

## Vaccine Safety, Immunization Adherence, and Awareness among Urban Populations: A Review

Christeena Mariam Thomas, Ansu Sara Koruthu, Rekha M V, Ancy A, Ashna S, Soumya V R

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### ABSTRACT

However, being among the most cost-effective interventions available, vaccines are still subject to gaps in the public's overall awareness, perceptions of safety, and adherence to national immunisation schedules. The following summary presents a synthesis of recent community-based studies that have assessed the knowledge, attitude, perception of safety, and adherence to immunisation schedules of parents with young children. This research documented that although vaccination was perceived as highly important, there was considerable variability in degree of knowledge, significant influence of misinformation, socio-demographic disparities, and instances of delayed and/or incomplete immunisation practices. Urban residence, higher levels of parent education, and parent engagement with healthcare providers all had a consistently positive impact on increasing both awareness of immunisation and adherence to immunisation schedules; however, challenges remain, including anti-vaccination narratives, reliance on non-medical sources for vaccination decision-making, and misconceptions regarding the side effects associated with immunisations. Strategies for enhancing communications with providers/parents regarding the requirement for vaccinations, implementing reminder systems, and developing community-based education programs focused on improving vaccination confidence and coverage are critical moving forward.

**Keywords:** Vaccine safety, immunization adherence, vaccine awareness, parental perception, vaccine hesitancy, public health

### I. INTRODUCTION

The goal of vaccination is to prevent infection and promote good health by decreasing the occurrence rate of vaccine-preventable diseases (VPDs). Vaccination is one of the most significant public health successes of our time, and it has helped to decrease global childhood morbidity and mortality from VPDs by over 90% in the last 50

years. Vaccines are estimated to save between 3.5 million and 5 million deaths from vaccine-preventable diseases each year, including measles, diphtheria, tetanus, pertussis, and polio [1]. The Global Immunization Network's Resource Centre in Geneva, Switzerland is responsible for providing supplies and support for the Expanded Programme on Immunization (EPI) that began in 1974. This milestone was achieved by introducing vaccination as a method of controlling VPDs globally [2]. India's Universal Vaccination Programme (UIP) launched in 1985, is one of the largest public health initiatives worldwide and provides free vaccinations against multiple VPDs to children under five years of age, thus helping to reduce mortality in infants and children <5 [3].

However, the global vaccination coverage has plateaued over the last few years with widening inequities among and within countries [4]. Reduced routine vaccination coverage due to disruptions caused by the COVID-19 pandemic has put children at greater risk for outbreaks of VPDs [4,5]. Persistent disparities in vaccination coverage are largely the result of differences in socioeconomic status, geographic access, education of parents, and health system capacity [6].

Vaccine hesitancy, or delaying to accept/decline vaccines based on the availability of vaccinations serves as a global health challenge [7]. The World Health Organization has also identified vaccine hesitancy as one of the top global health threats in 2019 [8]. The phenomenon is considered complex and specific within a context with the influencing factors broken down into the "3Cs" of confidence (trust in the safety/effectiveness of the vaccine), complacency (commonly low perceived risk of being diseased), and convenience (accessibility/affordability of service) [7]. The paradox of the success of immunizations has complicated how the public perceives this issue. The decline in the incidence of many vaccines preventable diseases (VPD's) causes communities to deem the disease less serious than they truly are whilst believing they hold a higher degree of risk in

the event of vaccination [9]. Misinformation, in particular through the internet and social media, has also contributed to vaccine scepticism and declining confidence in immunization programs; thus, the spread of misinformation can lead to a decline in the level of trust that parents have in both pharmaceutical companies and the government [10]. In addition, other factors help determine the decision of parents to have their children vaccinated, such as safety concerns, religious beliefs, sociocultural standards, and distrust in either of these two primary parties (the pharmaceutical industry or the government) [9, 10].

The level of knowledge and attitude of parents has been consistently found to be one of the most important predictors of childhood immunization uptake [6,11]. In addition to the knowledge of vaccine schedule, benefits and potential adverse effects of the vaccines, parents' have to be aware of multiple factors that will help to improve their compliance with vaccines. However, simply knowing about vaccines cannot guarantee compliance as there may be many structural barriers that will prevent parents from vaccinating children on time. Barriers to vaccination include lack of transportation, long wait both at clinics and for receiving vaccine, missed opportunities or indirect costs (such as taking time off work) [6,12].

