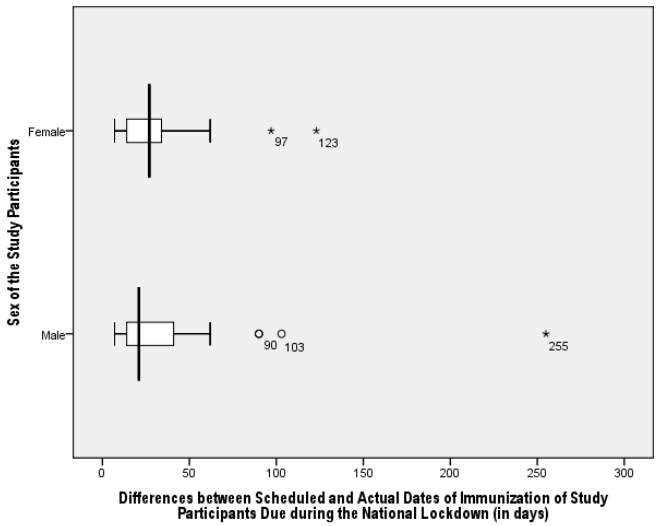

Figure 4.6: Differences between Scheduled and Actual Dates of Immunization of Study Participants Due during the National Lockdown By Sex of the Concerned Study Participants (in days)

ii. Among the 179 other children (M = 96, F = 83)[64] who did not have vaccinations during the lockdown, 133 experienced median delays of 35 days (Table 4.7).

Table 4.7: Differences between Scheduled and Actual Dates of Immunization Due before the National Lockdown and During the Unlock Phases 1.0 to 7.0 in 2020 (in days)

Name of the vaccine(s)	N	Mean	Median	Minimum	Maximum	Std. Deviation	% of Total N
LPV 1	1	303.00	303.00	303	303	.	.8%
LPV 2	6	68.50	55.50	41	147	39.607	4.5%
LPV 3	22	83.50	48.00	20	228	62.149	16.5%
IPV 2	1	173.00	173.00	173	173	.	.8%
MR 1	83	46.42	27.00	1	428	63.512	62.4%
VIT-A1	1	102.00	102.00	102	102	.	.8%
MR 2	18	48.94	18.50	6	256	69.039	13.5%
DPT 1B	1	213.00	213.00	213	213	.	.8%
Total	133	58.44	35.00	1	428	68.949	100.0%

While the range of difference in receiving the appropriate vaccine doses ranged from -89 to 428 days[65] among 179 children in the non-lockdown period of 2020 , the gap was a minimum of 1 day for those who faced delays (Table 4.7). Negative minimum differences indicate that some infants received their scheduled doses before the due date as in the case of 17 children who

[64] See Table A.4.9 in the Appendix
[65] See Table A.4.12 in the Appendix

secured MR shots well before schedule[66]. The median difference among female children was 34.5 days[67] with more than five children having outlying values (Figure 4.7).

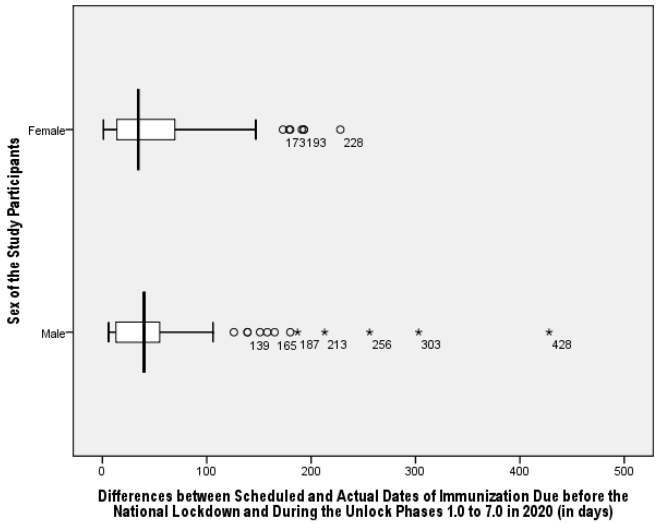

Figure 4.7: Differences between Scheduled and Actual Dates of Immunization Due before the National Lockdown and During the Unlock Phases 1.0 to 7.0 in 2020 By Sex of the Concerned Study Participants (in days)

Among males, the median difference in immunization days was 40[68], with around 9 children having outlying values (Figure 4.7). The highest median delay of 41 days was experienced in Thiruvalla Kadapra PHC and the least delay of 27 days in Mallappally Anicadu FHC[69]. Calculations based on the registry data disclose that 27 children received their appropriate doses after a delay of more than 100 days[70].

4.2.3.3 Immunization Status of Study Participants in 2021

In the wake of surge in COVID-19 cases in Kerala, a state-wide lockdown was imposed from May 8 to June 16, 2021. As in the previous year of the pandemic, the immunization statuses of the sample children varied in 2021 during the lockdown and unlock phases.

Accordingly, they are divided into two groups as follows:

[66] See Table A.4.13 in the Appendix
[67] See Table A.4.14 in the Appendix
[68] See Table A.4.14 in the Appendix
[69] See Table A.4.14 in the Appendix
[70] See Table A.4.15 in the Appendix

i. Those who had immunizations scheduled to be taken between May 8 and June 16, 2021 (State lockdown)

ii. Those who had immunizations scheduled to be taken before and after the State Lockdown (before May 8 and from June 17 to December 8, 2021)

Table 4.8: Immunization Status of Study Participants in 2021

Name of the vaccine(s)	Number of Study Participants with Immunizations Due During the State Lockdown	Number of Study Participants with Immunizations Due Before and After the State Lockdown	Total
MR 1		1	1
MR 2	33	89	122
VIT-A1		4	4
VIT-A2	1	20	21
VIT-A3	12	43	55
VIT-A4		17	17
NO RECORD	28	44	72
Total	74	218	292

From the sample of 292 children, 220 received their appropriate vaccine shots in 2021 (Table 4.8) and the dates on which these vaccinations took place were recorded. No records could be found of 72 children from the registers. They could have either secured their vaccines from other health facilities or were missing their scheduled doses. Around 55% of the study participants received MR 2 and its adjoining vaccines[71] in 2021 and of this 33 had these vaccines due during the state lockdown.

i. Of the 46 children (M = 24, F = 22)[72] who had vaccinations scheduled during the state lockdown, 36 children (M = 19, F = 17)[73]faced a median delay of 42 days (Table 4.9).

Table 4.9: Differences between Scheduled and Actual Dates of Immunization Due during the State Lockdown in 2021 (in days)

Name of the vaccine(s) due during state lockdown	N	Mean	Median	Minimum	Maximum	Std. Deviation	% of Total N
MR 2	24	32.25	30.00	6	82	22.895	66.7%
VIT-A2	1	42.00	42.00	42	42	.	2.8%

[71] Calculated from Table 4.8 as (122/220)*100 = 55.45

[72] See Table A.4.16 in the Appendix

[73] See Table A.4.17 in the Appendix

VIT-A3	11	104.18	109.00	21	171	53.585	30.6%
Total	36	54.50	42.00	6	171	47.797	100.0%

The range of delay experienced by these children was 165 days (Table 4.9) with two outliers of those with a gap of more than 150 days in securing their third doses of Vitamin A syrup (Figure 4.8). The median differences observed among female and male children separately were 41 and 42 days respectively[74]. Though the majority took MR 2 and its adjoining vaccines during the lockdown and experienced median delay of 30 days, the highest median delay of 109 days was observed in the case of third dose of Vitamin A (Table 4.9). The highest median gap of 65.5 days was recorded in Ranni Angadi PHC and the least delay of 13.5 days was observed in Mallappally Kottangal FHC[75]. Early vaccinations were reported among two children[76] during the state lockdown.

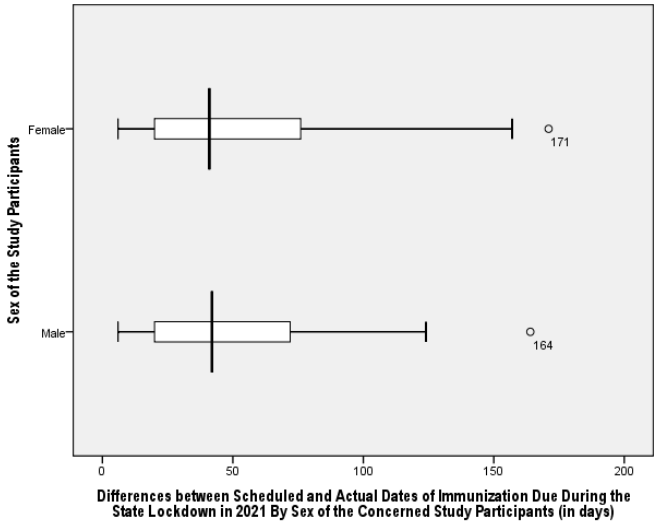

Figure 4.8: Differences between Scheduled and Actual Dates of Immunization Due During the State Lockdown in 2021 By Sex of the Concerned Study Participants (in days)

ii. Among the 174 other children (M = 83, F = 91)[77] who had scheduled vaccinations before and after the state lockdown, 142 experienced a median delay of 48 days (Table 4.10).

[74] See Table A.4.17 in the Appendix
[75] See Table A.4.17 in the Appendix
[76] See Table A.4.18 in the Appendix
[77] See Table A.4.16 in the Appendix

Table 4.10: Differences between Scheduled and Actual Dates of Immunization Due before and After the State Lockdown in 2021 (in days)

Name of the vaccine(s)	N	Mean	Median	Minimum	Maximum	Std. Deviation	% of Total N
MR 1	1	256.00	256.00	256	256	.	.7%
VIT-A1	3	189.33	178.00	178	212	19.630	2.1%
MR 2	76	54.01	34.00	6	435	70.987	53.5%
VIT-A2	20	160.75	152.50	21	324	89.290	14.1%
VIT-A3	36	94.89	83.50	7	261	75.289	25.4%
VIT-A4	6	33.17	37.50	7	55	19.031	4.2%
Total	142	82.81	48.00	6	435	84.172	100.0%

For these children, the minimum and maximum delays were 6 and 435 days (Table 4.10). The median differences among female and male children were 39 and 55 days respectively[78]. A large majority of children delayed uptake of MR 2 and adjoining vaccines followed by delays in intake of third dose of Vitamin A (Table 4.10). A child who missed MR 2 and adjoining vaccines by 435 days[79] was the highest delay recorded for any vaccine taken in this period. The highest median delay was observed in Ranni Angadi PHC of 68.5 days and the least delay was recorded in Ranni Pazhavangadi PHC of 34 days[80]. Around 43 children had delays greater than 100 days across these health centres, with 15 defaulting on the third dose of Vitamin A and 14 children on the second dose of Vitamin A[81]. The available records indicate that 17 children had early vaccinations[82].

[78] See Table A.4.20 in the Appendix
[79] See Table A.4.20 in the Appendix
[80] See Table A.4.20 in the Appendix
[81] See Table A.4.21 in the Appendix
[82] See Table A.4.22 in the Appendix

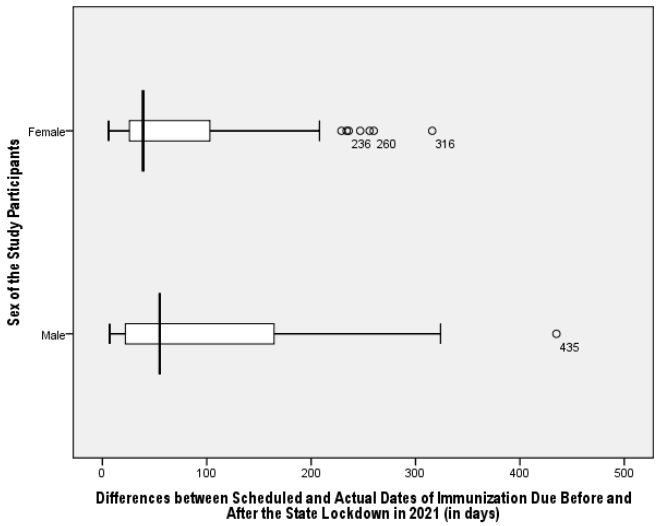

Figure 4.9: Differences between Scheduled and Actual Dates of Immunization Due Before and After the State Lockdown in 2021 By Sex of the Concerned Study Participants (in days)

4.2.3.4 Summary of the Assessment

A summary of the key results from this analysis of immunization uptake of 292 children across 2019, 2020 and 2021 is presented in the Table 4.11 as follows:

Table 4.11: Summary of Delays Experienced in Immunization by the Sample of 292 Children during the Selected Time Periods

Time Period of Vaccinations Scheduled	Number of Children with Vaccine(s) Scheduled in this Time Period	Number of Children who Took the Scheduled Vaccine(s) after Delays	Median Delays Experienced (in days) and Range (Minimum, Maximum)	Vaccine(s) for which Highest Delay in Uptake was Recorded	Vaccine(s) that was Delayed by the Largest Number of Children (Number, Median Delay in days)	Comparison of Median Delays by Sex of the Children
Last Immunization in 2019	292	211	98 days Range = 271 days (16, 287)	MR 1 + VIT A1 Highest delay of 287 days	OPV_LPV_RVV_3 + IPV 2 (114 children, 106 days)	Both female and male children faced 98 days.
<u>2020</u> 1.During the National	69	63	25 days Range = 248 days (7, 255)	MR 1 + VIT A1 Highest delay of 255 days	MR 1 + VIT A1 (50 children, 26 days)	Females had higher median delay of 27 days as compared to males (21 days).

Lockdown **2. Before the National Lockdown and During the Unlock Phases 1.0 to 7.0**	179	133	35 days Range = 427 days (1, 428)	MR 1 + VIT A1 Highest delay of 428 days	MR 1 + VIT A1 (83 children, 27 days)	Male children experienced higher delays (40 days) as compared to females (34.5 days).
<u>2021</u> **1. During the State Lockdown**	46	36	42 days Range = 165 days (6, 171)	VIT A3 Highest delay of 171 days	MR 2 + DPT 1B + OPV B+ VIT A2 (24 children, 30 days)	Male children experienced slightly higher delays (42 days) as compared to females (41 days).
2. Before and After State Lockdown	174	142	48 days Range = 429 days (6, 435)	MR 2 + DPT 1B + OPV B+ VIT A2 Highest delay of 435 days	MR 2 + DPT 1B + OPV B+ VIT A2 (76 children, 34 days)	Male children experienced higher delays (55 days) as compared to females (39 days).

4.2.4 Overall Immunization Coverages of Selected Vaccines[83] Recorded at the PHC/FHCs during Selected Months of 2019, 2020 and 2021

The National Lockdown began on March 24, 2020 and continued until the end of May 2020. Upon a surge in COVID-19 cases during the fifth wave in Kerala in 2021, a state-wide lockdown was imposed from May 8 to June 16. In this section, coverage of vaccines given to children in the first year of life that qualify them to be deemed as 'fully immunized' are calculated for these lockdown months as well as March to June of the previous non-COVID year 2019 across these five PHC/FHCs individually and cumulatively.

The administration of birth dose vaccines (BCG, Hepatitis B and OPV Zero Dose) continued uninterrupted at the delivery points during the lockdowns in the district. For some vaccines, coverages were found to soar above 100% indicating that additional children beyond

[83] See Table 1.1 in Chapter 1 for explanation of variables used in the Section (inclusive of tables and graphs)

those considered eligible for the particular month were immunized. These 'additions' arise on account of those children who had their scheduled doses in the months prior to the one under consideration and/or when children secure their vaccines at a PHC/FHC different from the one they are originally registered in.

4.2.4.1 Ranni Pazhavangadi PHC

Before the advent of COVID-19 here, a normal trend in vaccine coverages was witnessed in Ranni Pazhavangadi PHC, except for a larger than usual value of 133% in the case of MR 1 and Vitamin A doses in April 2019[84]. Less than full coverages were attained in March 2020 wherein the PHC could offer immunization services for only three weeks (Figure 4.10). The services resumed on 22 April 2020, and an overwhelming percentage of children sought vaccines mandated during the first 14 weeks of life (ranging between 107% and 128%)[85]. Similar large trends in vaccine administration are visible in the month of May 2020 as well. While close to 93% children secured their scheduled MR 1 vaccine in April 2020, only 14.29% received Vitamin A syrup along with it[86]. Shortage in supply of Vitamin A was reported in the months of May and June 2020. Though the state imposed a lockdown in May – June 2021, services continued to be provided with more than 100% coverage in certain vaccines (Figure 4.10).

[84] See Table A.4.23 in the Appendix
[85] See Table A.4.23 in the Appendix
[86] See Table A.4.23 in the Appendix

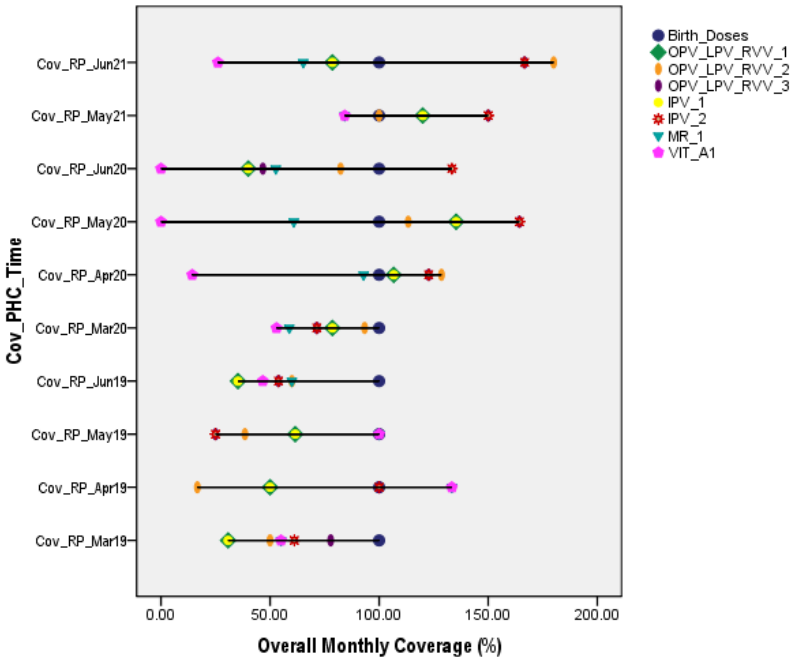

Figure 4.10: Overall Coverage (%) for Specific Antigens Administered in the First Year of Birth at Ranni Pazhavangadi PHC during Selected Months of 2019, 2020 & 2021[87]

Table 4.12: Number of Children Vaccinated in Addition to those Eligible for the Selected Months in 2019, 2020 and 2021 (based on Live Birth data) at Ranni Pazhavangadi PHC

		OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
RP_Add_Time	Apr-19	.	.	.	.	.	3	3
	Apr-20	1	4	5	1	5	.	.
	May-20	6	2	9	6	9	.	.
	May-21	2	.	3	2	3	.	.
	Jun-21	.	8	10	.	10	.	.

Assessing the differences in coverage at the PHC, the national lockdown months witnessed a drop primarily in immunization uptake of MR 1, Vitamin A and OPV_LPV_RVV_3 vaccines as compared to the same time period in 2019. In contrast to May 2020, the number of additional children who took the vaccines in May 2021 was lesser (Table 4.12) and the differences in coverage were largely negative (except for MR_1 and VIT_A1)[88]. For these

[87] See Table A.4.23 in the Appendix
[88] See Table A.4.24 in the Appendix

vaccines, a reversal can be observed in the direction of differences between June 2021 and June 2020.

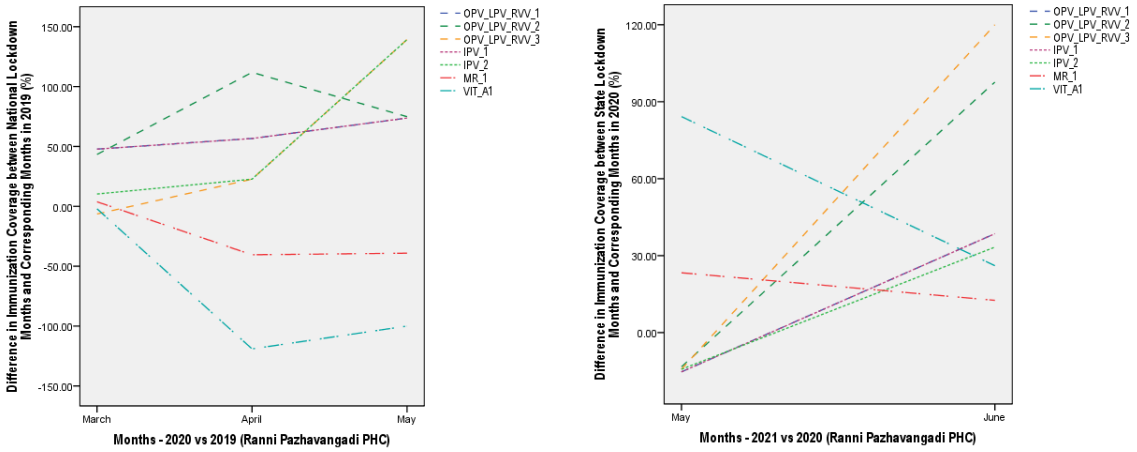

Figure 4.11: Difference in Coverage (%) of Specific Antigens between National Lockdown Months & Corresponding Months of 2019 (Panel A); between State Lockdown Months & Corresponding Months of 2020 at Ranni Pazhavangadi PHC (Panel B)[89]

4.2.4.2 Ranni Angadi PHC

This PHC experienced disruptions to routine immunization between 19 March and 21 April 2020, and services resumed from 22 April. There seems to be a greater surge in securing vaccines upon resumption (except in the case of MR_1 and VIT_A1 at 25%)[90] in April 2020 with seven more children getting vaccinated beyond those eligible for the month as compared to the previous month, and this trend has continued into May 2020 as well (Table 4.13). Apart from immunizing all the eligible children, significant efforts to cover those who missed their scheduled doses were also undertaken in May and June 2021.

[89] See Table A.4.24 in the Appendix
[90] See Table A.4.25 in the Appendix

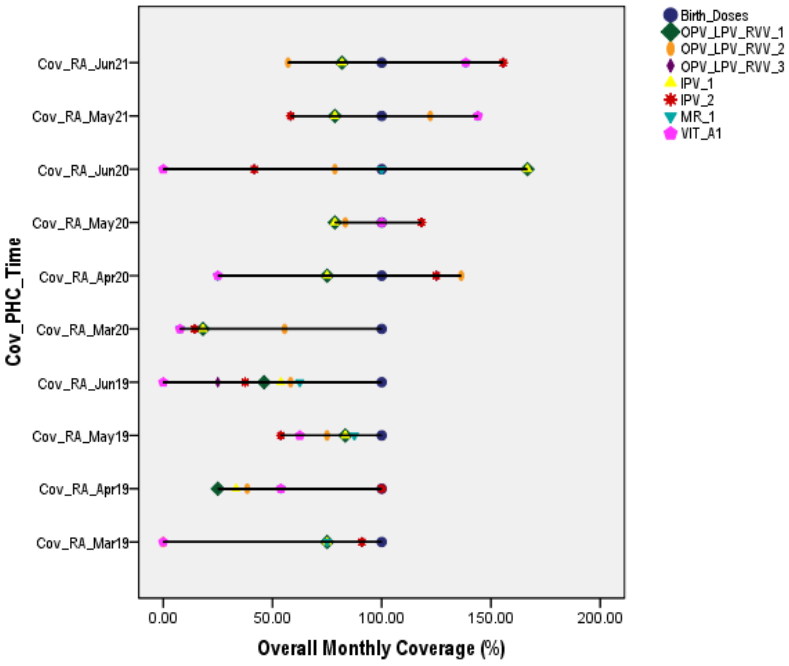

Figure 4.12: Overall Coverage (%) for Specific Antigens Administered in the First Year of Birth at Ranni Angadi PHC during Selected Months of 2019, 2020 & 2021[91]

Table 4.13: Number of Children Vaccinated in Addition to those Eligible for the Selected Months in 2019, 2020 and 2021 (based on Live Birth data) at Ranni Angadi PHC

		OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
RA_Add_Time	Apr-20	.	4	3	.	3	.	.
	May-20	.	.	2	.	2	.	.
	May-21	.	3	.	.	.	4	4
	Jun-21	.	.	5		5	5	5

As compared to the previous year, March 2020 witnessed significant declines in immunization coverage across vaccines (except for OPV_LPV_RVV_2 and VIT_A1)[92]. Resumed services in April 2020 resulted in higher coverage rates for most vaccines than that recorded in April 2019 except for a drop in demand for MR_1 and VIT_A1[93]. Mixed trends are

[91] See Table A.4.25 in the Appendix
[92] See Table A.4.26 in the Appendix
[93] See Table A.4.26 in the Appendix

observed across antigens in the comparison between the lockdown months of May and June in 2020 and 2021 (Figure 4.13B).