There are several dynamics within a household that dictate how decisions are made in regard to vaccinating children, including the level of education of the mother and recommendations from the healthcare provider [11,12].

Taking into account that there are multiple determinants in the uptake of vaccination, it is necessary to have an integrated approach to improving vaccination programs by developing a comprehensive approach that addresses behavioural, informational and systemic barriers. Therefore, developing targeted interventions to improve vaccination coverage and maintain the success of public health will require an understanding of parental knowledge/attitudes/compliance and perceived barriers.

This review attempts to summarize the current evidence relating to parental knowledge/attitude/practice/compliance and vaccine hesitancy and identify determinants and evidence-based approaches to improving childhood immunization rate.

## II. KNOWLEDGE REGARDING IMMUNIZATION

Parental awareness of vaccines for children ranges from moderately to very well; however, it is also evident there are numerous shortcomings in knowledge. Parent's knowledge of childhood vaccines in Uttarakhand was found to be on average or higher for 84.5% of those who participated [13]. Additionally, half of the mothers had good knowledge regarding childhood vaccines, 47.9% in Kerala, while 15.7% had poor knowledge of said vaccines [14]. Parents had a basic understanding of vaccines; however, there are still large gaps in this knowledge.

When looking at increasing disease awareness, those vaccines that are highly publicized have more patients being vaccinated as opposed to vaccines that do not have a substantial amount of advertisement (e.g., pertussis, boosters, combination vaccines, and the newly released). There appear to be variations in vaccination awareness among these patients due to different vaccine eradication campaigns; therefore, it is clear that there are substantial educational deficiencies surrounding the vaccine process.

Particular concerns included inadequate knowledge about:

- National schedule and timing for immunizations
- Booster doses' role and safety
- Safety and use of multiple vaccines given together
- True contraindications and minor illnesses

Some participants confused minor illnesses (like a mild fever or cough) with contraindications, resulting in missed chances to vaccinate. These results are consistent with evidence found globally that a lack of knowledge regarding vaccination schedules leads to delayed & incomplete vaccinations [13,14].

## III. ATTITUDES TOWARD IMMUNIZATION

Overall, most people tend to have positive views about immunizing their children against preventable diseases. For example, in Uttarakhand India, 98% of survey respondents believed that getting vaccinated is important for their child's health [13]. Similarly, 89% of surveyed mothers in Kerala believed that getting vaccines is very important for their child's health [2]. Likewise, 86% support mandatory immunization policies in Turkey [15].

Even though many people have positive views about immunizing their children against preventable diseases, there were still concerns. For

instance, some respondents indicated that they are worried about not having serious side effects from vaccines, what long-term health impact vaccinations may have on their children, and whether religious or cultural factors may affect the decision to vaccinate their child or that vaccines may cause the diseases they are trying to prevent.

The existence of concern regarding vaccinations is related to misinformation about vaccinations and changing digital media narratives regarding vaccinations. For instance, in Turkey, it was found that belief in the necessity of getting vaccinated reduced vaccination hesitation and respondents were more likely to be vaccine hesitant when they believed in mandatory vaccination beyond the recommendation from their religious leader than those who believe vaccinations are necessary [15]. The degree to which cognitive beliefs impacted acceptance of vaccinations, was supported within the regression model which accounted for 24.3% of variance of vaccination hesitation; thus, indicating that cognitive beliefs have a large impact on accepting to get vaccinated but there are other determinants that have not been accounted for.

These findings are consistent with what was identified by the SAGE Working Group as being three key areas that drive vaccination hesitation, which are confidence in vaccine safety and efficacy, complacency regarding getting vaccinated for oneself (or a child), and convenience of receiving vaccination [7]. Confidence in the safety and effectiveness of vaccines continues to be the most significant predictor of whether someone chooses to get vaccinated or their child vaccinated.

There was also a strong correlation between socio-demographic variables (higher level of education, living in an urban area, working in a skilled profession and having a higher household income) and higher vaccinations levels [13,14]. This relationship is consistent with existing research indicating that a mother's level of education and social and economic empowerment are positively correlated with seeking appropriate medical services for their children [17]. Education creates improved health literacy, the ability to critically evaluate misinformation and ultimately trust the healthcare system.