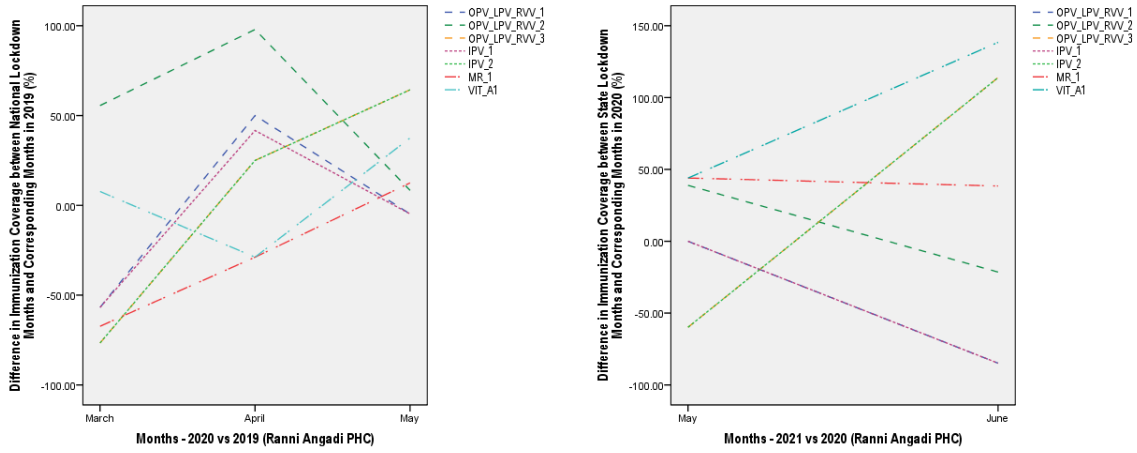

Figure 4.13: Difference in Coverage (%) of Specific Antigens between National Lockdown Months & Corresponding Months of 2019 (Panel A); between State Lockdown Months & Corresponding Months of 2020 at Ranni Angadi PHC (Panel B)[94]

4.2.4.3 Mallappally Anicadu FHC

In the selected months of 2019, coverages of vaccines given to children less than one year reflected a normal trend ranging above 50% and some attaining 100% at Anicadu FHC[95]. During the national lockdown, immunization services suspended after 18 March resumed on 22 April. Despite the shortfalls in March 2020, all the eligible children were vaccinated in April 2020 alongside a few additional children (in the case of OPV_LPV_RVV_2, MR_1 and VIT_A1) [Table 4.14]. Prior to the state lockdown, these services had to be halted between 07 April and 05 May when more than 60 COVID-positive cases were reported and the area including the FHC came under the category of a containment zone. Despite this, the immunization levels in May 2021 did not fall below 50% across vaccines[96].

[94] See Table A.4.26 in the Appendix
[95] See Table A.4.27 in the Appendix
[96] See Table A.4.27 in the Appendix

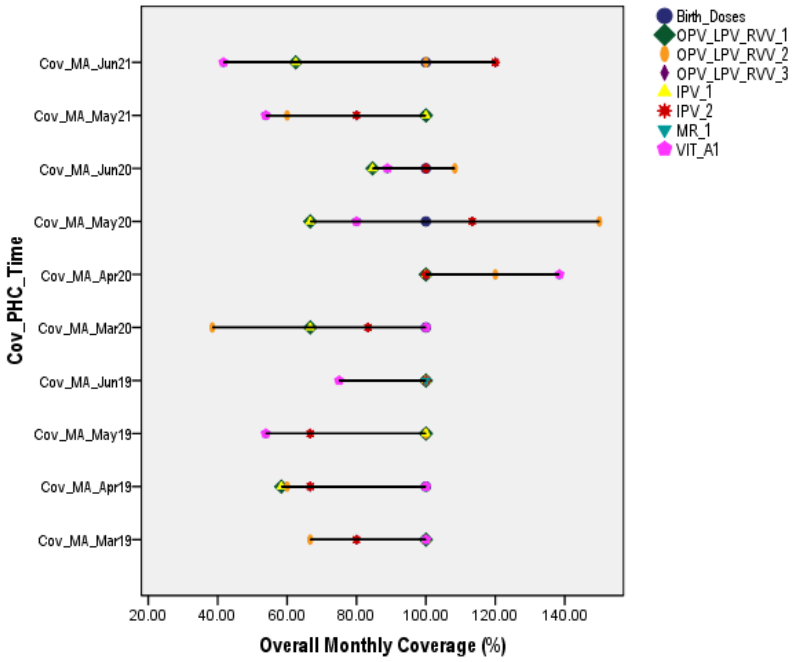

Figure 4.14: Overall Coverage (%) for Specific Antigens Administered in the First Year of Birth in Mallappally Anicadu FHC during 2019 and Lockdown Months (2020 & 2021)[97]

Table 4.14: Number of Children Vaccinated in Addition to those Eligible for the Selected Months in 2019, 2020 and 2021 (based on Live Birth data) at Mallappally Anicadu FHC

	OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
MA_Add_Time Apr-20	.	3	.	.	.	5	5

As compared to the counterpart months of the previous year, the intake of certain vaccines such as first and second doses of OPV, LPV, RVV and IPV 1 declined in March and May 2020[98]. April 2020 recorded more than 33% rise in coverage across all the vaccines than that reported in April 2019[99]. During the state lockdown months, negative differences in coverage was reported for MR_1 and VIT_A1 as compared to May and June 2020[100]. Similar decreasing trends are observed for all vaccines, except for OPV_LPV_RVV_3 and IPV_2 in June 2021 relative to the first unlock month of June 2020 (Figure 4.15B).

[97] See Table A.4.27 in the Appendix
[98] See Table A.4.28 in the Appendix
[99] See Table A.4.28 in the Appendix
[100] See Table A.4.28 in the Appendix

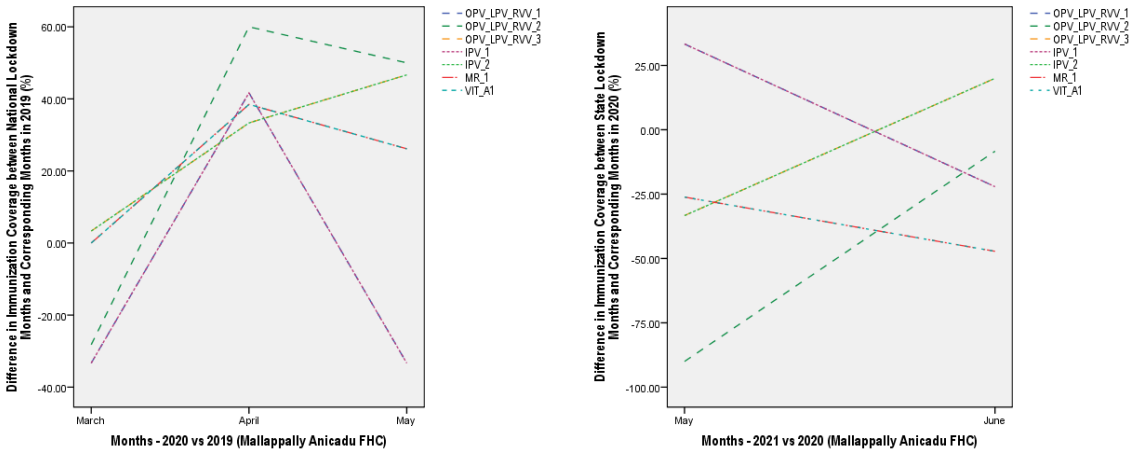

Figure 4.15: Difference in Coverage (%) of Specific Antigens between National Lockdown Months & Corresponding Months of 2019 (Panel A); between State Lockdown Months & Corresponding Months of 2020 at Mallappally Anicadu FHC (Panel B)[101]

4.2.4.4 Mallappally Kottangal FHC

Immunization sessions at this FHC faced disruptions during the national lockdown and resumed services on April 22, 2020 as in the other health centres. Coverage rates above 86% were recorded in April 2020[102] with impressive attempts to immunize all eligible children for the month. This catching-up trend continued in May 2020 too. While MR_1 and VIT_A1 vaccines were administered at a level less than 100% during March to June 2019, more than 90% of the eligible children received these vaccines in April, May and June 2020[103]. No shortage of Vitamin A syrups was reported from this FHC. Despite the state lockdown, sessions progressed uninterruptedly. By June 2021, more than three-fourths of the eligible children received first and second doses of OPV_LPV_RVV and 100% was attained in the case of OPV_LPV_RVV_3, MR_1 and VIT_A1[104].

[101] See Table A.4.28 in the Appendix
[102] See Table A.4.29 in the Appendix
[103] See Table A.4.29 in the Appendix
[104] See Table A.4.29 in the Appendix

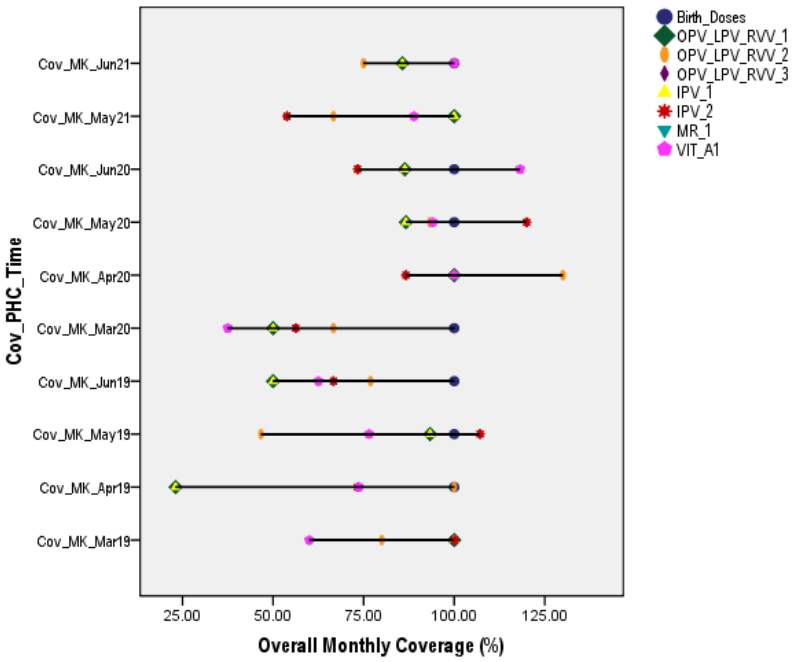

Figure 4.16: Overall Coverage (%) for Specific Antigens Administered in the First Year of Birth in Mallappally Kottangal FHC during 2019 and Lockdown Months (2020 & 2021)[105]

Table 4.15: Number of Children Vaccinated in Addition to those Eligible for the Selected Months in 2019, 2020 and 2021 (based on Live Birth data) at Mallappally Kottangal FHC

		OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
MK_Add_Time	May-19	.	.	1	.	1	.	.
	Apr - 20	.	3	.	.	.	.	.
	May-20	.	.	2	.	2	.	.

Negative differences in coverages across vaccines between March 2020 and March 2019 are clearly symptomatic of the disruption evoked by the pandemic at this FHC (Figure 4.17A). The Medical Officer had also pointed out that the test positivity rate in the areas under this FHC was over 40% during the initial period of the lockdown in 2020. Relative increases in coverage across vaccines were recorded in April 2020 as compared to April 2019[106]. Substantial decline in

[105] See Table A.4.29 in the Appendix
[106] See Table A.4.30 in the Appendix

coverages was observed across vaccines in May 2021 against May 2020 (except in the case of OPV_LPV_IPV_3 and IPV_2)[107].

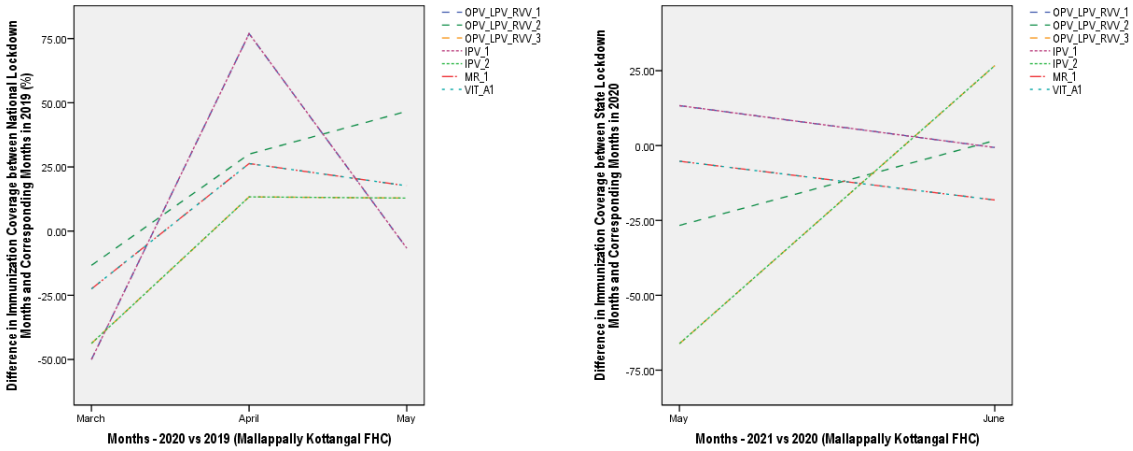

Figure 4.17: Difference in Coverage (%) of Specific Antigens between National Lockdown Months & Corresponding Months of 2019 (Panel A); between State Lockdown Months & Corresponding Months of 2020 at Mallappally Kottangal FHC (Panel B)[108]

4.2.4.5 Thiruvalla Kadapra PHC

This PHC recorded more than 64% overall coverage in immunization across antigens during March to May 2019[109]. Disruptions to services in March 2020 resulted in poor attainments (less than 45%) except in the case of OPV_LPV_RVV_2 and IPV_1[110]. Increased efforts were reflected in the coverage rates of April and May 2020 with all eligible and even additional children receiving their appropriate doses (Table 4.16). A shortage of Vitamin A syrups was experienced in May and June 2020. From the immunization register, it is understood that a session was held on 08 April 2020 after the lockdown was imposed. Regular sessions resumed from 22 April. Subsequently, sessions were suspended due to heavy rains and imposition of containment zone restrictions between 27 May and 17 June 2020 resulting in lower turnouts in June 2020 (except in the case of OPV_LPV_RVV_3 and IPV_2)[111].

[107] See Table A.4.30 in the Appendix
[108] See Table A.4.30 in the Appendix
[109] See Table A.4.31 in the Appendix
[110] See Table A.4.31 in the Appendix
[111] See Table A.4.31 in the Appendix

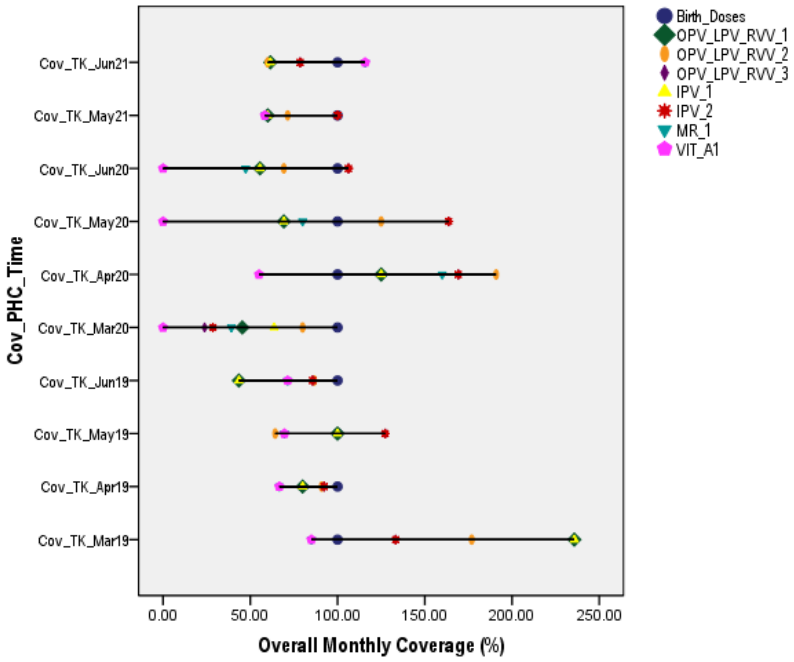

Figure 4.18: Overall Coverage (%) for Specific Antigens Administered in the First Year of Birth in Thiruvalla Kadapra PHC during 2019 and Lockdown Months (2020 & 2021)[112]

Table 4.16: Number of Children Vaccinated in Addition to those Eligible for the Selected Months in 2019, 2020 and 2021 (based on Live Birth data) at Thiruvalla Kadapra PHC

		OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
TK_Add_Time	Mar-19	19	10	5	19	5	.	.
	May-19	.	.	3	.	.	.	.
	Apr-20	4	10	9	4	9	12	.
	May-20	.	4	7	.	7	.	.

There are stark differences in immunization coverages between March 2019 and March 2020 across vaccines[113]. As observed in Figure 4.19A, increased coverage was recorded across all vaccines (except VIT_A1) in April 2020 as compared to its previous year counterpart and mixed trends prevailed in the differences between May 2020 and May 2019. Despite the fact

[112] See Table A.4.31 in the Appendix
[113] See Table A.4.32 in the Appendix

that coverage rates remained around or above 60% for all vaccines in May 2021[114], declines were observed in vaccine coverages relative to the same time in the previous year (except in the case of VIT_A1 that now became available) [Figure 4.19B].

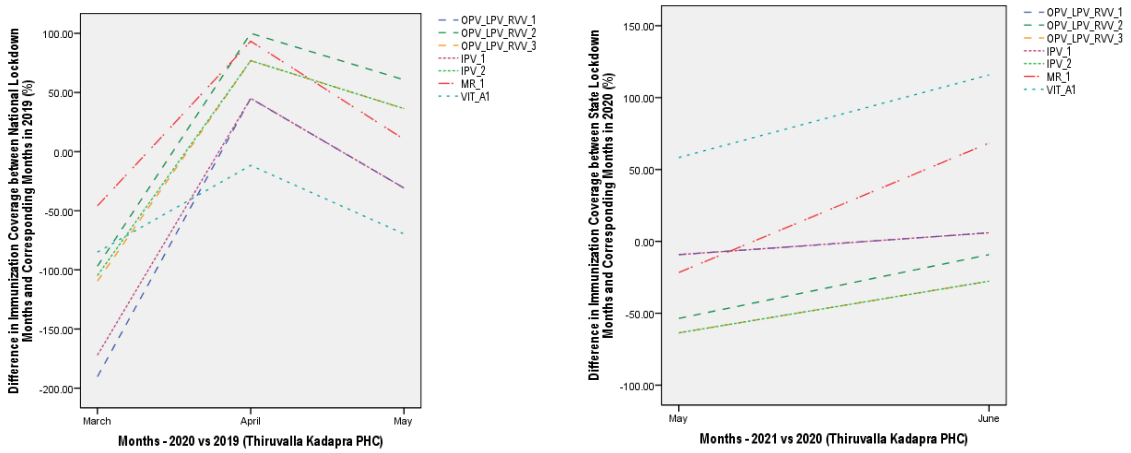

Figure 4.19: Difference in Coverage (%) of Specific Antigens between National Lockdown Months & Corresponding Months of 2019 (Panel A); between State Lockdown Months & Corresponding Months of 2020 at Thiruvalla Kadapra PHC (Panel B)[115]

4.2.4.6 Cumulative Immunization Coverages of the PHC/FHCs during Selected Months of 2019, 2020 and 2021

The cumulative median coverage of vaccines across the selected PHC/FHCs of the district in the month of March 2020 ranged between 37.5% for VIT_A1, 39% for MR_1 to around a high of 67% for OPV_LPV_RVV_2[116]. Except in the case of VIT_A1 in April 2020, full coverages could be attained across vaccines[117]. This month also witnessed 68 additional children receiving their appropriate doses (Table 4.17). In May 2020, coverage levels of more than 78% were attained across vaccines given in the first year of life[118]. Similarly, the state lockdown months also witnessed more than 70% coverage in vaccines across these health centres[119].

[114] See Table A.4.31 in the Appendix
[115] See Table A.4.32 in the Appendix
[116] See Table A.4.33 in the Appendix
[117] See Table A.4.33 in the Appendix
[118] See Table A.4.33 in the Appendix
[119] See Table A.4.33 in the Appendix

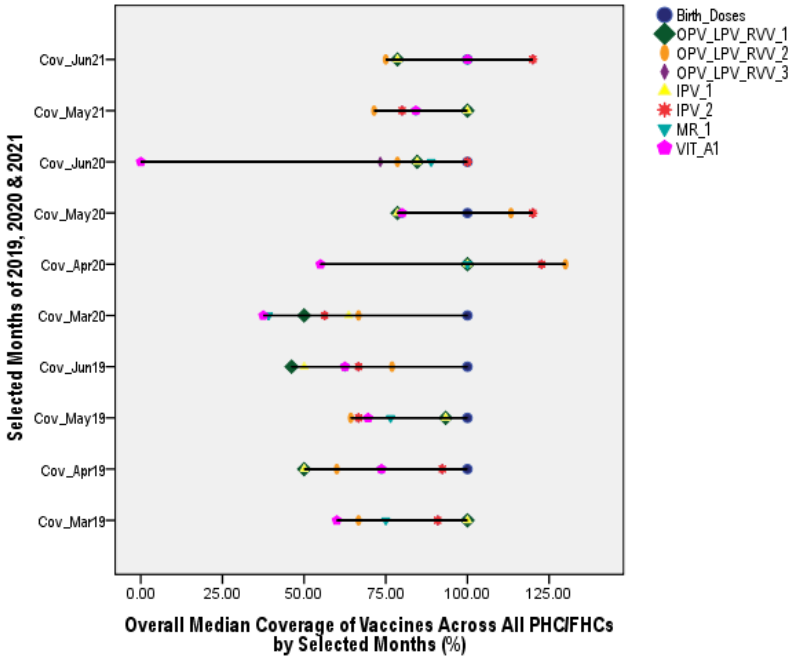

Figure 4.20: Overall Coverage (%) for Specific Antigens Administered in the First Year of Birth at all selected PHC/FHCs during 2019 and Lockdown Months (2020 & 2021)[120]

Table 4.17: Number of Children Vaccinated in Addition to those Eligible for the Selected Months in 2019, 2020 and 2021 (based on Live Birth data) of All PHC/FHCs

		OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
TK_Add_Time	Mar-19	19	10	5	19	5	.	.
	Apr-19	.	.	.	.	.	3	3
	May-19	.	.	4	.	1	.	.
	Apr-20	5	24	17	5	17	17	5
	May-20	6	6	20	6	20	.	.
	May-21	2	3	3	2	3	4	4
	Jun-21	.	8	15	.	15	5	5

[120] See Table A.4.33 in the Appendix

Fall in coverage ranging between 22.5 to 50% was estimated when comparing the differences in immunization intakes of different vaccines between March 2020 and March 2019 (except in case of OPV_LPV_RVV_2 where no change was recorded)[121]. In the subsequent months of the national lockdown, the coverages attained were greater than their previous year counterparts with a few exceptions of negative trends in VIT_A1 (April 2020 vs April 2019) and OPV_LPV_RVV_1 and IPV_1 (May 2020 vs May 2019) [Figure 4.21A]. When comparing the state lockdown months to the previous year's May and June, there are mixed trends across vaccines, some positive, others negative (Figure 4.21B). These negative trends are primarily observed in case of vaccines given to children less than four months old[122].

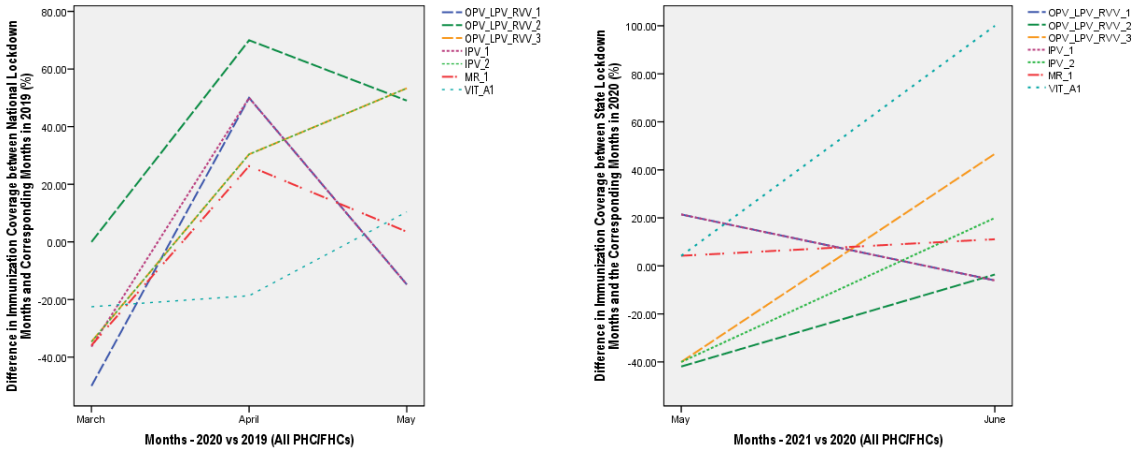

Figure 4.21: Difference in Coverage (%) of Specific Antigens between National Lockdown Months & Corresponding Months of 2019 (Panel A); between State Lockdown Months & Corresponding Months of 2020 at all PHC/FHCs (Panel B)[123]

[121] See Table A.4.34 in the Appendix
[122] See Table A.4.34 in the Appendix
[123] See Table A.4.34 in the Appendix

4.2.5 Demand Side Factors of Child's Right to Immunization

The success of an immunization programme depends equally upon demand side factors that affect the ability of the beneficiaries to secure their scheduled doses and prevent illnesses. Thirty parents/guardians of the two-year olds in the sample were interviewed to understand their socio-economic and demographic backgrounds as well as their personal experiences of bringing their children to the selected health centres for immunization during the pandemic. These short interviews conducted between December 2021 and March 2022 provides significant insights into the delivery and receipt of immunization in this unusual period of virus, fear and restrictions.

4.2.5.1 Socio-economic and Demographic Characteristics of the Beneficiaries

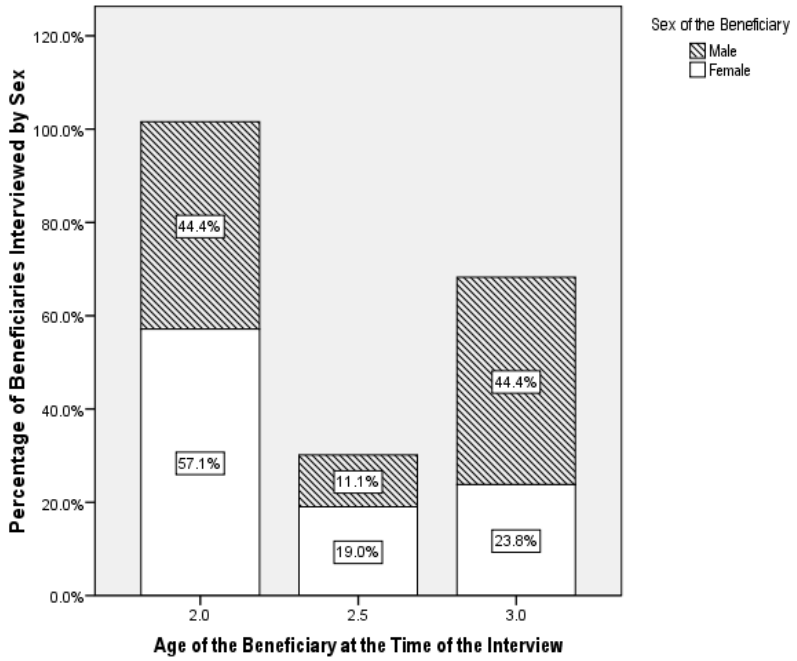

Figure 4.22: Percentage of Male and Female Beneficiaries by Sex whose Parents/Guardians were Interviewed

At the time of the interviews in late 2021 and early 2022, ages of the beneficiaries ranged from two to three years, and majority of them were female children of two years[124], first in order of birth (Table 4.18) and were visiting the health centres for mostly Vitamin A doses. All of them were residents of rural areas and belonged to different socio-economic backgrounds.

[124] See Table A.4.35 in the Appendix

Table 4.18: Crosstabulation of Sex and Birth Order of the Beneficiaries

Count		Birth Order of the Beneficiary			
		1	2	3	**Total**
Sex of the Beneficiary	Male	4	5	0	9
	Female	11	9	1	21
Total		15	14	1	30

Majority of the beneficiaries whose parents/guardians interviewed claimed to belong to general category and were holders of white color ration cards symbolic of non-priority, non-subsidy households (Table 4.19). Some respondents expressed reluctance in divulging accurate information on their caste and economic status.

Table 4.19: Crosstabulation of Caste and Household Wealth Status (in Terms of Ration Card) of the Beneficiaries

		Household Wealth Status in Terms of Ration Card			
		White	Blue	Pink	Total
Caste of the Beneficiary	General	17	0	0	17
	Gen EWS	0	1	0	1
	OBC	0	3	5	8
	SC	1	2	1	4
Total		18	6	6	30

All mothers of the beneficiaries had attained some level of education with more than half of them being graduates (70% in the General category)[125] but over 90% were not working at the time of interview[126]. During the lockdowns, only ten households had parents working and these primarily involved families where the mother was a graduate[127]. Five households where mothers had lower levels of education (matriculation or pre-university degree)[128], ten hailing from Scheduled Caste and Other Backward Classes faced employment related difficulties during the lockdowns[129] and these ten mothers were also not working at the time of interview[130].

[125] See Table A.4.36 in the Appendix
[126] See Table A.4.37 in the Appendix
[127] See Table A.4.38 in the Appendix
[128] See Table A.4.38 in the Appendix
[129] See Table A.4.39 in the Appendix

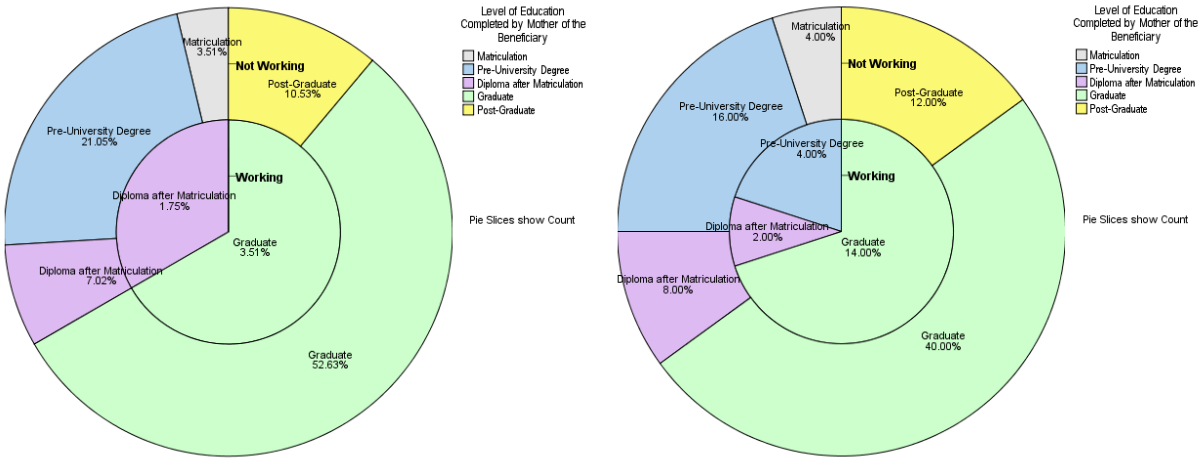

Figure 4.23: Level of Education Completed by Mothers by their Working Status (Panel A); Level of Education Completed by Mothers by Parents' Working Status During the Lockdowns (Panel B)

4.2.5.2 Assessment on Immunization Services during the Pandemic

4.2.5.2.1 Physical Accessibility to the Health Centres

All the health centres are rural-based but with the exception of one FHC, all the other main centres were less than a kilometer close to the main road. Upon enquiring with the respondents on their mode of commute and time taken to reach the nearest health centre for the purpose of immunization, the following results were obtained.

Table 4.20: Average Time taken by the Beneficiaries to Reach the Nearest Health Centre for Immunization by their PHC/FHC (in minutes)

Name of PHC/FHC	Mean	Median	Minimum	Maximum	Std. Deviation
Ranni Pazhavangadi	11.11	10.00	5	15	4.167
Ranni Angadi	15.00	10.00	5	30	13.229
Mallappally Anicadu	12.25	11.00	7	20	5.560
Mallappally Kottangal	7.20	5.00	5	20	4.780
Thiruvalla Kadapra	8.00	6.00	5	15	4.761
Total	9.93	8.50	5	30	6.034

On an average, it took 10 minutes to reach the nearest health centre for these respondents with a minimum time of 5 minutes and a maximum of 30 minutes (Table 4.20). The major

[130] See Table A.4.40 in the Appendix

modes of commute to the centre was by foot (40%) followed by auto-rickshaw (26.7%)[131], and the majority reached in 5 minutes (Table 4.21).

Table 4.21: Crosstabulation of the Average Time taken for the Beneficiary and Parents to Reach the Nearest Health Centre for Immunization (in minutes) and their preferred Mode of Commute

		Mode of Commute of the Beneficiary and Parents to the Nearest Health Centre for Immunization				
		Walk	Auto-rickshaw	Two-wheeler	Car	Total
Average Time taken for the Beneficiary and Parents to Reach the Nearest Health Centre for Immunization (in minutes)	5	7	2	1	2	12
	7	0	0	2	1	3
	10	2	3	1	0	6
	12	0	0	1	0	1
	15	3	1	0	1	5
	20	0	2	0	0	2
	30	0	0	1	0	1
Total		12	8	6	4	30

4.2.5.2.2 Disruptions & Resumption of Services

Among the respondents, five (M = 1, F = 4)[132] claimed that their children experienced disruptions to receipt of immunization during the pandemic while 24 others did not face any such issues[133]. Of these five children, one child was from an OBC household[134], while the other four belonged to General category[135][136]. An elderly couple who brought their grand-daughter to Ranni Angadi PHC was unsure of any such disruptions to her immunization schedule[137].

Upon resumption, fifteen parents/guardians were informed by the ASHAs on their appointment slots, nine relied on the due dates indicated on their child's immunization card, and six agreed to receiving information from both sources[138]. During the national lockdown, two beneficiaries could not receive their appropriate doses of vaccines on time[139], and five

[131] See Table A.4.41 in the Appendix
[132] See Table A.4.42 in the Appendix
[133] See Table A.4.42 in the Appendix
[134] Registered with Mallappally Kottangal FHC, See Table A.4.43 in the Appendix
[135] See Table A.4.43 in the Appendix
[136] Registered with Mallappally Kottangal FHC (1), Mallappally Anicadu FHC (2) and Thiruvalla Kadapra PHC (1), See Table A.4.44 in the Appendix
[137] See Table A.4.44 in the Appendix
[138] See Table A.4.45 in the Appendix
[139] See Table A.4.46 in the Appendix – One child missed a dose of MR 2, and the other parent could not recollect the name of the missed vaccine during the interview.

respondents claimed their children failed to receive the DPT 1B and Vitamin A as per schedule during the state lockdown[140].

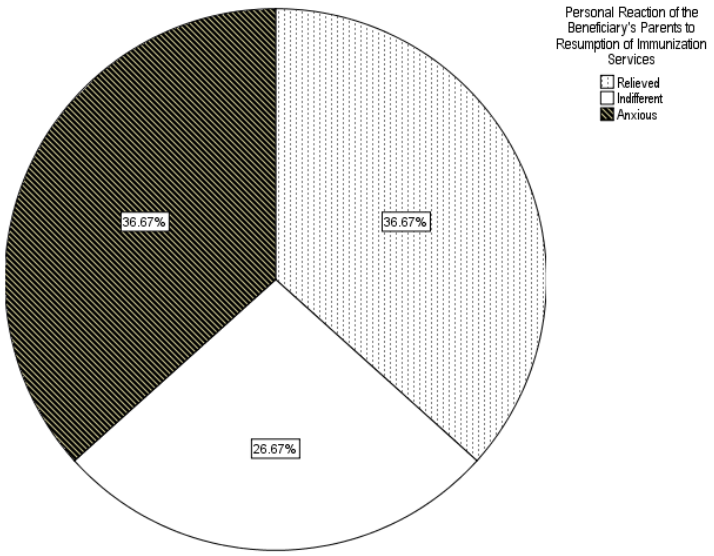

Figure 4.24: Pie-chart Depicting Personal Reactions of Beneficiaries' Parents to Information of Resumption of Immunization Services in 2020

Relief as well as anxiety was expressed by an equal percentage of parents as their personal reaction to the information of resumption of immunization services after the lockdown in 2020 (Figure 4.24). Close to 27% remained indifferent to the news and stated their reasons for these emotions detailed ahead in the Section 4.2.5.3.

4.2.5.2.3 Assessment of Safety, Crowd and Infrastructure Measures

From the interviews[141], it is gauged that all the PHC/FHCs (inclusive of their main and sub centres) ensured that the staff involved in the immunization process wore PPEs, masks, and gloves as they interacted with the beneficiaries and care-givers, and maintained separate set of sanitizer bottles for staff and the public. Physical distancing measures while seated or waiting in a queue were enforced at all times in these centres. While 21 respondents affirmed the presence of limited crowd at the centres, seven found the centres to be crowded at the time of their visits[142]. All the respondents who visited the sub-centres of Ranni Pazhavangadi PHC and the

[140] See Table A.4.47 in the Appendix – One child missed the first booster dose of DPT vaccine, and other four children of Vitamin A doses.
[141] See Table A.4.48 in the Appendix
[142] See Table A.4.48 in the Appendix

main centre of Thiruvalla Kadapra PHC expressed their displeasure at the limited area outside these centres for waiting and the congestion experienced. The presence of open area was attested by the respondents visiting other PHC/FHCs.

4.2.5.3 Thematic Analysis of Parental Response to Child's Right to Immunization

Interactions with the parents/guardians of the beneficiaries at the health centres provided critical insights into understanding their perceptions of this health intervention and public health facilities, their beliefs and attitudes towards their children availing these services during a health emergency, their personal experiences while undertaking visits to health centres for this purpose, and the changes imbibed in this dynamic situation. Table 4.22 presents a list of three themes and codes derived from their responses.

Table 4.22: Overview of the Themes and Codes

Themes	Codes
Fear, Mistrust and Disappointment with Public Health Facilities	Anxiety and fear of high-risk environments Difficulties in child management Preference to alternative health facilities Deliberate delays Infrastructure deficiencies of the health centres Provision of general services with immunization
Accessibility, Awareness & Acceptability	Trust in public health system Awareness and understanding of health interventions Physical Accessibility to health services Behavioral changes and acceptance
Coping with Challenges	Streamlined service delivery Adaptability and Responsiveness Communication and Education Timeliness of Information Uncompromised care

Theme 1: Fear, Mistrust and Disappointment with Public Health Facilities

The respondents expressed fear and anxiety in bringing their children to the health centres in the wake of the impending COVID-crisis. This sense of fear induced the need to adhere to safety measures in the centre.

'Due to the fear of catching COVID, I would try to stay away from others at the centre.' (1)

'I would stand at a safe distance from others while waiting for my child's turn and during the immunization process. We would come to this centre only for this purpose during the peak of the pandemic'. (2)

This fear prevented a mother from bringing her child to the sub-centre for taking the scheduled Vitamin A dose. Such acts of deliberate delaying have been reported by the JPHNs of the selected health centres, wherein they preferred not to pressurize parents during times of high virus transmission. No respondent indicated any instance of compulsion on the part of health workers towards them. Some mothers preferred taking their children to alternate taluk or private hospitals for immunization owing to the local health center's infrastructural concerns.

'We also took our child to the taluk hospital for immunization in between, and made sure all vaccines were taken on time. Sometimes, the PHC is quite crowded'. (3)

'The sub-centre is a congested one room, difficult for small babies and breast-feeding mothers. We would take our child to the taluk hospital for vaccination. I bring the child to the sub-centre for polio drops only.' (4)

The most common infrastructural concern mentioned was congestion with limited waiting area, except in the case of FHCs where such issues were minimal. Abrupt halt to the provision of general health services was also a reason for complaint among the elderly who would bring beneficiaries to the sub-centres.

One such grandmother expressed her displeasure as:

'Earlier I would get my BP and sugar levels checked at the sub centre once in a month. Now, they don't even have medicines for fever or minor ailments. I have to travel to the taluk hospital or PHC for this, which is quite difficult. Nevertheless, we take my grandchild to the sub-centre when they keep immunization sessions'. (5)

Yet another issue with attending immunization for several mothers was the inability of their infants or young children to strictly abide by safety measures such as wearing a mask for

prolonged periods of time. Several parents were reluctant to communicate their fears with the health workers and seek their advice.

Theme 2: Accessibility, Awareness & Acceptability

Unlike those expressing fear, an equal number of respondents were relieved with the reopening of health centres for immunization. Irrespective of socio-economic backgrounds, they placed immense trust in the health workers and the public health facilities. These mothers, some health professionals themselves, considered vaccination to be an essential health intervention for their children and refused to miss the scheduled vaccines. This knowledge became a reason not to delay vaccinations merely out of fear.

'Being a nurse, I am aware of the importance of vaccinations for my child. So, I cannot be scared of bringing him to the centre'. (6)

The trust factor becomes active when mothers believe that their child will be cared by the vaccinators, and that they are equally responsible for ensuring that the child is not exposed to high-risk environments. Another mother with similar views added,

'I am not worried about bringing my child here. We are training her to wear a mask and not remove it when we go out in public.' (7)

Some mothers were also taking this opportunity to train their children to adopt safety measures and adapt to the changed circumstances. Further, the location of the health centre has been a critical factor in accessing immunization services and this has been attested by most of the respondents. Centres closer to their residence are preferred especially if the child is taken care of by grandparents. An elderly respondent with his wife and grandchild were interviewed at one of the main centres, and upon enquiring about the child's immunization, he said:

'Though we brought our grandchild here (PHC) today, we used to take her to the sub-centre which is closer to home and less crowded.' (8)

Theme 3: Coping with Challenges

Around sixteen respondents discussed different aspects of the streamlined immunization process that they witnessed after resumption of services in April 2020 and during the subsequent lockdown months. They refer to the orderly conduct of sessions via time-slot allotment, shorter waiting period and reduced crowding outside the immunization room, keeping immunization sessions away from the OPD at most of the main centres, screening for flu and other illnesses by the doctor, receipt of timely information from the vaccinators and ASHAs on the imminent immunization dates, individual health education wherein they could clarify their doubts with the JPHNs without privacy concerns, provision of hand sanitizers, maintaining physical distancing, etc. as their personal observations while visiting health centres during the pandemic.

'I don't have any such fears. I am in close touch with Sister (referring to the JPHN) and ASHA. They clear my doubts whenever I call them.' (9)

'I found limited crowding at this centre. We can go fast, get the vaccine and come back home soon…' (10)

'They conduct the sessions on time, once in a month here. Children are vaccinated only if they are found to be not sick. Though the infrastructure is not as good as at the PHC, the staffs try their best.' (11)

'Sister (referring to JPHN) would allot time to us to come for sessions over the phone, so there was not much difficulty. After the lockdown, this slot system continued even if it was for taking Vitamin A.' (12)

Some parents commented on the vigilant approach adopted by the JPHNs after the pandemic began, in terms of allowing only one care-giver with the child inside the vaccination room, inquiry of any COVID cases at home before administering vaccines, wearing PPEs and face shields, sanitizing their gloved hands before and after the vaccine is given to the child, and giving advices.

'The (immunization) process is more orderly now and everyone here has become extra-cautious after COVID began.' (13)

Even as catching-up efforts were made by the health centres, there were complaints of delays in getting the vaccines. A mother working in the panchayat office of a village detailed her experiences at the FHC she was visiting with her second child:

'No (immunization) sessions were held here when this area also became a containment zone during the first lockdown. Children from containment zones were also not called in such a situation. My second child born in 2021 faced delays in getting vaccines, but coming here is better as the queues are shorter.' (14)

Some respondents admitted to delays on their part while others blamed the pandemic. Nobody explicitly mentioned any fault with the health workers across the interviews which is likely as the interviews were conducted as they waited in the health centre for vaccinations.

'The nurses here took great care during the entire immunization process to prevent any risk of COVID to my child by using masks and sanitizers. I could not bring her to the centre for Vitamin A on time due to personal reasons.' (15)

4.2.6 Integration of Results

Based on the results obtained from quantitative and qualitative analyses, a summary of the integrated results is presented under each domain of this research in the side-by-side joint display table below as preferred in a concurrent nested mixed methods study.

Table 4.23: A Side-by-Side Joint Display of the Quantitative, Qualitative and Summary of Results of the Study

Domain	Key Quantitative Results	Key Qualitative Results	Summary
Resilience of Health System	<u>Planning & Service Delivery</u> i. Average number of Immunizations conducted (Held/Planned): National Lockdown = 10/16 State Lockdown = 10/10 ii. Trainings – No specific training on child immunization.	i. Sessions held as per the guidelines received from the Central, State and District health authorities, and areas were categorized into zones based on prevailing COVID cases. ii. Online trainings for the health workers were conducted on COVID-management. iii. Micro-plans were prepared before the pandemic began in	i. Clearly, routine immunization was a neglected health intervention in terms of its planning and service delivery primarily due to the greater emphasis on COVID management at the grassroots level. ii. Undertaking service delivery in the new circumstances with existing plans was far from a perfect approach. Though the health centres did adapt and

	iii. Microplanning & Service Delivery: a. No micro-plans prepared after the pandemic broke out in March 2020. b. Average number of children vaccinated per session from Containment & Buffer Zones = 0 (irrespective of health facility or outreach) c. Average number of children vaccinated from Beyond Buffer & Green Zones = 23 (health facility), 24 (outreach) d. Priority groups = Partially or not immunized at all of less than 5 years of age e. Number of caregivers allowed with the beneficiary during immunization = 1	2020 (February – early March). These were not modified to suit the pandemic situation. Most of the health centres continued with existing plans incorporating the safety measures practically. No documents obtained for review. iv. One Medical Officer admitted to the lapses in planning for RI that it took around 7-8 months for the health care workers to realize that children were defaulting on their scheduled vaccines. v. Birth dose vaccinations were not interrupted at any delivery points. vi. Major changes in service delivery were: Slot/Appointment system, One caregiver per beneficiary permitted, Physical distancing, Use of safety measures (masks, gloves, sanitizers, PPEs), Individual health education & Local COVID-19 assessments before organizing a session. vii. Medical Officers screened children for flu or other illnesses, and inquired of any COVID cases in the family before vaccination. viii. Local self-governments and private sector were not involved in RI offered by the public health centres.	function with multiple constraints, it indicates the degree of emphasis given to this critical health intervention for a vulnerable section of the population during a health emergency.
	<u>Logistics</u> i. Timing of delivery of vaccines to PHC/FHCs = Once in a month or once in three months (varied across PHC/FHCs) ii. Shortage of Vitamin A syrups was reported in three PHCs in May and June 2020.	i. Vaccine deliveries were made on time as per the requirement of the PHC/FHCs from the block level. ii. Though two PHC/FHCs faced difficulties in hiring a vehicle for transporting vaccines during the lockdowns, none of the centres reported any major transportation induced delays.	i. No major hassles reported in case of vaccine delivery (except Vitamin A syrups in 2020) or cold chain systems across the health centres. ii. Existing emergency plans of vaccine delivery and cold chain maintenance were in place during the pandemic. New plans were not considered required.

	ii. Zero transportation delays reported from any of the health centres. iii. No requirement for cold chain repairs or maintenance at the health centres. iv. Vaccine wastage = 0% at three PHC/FHCs, and negligible amount at two PHC/FHCs.	iii. Usual maintenance plans were followed for cold chain system; No new emergency plans were prepared. Daily assessment of the cold chain system was made by the JPHNs during the lockdowns. iv. The JPHNs mentioned that they would usually open vials depending on the number of children getting vaccinated to prevent wastages.	iii. Exact amounts of vaccine wastages were not made available. Based on the qualitative responses, it can be concluded that the wastage was minimal.
	<u>Staffing</u> i. No. of sessions attended by ASHAs during lockdowns = 16 + 10 ii. No. of health workers present per session = 1 Medical Officer + 2 JPHNs + 1 JHI + 2 ASHAs (Health facility); 1 Medical Officer + 1 JPHN + 1 JHI + 1 ASHA (Outreach) iii. No shortage of masks, gloves, sanitizers, or PPEs were reported from any centres.	i. Limited staffing at all sessions to prevent virus transmission. Only healthy nurses and ASHAs were mandated to attend sessions. ii. No additional vaccinators were hired in any of the selected PHC/FHCs.	During the pandemic, staffing was done in a prudent manner to avoid virus transmission and minimize fears of human interaction among beneficiary households. No shortage of essential safety items were reported by any health workers.
	<u>Information, Education & Communication</u>	i. Methods of IEC used were phone calls/SMS to reach beneficiary households. No house visits were allowed. Limited face-to-face interactions until the pandemic restrictions eased. ii. Individual health education offered scope for parents to clarify their queries without privacy concerns. iii. Additional advices given to parents in view of constraints of the health centres such as arrive in	Despite limitations, the health workers remained in touch with the beneficiary households via existing accessible technology and offered guidance as possible.

		private vehicles, do not expose the child to other places prior to attending an immunization session, etc. iv. There were no categories of people who were unreachable.	
	<u>Outcomes</u> i. Range of maximum vaccine doses administered per session = 60 (45, 105)[143] ii. Average duration of disruption of RI National Lockdown = 4.2 weeks State Lockdown = 0 iii. Total number of serious/severe cases of AEFIs reported = 0		The average duration of disruption was estimated to be a month during the national lockdown. Upon resumption of services, the maximum number of doses administered per session ranged between 45 and 105 across the selected health centres.
	<u>Assessment of immunization uptake of the sample of two-year old children</u>[144] <u>A. Last Immunization in 2019</u> o No. of children who faced delays out of those who took the vaccine(s) = 211 of 292 o Estimated median difference = 98 days [Range: 271 days (16, 287)][145] o Maximum delay recorded in case of MR_1 intake by 287 days. o Highest number of children (114) delayed OPV_LPV_RVV_3		i. Contrary to expectations, the median delays in vaccine uptake in 2019 was higher than the delays experienced in lockdown and unlock phases of 2020 and 2021. ii. The median delays reported from both the groups in 2021 were higher than that reported in 2020. This could be attributed to the anxiety among parents owing to the severity of the COVID-wave in Kerala in 2021 despite health centres providing immunization services without interruption. iii. There are large outlying values of delay experienced by children

[143] Range (minimum, maximum values)
[144] See Table 4.11 in Section 4.2.3
[145] Figures in round brackets after the value of Range in this Column indicates the minimum and maximum delays recorded.