#### IV. IMMUNISATION COMPLIANCE

Immunisation compliance is influenced by the level of knowledge and attitude towards immunisation, which are both generally favourable; however, there are many differences in compliance

rates by region. Parents in Uttarakhand reported an immunisation non-compliance rate of 19.5% for that vaccination schedule (13); a study in Turkey found an incompletely vaccinated rate for children of 16.3% (15); while full immunisation coverage was 96.4% in Kerala (14). This indicates the presence of regional variability in the performance of the immunisation programme.

Higher levels of knowledge are associated with being immunised completely (13,14). However, this is not a strict conformity. Structural determinants, such as the access to healthcare services and the efficiency of those services likely moderate the level of compliance.

Lastly, these findings support the notion that intent does not automatically translate into action due to structural and contextual barriers as indicated in general observations in the world (11,17).

#### V. BARRIERS TO COMPLETE IMMUNIZATION

Barriers reported include:

- Lack of knowledge about next scheduled dose
- Illness of child/family member
- Vaccine not available at health facility
- Long waiting times
- Fear of side effects

In Kerala, 24.3% of mothers reported being exposed to anti-vaccination campaigns [14]. In Turkey, vaccine-related information came from social media and internet platforms [15], leading to an increase in misinformation-induced vaccine hesitancy.

Digital misinformation is a growing global threat to vaccination confidence [11]. Exposure to negative vaccine content increases risk perception and decreases trust in the health authority [10]. Structural barriers (such as cost of transportation and opportunity cost) disproportionately affect lower socioeconomic groups and increase inequities in immunization coverage [11].

#### VI. ROLE OF HEALTH CARE PROFESSIONALS

More than any other study, every study has determined that health care providers are the most credible source of information about vaccines. However, relatives or social networks play a significant role in influencing a person's decision about getting vaccinated [14].

Consistent with earlier studies, health care providers have been identified as having a strong

influence on whether a person receives vaccines, as strong health care provider recommendations are a key predictor of vaccine uptake [7]. Effective communication with patients, providing reassurance about the potential side effects of a vaccine, and proactively counselling patients during each health care encounter will greatly reduce vaccine hesitancy.

Community-based strategies to engage family decision-makers (like fathers and elders) could help improve follow through with vaccines in socio-culturally hierarchical societies.

#### Public Health Considerations

The synthesis advocates for broad strategies:

- Reminder / notification systems to help reduce missed doses
- Organized immunization counselling at the initial encounter
- Digital literacy campaigns designed to combat misleading information
- Guaranteeing that vaccine supply chains continue uninterrupted
- Attempting to have flexible clinic hours to reduce opportunity costs
- Engaging fathers or families as influencers
- Promoting the administration of vaccines to adults in order to establish or strengthen trust within the family unit

Operational and implementation research will be instrumental in tailoring interventions specifically to the local sociocultural context. [13]

## VII. CONCLUSION

The review reveals that even though there is an overall positive attitude from parents toward immunizing their children, there remain many gaps in knowledge related to vaccinations, logistical difficulties, and vaccine hesitancy that impede optimal vaccination rates. Although the majority of parents appreciate the value of vaccinating their children, incomplete knowledge of the immunization schedule, lack of understanding of booster shots, and concerns regarding vaccine safety all contribute to delaying or missing vaccinations. Additionally, socioeconomic factors such as the parent's level of education, occupation, and income influence knowledge levels, which in turn affects how compliant parents are with the vaccination schedule and are therefore indicators of a parent's health literacy and thus how they behave in terms of vaccination.

Although the majority of parents have a favourable view toward vaccinations, there are several structural barriers to parents obtaining

vaccinations for their children that include lack of access to vaccines, long wait times in the physician's office, the cost associated with receiving a vaccination, and lack of reminder systems. The increasing prevalence of misinformation, particularly through the internet, also reduces parent's confidence in vaccines. Additionally, strong trust in health care providers has been found to be a major protective factor, thus highlighting the importance of improving communication between parents and health care providers.

To maintain high vaccination rates, there needs to be an integrated approach to health care by enhancing health education, improving accessibility to health care services, providing a reliable supply of vaccines, and having comprehensive initiatives to counteract misinformation on the internet. It is necessary to address both behaviour and system-level determinants to close the gap between a parent's positive attitude toward a vaccine and full compliance with the recommended schedule so that we can limit the resurgence of vaccine-preventable illnesses and protect the long-term health of all children.

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