	& IPV_2 vaccines by a median of 106 days. o Both female and male children experienced a similar median delay of 98 days. <u>B. Immunizations in 2020</u> Group 1: Vaccines due during the National Lockdown (n = 69) o No. of children who took the vaccine and faced delays = 63 o Median delay = 25 days [Range = 248 days (7, 255)] o Maximum delay recorded in case of MR_1 intake by 255 days. o 50 children delayed MR_1 intake and remaining 13 delayed intake of OPV_LPV_RVV 3 & IPV_2 vaccines by an average of 26 and 21 days respectively. o Females had higher median delay of 27 days as compared to males (21 days). Group 2: Vaccines due Before National Lockdown and during Unlock Phases 1.0 to 7.0 (n = 179) o No. of children who took vaccine(s) and faced delays = 133 o Median delay = 35 days [Range = 427		across the health centres. iv. More children missed out on timely receipt of MR 1 & 2 and their associated vaccines scheduled after 9 and 18 months respectively in 2020 and 2021. This reflects a trend of immunization being delayed after obtaining the doses mandated for the first six months of life. This trend is further witnessed in the case of subsequent Vitamin A intakes as well. v. Early vaccinations were observed in a few cases, for which specific reasons could not be found. vi. A gender-based bias in accessing timely immunization could not be found out from this sample.

	days (1, 428)] ○ Maximum delay recorded in case of MR_1 intake by 428 days. ○ 83 delayed in MR_1 intake by an average of 27 days. ○ Male children experienced higher delays (40 days) as compared to females (34.5 days). <u>C. Immunizations in 2021</u> Group 1: Vaccines Due during State Lockdown (n = 46) ○ No. of children who took vaccine(s) and faced delays = 36 ○ Median delay = 42 days [Range = 165 days (6, 171)] ○ Maximum delay recorded in case of VIT_A3 intake by 171 days. ○ 24 delayed in intake of MR_2 and adjoining vaccines by an average of 30 days and 11 delayed intake of VIT_A3 by 109 days. ○ Male children experienced slightly higher delays (42 days) as compared to females (41 days). Group 2: Vaccines due Before and After the State Lockdown (n = 174) ○ No. of children who		

	took vaccine(s) and faced delays = 142 o Median delay = 48 days [Range = 429 days (6, 435)] o Maximum delay recorded in case of MR_2 and adjoining vaccines by 435 days o 76 children delayed in MR 2 and adjoining vaccines' intake by an average of 34 days and 36 delayed intake of VIT_A3 by 83.5 days. o Male children experienced higher delays (55 days) as compared to females (39 days).		
Immunization Coverages and Comparisons	<u>Monthly Immunization Coverages</u> **March 2020:** The cumulative median coverage of vaccines across the selected PHC/FHCs ranged between 37.5% for VIT_A1, 39% for MR_1 to a high of 67% for the second dose of OPV, LPV, and RVV vaccines (coverages for other vaccines lying in between). **April 2020:** 68 additional children were vaccinated across health centres. **May 2020:** Coverages above 78% recorded across vaccines. **May & June 2021:** Coverages above 70%	Additional children (apart from those deemed eligible based on the live birth data) were vaccinated in months subsequent to resumption of immunization services. These include children who had missed their scheduled doses in the previous months, or were taking vaccines at a health centre they were not registered in (if they were visiting their maternal homes or at a vacation in their native place other than their usual area of residence, etc.).	The median coverages for these vaccines across the health centres dropped initially in March 2020 as the pandemic induced lockdown came into effect. The coverages climbed up (beyond 100% in some cases) in the subsequent lockdown months of April and May 2020, and remained above 70% during May and June 2021 despite the severe fifth wave of COVID-19 in the state.

	across vaccines, and some attained 100%.		
	<u>Comparison between vaccine coverages in 2019, 2020 and 2021</u> March 2020 vs March 2019: Drop in coverage in the range of 22.5% to 50% across vaccines (except for zero change in OPV_LPV_RVV_2) Largely positive differences in coverages for most vaccines for April and May (2020 vs 2019), except for negative trends in VIT_A1 (April 2020 vs April 2019) and OPV_LPV_RVV_1 & IPV_1 (May 2020 vs May 2019). Mixed trends in comparisons between State Lockdown Months of 2021 vis-a-vis May and June 2020.		The differences in coverage between March 2020 and March 2019 were negative for all vaccines (zero for second doses of OPV, LPV and RVV). Largely positive differences in coverages for most vaccines for April and May (2020 vs 2019), except for negative trends in VIT_A1 (April 2020 vs April 2019) and OPV_LPV_RVV_1 & IPV_1 (May 2020 vs May 2019). Mixed trends in comparisons between State Lockdown Months of 2021 vis-a-vis May and June 2020. Negative trends were primarily observed in case of vaccines given to children less than four months old possibly referring to the fear in taking these infants to the health centres at the peak of the fifth wave.
Influence of Socio-Economic and Demographic Characteristics on Parental Decisions on Immunization during the Pandemic	<u>Socio-Economic-Demographic Characteristics of 30 Beneficiaries</u> o 70% were female children. o 53% were 2 year old at the time of the interview. o Half of them were first in order of birth. o All were rural area residents. o Caste status = 17 (General); 13 (EWS, OBC & SC);	i. No suggestion of socio-economic-demographic factors of the household affected child's immunization from any respondent. ii. Mothers who had knowledge of child health seemed more determined to get their children vaccinated irrespective of circumstances, even if they had to go to higher public or private facilities. They also expressed a shared responsibility for their child's welfare. *(3, 6, 7)*	i. Socio-economic and demographic factors do not seem to have influenced immunization outcomes to a great extent among those interviewed. ii. It is evident that households faced difficulties without employment during the pandemic, but it cannot be said that this deprivation adversely influenced the immunization uptake of their children from this sample. iii. Some respondents expressed the need for a sense of shared

	○ Household Ration Card Status: • Non-Priority (Non-Subsidy) = 18, • Non-Priority (Subsidy) = 6, • Priority = 6 <u>Mother's Education & Present Working Status</u> ○ More than half of the mothers were graduates. ○ All mothers received some level of formal education. ○ Only 10% of the mothers were employed at the time of the interview. <u>Parents' Working Status during Lockdowns</u> Only 10 households had parents working in this period. <u>Physical Accessibility to Health Centre during the Pandemic</u> ○ Average time taken to reach the nearest health centre for immunization = 10 minutes [Range = 25 (5, 30)] ○ Most common mode of transport = Walking (40%)	iii. Preference for the nearest health centre with limited crowding, clean and hygiene surroundings determined their physical accessibility to immunization services. *(8, 10, 14)*	responsibility of performing actions beneficial for the child's well-being. This affirms a child's right to immunization (and health). At the same time, it is important to keep in mind that not all parents may be able to go beyond their capabilities and therefore the question of equity is pertinent here. iv. Physical accessibility to the health centre, cleanliness and hygiene are critical factors that influence the decision of parents on their child's immunization especially in the wake of restrictions imposed by the pandemic.
Personal Experiences of Beneficiary Parents*	i. Only 5 respondents claimed to have (Gen = 1, OBC = 4) faced disruptions to their child's scheduled vaccinations among the 30 caregivers interviewed.	i. Fear was expressed by respondents, irrespective of their social or economic status to be the primary cause of delayed immunizations. *(1, 2)* ii. Almost all the respondents agreed to receipt of information on immunization sessions on	i. A small number of respondents in the sample interviewed had experienced disruptions to their child's immunization during the pandemic. ii. Equal number of respondents expressed relief as well as fear towards resumption of

	ii. Number of parents receiving information on resumed immunization services in 2020 from different sources are as follows: • Calls from ASHAs = 15 • Immunization Card = 9 • Both = 6. iii. Number of beneficiaries who missed their scheduled doses during the lockdowns: National Lockdown = 2 State Lockdown = 5 Delays could not be exactly recollected by the respondents, and only five knew the name of the vaccine(s) missed. iv. Personal reaction on resumption of immunization services: 36.67% expressed relief, 26.67% were indifferent, and 36.67% were anxious.	time. *(9, 12)* iii. Delays were attributed by the parents to the pandemic induced disruptions or their personal circumstances without blaming the health system. *(14, 15)* iv. Some parents found the immunization process to be more orderly, with shorter waiting time and limited crowding. *(10, 11, 12, 13)* v. Concerns raised by parents on service delivery are: Fear of taking children to high risk environments, inadequate infrastructure suiting all COVID safety measures, crowding, etc. *(3, 4, 5, 11)* vi. Parents/guardians of the beneficiaries expressed both satisfaction and mistrust of the services offered at the public health facilities. Many noted prudent approach of the staff towards the service after the pandemic began. *(12,13, 14, 15)*	immunization services, and this fear was beyond social or economic status. iii. All the respondents received information on resumption of services after the lockdown at the health centres. iv. While delays invoked concern among some parents, it was a deliberate decision on the part of others if the child only had to take a Vitamin A dose or out of fear. v. They were equally aggrieved with the infrastructural deficiencies at health centres that affect the resilience of the health system, and this generates preferences for higher public or private facilities. vi. Satisfied parents noted the new streamlined approach and vigilance of the health workers that ought to be taken forward even if COVID-19 no longer remains a threat.
**Numbers against the Quotes in Section 4.5.2.3 have been mentioned in brackets in italics in the Qualitative Results Section of the Domains 'Influence of Socio-Economic and Demographic Characteristics on Parental Decisions on Immunization during the Pandemic' and 'Personal Experiences of Beneficiary Parents'.*			

CHAPTER 5

DISCUSSION AND CONCLUSION

The purpose of this study was to examine the impact of the COVID-19 pandemic on routine immunization programme in Pathanamthitta District, Kerala and the role of demand side elements of a rights-based approach to immunization of children during this period. This purpose was accomplished through a concurrent exploratory mixed methods study of nested design by addressing the following guiding research questions:

1. To understand the impact of COVID-19 pandemic on the routine child immunization programme in Pathanamthitta District, Kerala.

Q.1.1. How have public healthcare facilities dealt with the disruption of immunization services (with respect to planning, logistics, staffing, IEC and service delivery) in the selected areas of the district?

Q.1.2. How has the coverage of immunization been during the lockdown periods as compared to the same period in the previous year?

2. To understand the role of demand side elements of a rights-based approach to health of children in the selected areas during the pandemic with respect to immunization.

Q.2.1. How has the recipient's socio-economic and demographic factors affected his/her immunization uptake during the pandemic?

Q.2.2. How have parents/caregivers tackled with missed opportunities and responded to catch-up efforts?

Data analysis involving qualitative inputs on the actual service provision and beneficiary experiences embedded within the quantitative information on vaccine coverages, process and outcomes of service delivery offered critical insights to answer multiple facets of these research questions. As a district based study in the Indian context, these results aid in understanding how a region's routine immunization system was affected by a public health emergency and how it responded to the crisis by re-orienting its strategies. Adopting mixed

methods study design enabled comparison of results from both types of data and securing a clear picture of the immunization scenario during the pandemic.

This chapter will provide an overview of the integrated study results, followed by a discussion on the findings, theoretical and practical implications of the study, study limitations and strengths, recommendations for future research, and concluding remarks.

5.1 Overview of the Study Findings

1. Resilience of the Health System

Routine immunization deemed as an essential service faced neglect on account of the increased emphasis on COVID-19 management in the district. However, the heightened vigilance of the health system in ensuring regular vaccine supplies, cold chain maintenance, proper staffing and communicating with the beneficiary households via accessible means of technology are critical factors worth emulation. Taking lessons from the national lockdown period, immunization services continued to be provided without interruption at the health centres during the state lockdown despite the surge in COVID-19 cases. Satisfactory outcomes of only 4.2 weeks of disruption to the service during the pandemic, zero cases of serious/severe AEFIs reported, and a moderate number of maximum doses administered per session irrespective of infrastructural deficiencies of the health centres masks reality to some extent.

While disruptions were mitigated and service delivery re-oriented based on the guidelines issued by the central and state health authorities, impediments lay in the form of absence of timely and contextual microplanning and training modules on conduct of child immunization, infrastructural deficiencies and late realization of immunization uptake delays. Contrary to expectations, from the sample of 292 two year old children, median delay on the last immunization uptake in 2019 (98 days) was higher than that experienced for those children with immunizations due during the lockdowns[146] as well as for those with doses due during non-lockdown phases[147] during the pandemic years. Moreover, median delay during the state lockdown was higher than that of the national lockdown period due to the anxiety induced among parents with the surge in COVID-19 cases reported during the fifth wave in the state.

[146] See Table 4.11; Median delay in immunization experienced by those children with scheduled vaccines during: i. National Lockdown = 25 days; ii. State Lockdown = 42 days

[147] See Table 4.11; Median delay in immunization experienced by those children with scheduled vaccines: i. Before National Lockdown and from Unlock Phases 1.0 to 7.0 in 2020 = 35 days; ii. Before and after the State Lockdown in 2021 = 48 days

More children missed their scheduled doses of MR (1 or 2), adjoining booster doses of DPT and OPV (with MR 2) and Vitamin A supplementation in the pandemic period indicative of a trend of delaying immunizations that come later in the schedule after the vaccines mandated for the first six months of life. Early vaccinations and absence of clear gender biases in delayed immunization uptake in the sample were results without parallels in literature. Despite adaptation, these selected health centres in the district had a far from perfect approach in immunization service delivery during the pandemic. It failed short of exhibiting expected levels of resilience in a best case scenario due to the discrepancies in planning, infrastructure and in mitigating fear-induced delays.

2. Immunization Coverages and Comparisons

With the onset of the pandemic-induced national lockdown, immunization sessions were disrupted in the month of March 2020 lowering overall[148] coverages across vaccines in the selected health centres of the district. In the subsequent lockdown months, intense catch-up efforts resulted in coverages for some vaccines climbing above 100% indicating 'additional' children being vaccinated. The state lockdown months also witnessed overall coverages above 70% across vaccines.

The difference in coverages was negative for all the vaccines (except for a zero change in the case of the second dose of OPV, LPV and RVV) between March 2020 and March 2019 reflecting the pandemic's impact on routine immunization. Indicative of catching-up efforts, largely positive differences across vaccines were recorded between April and May 2020 and their previous year counterpart months except in the case of Vitamin A1 (April) and first dosesof OPV, LPV, RVV and IPV (May). Comparing the state lockdown months (May-June 2021) with May and June 2020 offer mixed results with negative differences more prevalent in case of vaccines given to children less than four months old. This can be attributed to the fear induced anxiety among parents in taking their infants for immunizations as COVID cases rose significantly during the state lockdown period.

3. Influence of Socio-Economic and Demographic Characteristics on Parental Decisions on Immunization during the Pandemic

[148] Overall coverage indicates ' the average value of coverage across all the five selected PHC/FHCs.'

From the analysis of responses of thirty parents/guardians of beneficiary children interviewed, socio-economic and demographic characteristics does not seem to have influenced the outcomes of immunization to a great extent. Two-thirds of these parents faced unemployment but this does not seem to have adversely affected immunization uptake of children either.

Only 10% of the mothers were employed at the time of interview and all had attained some level of education. Mothers aware of child health (primarily health professionals) were more determined than others to get their children vaccinated irrespective of circumstances even if they had to go to a higher public or private health facility. These mothers expressed the need for a sense of shared responsibility between healthcare providers and parents to undertake activities beneficial for child well-being thereby affirming child's right to immunization. However as capabilities of parents differ (example: parents from poorer socio-backgrounds might not be able to take their child to a private facility for timely vaccination), this idea of a shared responsibility and equal agency will not be possible evoking equity concerns.

Physical accessibility to the health centre, cleanliness and hygiene were critical factors that influenced parental decisions on child immunization. It took them ten minutes on an average to reach the nearest health centre and around 40% commuted on foot.

4. Personal Experiences of Beneficiary' Parents

Of the thirty respondents, only five claimed to have faced disruptions to their child's scheduled immunization during the pandemic. All parents had secured information on resumption of immunization services with an equal number (36.67%) expressing both fear as well as relief at the resumed services. Nevertheless, fear of contracting COVID was the primary reason that prevented parents from ensuring timely immunization of their children. They attributed delayed immunization uptakes to pandemic-induced disruptions or their personal circumstances or sometimes even deliberate decision-making if it were only a Vitamin A supplementation without explicitly blaming the health system. Two children missed their scheduled doses during the national lockdown and five during the state lockdown. Parents raised grievances on the physical infrastructural deficiencies at the public health centres that generated preferences for private or higher public facilities. At the same time, those satisfied with the immunization services offered at the PHC/FHCs noted the new streamlined approach and

enhanced vigilance of the health workers that ought to be carried forward even if the pandemic ceases to be a threat.

5.2 Discussion

Based on the results of this study, it becomes pertinent to contemplate over certain factors that culminated in a far from perfect immunization service delivery and delayed intakes in the district which are discussed as follows:

1. Guidelines: Theory versus Reality

The Ministry of Health and Family Welfare issued a guidance note on 14th April 2020[149] identifying 'vaccinations' to be a high priority service (p.10), and seven general guidelines on immunization services (p.13). In its order dated 15 April 2020[150], the Ministry of Home Affairs stated that all health services were to remain functional during the lockdowns. These statements were reiterated in the 16 April 2020 advisory[151] released by the Kerala state's Health and Family Welfare Department with 24 specific guidelines for restarting immunization services in the public as well as private health facilities. Further, a summary advisory issued by the Ministry of Health and Family Welfare dated 15 May 2020[152] offers a set of uniform, decontextualized and rather inflexible guidelines for conducting immunization sessions at the health facilities and outreach centres in various zones.

Based on results of this study, the following observations are made to corroborate the disconnect between the guidelines released and the ground reality of the selected health centres.

Table 5.1: Analysis of Disconnect between Guidelines and Reality of Immunization Service Delivery at the Selected PHC/FHCs of Pathanamthitta District, Kerala

S. No.	Guideline(s)	Issues/Gaps
1.	*"Ensure social distancing and hand washing etc. as outlined in the annexure, to be adopted at health facility level for vaccinating the pregnant women and children who have reported to these*	Usage of the term 'social distancing' instead of 'physical distancing' presents ethical concerns particularly during a public health emergency where social interactions are viewed

[149] https://www.mohfw.gov.in/pdf/EssentialservicesduringCOVID19updated0411201.pdf
[150] https://www.mha.gov.in/sites/default/files/MHA%20order%20dt%2015.04.2020%2C%20with%20Revised%20Consolidated%20Guidelines_compressed%20%283%29.pdf
[151] https://arogyakeralam.gov.in/wp-content/uploads/2020/03/Advisory-for-restarting-Immunisation-activities-regarding-Universal-Immunisation-Programme.pdf
[152] https://www.mohfw.gov.in/pdf/3ImmunizationServicesduringCOVIDOutbreakSummary150520202.pdf

	facilities" [Advisory dated 15th May 2020, MoHF&W, p.2] *'The immunization sessions can be restarted both in public and private institutions with strict directions to the intuitions[153] for practicing all the components of the 'break the chain' instructions and strictly maintaining the social distancing without fail"* [Advisory No. 31/F2/2020/Health-16thApril 2020, Health and Family Welfare Department, Government of Kerala, p.2]	with suspicion and fear. The preventive measure endorsed has been to maintain distant socialization with a sense of social inclusion, of being together in crisis and remain connected via virtual communication technologies. In a socially diverse country like India, this term can foster distinction and discrimination in the name of distancing, and therefore repeated use of this term in the advisories require correction.
2.	*"Pre-identification of a well-ventilated seating area with demarcated seating location 1 meter apart"* [Advisory dated 15th May 2020, MoHF&W, p.5] *"Pre-identification of session site with adequate seating space for beneficiaries and caregivers while maintaining social distancing (at least 1-meter gap) with clear area of demarcation for incoming beneficiaries, post vaccination waiting area and a reserve zone if gathering increases"* [Advisory dated 15th May 2020, MoHF&W, p.3] *"Social distancing shall be strictly followed in the waiting room, vaccination room as well as the observation room"* [Advisory No. 31/F2/2020/Health-16thApril 2020, Health and Family Welfare Department, Government of Kerala, p.2] *"In the waiting area, the chairs shall be kept at a distance of 1 meter from each other"* [Advisory No. 31/F2/2020/Health-16thApril 2020, Health and Family Welfare Department, Government of Kerala, p.3]	These guidelines pertain to the physical distancing mandated at the health facility as well as in outreach session sites during the immunization process. But the ground reality of physical infrastructural deficiencies at the PHC/FHCs and sub-centres was completely ignored. In the study district, it was observed that most of the PHCs and sub-centres lacked distinction between waiting room and observation room. Either it was a common space used interchangeably or none that existed. One sub-centre visited was a single room set-up with its entrance barely a few metres away from the main road. Any queue of beneficiaries and their caregivers formed would be by the side of this road sans any waiting area or chairs. There were two main centres of PHC/FHCs as well that did not have specific waiting/seating area.
3.	*"In hospitals, immunization may be provided in an area away from the OP and IP wing. Preferably, a separate entrance away from the general patient entry may be arranged for the immunization area"* [Advisory No. 31/F2/2020/Health-16thApril 2020, Health and Family Welfare Department, Government of Kerala, p.2]	Though specific to a hospital, this guideline should also be made applicable to the PHC/FHCs of the district where many residents were observed to frequent for out-patient care. In two of the selected main health centres visited, a common entrance led to the OPD and immunization room. At one of these PHCs, a greater risk of exposure of the beneficiaries to the general patients was observed as both awaited their turns for immunization and OPD care respectively.

[153] Could be 'institutions' (a possible typing error in the guidelines issued)

4.	*"Support from Panchayat/Urban Local Body to be sought for identification of appropriate session site with adequate space to practice social distancing (at least 1 meter)"* [Advisory dated 15th May 2020, MoHF&W, p.4]	The local self-government bodies were involved in COVID-management activities along with the PHC staff, but their role in supporting child immunization services by securing new spacious session sites was not reported by the health workers.
5.	*"Alternate Session Sites: Site other than Anganwadi center may need to be identified in case of space constraints to maintain social/physical distancing and lack of adequate provision for hand washing with soap and water. Schools, Panchayat Ghars, community centers etc. may be explored as alternate sites"* [Advisory dated 15th May 2020, MoHF&W, p.6]	None of the health centres mentioned about alternate session sites being taken to conduct immunization sessions. In the wake of infrastructural deficiencies at the main and sub-centres, this option should have been explored for the safety of children and satisfaction of parents.
6.	*"Ensure that beneficiaries and caregivers maintain the social distancing during the 30-minute waiting period. This 30-minute waiting period to be used for group counselling and avoid individual counselling. Provide key preventive messages related to COVID-19, (handwashing technique, nutrition of pregnant women, breastfeeding etc.)".* [Advisory dated 15th May 2020, MoHF&W, p.7]	From the study results, brief individual health education was given to caregivers during their child's immunization process. Group counselling sessions were avoided to prevent the risk of COVID transmission particularly as children were not capable of face-masking. The vaccinators clarified the doubts and advised caregivers protecting their privacy. Moreover, not all caregivers adhered to the 30 minute waiting period after vaccination and preferred going home without exposing their children for a longer period in the risky environment of a health centre.
7.	*"**Capacity building of front-line health workers:** Instead of In-person trainings, existing digital health platforms may be leveraged for training and capacity building"* [Advisory dated 15th May 2020, MoHF&W, p.7]	Though online trainings focused on COVID care and management were conducted, the health workers indicated that there was no module on child immunization in these sessions.
8.	*"States need to strengthen the supportive supervisory mechanism for VHSND/immunization sessions and to include monitoring of practices associated with social distancing and other guidelines. Data from SS should be used for local action and monitoring progress".* [Advisory dated 15th May 2020, MoHF&W, p.8]	No information has been obtained on the existence of supportive supervisory mechanisms or monitoring of practices from any of the PHC/FHCs in the study.

India's Universal Immunization Programme is administered and monitored by the Ministry of Health and Family Welfare whereby the state governments receive funds from the Centre to provide vaccinations as per the National Immunization Schedule free of cost. However, the PHC/FHCs and other public facilities providing immunization services come under the responsibility of the State governments. For the programme to attain success, there ought to be a joint effort in improving public health infrastructure as well as adequate disbursal of funds (Brahma & Mukherjee, 2020). A 'one-size-fits-all' set of guidelines released by the Centre did not account for the disparities in health infrastructure across states and districts. These infrastructural deficiencies obstructed adherence to safety measures at the health centres which further became a cause of dissatisfaction for some parents/guardians. Without rectifying the inherent infrastructural deficiencies, guidelines were blindly imposed on and adopted by the health centres.

Though Kerala's proactive model of COVID management was appreciated by the World Health Organization[154], their absence of vigilance and enforcement of protective measures in the months preceding the elections to the State legislature triggered a huge COVID crisis that finally led to the state lockdown in May 2021 (Kuttichira, et.al 2021). While the Election Commission had issued broad guidelines for conducting elections in the novel circumstances in August 2020[155], the Ministry of Health and Family Welfare was continually reviewing the surge in COVID-cases in Kerala and had advised caution[156]. It is surprising that the State government let loose their guard in spite of these warnings and hard lessons learnt from the consequences of easing restrictions during Onam and Christmas in the previous year[157]. Eventually, this unwise approach resulted in a drop in coverages of vaccines taken by children less than four months old as observed in the study district in the months succeeding the elections. It is imbibed that inconsistencies between government policies and their on-ground implementation in a health emergency can result in relapses irrespective of the resilience of the public health system.

2. Transition and Recovery Process of Immunization Services

Broadly health systems recovery is defined as the rebuilding, restoration and improvement of the health system's components and core public health functions in alignment with the

[154] https://www.who.int/india/news/feature-stories/detail/responding-to-covid-19---learnings-from-kerala
[155] https://eci.gov.in/files/file/12167-broad-guidelines-for-conduct-of-general-electionbye-election-during-covid-19/
[156] https://pib.gov.in/PressReleasePage.aspx?PRID=1701884
[157] https://www.dailypioneer.com/2021/page1/from-kerala-to-bengal--impact--of-elections-on-covid-19-surge.html

principles of building back better and sustainable development (WHO, 2020b). The World Bank Good Practice Notes on Health (World Bank Good Practice Notes: *Health*, 2008 as cited in IRP & UNDP, 2012) divides the Recovery and Reconstruction Phase into two: Transitional (usually 3-12 months), Recovery and Reconstruction (1 to 3 years or more).

While the transition phase focuses on ensuring access to essential health services to minimize vulnerabilities and protect lives, the medium and long term phases of recovery and reconstruction stresses on utilization and quality of services. Amidst the pandemic, the essential nature of routine immunization and fear of resurgence of communicable diseases had warranted its immediate resumption. An attempt is made here to capture actions undertaken in these phases (as the pandemic continues) in the selected health centres of Pathanamthitta District based on the responses collected from the health workers and other personal observations.

Table 5.2: Actions Undertaken in Transition and Recovery Phases

Area[158]	Transitional Phase	Short-term Recovery
Assistance	• Guidelines and advisories for restarting immunization services were released in April 2020 by the Ministry of Health and Family Welfare and COVID-19 Outbreak Control and Prevention State Cell, Health & Family Welfare Department, Government of Kerala (based on inputs received from State Technical Advisory Group on Immunization). • No partnerships with any organizations or multilateral/bilateral agencies working on child health was identified.	N/A
Information Gathering	<u>Post-disaster Needs Assessment:</u> • A list of children missing out on scheduled vaccines during the lockdown was prepared by the JPHNs. • Safety measures (seating, sanitizers, PPEs, face shields, masks & gloves, minimal staffing) assessed and implemented. • Cold chain system and vaccine logistics assessed for losses and damages	• Information on children missing scheduled immunizations was identified from the official administrative data available at the health centres. This took place after considerable delay in some PHC/FHCs. • Monthly immunization plans and targets were prepared at the PHC level. • No information sharing with the private sector or community organizations was mentioned.

[158] Areas adopted from the framework provided in Mortluck, et.al (2010) - Guidance Notes on Health Sector Recovery

	regularly by the JPHNs during the lockdown. • Infrastructural deficiencies were not adequately accounted and amended for at the health centres. <u>Risk Assessment:</u> • Local COVID assessments were conducted before restarting immunization services during the National Lockdown and/or after being delisted as containment zones. • To an extent, ASHAs conveyed information on ground-level difficulties concerning beneficiaries to the JPHNs and Health Inspectors.	• Updation of immunization records on the RCH[159] portal was observed at the PHCs. • The HMIS[160] portal is yet to be updated with immunization and childhood diseases information beyond May 2021. Only provisional district based data of 2020-21 and 2021-22 is available.
Leadership, Governance and Coordination	• The District Administration was responsible for implementing the guidelines. • The Medical Officer of the PHC was in charge of planning and supervision of immunization services. • No modifications were made to the supervisory framework.	The Medical Officer, health inspectors and JPHNs continued to administer and monitor the programme at the PHC and sub-centre levels.
Communications	• No specific communication plan, except for advisories extended on avoidance of home visits by ASHAs, contact beneficiary households via phones, and group counselling. • Individual health education and counselling (on the vaccines given, side-effects, breast-feeding, nutrition, etc.) was given during the immunization process without creating delay for those waiting and to prevent over-crowding after the session.	• Messaging tools have expanded to public announcements of vaccination campaigns (pulse polio, Vitamin A) on moving vehicles across wards. • Beneficiary parents/guardians are informed via phone or on their visit about the next date of vaccination. • No group health education and counselling sessions were conducted.
Funding	New context-specific budget preparation did not take place at the PHC/FHCs.	No information obtained.
Human Resources	• Minimal essential staffing plan prepared and implemented for the health facility based immunization. • Additional vaccinators were not required	• Continued with minimal staffing at health facilities and outreach sessions. • No specific training session held upon restarting of immunization services.

[159] Reproductive and Child Health Portal: https://rch.nhm.gov.in/RCH/
[160] Health Management Information System: https://hmis.nhp.gov.in/#!/standardReports

	at these health centres. • No immunization-specific training session were conducted for health workers.	
Strategy and Planning	• New micro-plans suited to the pandemic situation were not prepared. Plans prepared in February-March 2020 continued into the lockdown period. • Risk assessments conducted before restarting immunization sessions and safety measures were incorporated with the existing plans into action.	• Revision of micro-plans unlikely in 2021; no documental evidence obtained from the health centres. • Risk assessments continued particularly as areas moved in and out of containment zones, and on account of flood related events.
Consultation	• Consultations were held with the district and block level health authorities, PHC health workers, and ASHAs on issues related to resumption of immunization services. • Involvement of local self-governments and beneficiary parents/guardians in consultations is improbable. • Gender and caste/tribe neutral approach was adopted to ensure attendance of beneficiaries at the sessions.	Wider consultations with the private sector, parents/guardians on conduct of routine immunization services are unlikely.
Monitoring & Evaluation	• The Central Ministry had mandated States to set up supportive supervisory framework for monitoring practices related to social distancing and other guidelines. • No new monitoring frameworks were reported from the PHC/FHCs. Internal monitoring continued. • Key indicators: Coverage of vaccinated against targeted population and AEFI cases reported.	• No new monitoring frameworks were reported from the PHC/FHCs. • Internal monitoring continued. • Key indicators: Coverage of vaccinated against targeted population (per vaccine) and AEFI cases reported.
Infrastructure	• Cold chain systems were regularly checked and maintenance ensured. • Main centres were largely preferred for conducting immunization services to prevent virus transmission. • Arrangements were made for limited crowding (time slot-based system), distanced seating and waiting,	Not much change was brought to the physical infrastructural facilities at the main or sub-centres (waiting area, roofing, etc.)

	sanitizers/hand washing, regular disinfection before and after sessions.	
Health Service Delivery	• Immunization services resumed after an average gap of 4.2 weeks in 2020. • Prioritization of children for immunization based on age and type of missed vaccines during the lockdown. • Immediate safety precautions were taken with sick children, those from containment zones, or in households having COVID-infected persons and they were strictly avoided from attending sessions. • VPD Surveillance was re-established in the health centres. • Health professionals worked as per the guidelines received from the Centre and State health authorities. • Equal access ensured to all sections of the population; walk-in-beneficiaries were also vaccinated. • No collaboration with private health facilities on identifying children with missed doses or in conducting sessions.	• No disruptions to immunization reported at the health centres during the state lockdown in 2021. Some health centres stopped providing immunization services when they were listed as containment zone. • Sub-centres could not accommodate provision of general health services alongside routine immunization. • Adherence to safety precautions (except for usage of PPEs as COVID restrictions eased) and VPD surveillance continued at the health centres. • Mass vaccination camps for Pulse Polio and Vitamin A were restarted at the PHC/FHCs and sub-centres.
Medicines, Supply and Technology	• No new emergency logistics plan prepared for vaccine delivery, shortages or cold chain maintenance. • Vaccine availability was ensured to a great extent, except for Vitamin A shortages in three PHCs during May-June 2020. • Two PHC/FHCs hired panchayat owned vehicles for transporting vaccines during the lockdowns. • Uninterrupted supply of vaccines to a private hospital reported from one PHC.	• No vaccine supply or logistical issues were reported. • One PHC without own transportation facility purchased a vehicle for vaccine delivery and movement. • Uninterrupted supply of vaccines to the private hospital continued.
Implementation	• All the main centres in the study officially restarted with regular immunization services from April 22, 2020. • In two PHC/FHCs, two outreach sessions for Vitamin A supplementation were held on 21 April and one PHC had conducted a session on 8 April.	• Continuation of implementation of the programme as per the guidelines received in 2020. • There is a need to prioritize resolution of infrastructural concerns, fear-induced delays among beneficiary households and prepare context-specific contingency plans.

3. Outcomes of VPD Surveillance

According to the weekly outbreak reports[161] released by the Integrated Disease Surveillance Programme, there were no outbreaks of any vaccine-preventable diseases (taken care of in the National Immunization Schedule) in Pathanamthitta District in 2020, 2021 and 2022 (up to 13th week). Further, no sporadic cases of childhood diseases of Diphtheria, Pertussis, Tetanus, Tuberculosis or Measles were recorded from the district in the HMIS standard reports[162] for 2020 and 2021.

4. Vaccine Delays and Perceptions

From Table 4.11[163], it can be inferred that a large number of children delayed the intake of the first dose of Measles-Rubella vaccine (and Vitamin A1) and the second dose of Measles-Rubella vaccine along with booster doses of DPT and OPV (and Vitamin A2) in 2020 and 2021 respectively. Some of the individual values of delay reported from this sample goes beyond 250 days. It is concerning to note this rising tendency among parents to defer the uptake of MR shots and Vitamin A supplementation that are slated for much later in the National Immunization Schedule (after 9 months of life) as compared to vaccines such as BCG, DPT, Poliovirus and Rotavirus vaccines due to be taken in the first four months of life.

As India is marching towards the MR elimination goals and seeks to attain more than 95% coverages in two doses of MR vaccination across the country[164], delaying these vaccines will lead to a retreat in the achievements made. Vitamin A supplementation also faces a similar dilemma. Though shortages in supply of Vitamin A syrups were reported from three PHCs in two taluks during the months of May and June 2020, this was soon rectified. Personal observations of immunization sessions at the health centres and available data reveal that the intake of the remaining seven doses of Vitamin A[165] by children largely depends on the convenience of parents/guardians. There could be a gap in conveying and grasping the importance of MR vaccines and Vitamin A supplementation among the parents/guardians which ought to be rectified in the district.

[161] https://idsp.nic.in/index4.php?lang=1&level=0&linkid=406&lid=3689
[162] https://hmis.nhp.gov.in/#!/standardReports
[163] See Section 4.2.3
[164] https://main.mohfw.gov.in/sites/default/files/19543158507148966507 3.pdf
[165] The first two doses of the Vitamin A syrup are taken along with MR vaccines.

5.3 Implications of the Study

1. Theoretical Implications

Placing the research objectives of this study in a Critical Realist framework[166] has allowed theorization of explanations for the disruptive tendencies in seeking immunization as observed in Pathanamthitta district. In the context of COVID-19, it was possible to empirically observe the drop in coverages across vaccines during the national lockdown and gradual catching-up efforts. The actual conditions of immunization disruption and delivery at the health centres were assessed through initial surveys, interviews and administrative data. Further, the real mechanisms (fear, planning and infrastructural deficiencies, physical accessibility and hygiene of the health centre, trust, parent' awareness and perceptions of vaccines, etc.) at play inducing delayed immunizations provided deeper insights into factors that influence a child's right to health (immunization) during a public health emergency. The effect of socio-economic factors on immunization uptake of children was minimal as the study was conducted on a best-case scenario. Unintentional as well as deliberate decision-making on behalf of children has also affected their right to immunization services during the pandemic.

2. Practical Implications

This study offers the following recommendations to the policymakers for improving routine immunization services:

i. The study highlights the importance of preparing context-based plans incorporating administrative guidelines and putting them into action as key to implementing a public health programme successfully. Blind adherence to guidelines issued by authorities overlooking disparities across regions, within health centres, and societies will provide results that are far from perfect.

ii. The fear of virus transmission is real and has affected the decision-making of parents in favor of child's right to immunization. It is important that parents/guardians are not regarded as passive actors in the decision-making related to child health. Mitigating their apprehensions and concerns can result in ensuring timely vaccination of all children.

iii. Communication and education strategies aimed at changing the perceptions of different vaccines (particularly Measles-Rubella) and their significance to child health should be appropriately framed, implemented and the progress of these vaccinations with

[166] See Figure 3.1

elimination targets be continuously monitored for delays and avoidances even if the state has high human development indicators.

iv. There is a need to overhaul the physical infrastructural deficiencies of the public health facilities on which a large section of the population particularly those from the lower socio-economic backgrounds depend. Their inability to visit higher public or private health facilities in a situation of unemployment, disease and restricted movement has to be taken into account. It is necessary to prepare these PHC/FHCs and their sub-centres for meeting future public health emergencies without disrupting essential services.

v. An enhanced comprehensive system of data recording and management, and transparency in data sharing on child health and disease surveillance (other than COVID-19) indicators has to be established and made available in the public domain for research purposes.

vi. Training sessions should be developed for primary level health workers by experts knowledgeable of conducting immunization sessions in emergency contexts. A flexible model of monitoring and evaluation framework should be made available for the states to formulate their own context-specific frameworks.

vii. The lessons learnt from the operationalization of immunization services should be documented and model guidelines prepared for the Indian context after conducting national and state level analyses of the implementation of UIP during the pandemic.

5.4 Strengths and Limitations of the Study

Based on a transparent appraisal of the research process involved, a discussion on the strengths and limitations of this study is crucial.

1. Strengths

Situating the study in a Critical Realist Paradigm allowed for methodological pluralism resulting in the adoption of a Mixed Methods study design. The concurrent nested study design enabled a multi-faceted exploration of the process and perspectives on child immunization in the selected health centres of this district.

As a research on a vulnerable group ‘children’, it was conceptualized in a manner that did not require their direct participation. Even though older children receiving routine vaccines as per the National Immunization Schedule and capable of narrating own experiences could have

been selected, they were deliberately avoided due to potential risks via interaction. All the beneficiary parents were recruited randomly at the health centres during the immunization sessions. Data collection began in the first week of December 2021 after adult COVID-vaccination coverages crossed 102% (first dose) and 77% (second dose) in November[167], and as the number of active cases declined from November to December 2021[168]. As a convergent nested mixed methods study, simultaneous collection of quantitative and qualitative data was possible reckoning the difficulty in securing availability of health workers and parents/guardians of two year old children (who were nearing completion of their first set of scheduled vaccines) and the dynamic nature of the pandemic. Selecting this design enabled the study to be reduced in scope and manageable with the time and resources available with the researcher.

Further, in-person mode of data collection allowed understanding the context of the study – health centres, their location, infrastructure, service provision, and responses to the evolving pandemic situation. With the help of prepared questionnaires and interview schedules, time constraints were managed as most respondents expressed a sense of urgency to complete the interviews. Health workers were not willing to respond to digital modes of interviewing (online questionnaires or telephonic interviews) and preferred conveying information in person. Rapport built with them over these visits resulted in securing their trust and continued cooperation even during the analysis phase of this study. These in-person interviews offered not just contextual information, but also corroboration of facts from qualitative responses with quantitative and observational inputs. It was possible to inform and convince respondents on the utility of the research, secure better response rate and more complete answers. Fortunately, research fatigue was not observed among the respondents because few public health studies have been conducted in this district. Questions could be further modified based on the personal observations at the health centres such as eliciting opinion on infrastructural facilities from the parents/guardians.

In data interpretation, comparisons were made of the pandemic related data with the pre-existing data and deviations from prior expectations were documented. Internal validity could be ensured due to triangulation of evidences via different tools from multiple sources. This study fulfills the utility criterion in evaluating almost all the aspects of the immunization programme in detail. The flexibility offered to undertake research in the researcher's home district during the

[167] https://dhs.kerala.gov.in/wp-content/uploads/2021/11/Vaccine-Bulletin-November-29.pdf (p.7)
[168] https://dashboard.kerala.gov.in/covid/dailyreporting-view-public-districtwise.php

pandemic, extension of deadlines for fieldwork, and regular feedbacks from the Supervisor resulted in the timely completion of this study.

2. Limitations

Unequal sample sizes would have revealed a little less of the qualitative side than the quantitative side of the study. There are chances of mild discrepancies in comparing both types of data which had different variables and concepts, but an attempt has been made to minimize such occurrences. Assessment of immunizations across three years was performed for only 292 children as against the ideal sample size estimated to be 310. Though equal number of children was supposed to be considered from each PHC/FHC, difficulties in following up a child through the immunization registers of three years yielded in going ahead with the complete data of 52 to 62 children across these centres.

Responses of some parents/guardians would have been influenced by location of the interview and presence of health workers in the vicinity. Since permission to collect personal information of the beneficiaries was not granted, the interviews could not have been held elsewhere but within the premises of the health centre as social gatherings continued to face restrictions. Despite multiple visits to immunization sessions at the health centres, it was not possible to attain the target of interviewing 35 to 40 parents/guardians as initially conceptualized. This was because fewer beneficiaries of the selected age-group came to receive their Vitamin A supplementation at the time of data collection. Most of these interviews were completed in a time-span of five to seven minutes which meant only the most important questions were selected and asked. Though pandemic related difficulties were narrated, precise details on socio-economic factors were not disclosed by some respondents such as household income and caste. The health centres were randomly selected for the study and all these centres were located in rural areas with homogeneous population (without a significant tribal population as expected). Hence, there were no Scheduled Tribe respondents in the interviews conducted among the parents/guardians.

Visiting health centres to collect data was not an easy prospect due to the risky environment, and the vaccinators were found to be busy with COVID-19 vaccinations. On these days, immunization registries and microplanning documents were taken for noting official secondary data. Within the limited time allotted in the afternoons, manually writing down secondary data was a time-consuming and effort-taking task in itself. There were instances when

some JPHNs were reluctant to provide access to secondary documents on frivolous grounds, but it was later found that immunization records of the lockdown months were actually incomplete. Due to paucity of time and hesitancy, audio recording of interviews were avoided which implied writing down responses as promptly as possible. Human error is likely to have creeped in this process. Lastly, generalizability of the findings of this study is limited as the results are specific to the context of the public health centres of this district and to a best case scenario.

5.5 Recommendations for Future Research

Future studies could replicate this research on a larger scale to include public and private health facilities to generate a broader picture about child immunization in the district. There may be studies to examine the immunization outcomes and delays in coverages of children of higher age groups as compared to those less than two years old. A larger number of parents/guardian perspectives could be gathered on the immunization services provided at the health facilities. Assessments on the effectiveness of IEC tools deployed, VPD surveillance mechanisms, monitoring and evaluation frameworks at the health centres would provide insights into specific aspects of the programme. The health facilities in the district should foster an encouraging environment to perform research and use research findings to enhance their service delivery.

5.6 Conclusion

Routine Immunizations are critical services to child health that cannot be disregarded during a public health emergency. This study employed a mixed methods approach to understand the impact of the COVID-19 pandemic on the progress of the immunization programme and child's right to health in Pathanamthitta district, Kerala. The study design helped develop an in-depth contextual understanding of the immunization service delivery and process in selected health centres along with gathering information on parental perspectives that determine children's access to this essential service. The study results convey disruptions to immunization services and delays experienced by two year old children in their appropriate vaccine uptakes during the pandemic. Discrepancies in preparation of guidelines, planning, service delivery and community engagement precipitated in less than complete coverage of most vaccines and significant outliers of delay. Socio-economic and demographic characteristics of the beneficiary households did not seem to affect immunization uptakes. However, fear of contracting COVID-

19 and physical infrastructural deficiencies of the health centres influenced parental decisions. Therefore, it is recommended that the issues in programme planning and implementation be rectified at the earliest and the lessons learnt be carried forward to prepare for future emergencies without disrupting the immunization services.

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Research Methodology

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APPENDIX – I

RESULTS

Table A.4.1: Average Number of Immunizations Planned and Held Across All PHC/FHCs during the National and State Lockdowns

	N	Mean	Maximum	Minimum	Std. Deviation
Number of Planned Immunization Sessions during National Lockdown	5	16	18	14	1.414
Number of Sessions Held during National Lockdown	5	10	12	10	.894
Number of Planned Immunization Sessions during State Lockdown	5	10	10	9	.447
Number of Sessions Held during State Lockdown	5	10	10	9	.447
Valid N (listwise)	5				

Table A.4.2: Summary Statistics of Children Allowed to Receive Immunization in Health Facilities and Outreach Centres in Beyond Buffer and Green Zones

		Number of Children Immunized in the Health Facility in Beyond Buffer and Green Zones	Number of Children Immunized at the Outreach Centres in Beyond Buffer and Green Zones
N	Valid	5	5
	Missing	0	0
Mean		23.00	24.00
Median		20.00	25.00
Std. Deviation		7.583	4.183
Minimum		15	20
Maximum		35	30

Table A.4.3: Average Length of Disruption of Immunization Services during the Lockdown at the PHC/FHCs (in Weeks)

		Length of Disruption of Immunization Services during the National Lockdown (in weeks)	Length of Disruption of Immunization Services during the State Lockdown (in weeks)
Name of Primary/Family Health Centre	Ranni Pazhavangadi	4	0
	Ranni Angadi	4	0
	Mallappally Anicadu	5	0
	Mallappally Kottangal	4	0
	Thiruvalla Kadapra	4	0

Table A.4.4: Categorization of Study Participants by their Sex at Birth

		Frequency	Percent
Valid	Male	151	51.7
	Female	141	48.3
	Total	292	100.0

Table A.4.5: Descriptive Statistics of Last Vaccination of All Study Participants in 2019

Name of the vaccine(s)	N	Mean	Median	Minimum	Maximum
Birth Doses	82	1.01	.00	0	67
LPV 1	45	49.51	47.00	0	137
IPV 1	2	46.50	46.50	43	50
LPV 2	41	80.68	76.00	41	199
LPV 3	114	110.49	106.00	94	227
MR 1	8	267.50	272.50	245	287
Total	292	70.03	75.50	0	287

Table A.4.6: Number of Study Participants with Differences in Immunization Scheduled & Actual Dates Less than 100 (and > 0) and More than 100 by Vaccine in 2019

		No. of Participants with Differences in Immunization Scheduled & Actual Dates		
		> 0 and <= 100 days	>100 days	Total
Name of the vaccine(s)	Birth Doses	2	0	2
	LPV 1	42	2	44
	IPV 1	2	0	2
	LPV 2	38	3	41
	LPV 3	36	78	114
	MR 1	0	8	8
Total		120	91	211

Table A.4.7: Number of Study Participants with Differences in Immunization Scheduled & Actual Dates Less than 200 (and > 0) and More than 200 by Vaccine in 2019

		No. of Participants with Differences in Immunization Scheduled & Actual Dates		
		> 0 and <= 200 days	>200 days	Total
Name of the vaccine(s)	Birth Doses	2	0	2
	LPV 1	44	0	44
	IPV 1	2	0	2
	LPV 2	41	0	41
	LPV 3	113	1	114
	MR 1	0	8	8
Total		202	9	211

Table A.4.8: Difference between Scheduled and Actual Dates of Study Participants with Immunizations during the Last Immunization in 2019 by PHC/FHC and Sex of the Study Participants (in days)

Name of PHC/FHC	Sex of the Child	Name of the vaccine (s)	N	Mean	Median	Minimum	Maximum	Std. Deviation
Ranni Pazhavangadi	Male	LPV 1	4	44.25	44.00	42	47	2.630
		LPV 2	3	73.33	71.00	69	80	5.859
		LPV 3	6	108.17	109.50	97	118	9.908
		MR 1	1	276.00	276.00	276	276	.
		Total	14	94.43	88.50	42	276	59.541
	Female	LPV 1	3	46.67	49.00	42	49	4.041
		IPV 1	2	46.50	46.50	43	50	4.950
		LPV 2	3	83.33	84.00	81	85	2.082
		LPV 3	10	106.00	99.00	94	137	14.119

		Total	18	85.72	95.50	42	137	28.328
	Total	LPV 1	7	45.29	46.00	42	49	3.251
		IPV 1	2	46.50	46.50	43	50	4.950
		LPV 2	6	78.33	80.50	69	85	6.743
		LPV 3	16	106.81	100.00	94	137	12.389
		MR 1	1	276.00	276.00	276	276	.
		Total	32	89.53	95.50	42	276	44.113
Ranni Angadi	Male	LPV 1	4	47.00	45.00	42	56	6.377
		LPV 2	3	76.67	74.00	74	82	4.619
		LPV 3	7	111.57	114.00	99	124	10.722
		MR 1	3	265.67	276.00	245	276	17.898
		Total	17	117.41	100.00	42	276	76.028
	Female	LPV 1	3	42.00	43.00	35	48	6.557
		LPV 2	3	116.67	77.00	74	199	71.319
		LPV 3	14	109.29	106.00	97	131	10.344
		Total	20	100.30	102.00	35	199	35.378
	Total	LPV 1	7	44.86	43.00	35	56	6.466
		LPV 2	6	96.67	75.50	74	199	50.230
		LPV 3	21	110.05	108.00	97	131	10.259
		MR 1	3	265.67	276.00	245	276	17.898
		Total	37	108.16	102.00	35	276	57.483
Mallappally Anicadu	Male	LPV 1	6	49.83	47.50	47	61	5.529
		LPV 2	6	78.67	75.50	72	98	9.626
		LPV 3	12	113.67	108.50	96	149	16.892
		MR 1	3	260.00	263.00	248	269	10.817
		Total	27	107.96	98.00	47	269	61.753
	Female	LPV 1	5	65.20	48.00	46	137	40.146
		LPV 2	7	76.71	73.00	69	90	7.740
		LPV 3	9	108.00	108.00	96	118	9.421
		MR 1	1	287.00	287.00	287	287	.
		Total	22	96.45	93.00	46	287	50.064
	Total	LPV 1	11	56.82	48.00	46	137	26.914
		LPV 2	13	77.62	75.00	69	98	8.342
		LPV 3	21	111.24	108.00	96	149	14.167
		MR 1	4	266.75	266.00	248	287	16.132
		Total	49	102.80	97.00	46	287	56.530
Mallappally Kottangal	Male	LPV 1	6	56.83	48.00	41	107	24.766
		LPV 2	6	74.17	73.50	70	80	4.119
		LPV 3	13	112.00	114.00	96	132	14.248
		Total	25	89.68	97.00	41	132	28.854
	Female	LPV 1	4	47.50	46.50	44	53	3.873

		LPV 2	2	80.50	80.50	79	82	2.121
		LPV 3	16	109.81	107.00	96	137	13.258
		Total	22	95.82	99.00	44	137	27.279
	Total	LPV 1	10	53.10	47.50	41	107	19.209
		LPV 2	8	75.75	76.00	70	82	4.621
		LPV 3	29	110.79	112.00	96	137	13.505
		Total	47	92.55	97.00	41	137	27.994
Thiruvalla Kadapra	Male	LPV 1	5	52.40	47.00	42	78	14.536
		LPV 2	3	92.67	110.00	41	127	45.545
		LPV 3	12	107.25	105.00	96	138	11.600
		Total	20	91.35	100.00	41	138	29.999
	Female	Birth Doses	2	41.50	41.50	16	67	36.062
		LPV 1	4	44.75	45.00	42	47	2.217
		LPV 2	5	73.00	74.00	65	79	5.612
		LPV 3	15	116.00	104.00	96	227	33.473
		Total	26	91.04	98.00	16	227	40.782
	Total	Birth Doses	2	41.50	41.50	16	67	36.062
		LPV 1	9	49.00	46.00	42	78	11.124
		LPV 2	8	80.38	75.50	41	127	26.726
		LPV 3	27	112.11	104.00	96	227	26.074
		Total	46	91.17	98.50	16	227	36.111
Total	Male	LPV 1	25	50.68	47.00	41	107	13.954
		LPV 2	21	78.33	74.00	41	127	16.752
		LPV 3	50	110.74	109.00	96	149	13.209
		MR 1	7	264.71	269.00	245	276	13.363
		Total	103	100.02	98.00	41	276	52.976
	Female	Birth Doses	2	41.50	41.50	16	67	36.062
		LPV 1	19	50.58	47.00	35	137	21.259
		IPV 1	2	46.50	46.50	43	50	4.950
		LPV 2	20	83.15	77.50	65	199	27.967
		LPV 3	64	110.30	104.00	94	227	19.088
		MR 1	1	287.00	287.00	287	287	.
		Total	108	93.94	98.00	16	287	37.407
	Total	Birth Doses	2	41.50	41.50	16	67	36.062
		LPV 1	44	50.64	47.00	35	137	17.259
		IPV 1	2	46.50	46.50	43	50	4.950
		LPV 2	41	80.68	76.00	41	199	22.755
		LPV 3	114	110.49	106.00	94	227	16.699
		MR 1	8	267.50	272.50	245	287	14.668
		Total	211	96.91	98.00	16	287	45.666

Table A.4.9: Number of Study Participants with Immunizations Scheduled and Recorded in 2020 from the Selected Health Centres in Pathanamthitta District By their Sex of the Study Participants

Sex of the Child	Number of Study Participants with Immunizations Due During the National Lockdown	Number of Study Participants with Immunizations Due Before the National Lockdown or During the Unlock Phases 1.0 to 7.0
Male	32	96
Female	37	83
Total	69	179

Table A.4.10: Difference between Scheduled and Actual Dates of Study Participants with Immunizations due During the National Lockdown by PHC/FHC and Sex of the Study Participants (in days)

Name of PHC/FHC	Sex	Name of the vaccine(s)	N	Mean	Median	Minimum	Maximum
Ranni Pazhavangadi	Male	LPV 3	1	25.00	25.00	25	25
		MR 1	3	13.67	13.00	7	21
		Total	4	16.50	17.00	7	25
	Female	LPV 3	3	32.33	21.00	21	55
		MR 1	2	14.50	14.50	13	16
		Total	5	25.20	21.00	13	55
	Total	LPV 3	4	30.50	23.00	21	55
		MR 1	5	14.00	13.00	7	21
		Total	9	21.33	21.00	7	55
Ranni Angadi	Male	LPV 3	2	52.00	52.00	14	90
		MR 1	2	131.50	131.50	8	255
		Total	4	91.75	52.00	8	255
	Female	MR 1	6	43.17	27.00	27	123
		Total	6	43.17	27.00	27	123
	Total	LPV 3	2	52.00	52.00	14	90
		MR 1	8	65.25	27.00	8	255
		Total	10	62.60	27.00	8	255
Mallappally Anicadu	Male	MR 1	5	36.20	25.00	7	103
		Total	5	36.20	25.00	7	103
	Female	MR 1	4	41.00	30.00	7	97
		Total	4	41.00	30.00	7	97
	Total	MR 1	9	38.33	25.00	7	103
		Total	9	38.33	25.00	7	103
Mallappally Kottangal	Male	LPV 3	2	34.50	34.50	21	48
		MR 1	7	49.29	41.00	20	90
		Total	9	46.00	41.00	20	90
	Female	LPV 3	2	52.50	52.50	49	56
		MR 1	9	27.33	27.00	13	62

		Total	11	31.91	28.00	13	62
	Total	LPV 3	4	43.50	48.50	21	56
		MR 1	16	36.94	34.00	13	90
		Total	20	38.25	34.50	13	90
	Male	LPV 3	1	14.00	14.00	14	14
		MR 1	7	12.86	14.00	7	27
		Total	8	13.00	14.00	7	27
	Female	LPV 3	2	13.00	13.00	13	13
Thiruvalla Kadapra		MR 1	5	20.60	21.00	7	41
		Total	7	18.43	13.00	7	41
	Total	LPV 3	3	13.33	13.00	13	14
		MR 1	12	16.08	14.00	7	41
		Total	15	15.53	14.00	7	41
	Male	LPV 3	6	35.33	23.00	14	90
		MR 1	24	38.33	20.50	7	255
		Total	30	37.73	21.00	7	255
	Female	LPV 3	7	32.57	21.00	13	56
Total		MR 1	26	30.81	27.00	7	123
		Total	33	31.18	27.00	7	123
	Total	LPV 3	13	33.85	21.00	13	90
		MR 1	50	34.42	26.00	7	255
		Total	63	34.30	25.00	7	255

Table A.4.11: Number of Study Participants with Differences in Immunization Scheduled & Actual Dates Less than 100 (and > 0) and More than 100 by Vaccine during the National Lockdown in 2020

		No. of Participants with Differences in Immunization Scheduled & Actual Dates		
		> 0 and <= 100 days	>100 days	Total
Name of the vaccine(s)	LPV 3	13	0	13
	MR 1	47	3	50
Total		60	3	63

Table A.4.12: Descriptive Statistics of Study Participants from the Selected Health Centres in Pathanamthitta District in 2020

	Descriptive Statistics of Study Participants with a Difference in Scheduled and Actual Immunization Dates During the National Lockdown	Descriptive Statistics of Study Participants with a Difference in Scheduled and Actual Immunization Dates Before the National Lockdown and During the Unlock Phases 1.0 to 7.0 in 2020
N Valid	69	179
Mean	31.32	39.22
Std. Error of Mean	4.528	5.183
Median	21.00	20.00
Std. Deviation	37.616	69.350
Skewness	3.628	2.032
Std. Error of Skewness	.289	.182
Kurtosis	18.177	6.640
Std. Error of Kurtosis	.570	.361
Range	255	517
Minimum	0	-89
Maximum	255	428

Table A.4.13: Number of Participants with Early Vaccinations before the National Lockdown and During the Unlock Phases 1.0 to 7.0 by Vaccine in 2020

		No. of Participants with Differences between Immunization Scheduled & Actual Dates < 0 (in days)		
		0 (Not Early Vaccination)	1 (Early Vaccination)	Total
Name of the Vaccine(s)	LPV 1	1	0	1
	LPV 2	6	0	6
	IPV 2	1	0	1
	LPV 3	22	0	22
	MR 1	101	5	106
	VIT-A1	1	0	1
	MR 2	29	12	41
	DPT 1B	1	0	1
Total		162	17	179

Table A.4.14: Difference between Scheduled and Actual Dates of Study Participants with Immunizations Due Before the National Lockdown or During the Unlock Phases 1.0 to 7.0 (in days) By PHC/FHC and Sex of the Study Participants

Name of PHC/FHC	Sex of the Child	Name of the vaccine(s)	N	Mean	Median	Minimum	Maximum
Ranni Pazhavangadi	Male	LPV 2	2	56.50	56.50	48	65
		LPV 3	2	73.00	73.00	40	106
		MR 1	10	89.70	38.00	7	428
		MR 2	1	256.00	256.00	256	256
		Total	15	94.13	42.00	7	428
	Female	LPV 2	1	147.00	147.00	147	147
		IPV 2	1	173.00	173.00	173	173
		MR 1	11	47.00	28.00	7	191
		MR 2	4	43.75	28.00	7	112
		Total	17	59.53	35.00	7	191
	Total	LPV 2	3	86.67	65.00	48	147
		LPV 3	2	73.00	73.00	40	106
		IPV 2	1	173.00	173.00	173	173
		MR 1	21	67.33	35.00	7	428
		MR 2	5	86.20	40.00	7	256
		Total	32	75.75	37.50	7	428
Ranni Angadi	Male	LPV 1	1	303.00	303.00	303	303
		LPV 3	1	34.00	34.00	34	34
		MR 1	10	34.30	17.00	7	165
		DPT 1B	1	213.00	213.00	213	213
		Total	13	68.69	21.00	7	303
	Female	LPV 2	1	47.00	47.00	47	47
		LPV 3	2	131.00	131.00	34	228
		MR 1	4	120.50	127.50	34	193
		MR 2	4	21.00	18.50	7	40
		Total	11	79.55	40.00	7	228
	Total	LPV 1	1	303.00	303.00	303	303
		LPV 2	1	47.00	47.00	47	47
		LPV 3	3	98.67	34.00	34	228
		MR 1	14	58.93	27.50	7	193
		MR 2	4	21.00	18.50	7	40
		DPT 1B	1	213.00	213.00	213	213
		Total	24	73.67	34.00	7	303
Mallappally Kottangal	Male	LPV 3	4	75.75	44.50	34	180
		MR 1	9	23.44	27.00	7	48
		VIT-A1	1	102.00	102.00	102	102

		MR 2	2	97.00	97.00	7	187
		Total	16	50.63	34.00	7	187
	Female	LPV 3	5	103.60	70.00	41	180
		MR 1	5	48.20	34.00	13	111
		Total	10	75.90	58.50	13	180
	Total	LPV 3	9	91.22	48.00	34	180
		MR 1	14	32.29	30.50	7	111
		VIT-A1	1	102.00	102.00	102	102
		MR 2	2	97.00	97.00	7	187
		Total	26	60.35	37.50	7	187
	Male	LPV 3	2	139.00	139.00	139	139
		MR 1	9	27.22	40.00	7	41
		MR 2	6	21.83	10.50	6	55
		Total	17	38.47	40.00	6	139
	Female	MR 1	12	32.42	24.00	7	103
Mallappally Anicadu		MR 2	1	41.00	41.00	41	41
		Total	13	33.08	27.00	7	103
	Total	LPV 3	2	139.00	139.00	139	139
		MR 1	21	30.19	27.00	7	103
		MR 2	7	24.57	14.00	6	55
		Total	30	36.13	27.00	6	139
	Male	LPV 2	2	52.00	52.00	41	63
		LPV 3	2	51.50	51.50	34	69
		MR 1	4	57.00	31.50	7	158
		Total	8	54.38	45.00	7	158
	Female	LPV 3	4	48.25	41.50	20	90
Thiruvalla Kadapra		MR 1	9	33.33	7.00	1	125
		Total	13	37.92	20.00	1	125
	Total	LPV 2	2	52.00	52.00	41	63
		LPV 3	6	49.33	41.50	20	90
		MR 1	13	40.62	14.00	1	158
		Total	21	44.19	41.00	1	158
	Male	LPV 1	1	303.00	303.00	303	303
		LPV 2	4	54.25	55.50	41	65
		LPV 3	11	78.55	48.00	34	180
		MR 1	42	45.81	30.50	7	428
Total		VIT-A1	1	102.00	102.00	102	102
		MR 2	9	64.56	14.00	6	256
		DPT 1B	1	213.00	213.00	213	213
		Total	69	60.93	40.00	6	428
	Female	LPV 2	2	97.00	97.00	47	147

		LPV 3	11	88.45	48.00	20	228
		IPV 2	1	173.00	173.00	173	173
		MR 1	41	47.05	27.00	1	193
		MR 2	9	33.33	21.00	7	112
		Total	64	55.77	34.50	1	228
	Total	LPV 1	1	303.00	303.00	303	303
		LPV 2	6	68.50	55.50	41	147
		LPV 3	22	83.50	48.00	20	228
		IPV 2	1	173.00	173.00	173	173
		MR 1	83	46.42	27.00	1	428
		VIT-A1	1	102.00	102.00	102	102
		MR 2	18	48.94	18.50	6	256
		DPT 1B	1	213.00	213.00	213	213
		Total	133	58.44	35.00	1	428

Table A.4.15: Number of Study Participants with Differences in Immunization Scheduled & Actual Dates Less than 100 (and > 0) and More than 100 by Vaccine before National Lockdown and During Unlock Phases 1.0 to 7.0 in 2020

		No. of Participants with Differences in Immunization Scheduled & Actual Dates		
		> 0 and <= 100 days	>100 days	Total
Name of the Vaccine(s)	LPV 1	0	1	1
	LPV 2	5	1	6
	LPV 3	15	7	22
	IPV 2	0	1	1
	MR 1	71	12	83
	VIT-A1	0	1	1
	MR 2	15	3	18
	DPT 1B	0	1	1
Total		106	27	133

Table A.4.16: Number of Study Participants with Immunizations Scheduled and Recorded in 2021 from the Selected Health Centres in Pathanamthitta District Categorized According to their Sex

Sex	Number of Study Participants with Immunizations Due During the State Lockdown	Number of Study Participants with Immunizations Due Before and After the State Lockdown
Male	24	83
Female	22	91
Total	46	174

Table A.4.17: Difference between Scheduled and Actual Dates of Study Participants with Immunizations Due during the State Lockdown in 202 by PHC/FHC and Sex of the Study Participants (in days)

Name of PHC/FHC	Sex of the Child	Name of the vaccine(s)	N	Mean	Median	Minimum	Maximum
Ranni Pazhavangadi	Male	MR 2	6	28.83	27.50	14	42
		VIT-A3	1	164.00	164.00	164	164
		Total	7	48.14	35.00	14	164
	Female	VIT-A3	1	21.00	21.00	21	21
		Total	1	21.00	21.00	21	21
	Total	MR 2	6	28.83	27.50	14	42
		VIT-A3	2	92.50	92.50	21	164
		Total	8	44.75	28.00	14	164
Ranni Angadi	Male	MR 2	3	64.00	69.00	48	75
		Total	3	64.00	69.00	48	75
	Female	MR 2	4	47.75	47.50	14	82
		VIT-A3	3	89.67	76.00	36	157
		Total	7	65.71	62.00	14	157
	Total	MR 2	7	54.71	62.00	14	82
		VIT-A3	3	89.67	76.00	36	157
		Total	10	65.20	65.50	14	157
Mallappally Anicadu	Male	MR 2	1	27.00	27.00	27	27
		VIT-A2	1	42.00	42.00	42	42
		VIT-A3	1	109.00	109.00	109	109
		Total	3	59.33	42.00	27	109
	Female	MR 2	1	41.00	41.00	41	41
		Total	1	41.00	41.00	41	41
	Total	MR 2	2	34.00	34.00	27	41
		VIT-A2	1	42.00	42.00	42	42
		VIT-A3	1	109.00	109.00	109	109
		Total	4	54.75	41.50	27	109
Mallappally Kottangal	Male	MR 2	2	6.50	6.50	6	7

		VIT-A3	1	124.00	124.00	124	124
		Total	3	45.67	7.00	6	124
	Female	MR 2	1	20.00	20.00	20	20
		Total	1	20.00	20.00	20	20
	Total	MR 2	3	11.00	7.00	6	20
		VIT-A3	1	124.00	124.00	124	124
		Total	4	39.25	13.50	6	124
Thiruvalla Kadapra	Male	MR 2	2	27.50	27.50	13	42
		VIT-A3	1	82.00	82.00	82	82
		Total	3	45.67	42.00	13	82
	Female	MR 2	4	15.50	7.00	6	42
		VIT-A3	3	125.67	151.00	55	171
		Total	7	62.71	42.00	6	171
	Total	MR 2	6	19.50	10.00	6	42
		VIT-A3	4	114.75	116.50	55	171
		Total	10	57.60	42.00	6	171
Total	Male	MR 2	14	32.86	31.00	6	75
		VIT-A2	1	42.00	42.00	42	42
		VIT-A3	4	119.75	116.50	82	164
		Total	19	51.63	42.00	6	164
	Female	MR 2	10	31.40	26.50	6	82
		VIT-A3	7	95.29	76.00	21	171
		Total	17	57.71	41.00	6	171
	Total	MR 2	24	32.25	30.00	6	82
		VIT-A2	1	42.00	42.00	42	42
		VIT-A3	11	104.18	109.00	21	171
		Total	36	54.50	42.00	6	171

Table A.4.18: Number of Participants with Early Vaccinations during the State Lockdown in 2021

		No. of Participants with Difference between Immunization Scheduled & Actual Dates < 0 (in days)		
		0 (Not Early Vaccination)	1 (Early Vaccination)	Total
Name of the vaccine(s) due during state lockdown	MR 2	32	1	33
	VIT-A2	1	0	1
	VIT-A3	11	1	12
Total		44	2	46

Table A.4.19: Descriptive Statistics of Study Participants from the Selected Health Centres in Pathanamthitta District in 2021

	Descriptive Statistics of Study Participants with a Difference in Scheduled and Actual Immunization Dates During the State Lockdown in 2021	Descriptive Statistics of Study Participants with a Difference in Scheduled and Actual Immunization Dates Before and After the State Lockdown in 2021
N Valid	46	174
Mean	40.87	61.29
Median	30.00	34.00
Std. Error of Mean	7.449	6.883
Std. Deviation	50.525	90.798
Skewness	1.048	1.050
Std. Error of Skewness	.350	.184
Kurtosis	1.097	1.873
Std. Error of Kurtosis	.688	.366
Range	239	634
Minimum	-68	-199
Maximum	171	435

Table A.4.20: Difference between Scheduled and Actual Dates of Study Participants with Immunizations Due Before and After the State Lockdown in 2021 by PHC/FHC and Sex of the Study Participants (in days)

Name of PHC/FHC	Sex of the Child	Name of the vaccine(s)	N	Mean	Median	Minimum	Maximum
Ranni Pazhavangadi	Male	MR 2	7	107.43	57.00	7	435
		VIT-A2	1	48.00	48.00	48	48
		VIT-A3	4	142.50	147.50	14	261
		VIT-A4	1	34.00	34.00	34	34
		Total	13	108.00	48.00	7	435
	Female	MR 2	12	33.08	30.50	7	82
		VIT-A3	4	84.00	82.50	27	144
		Total	16	45.81	34.00	7	144
	Total	MR 2	19	60.47	34.00	7	435
		VIT-A2	1	48.00	48.00	48	48
		VIT-A3	8	113.25	82.50	14	261
		VIT-A4	1	34.00	34.00	34	34
		Total	29	73.69	34.00	7	435
Ranni Angadi	Male	MR 2	13	83.92	48.00	7	262
		VIT-A2	3	145.33	179.00	21	236
		VIT-A3	1	111.00	111.00	111	111

		Total	17	96.35	49.00	7	262
	Female	MR 2	4	69.25	31.00	7	208
		VIT-A2	6	167.17	145.00	68	316
		VIT-A3	5	89.00	88.00	27	185
		Total	15	115.00	88.00	7	316
	Total	MR 2	17	80.47	34.00	7	262
		VIT-A2	9	159.89	147.00	21	316
		VIT-A3	6	92.67	99.50	27	185
		Total	32	105.09	68.50	7	316
Mallappally Anicadu	Male	MR 2	6	50.83	44.00	28	110
		VIT-A2	1	324.00	324.00	324	324
		VIT-A3	3	120.67	102.00	75	185
		VIT-A4	2	31.00	31.00	7	55
		Total	12	87.75	49.50	7	324
	Female	MR 2	8	39.75	32.00	7	103
		VIT-A2	1	103.00	103.00	103	103
		VIT-A3	8	120.00	109.50	14	247
		VIT-A4	1	41.00	41.00	41	41
		Total	18	79.00	51.50	7	247
	Total	MR 2	14	44.50	40.50	7	110
		VIT-A2	2	213.50	213.50	103	324
		VIT-A3	11	120.18	102.00	14	247
		VIT-A4	3	34.33	41.00	7	55
		Total	30	82.50	49.50	7	324
Mallappally Kottangal	Male	MR 2	6	27.33	22.00	7	64
		VIT-A1	3	189.33	178.00	178	212
		VIT-A2	1	68.00	68.00	68	68
		VIT-A3	2	83.50	83.50	82	85
		VIT-A4	1	14.00	14.00	14	14
		Total	13	75.46	64.00	7	212
	Female	MR 1	1	256.00	256.00	256	256
		MR 2	7	29.00	14.00	6	82
		VIT-A3	5	58.80	42.00	26	103
		Total	13	57.92	37.00	6	256
	Total	MR 1	1	256.00	256.00	256	256
		MR 2	13	28.23	21.00	6	82
		VIT-A1	3	189.33	178.00	178	212
		VIT-A2	1	68.00	68.00	68	68
		VIT-A3	7	65.86	82.00	26	103
		VIT-A4	1	14.00	14.00	14	14
		Total	26	66.69	39.00	6	256

Thiruvalla Kadapra	Male	MR 2	6	40.50	38.00	7	90
		VIT-A2	5	176.00	181.00	84	236
		VIT-A3	2	55.00	55.00	7	103
		Total	13	94.85	84.00	7	236
	Female	MR 2	7	50.71	28.00	7	229
		VIT-A2	2	176.50	176.50	117	236
		VIT-A3	2	30.50	30.50	13	48
		VIT-A4	1	48.00	48.00	48	48
		Total	12	68.08	35.00	7	236
	Total	MR 2	13	46.00	28.00	7	229
		VIT-A2	7	176.14	181.00	84	236
		VIT-A3	4	42.75	30.50	7	103
		VIT-A4	1	48.00	48.00	48	48
		Total	25	82.00	48.00	7	236
Total	Male	MR 2	38	67.24	39.50	7	435
		VIT-A1	3	189.33	178.00	178	212
		VIT-A2	11	159.64	179.00	21	324
		VIT-A3	12	110.00	93.50	7	261
		VIT-A4	4	27.50	24.00	7	55
		Total	68	92.78	55.00	7	435
	Female	MR 1	1	256.00	256.00	256	256
		MR 2	38	40.79	28.00	6	229
		VIT-A2	9	162.11	143.00	68	316
		VIT-A3	24	87.33	61.50	13	247
		VIT-A4	2	44.50	44.50	41	48
		Total	74	73.65	39.00	6	316
	Total	MR 1	1	256.00	256.00	256	256
		MR 2	76	54.01	34.00	6	435
		VIT-A1	3	189.33	178.00	178	212
		VIT-A2	20	160.75	152.50	21	324
		VIT-A3	36	94.89	83.50	7	261
		VIT-A4	6	33.17	37.50	7	55
		Total	142	82.81	48.00	6	435

Table A.4.21: Number of Study Participants with Differences in Immunization Scheduled & Actual Dates Less than 100 (and > 0) and More than 100 before and after State Lockdown in 2021

		No. of Participants Differences in Immunization Scheduled & Actual Dates		
		> 0 and <= 100 days	>100 days	Total
Name of the vaccine(s)	MR 1	0	1	1
	VIT-A1	0	3	3
	MR 2	66	10	76
	VIT-A2	6	14	20
	VIT-A3	21	15	36
	VIT-A4	6	0	6
Total		99	43	142

Table A.4.22: Number of Participants with Early Vaccinations before and after the State Lockdown in 2021

		No. of Participants with Difference between Immunization Scheduled & Actual Dates < 0 (in days)		
		0 (Not Early Vaccination)	1 (Early Vaccination)	Total
Name of the vaccine(s)	MR 1	1	0	1
	MR 2	76	1	77
	VIT-A1	3	1	4
	VIT-A2	20	0	20
	VIT-A3	36	5	41
	VIT-A4	6	10	16
Total		142	17	159

Table A.4.23: Overall Coverage (%) for Specific Antigens Administered in the First Year of Birth in Ranni Pazhavangadi PHC during 2019 and Lockdown Months (2020 & 2021)

		Birth_Doses	OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
Cov_PHC_Time	Cov_RP_Mar19	100.00	30.77	50.00	77.78	30.77	61.11	55.00	55.00
	Cov_RP_Apr19	100.00	50.00	16.67	100.00	50.00	100.00	133.33	133.33
	Cov_RP_May19	100.00	61.54	38.46	25.00	61.54	25.00	100.00	100.00
	Cov_RP_Jun19	100.00	35.29	60.00	53.85	35.29	53.85	60.00	46.67
	Cov_RP_Mar20	100.00	78.57	93.33	71.43	78.57	71.43	58.82	52.94
	Cov_RP_Apr20	100.00	106.67	128.57	122.73	106.67	122.73	92.86	14.29
	Cov_RP_May20	100.00	135.29	113.33	164.29	135.29	164.29	60.87	.00
	Cov_RP_Jun20	100.00	40.00	82.35	46.67	40.00	133.33	52.63	.00
	Cov_RP_May21	100.00	120.00	100.00	150.00	120.00	150.00	84.21	84.21
	Cov_RP_Jun21	100.00	78.57	180.00	166.67	78.57	166.67	65.22	26.09

Table A.4.24: Difference in Coverage (%) of Specific Antigens between 2019, 2020 National Lockdown and 2021 State Lockdown Months at Ranni Pazhavangadi PHC

		OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
PHC_Diff_Time	RP_Mar 2020 vs Mar 2019	47.80	43.33	-6.35	47.80	10.32	3.82	-2.06
	RP_Apr 2020 vs Apr 2019	56.67	111.90	22.73	56.67	22.73	-40.48	-119.05
	RP_May 2020 vs May 2019	73.76	74.87	139.29	73.76	139.29	-39.13	-100.00
	RP_May 2021 vs May 2020	-15.29	-13.33	-14.29	-15.29	-14.29	23.34	84.21
	RP_Jun 2021 vs Jun 2020	38.57	97.65	120.00	38.57	33.33	12.59	26.09

Table A.4.25: Overall Coverage (%) for Specific Antigens Administered in the First Year of Birth in Ranni Angadi PHC during 2019 and Lockdown Months (2020 & 2021)

		Birth_Doses	OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
Cov_PHC_Time	Cov_RA_Mar19	100.00	75.00	.00	90.91	75.00	90.91	75.00	.00
	Cov_RA_Apr19	100.00	25.00	38.46	100.00	33.33	100.00	53.85	53.85
	Cov_RA_May19	100.00	83.33	75.00	53.85	83.33	53.85	87.50	62.50
	Cov_RA_Jun19	100.00	46.15	58.33	25.00	53.85	37.50	62.50	.00
	Cov_RA_Mar20	100.00	18.18	55.56	14.29	18.18	14.29	7.69	7.69
	Cov_RA_Apr20	100.00	75.00	136.36	125.00	75.00	125.00	25.00	25.00
	Cov_RA_May20	100.00	78.57	83.33	118.18	78.57	118.18	100.00	100.00

	Cov_RA_Jun20	100.00	166.67	78.57	41.67	166.67	41.67	100.00	.00
	Cov_RA_May21	100.00	78.57	122.22	58.33	78.57	58.33	144.00	144.00
	Cov_RA_Jun21	100.00	81.82	57.14	155.56	81.82	155.56	138.46	138.46

Table A.4.26: Difference in Coverage (%) of Specific Antigens between 2019, 2020 National Lockdown and 2021 State Lockdown Months at Ranni Angadi PHC

		OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
PHC_Diff_Time	RA_Mar 2020 vs Mar 2019	-56.82	55.56	-76.62	-56.82	-76.62	-67.31	7.69
	RA_Apr 2020 vs Apr 2019	50.00	97.90	25.00	41.67	25.00	-28.85	-28.85
	RA_May 2020 vs May 2019	-4.76	8.33	64.34	-4.76	64.34	12.50	37.50
	RA_May 2021 vs May 2020	.00	38.89	-59.85	.00	-59.85	44.00	44.00
	RA_Jun 2021 vs Jun 2020	-84.85	-21.43	113.89	-84.85	113.89	38.46	138.46

Table A.4.27: Overall Coverage (%) for Specific Antigens Administered in the First Year of Birth in Mallappally Anicadu FHC during 2019 and Lockdown Months (2020 & 2021)

		Birth_Doses	OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
Cov_PHC_Time	Cov_MA_Mar19	100.00	100.00	66.67	80.00	100.00	80.00	100.00	100.00
	Cov_MA_Apr19	100.00	58.33	60.00	66.67	58.33	66.67	100.00	100.00
	Cov_MA_May19	100.00	100.00	100.00	66.67	100.00	66.67	53.85	53.85
	Cov_MA_Jun19	100.00	100.00	100.00	100.00	100.00	100.00	100.00	75.00
	Cov_MA_Mar20	100.00	66.67	38.46	83.33	66.67	83.33	100.00	100.00
	Cov_MA_Apr20	100.00	100.00	120.00	100.00	100.00	100.00	138.46	138.46
	Cov_MA_May20	100.00	66.67	150.00	113.33	66.67	113.33	80.00	80.00
	Cov_MA_Jun20	100.00	84.62	108.33	100.00	84.62	100.00	88.89	88.89
	Cov_MA_May21	100.00	100.00	60.00	80.00	100.00	80.00	53.85	53.85
	Cov_MA_Jun21	100.00	62.50	100.00	120.00	62.50	120.00	41.67	41.67

Table A.4.28: Difference in Coverage (%) of Specific Antigens between 2019, 2020 National Lockdown and 2021 State Lockdown Months at Mallappally Anicadu FHC

		OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
PHC_Diff_Time	MA_Mar 2020 vs Mar 2019	-33.33	-28.21	3.33	-33.33	3.33	.00	.00
	MA_Apr 2020 vs Apr 2019	41.67	60.00	33.33	41.67	33.33	38.46	38.46

	MA_May 2020 vs May 2019	-33.33	50.00	46.67	-33.33	46.67	26.15	26.15
	MA_May 2021 vs May 2020	33.33	-90.00	-33.33	33.33	-33.33	-26.15	-26.15
	MA_Jun 2021 vs Jun 2020	-22.12	-8.33	20.00	-22.12	20.00	-47.22	-47.22

Table A.4.29: Overall Coverage (%) for Specific Antigens Administered in the First Year of Birth in Mallappally Kottangal FHC during 2019 and Lockdown Months (2020 & 2021)

		Birth_Doses	OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
Cov_PHC_Time	Cov_MK_Mar19	100.00	100.00	80.00	100.00	100.00	100.00	60.00	60.00
	Cov_MK_Apr19	100.00	23.08	100.00	73.33	23.08	73.33	73.68	73.68
	Cov_MK_May19	100.00	93.33	46.67	107.14	93.33	107.14	76.47	76.47
	Cov_MK_Jun19	100.00	50.00	76.92	66.67	50.00	66.67	62.50	62.50
	Cov_MK_Mar20	100.00	50.00	66.67	56.25	50.00	56.25	37.50	37.50
	Cov_MK_Apr20	100.00	100.00	130.00	86.67	100.00	86.67	100.00	100.00
	Cov_MK_May20	100.00	86.67	93.33	120.00	86.67	120.00	94.12	94.12
	Cov_MK_Jun20	100.00	86.36	73.33	73.33	86.36	73.33	118.18	118.18
	Cov_MK_May21	100.00	100.00	66.67	53.85	100.00	53.85	88.89	88.89
	Cov_MK_Jun21	100.00	85.71	75.00	100.00	85.71	100.00	100.00	100.00

Table A.4.30: Difference in Coverage (%) of Specific Antigens between 2019, 2020 National Lockdown and 2021 State Lockdown Months at Mallappally Kottangal FHC

		OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
PHC_Diff_Time	MK_Mar 2020 vs Mar 2019	-50.00	-13.33	-43.75	-50.00	-43.75	-22.50	-22.50
	MK_Apr 2020 vs Apr 2019	76.92	30.00	13.33	76.92	13.33	26.32	26.32
	MK_May 2020 vs May 2019	-6.67	46.67	12.86	-6.67	12.86	17.65	17.65
	MK_May 2021 vs May 2020	13.33	-26.67	-66.15	13.33	-66.15	-5.23	-5.23
	MK_Jun 2021 vs Jun 2020	-.65	1.67	26.67	-.65	26.67	-18.18	-18.18

Table A.4.31: Overall Coverage (%) for Specific Antigens Administered in the First Year of Birth in Thiruvalla Kadapra PHC during 2019 and Lockdown Months (2020 & 2021)

		Birth_Doses	OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
Cov_PHC_Time	Cov_TK_Mar19	100.00	235.71	176.92	133.33	235.71	133.33	85.00	85.00
	Cov_TK_Apr19	100.00	80.00	90.91	92.31	80.00	92.31	66.67	66.67

	Cov_TK_May19	100.00	100.00	64.29	127.27	100.00	127.27	69.57	69.57
	Cov_TK_Jun19	100.00	43.48	86.67	85.71	43.48	85.71	71.43	71.43
	Cov_TK_Mar20	100.00	45.45	80.00	23.81	63.64	28.57	39.13	.00
	Cov_TK_Apr20	100.00	125.00	190.91	169.23	125.00	169.23	160.00	55.00
	Cov_TK_May20	100.00	69.23	125.00	163.64	69.23	163.64	80.00	.00
	Cov_TK_Jun20	100.00	55.56	69.23	106.25	55.56	106.25	47.37	.00
	Cov_TK_May21	100.00	60.00	71.43	100.00	60.00	100.00	58.33	58.33
	Cov_TK_Jun21	100.00	61.54	60.00	78.57	61.54	78.57	115.79	115.79

Table A.4.32: Difference in Coverage (%) of Specific Antigens between 2019, 2020 National Lockdown and 2021 State Lockdown Months at Thiruvalla Kadapra PHC

		OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
PHC_Diff_Time	TK_Mar 2020 vs Mar 2019	-190.26	-96.92	-109.52	-172.08	-104.76	-45.87	-85.00
	TK_Apr 2020 vs Apr 2019	45.00	100.00	76.92	45.00	76.92	93.33	-11.67
	TK_May 2020 vs May 2019	-30.77	60.71	36.36	-30.77	36.36	10.43	-69.57
	TK_May 2021 vs May 2020	-9.23	-53.57	-63.64	-9.23	-63.64	-21.67	58.33
	TK_Jun 2021 vs Jun 2020	5.98	-9.23	-27.68	5.98	-27.68	68.42	115.79

Table A.4.33: Overall Coverage (%) for Specific Antigens Administered in the First Year of Birth in All the Selected PHC/FHCs during 2019 and Lockdown Months (2020 & 2021)

		Birth_Doses	OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
Cov_Time	Cov_Mar19	100.00	100.00	66.67	90.91	100.00	90.91	75.00	60.00
	Cov_Apr19	100.00	50.00	60.00	92.31	50.00	92.31	73.68	73.68
	Cov_May19	100.00	93.33	64.29	66.67	93.33	66.67	76.47	69.57
	Cov_Jun19	100.00	46.15	76.92	66.67	50.00	66.67	62.50	62.50
	Cov_Mar20	100.00	50.00	66.67	56.25	63.64	56.25	39.13	37.50
	Cov_Apr20	100.00	100.00	130.00	122.73	100.00	122.73	100.00	55.00
	Cov_May20	100.00	78.57	113.33	120.00	78.57	120.00	80.00	80.00
	Cov_Jun20	100.00	84.62	78.57	73.33	84.62	100.00	88.89	.00
	Cov_May21	100.00	100.00	71.43	80.00	100.00	80.00	84.21	84.21
	Cov_Jun21	100.00	78.57	75.00	120.00	78.57	120.00	100.00	100.00

Table A.4.34: Difference in Coverage (%) of Specific Antigens between 2019, 2020 National Lockdown and 2021 State Lockdown Months of All PHC/FHCs

		OPV_LPV_RVV_1	OPV_LPV_RVV_2	OPV_LPV_RVV_3	IPV_1	IPV_2	MR_1	VIT_A1
Cov_Diff_Time	Mar 2020 vs Mar 2019	-50.00	.00	-34.66	-36.36	-34.66	-35.87	-22.50
	Apr 2020 vs Apr 2019	50.00	70.00	30.42	50.00	30.42	26.32	-18.68
	May 2020 vs May 2019	-14.76	49.04	53.33	-14.76	53.33	3.53	10.43
	May 2021 vs May 2020	21.43	-41.90	-40.00	21.43	-40.00	4.21	4.21
	Jun 2021 vs Jun 2020	-6.05	-3.57	46.67	-6.05	20.00	11.11	100.00

Table A.4.35: Crosstabulation of Age of the Beneficiary at the Time of the Interview by their Sex

		Male	Female	Total
Age of the Beneficiary at the Time of the Interview	2	4	12	16
	2.5	1	4	5
	3	4	5	9
Total		9	21	30

Table A.4.36: Crosstabulation of Caste of the Beneficiaries with the Level of Education of the Mothers

		Level of Education Completed by Mother of the Beneficiary					
		Matriculation	Pre-University Degree	Diploma after Matriculation	Graduate	Post-Graduate	Total
Caste of the Beneficiary	General	0	2	2	12	1	17
	Gen EWS	0	0	0	1	0	1
	OBC	1	3	0	2	2	8
	SC	0	1	1	2	0	4
Total		1	6	3	17	3	30

Table A.4.37: Crosstabulation of the Level of Education of Mothers with their Present Working Status

		Present Working Status of the Mother of the Beneficiary		
		Working	Not Working	Total
Level of Education Completed by Mother of the Beneficiary	Matriculation	0	1	1
	Pre-University Degree	0	6	6
	Diploma after Matriculation	1	2	3
	Graduate	2	15	17
	Post-Graduate	0	3	3
Total		3	27	30

Table A.4.38: Crosstabulation of Level of Education of Mothers and the Working Status of the Parents During Lockdowns

		Working Status of the Parents of the Beneficiary During Lockdowns		
		Working	Not Working	Total
Level of Education Completed by Mother of the Beneficiary	Matriculation	0	1	1
	Pre-University Degree	2	4	6
	Diploma after Matriculation	1	2	3
	Graduate	7	10	17
	Post-Graduate	0	3	3
Total		10	20	30

Table A.4.39: Crosstabulation of Caste of the Beneficiary with the Working Status of their Parents During Lockdowns

		Working Status of the Parents of the Beneficiary During Lockdowns		
		Working	Not Working	Total
Caste of the Beneficiary	General	8	9	17
	Gen EWS	0	1	1
	OBC	1	7	8
	SC	1	3	4
Total		10	20	30

Table A.4.40: Crosstabulation of Caste of the Beneficiary with the Present Working Status of their Mothers

		Present Working Status of the Mother of the Beneficiary		
		Working	Not Working	Total
Caste of the Beneficiary	General	1	16	17
	Gen EWS	0	1	1
	OBC	1	7	8
	SC	1	3	4
Total		3	27	30

Table A.4.41: Descriptives of the Mode of Commute of the Beneficiary and Parents to the Nearest Health Centre for Immunization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Walk	12	40.0	40.0	40.0
	Auto-rickshaw	8	26.7	26.7	66.7
	Two-wheeler	6	20.0	20.0	86.7
	Car	4	13.3	13.3	100.0
	Total	30	100.0	100.0	

Table A.4.42: Crosstabulation of Whether the Beneficiary Experienced Disruptions in Attending Immunization Services During the Pandemic by the Sex of the Beneficiary

		Sex of the Beneficiary		
		Male	Female	Total
Whether the Beneficiary Experienced Disruptions in Attending Immunization Services During the Pandemic	Yes	1	4	5
	No	8	16	24
	Unsure	0	1	1
Total		9	21	30

Table A.4.43: Crosstabulation of Whether the Beneficiary Experienced Disruptions in Attending Immunization Services During the Pandemic by the Caste of the Beneficiary

		Caste of the Beneficiary				
		General	Gen EWS	OBC	SC	Total
Whether the Beneficiary Experienced Disruptions in Attending Immunization Services During the Pandemic	Yes	4	0	1	0	5
	No	12	1	7	4	24
	Unsure	1	0	0	0	1
Total		17	1	8	4	30

Table A.4.44: Crosstabulation of Whether the Beneficiary Experienced Disruptions in Attending Immunization Services During the Pandemic by the name of the PHC/FHC

		PHC/FHC					
		Ranni Pazhavangadi	Ranni Angadi	Mallappally Anicadu	Mallappally Kottangal	Thiruvalla Kadapra	Total
Whether the Beneficiary Experienced Disruptions in Attending Immunization Services During the Pandemic	Yes	0	0	2	2	1	5
	No	9	2	2	8	3	24
	Unsure	0	1	0	0	0	1
Total		9	3	4	10	4	30

Table A.4.45: Crosstabulation of Whether the Beneficiary Experienced Disruptions in Attending Immunization Services by Mode of Receipt of Information on Resumption of Services after the Lockdowns

		Mode of Receipt of Information on Resumption of Immunization Services			
		Calls from ASHAs	Immunization Card	Both	Total
Whether the Beneficiary Experienced Disruptions in Attending Immunization Services During the Pandemic	Yes	3	1	1	5
	No	11	8	5	24
	Unsure	1	0	0	1
Total		15	9	6	30

Table A.4.46: Crosstabulation of Whether the Beneficiary Experienced Delay in Receiving Any Vaccination During the National Lockdown by the Name of the Vaccines

		Name of the Vaccines Received by the Beneficiary After a Delay During the National Lockdown			
			MR 2	Name not Recollected	Total
Whether the Beneficiary Experienced Delay in Receiving Any Vaccination During the National Lockdown	Yes	0	1	1	2
	No	26	0	0	26
	Unsure	2	0	0	2
Total		28	1	1	30

Table A.4.47: Crosstabulation of Whether the Beneficiary Experienced Delay in Receiving Any Vaccination During the State Lockdown by the Name of the Vaccine

		Name of the Vaccines Received by the Beneficiary After a Delay During the State Lockdown			
			DPT 1B	Vitamin A	Total
Whether the Beneficiary Experienced Delay in Receiving Any Vaccination During the State Lockdown	Yes	0	1	4	5
	No	24	0	0	24
	Unsure	1	0	0	1
Total		25	1	4	30

Table A.4.48: Crosstabulation of the Availability of Safety, Crowd Management and Infrastructural Measures during the Immunization Process in the Pandemic at the PHC/FHCs and their Sub-centres

	Whether the Health Centre Staff Wore PPEs	Whether the Health Centre Staff Wore Masks	Whether the Health Centre Staff Wore Gloves	Whether the Health Centre Provided Sanitizers	Whether Physical Distancing Measures were Maintained	Whether the Health Centre Faced Limited Crowd[a]				Whether the Health Centre had an Open Area[a]		
Name of PHC/FHC	Yes	Yes	Yes	Yes	Yes	Y	N	S	T	Y	N	T
Ranni Pazhavangadi	9	9	9	9	9	6	1	2	9	0	9	9
Ranni Angadi	3	3	3	3	3	2	1	0	3	2	1	3
Mallappally Anicadu	4	4	4	4	4	1	3	0	4	4	0	4
Mallappally Kottangal	10	10	10	10	10	10	0	0	10	10	0	10
Thiruvalla Kadapra	4	4	4	4	4	2	2	0	4	0	4	4
Total	30	30	30	30	30	21	7	2	30	16	14	30

Footnote a: Y = Yes, N = No, S = Sometimes, T = Total

APPENDIX – II
MIXED SURVEY QUESTIONNAIRE

CENTRE OF SOCIAL MEDICINE AND COMMUNITY HEALTH

JAWAHARLAL NEHRU UNIVERSITY, NEW DELHI

CHILD IMMUNIZATION DURING COVID-19: A CASE STUDY OF PATHANAMTHITTA DISTRICT OF KERALA

SURVEY QUESTIONNAIRE *(to be administered to PHC/SC Staff)*

I. GENERAL INFORMATION

1.1 Taluk	1.2 PHC	1.3 SC	1.4 Designation of Respondent

II. IMMUNIZATION SERVICE RELATED INFORMATION

2.1 Planning & Service Delivery

2.1.1	a. No. of Immunization Sessions planned for the period	b. No. of Immunization Sessions held during the period
i. Nationwide Lockdown (March-June 2020)		
ii. State Lockdown (May – June 2021)		

2.1.2	a. No. of Training Sessions planned for the period	b. No. of Training Sessions held during the period
i. Nationwide Lockdown (March-June 2020)		
ii. State Lockdown (May – June 2021)		

2.1.3 How were immunization sessions held with respect to the areas and types of sessions?

Zones		Birth dose vaccination	Health facility based session	Outreach session
2.1.3.1 Areas under the PHC/SC were in Containment & Buffer Zone	2.1.3.1.1 No. of children per session			
	2.1.3.1.2 How were the slots allotted?			
	2.1.3.1.3 Type of beneficiary mobilization			
	2.1.3.1.4 Were walk-in beneficiaries vaccinated?			

	2.1.3.1.4.1 If no (to above question), what were the alternatives provided?			
	2.1.3.1.5 Was the local self-government involved in this planning? If yes, elaborate.			
2.1.3.2 Areas under the PHC/SC were beyond Buffer zone and Green zone	2.1.3.2.1 No. of children per session			
	2.1.3.2.2 How were the slots allotted?			
	2.1.3.2.3 Type of beneficiary mobilization			
	2.1.3.2.4 Were walk-in beneficiaries vaccinated?			
	2.1.3.2.4.1 If no (to above question), what were the alternatives provided?			
	2.1.3.2.5 Was the local self-government involved in this planning? If yes, elaborate.			

2.1.3.3 How was the local assessment of COVID-19 situation done before the start of a facility based/outreach immunization sessions?

2.1.4 How was the microplanning and service delivery during the pandemic changed with respect to COVID-19 guidelines issued by the Ministry of Health and Family Welfare?

2.1.4.1 Major COVID related measures adopted at health facility based sessions	2.1.4.1.1 Well-ventilated seating area	
	2.1.4.1.2 No. of vaccination staff recommended	
	2.1.4.1.3 No. of support staff recommended	
	2.1.4.1.4 Availability of hand sanitizers/handwashing units with chlorinated water	
	2.1.4.1.5 Conduct of disinfection after every session	
	2.1.4.1.6 Visual/audio alerts	
	2.1.4.1.7 Was the private sector engaged in vaccination, awareness generation or identification of missing children?	
2.1.4.2 Major COVID related measures adopted at outreach sessions	2.1.4.2.1 Presence of seating space for beneficiaries and caregivers with/without demarcations	
	2.1.4.2.2 Presence of Post vaccination waiting area	
	2.1.4.2.3 No. of pre-identified staff recommended	
	2.1.4.2.4 Presence of a reserve zone	

	(if crowd increased)	
	2.1.4.2.5 Alternative session sites?	
	2.1.4.2.6 If not as per the staggered approach, how many break up sessions were held?	
	2.1.4.2.6.1 Were vaccinators hired for these sessions?	
	2.1.4.2.7 Were mobile teams sent to hard-to-reach areas?	
	2.1.4.2.8 Was the private sector engaged in vaccination, awareness generation or identification of missing children?	
2.1.4.3 Did the ASHAs or AWWs visit homes for beneficiary mobilization?		
2.1.4.4 How many caregivers per child was allowed at a session?		
2.1.4.5 Were the children screened for flu-like symptoms prior to immunization?		
2.1.4.6 Any prioritization of specific vaccines or age groups (if yes, specify)		
2.1.4.7 Were group counselling sessions held during the waiting period before immunization?		
2.1.4.8 Emergency cold chain maintenance plans		
2.1.4.9 Emergency plans to deal with vaccine shortages		
2.1.4.10 Modifications in monitoring or supervision framework within the PHC/SC		
2.1.4.11 Any other changes		

2.2 Logistics

2.2.1 Timing of delivery of vaccines to the PHCs	2.2.2 Issues experienced with transportation of vaccines	2.2.3 Issues experienced with storage of vaccines – Cold chain facility	2.2.4 Timing of cold chain repairs, if any	2.2.5 Vaccine wastage reported

2.3 Staffing

2.3.1 No. of sessions attended by ASHAs	2.3.2 No. of pre-identified vaccination staff available at		2.3.3 No. of support staff available		2.3.4 Availability of surgical masks, gloves, sanitizers for the staff
	2.3.2.1 At the health facility	2.3.2.2 At the outreach session	2.3.3.1 At the health facility	2.3.3.2 At the outreach session	
2.3.5 No. of additional vaccinators hired (for break up sessions, if any)					

2.4 Information, Education and Communication

2.4.1 Methods of IEC used	2.4.2 Categories of people who were unreachable

2.5 Outcomes

2.5.1 Maximum no. of doses administered per session	2.5.2 Average gap experienced in conducting the next session	2.5.3 Length of disruption of routine services	2.5.4 No. of AEFI (serious/severe) cases reported

III. IMMUNIZATION COVERAGE INFORMATION

3.1 Coverage of March – June 2019

Vaccine	**March 2019**	**April 2019**	**May 2019**	**June 2019**
BCG				
Hepatitis B (Birth dose)				
OPV 0				
OPV 1				
OPV 2				
OPV 3				
Pentavalent 1				
Pentavalent 2				
Pentavalent 3				
Inactivated Injectable Polio Vaccine 1 (IPV 1)				
Inactivated Injectable Polio Vaccine 2 (IPV 2)				
Rotavirus 1				
Rotavirus 2				
Rotavirus 3				
MR/MCV 1				
MR/MCV 2				
DPT Booster				
OPV Booster				
No. of immunization sessions planned				
No. of immunization sessions held				
No. of AEFIs reported				

3.2 Coverage during National Lockdown (March – June 2020)

Vaccine	**March 2020**	**April 2020**	**May 2020**	**June 2020**
BCG				
Hepatitis B (Birth dose)				
OPV 0				
OPV 1				
OPV 2				
OPV 3				
Pentavalent 1				
Pentavalent 2				
Pentavalent 3				
Inactivated Injectable Polio Vaccine 1 (IPV 1)				
Inactivated Injectable Polio				

Vaccine 2 (IPV 2)				
Rotavirus 1				
Rotavirus 2				
Rotavirus 3				
MR/MCV 1				
MR/MCV 2				
DPT Booster				
OPV Booster				
No. of immunization sessions planned				
No. of immunization sessions held				
No. of AEFI cases reported				

3.3 Coverage during State Lockdown (May-June 2021)

Vaccine	**May 2021**	**June 2021**
BCG		
Hepatitis B (Birth dose)		
OPV 0		
OPV 1		
OPV 2		
OPV 3		
Pentavalent 1		
Pentavalent 2		
Pentavalent 3		
Inactivated Injectable Polio Vaccine 1 (IPV 1)		
Inactivated Injectable Polio Vaccine 2 (IPV 2)		
Rotavirus 1		
Rotavirus 2		
Rotavirus 3		
MR/MCV 1		
MR/MCV 2		
DPT Booster		
OPV Booster		
No. of immunization sessions planned		
No. of immunization sessions held		
No. of AEFI cases reported		

IV. CHILD-SPECIFIC IMMUNIZATION DATA (Space provided for 62 children per PHC)

(1) S. No.	(2) Date of Birth of Child	(3) Date of last immunization received in 2019					(4) Date & Type of Immunization Due during National Lockdown	(5) Date of Immunization Received (based on Column 3)	(6) Date & Type of Immunization Due during State Lockdown	(7) Date of Immunization Received (based on Column 5)
		Birth BCG HBV OPV	6 wks PVV OPV RVV	10 wks OPV PVV RVV	14 wks OPV iPV PVV RVV	9 mnths MCV				

APPENDIX – III
SEMI-STRUCTURED INTERVIEW SCHEDULE (I)

INTERVIEW (അഭിമുഖം) *[to be administered to parents/guardians of recipient children aged two years]*

I. GENERAL INFORMATION (പൊതു വിവരങ്ങൾ)

1.1 Taluk (താലൂക്ക്)	1.2 PHC & SC (പി.എച്ച്.സി & സബ് സെൻ്റർ)	1.3 Age of child (കുട്ടിയുടെ വയസ്)	1.4 Gender of child	1.5 Birth Order of child (എത്രാമത്തെ കുട്ടി?)
1.6 Household Wealth Status (സാമ്പത്തിക സ്ഥിതി)	1.7 Caste Status (Gen/SC/ST/OBC/EWS) (ജാതി)	1.8 Place of residence (rural/urban) [താമസ സ്ഥലം] (ഗ്രാമം/നഗരം)	1.9 Mother's education (അമ്മയുടെ വിദ്യാഭ്യാസം)	1.10 Mother's working status (അമ്മയുടെ ജോലി)
1.11 Parents' working status during lockdowns ലോക്ഡൗൺ സമയത്ത് ജോലി ഉണ്ടായിരുന്നോ?	1.12 Distance of nearest PHC/SC from home വീട്ടിൽ നിന്ന് അടുത്ത പി.എച്ച്.സി/സബ് സെൻ്ററിലേക്ക് ദൂരം	1.13 Mode of commute from home to PHC/SC അവിടേക്കുള്ള ഗതാഗതാ സൗകര്യം		

II. INFORMATION ON RECEIPT OF IMMUNIZATION (കുത്തിവെയ്പ്പിനെ കുറിച്ചുള്ള വിവരങ്ങൾ)

2.1 Did you face disruptions in getting your child immunized during the pandemic? If yes, how did you receive the information on disruption? (മഹാമാരി കാലത്ത് പ്രതിരോധ കുത്തിവെയ്പ്പ് താത്കാലികമായി നിർത്തി വെച്ചോ? എങ്കിൽ, ഈ തടസത്തെ പറ്റി താങ്കൾ എങ്ങനെ അറിഞ്ഞു ?)

2.2 How did you get to know of the resumption of immunization services in your area? (ഈ സേവനം പുനഃരാരംഭിച്ചത് താങ്കൾ എങ്ങനെ അറിഞ്ഞു?)

2.3 How much was the delay in getting the next immunization due for your child during the national lockdown? Mention the name of the vaccine(s). (ദേശീയ ലോക്ഡൗൺ കാലത്ത് കുത്തിവെയ്പ്പിൽ വന്ന കാലതാമസം എത്ര? ഏത് വാക്സിൻ?)

2.4 How much was the delay in getting the next immunization due for your child during the state lockdown? Mention the name of the vaccine(s). (സംസ്ഥാന ലോക്ഡൗൺ കാലത്ത് കുത്തിവെയ്പ്പിൽ വന്ന കാലതാമസം എത്ര? ഏത് വാക്സിൻ?)

2.5 Were the following safety measures taken by the health worker(s) at the time of your child's immunization after the lockdown? (താഴെ കാണുന്ന സുരക്ഷാ ഉപാധികൾ ആരോഗ്യ പ്രവർത്തകർ ലോക്ഡൗണിനു ശേഷവും കുത്തിവെയ്പ്പിൻ്റെ സമയത്ത് ഉപയോഗിച്ചോ)

Safety Measures (സുരക്ഷാ ഉപാധികൾ)	**Yes (ഉണ്ട്)**	**No (ഇല്ല)**
2.5.1 PPE (പി.പി. ഇ)		
2.5.2 Masks (മാസ്ക്)		
2.5.3 Gloves (ഗ്ലൗസ്)		
2.5.4 Sanitizer (സാനിറ്റൈസർ)		
2.5.5 Physical distancing (സാമൂഹ്യ അകലം)		
2.5.6 Limited crowd (പരിമിത ജനക്കൂട്ടം)		
2.5.7 Open site (തുറസായ സ്ഥലം)		

2.6 What was your personal reaction to resumption of immunization services after the lockdowns? (Relieved or Anxious) [ലോക്ഡൗണിന് ശേഷം കുത്തിവെയ്പ്പ് പുനഃരാരംഭിക്കുന്നു എന്ന് അറിഞ്ഞപ്പോൾ താങ്കളുടെ പ്രതികരണം എന്തായിരുന്നു? (ആശ്വാസം/ഉത്കണ്ഠ/ പ്രത്യേകിച്ച് ഒന്നും തോന്നിയില്ല)]

2.6.1 If anxious, what were your personal fears over taking your child for vaccination? [ഉത്കണ്ഠ : എന്തായിരുന്നു അതിൻ്റെ പിന്നിൽ ഉണ്ടായിരുന്ന ഭയം?]

2.6.2 Were your fears allayed by the health worker? (താങ്കളുടെ ഈ ഭയം ആരോഗ്യ പ്രവർത്തകർ ദൂരീകരിച്ചോ?)

2.7 What are your personal observations on the immunization process during and after the lockdown? (ലോക്ഡൗണിന് മുമ്പും പിമ്പും പ്രതിരോധ കുത്തിവെയ്പ്പ് പ്രക്രിയയെ പറ്റി താങ്കളുടെ നിരീക്ഷണങ്ങൾ എന്തെല്ലാം?)

APPENDIX – IV
SEMI-STRUCTURED INTERVIEW SCHEDULE (II)

INTERVIEW SCHEDULE 2 (to be administered to the Medical Officer) – **RI MICRO-PLANNING**

1.1 Was a new micro-plan prepared after the national lockdown was announced in March 2020?	1.2 Who all were involved in this process of microplanning?	1.3 Were you able to convene a sensitization meeting with ANMs and other staff before preparing a new micro-plan? Or was such a meeting held at the Block level with all Medical Officers and health staff?	1.4 Were areas demarcated into Containment, Buffer or Green zones for the purpose of conducting RI?
1.5 Was house-to-house survey and head counting encouraged in the new circumstances? If yes, how was it proposed to be done? If no, what was preferred instead?	1.6 Were RI microplan review meetings held with the ANMs?	1.7 What were some of the concerns that the ANMs discussed with you in the review meetings?	1.8 Were special provisions made for unreachable or hard-to-reach populations to attend immunization sessions under your FHC/PHC?
1.9 Was a local COVID risk assessment made before starting RI sessions after the lockdown? If yes, please elaborate.	1.10 Were training sessions held for ANMs and ASHAs in the changed circumstances?	1.11 Did the ANMs submit new Sub-Centre microplans or did they continue with existing microplans?	

2. How different was the micro-plan prepared during the COVID-19 period as compared to the previous years in terms of:

a. Beneficiary mobilization per session

b. Alternate Vaccine Delivery plan and route chart

c. Supervision Plan

d. Cold chain contingency plan

e. Immunization waste disposal plan

f. IEC and social mobilization

g. Training plan

h. Budget

i. Conduct of Outreach and/or Modified Outreach Sessions (VHSND)

3. Was the RI microplan modified in 2021 upon the surge in COVID-19 cases in May-June 2021 (State lockdown)? If yes, what were the key changes made?

APPENDIX – V
PARTICIPANT INFORMATION SHEET (English & Malayalam)

Title: Child Immunization during COVID-19: A Case Study of Pathanamthitta District of Kerala

Principal Investigator: Liz Maria Kuriakose

Supervisor: Dr. Rajib Dasgupta

Institution: Centre of Social Medicine and Community Health, Jawaharlal Nehru University, New Delhi

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1. Introduction

You are invited to participate in the research titled 'Child Immunization during COVID-19: A Case Study of Pathanamthitta District of Kerala'. Before you decide if you wish to participate on behalf of your child, we would like you to understand why the study is being done, what it will involve and how your child's information will be used.

2. Purpose of the Research

This study seeks to understand the impact of the COVID-19 pandemic on routine immunization of children visiting public healthcare facilities in the district. Based on official records and experiences of parents and children, it is expected that a comprehensive understanding of the problems, lessons and measures can be collated as a case study. The study also looks at child immunization as a critical preventive health measure which is a right of every child and tries to understand how far demand side elements have affected this right.

3. Why have I been chosen?

You have been chosen to participate in this research on behalf of your two year old child registered with the local primary health centre for immunization services.

4. Do I have to take part in the research?

It is up to you to decide whether or not to take part in this study. If you do decide to take part, you will be given this Participant Information Sheet and Consent Form to sign and you will be given a copy to keep. If you decide to take part you can change your mind later and withdraw from the study at any stage, for any reason.

5. What do I have to do?

You will have to answer questions on behalf of your child on common household-related information, immunization information of your child and personal experiences on taking your child to the health centre during the pandemic. No personal identification documents or information of your child will be collected from you.

6. What are the possible benefits of taking part?

There will be no direct benefit to you for participating in this research, but your responses will be valuable in understanding your child's experience in receiving immunization during this pandemic. It is expected that the results of this study can serve as an example with lessons for improving the immunization services in other parts of the country and in the district.

7. What do I do if I wish to withdraw from the research?

You may contact the Principal Investigator if you wish to withdraw at any time during the course of this study.

8. What will happen to information about my child?

All data collected for this research including the audio recordings will be kept strictly confidential and will be used only for academic purposes. No personal identification details or documents of your child will be collected and your child's anonymity will be strictly maintained.

9. Who has reviewed the study?

This study has been reviewed and approved by the Institutional Ethics Review Board, Jawaharlal Nehru University, New Delhi.

10. Further information and whom to contact.

If you would like any further information on this study you may contact Liz Maria Kuriakose at +91-8860699303 or email: almk0213@gmail.com

ഗവേഷണ സഹകാരിയുടെ വിവര പത്രിക

ശീർഷകം: കോവിഡ് -19 കാലത്തെ കുട്ടികളുടെ പ്രതിരോധകുത്തിവെയ്പ്പ്: പത്തനംതിട്ട ജില്ലയിൽ ഒരു ഗവേഷണ പഠനം

മുഖ്യ അന്വേഷക: ലിസ് മരിയ കുര്യാക്കോസ്

സൂപ്പർവൈസർ: ഡോ. രാജിബ് ദാസ്ഗുപ്ത

സ്ഥാപനം: സെന്റർ ഓഫ് സോഷ്യൽ മെഡിസിൻ ആൻഡ് കമ്മ്യൂണിറ്റി ഹെൽത്ത്, ജവഹർലാൽ നെഹ്റു യൂണിവേഴ്സിറ്റി, ന്യൂ ഡൽഹി

1.ആമുഖം

ഈ ഗവേഷണത്തിൽ പങ്കെടുക്കുവാനായി താങ്കളെ ക്ഷണികുന്നതിനോടൊപ്പം, ഈ ഗവേഷണത്തെ പറ്റിയും, ശേഖരിക്കുന്ന ഉപയോഗിക്കുന്ന രീതിയെ പറ്റിയും വിശദീകരിക്കുവാൻ ആഗ്രഹിക്കുന്നു.

2. ഗവേഷണത്തിന്റെ ഉദ്ദേശം

ഈ പഠനത്തിന്റെ ഉദ്ദേശം കോവിഡ് -19 എന്ന മഹാമാരി ഈ ജില്ലയിൽ കുട്ടികളുടെ പ്രതിരോധ കുത്തിവെയ്പ്പിനെ എങ്ങനെ ബാധിച്ചു എന്ന് മനസിലാക്കാൻ വേണ്ടിയാണ്. ഔദ്യോഗിക രേഖകളും, കുട്ടികളുടെയും അവരുടെ മാതാപിതാക്കളുടെയും പ്രായോഗിക അനുഭവങ്ങളും കൊണ്ട് ഒരു സമഗ്രമായ പഠനത്തിൽലുടെ ഈ ആരോഗ്യ സേവനത്തിൽ വന്ന പ്രശ്നങ്ങളും, പാഠങ്ങളും, പരിഹാരങ്ങളും മനസിലാക്കുവാൻ സാധിക്കും എന്ന് പ്രതീക്ഷിക്കുന്നു. കുട്ടികളുടെ അവകാശമായ ഈ സേവനത്തെ അവശ്യ ഘടകങ്ങൾ എത്ര മാത്രം ബാധിച്ചു എന്നും ഈ പഠനം അന്വേഷിക്കുന്നു.

3. എന്നെ എന്തുകൊണ്ട് തിരഞ്ഞെടുത്തു?
താങ്കളുടെ രണ്ട് വയസുള്ള കുട്ടിയെ പ്രതിനിധീകരിക്കാനായി തിരഞ്ഞെടുത്തിരിക്കുന്നു.

4. ഈ ഗവേഷണത്തിൽ ഞാൻ പങ്കെടുക്കണോ?
താങ്കൾക്കു തീരുമാനം എടുക്കാവുന്നത് ആണ്. ഇതിൽ പങ്കെടുക്കാൻ താല്പര്യം ഉണ്ടെങ്കിൽ ഗവേഷണ സഹകാരിയുടെ വിവര പത്രികയും, സമ്മത പത്രവും ഒപ്പിട്ട് നൽകണമെന്നും അഭ്യർത്ഥിക്കുന്നു. ഇതിന്റെ ഒരു പതിപ്പ് താങ്കൾക്കു നൽകുന്നതും ആയിരിക്കും. ഈ പഠനത്തിൽ നിന്ന് പിന്മാറാൻ ഏതു സമയത്തും താങ്കൾക്കു സ്വാതന്ത്ര്യം ഉണ്ടായിരിക്കും.

5. എന്താണ് ഞാൻ ചെയ്യേണ്ടത്?

താങ്കളുടെ കുട്ടിയുടെ പൊതുവിവരങ്ങളും, കുത്തിവെയ്പ്പ് സംബന്ധിച്ച വിവരങ്ങളും, ലോക്ഡൗൺ കാലത്ത് കുട്ടിയുടെ പ്രതിരോധ കുത്തിവെയ്പ്പ് അനുഭവങ്ങൾ എന്നിവയെ പറ്റിഉള്ള വിവരങ്ങൾ ഈ അന്വേഷകയുമായി പങ്കിടുക. കുട്ടിയുടെയും താങ്കളുടെയും പേരുവിവരങ്ങൾ, വ്യക്തിഗത രേഖകൾ ശേഖരിക്കുന്നത് അല്ല.

6. ഈ ഗവേഷണത്തിൽ പങ്കെടുക്കുന്നത് കൊണ്ട് എനിക്ക് എന്തെങ്കിലും ആനുകൂല്യങ്ങൾ ലഭിക്കുമോ?

ഇല്ല, ഈ ഗവേഷണത്തിൽ പങ്കെടുക്കുന്നത് കൊണ്ട് താങ്കൾക്ക് നേരിട്ട് യാതൊരു ആനുകൂല്യവും ലഭിക്കില്ല. എന്നാൽ താങ്കളുടെ പ്രതികരണങ്ങൾ ഈ പഠനത്തിൻ്റെ കണ്ടെത്തലുകളെ സ്വാധീനിക്കുകയും, ഈ ആരോഗ്യ സേവനം മെച്ചപ്പെടുത്തുന്നതിനും, രാജ്യത്തിന് ഒരു മാതൃകയും പാഠവും നൽകുന്നതിൽ ഒരു വലിയ പങ്ക് വഹിക്കും.

7. ഈ പഠനത്തിൽ നിന്ന് പിന്നിട് എനിക്ക് പിന്മാറാൻ സാധിക്കുമോ?

തീർച്ചയായും. ഈ പഠനത്തിൽ നിന്ന് പിന്മാറാൻ താങ്കള്ക്ക് ഈ അന്വേഷകയെ അറിയിക്കാം.

8. ഞാൻ നൽകുന്ന എൻ്റെ കുട്ടിയുടെ വിവരങ്ങൾക്ക് എന്താണ് സംഭവിക്കുന്നത്?

താങ്കൾ നൽകുന്ന കുട്ടിയുടെ വിവരങ്ങൾ തികച്ചും രഹസ്യാത്മകമായി സൂക്ഷിക്കുന്നതാണ്. ഈ വിവരങ്ങൾ അക്കാദമിക്ക് കാര്യങ്ങൾക്ക് വേണ്ടി മാത്രം ഉപയോഗിക്കുന്നത് ആണ്. ഇതുമായി ബന്ധപ്പെട്ട ഒരു വ്യക്തിഗത വിവരങ്ങളും, സംഭാഷണങ്ങളും ആരുമായും പങ്കുവെക്കുന്നത് അല്ല.

9. ഈ പഠനത്തിൻ്റെ അവലോകനം ചെയ്തിട്ടുണ്ടോ?

ഈ പഠനത്തിൻ്റെ അവലോകനം ജവഹർലാൽ നെഹ്റു യൂണിവേഴ്സിറ്റിയുടെ ഇൻസ്റ്റിറ്റ്യൂട്ടിൻറെ എത്തിക്സ് റിവ്യു ബോർഡ് ചെയ്തിട്ടുണ്ട്.

10. കൂടുതൽ വിവരങ്ങൾ അറിയുവാൻ

ഈ പഠനത്തിൻ്റെ കൂടുതൽ വിവരങ്ങൾ അറിയുവാൻ, ലിസ് മരിയ കുര്യാക്കോസ്മായി ബന്ധപെടുക (+91-8860699303/ almk0213@gmail.com)

APPENDIX – VI
CONSENT FORM

English & Malayalam (for Respondents)

Title of the Study: **"Child Immunization during COVID-19: A Case Study of Pathanamthitta District, Kerala"**

Name of the Principal Investigator: Prof. Rajib Dasgupta
Name of the M.Phil Student: Liz Maria Kuriakose

Brief Description of the Study:

The researcher intends to understand the impact of the COVID-19 pandemic on routine immunization of children visiting public healthcare facilities in the district. The study also looks at child immunization as a critical preventive health measure which is a right of every child and tries to understand how far demand side elements have affected this right.

The advantages and disadvantages of the research in which I am expected to participate (on behalf of my child), for which I have to convey information has been explained to me.

I willingly, under no pressure from the researcher-

(i) agree to take part in this research on behalf of my child,
(ii) agree that my child's immunization related information can be collected and used by the researcher for this research study only.
(iii) agree for audio recording (Yes/ No)

My consent is explicitly not for disclosing any personal information.

I have been informed that JNU and the researcher (Liz Maria Kuriakose) will take my prior consent before they draw benefits from research based on the information I provide.

Signatures

| --- | --- | --- |
| Study Respondent | Witness | Principal Investigator. |

സമ്മത പത്രം

ഗവേഷണത്തിൻ്റെ തലക്കെട്ട്: **"കോവിഡ്-19 കാലത്തെ കുട്ടികളുടെ പ്രതിരോധ കുത്തിവെയ്പ്പ്: പത്തനംതിട്ട ജില്ലയിലെ വിശദമായ അന്വേഷണം."**

ഗവേഷകന്റെ പേര്: പ്രൊഫ. രാജിബ് ദാസ്ഗുപ്ത
എം.ഫിൽ വിദ്യാർത്ഥിയുടെ പേര്: ലിസ് മരിയ കുരിയാക്കോസ്

ഗവേഷണത്തെ കുറിച്ചുള്ള ലഘു വിവരണം:

ഈ ഗവേഷണത്തിലൂടെ പത്തനംതിട്ട ജില്ലയിൽ കോവിഡ്-19 മൂലം പൊതു ആരോഗ്യ മേഖലയിൽ കുട്ടികളുടെ പ്രതിരോധ കുത്തിവയ്പുകൾക്ക് ഉണ്ടായ പ്രഭാവം പഠിക്കുവാൻ ആഗ്രഹിക്കുന്നു. അതോടൊപ്പം കുട്ടികളുടെ അവകാശമായ നിർണായകമായ ഈ പ്രതിരോധ സേവനത്തെ അവർക്ക് ലഭിക്കുന്നതിൽ അവശ്യ ഘടകങ്ങളുടെ സ്വാധീനത്തേ കുറിച്ചും മനസ്സിലാക്കുവാൻ ആഗ്രഹിക്കുന്നു.

എന്റെ കുട്ടിയുടെ പേരിൽ ഞാൻ പങ്കെടുക്കുന്ന ഈ ഗവേഷണ പഠനത്തിന്റെ നേട്ടങ്ങളും ദോഷങ്ങളും എന്നോട് വിശദികരിച്ചിട്ടുണ്ട്.

ഞാൻ പൂർണ സമ്മതത്തോടെ, ഗവേഷകയുടെ യാതൊരു സമ്മർദ്ധവും ഇല്ലാതെ -

(i) എന്റെ കുട്ടിക്ക് വേണ്ടി ഞാൻ ഈ ഗവേഷണത്തിൽ പങ്കെടുക്കുന്നു.
(ii) ഈ ഗവേഷണത്തിനായി മാത്രം എന്റെ കുട്ടിയുടെ പ്രതിരോധ കുത്തിവയ്പിന്റെ വിവരങ്ങൾ ശേഖരിക്കാനും ഉപയോഗിക്കാനും ഇതിനാൽ ഞാൻ അനുവാദം നൽകുന്നു.
(iii) ഈ സംഭാഷണം റെക്കോർഡ് ചെയ്തുകൊള്ളാൻ അനുവാദം നൽകുന്നു.

എന്റെ വ്യക്തിപരമായ വിവരങ്ങൾ വെളിപ്പെടുത്തുവാൻ പാടുള്ളതല്ല.

എന്റെ വ്യക്തിപരമായ വിവരങ്ങൾ ഈ ഗവേഷണത്തിൽ ഉൾകൊള്ളിച്ചിരിക്കുന്നതിനാൽ ഇതുമായി ബന്ധപ്പെട്ട ആനുകൂല്യങ്ങൾ സ്വീകരിക്കുന്നതിനു മുൻപ് എന്റെ സമ്മതം നേടാം എന്ന് JNU വും ഗവേഷകയും (ലിസ് മരിയ കുര്യാക്കോസ്) അറിയിച്ചിട്ടുണ്ട്.

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രക്ഷകർത്താവ്	സാക്ഷി	അന്വേഷകൻ