

**BEHAVIOUR INSIGHTS RESEARCH ON DRIVERS
INFLUENCING CHILDHOOD IMMUNIZATION-
RELATED BEHAVIOURS IN KYRGYZSTAN**



EURO HEALTH GROUP



for every child

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ABBREVIATIONS AND ACRONYMS

BDs	Behavioural Drivers
BDM	Behavioural Drivers Model
BI	Behaviour Insight
CAPI	Computer-assisted personal interviewer-administered questionnaire
CASI	Computer-assisted self-interview
CATI	Computer assisted telephone interviewer-administered questionnaire
COM-B	Capability, Opportunity, Motivation – Behaviour
CSAQ	Computer-assisted self-administered questionnaire/interview
ECA	Europe and Central Asia Region
EHG	Euro Health Group A/S
KIs	Key Informants
M&E	Monitoring and Evaluation
MICS	Multiple Indicator Cluster Survey
MOHSP KR	The Ministry of Health and Social Protection of the Kyrgyz Rep.
QA	Quality assurance
PAPI	Pen-and-pencil interviewing
RFP	Request for Proposal
SEM	The social ecological model
SCT	Social Cognitive Theory
TA	Technical Assistance
TIP	Tailoring Immunisation programmes
TL	Team Leader
TPB	The theory of planned behaviour
ToR	Terms of Reference
TTM	Trans-theoretical Model of Behaviour Change
UNFPA	United Nations Population Fund
UNICEF	The United Nations Children's Fund
USAID	United States Agency for International Development
WB	World Bank
WHO	World Health Organization

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EXECUTIVE SUMMARY

Understanding the factors influencing people's childhood immunization-related choices and practices in Kyrgyzstan will provide government and decision-makers with insights into the barriers and drivers of immunisation among priority target groups and enable them to design evidence-based interventions for high and equitable immunisation coverage.

The adapted Behavioural Drivers Model (BDM) was used to understand the factors (drivers) that influence people's immunisation decisions and practices. Two cross-sectional studies were conducted through the collaborative research network of the Euro Health Group (EHG) team, the UNICEF country office in Kyrgyzstan and the Rebicon team, under the supervision of the UNICEF Regional Office for Europe and Central Asia (ECARO). The first survey included adult parents/caregivers of children under five living in Kyrgyzstan, and was conducted in September and October 2022, using Computer-Assisted Personal Interviewing (CAPI) as a data collection mode. The second survey included healthcare workers (HCWs) from primary health care level in Kyrgyzstan and was conducted during the same period using the same methodology (CAPI). Multi-stage stratified sampling was used to select respondents (parents/caregivers), with stratification based on oblasts of Kyrgyzstan, cities of Bishkek and Osh, and type of area (urban/rural). Primary healthcare institutions in Kyrgyzstan were selected from the list of medical institutions obtained from the Republican Center for Health Promotion and Mass Communication (RCHP) and HCWs (both physicians and nurses/technicians) were randomly selected. Responses from 1000 parents/caregivers and 400 HCWs workers were included in the analysis.

Key findings from the survey of parents/caregivers

The sample of parents included 96.6% of female respondents, aged between 19 and 70 years. The majority of parents/caregivers reported that they had vaccinated their child on time according to the vaccination calendar (96.8%, n=866).

Parents'/caregivers' attitudes towards vaccine efficacy and vaccine safety were positive (Mean=4.10, SD=0.78 and Mean=3.81, SD=0.63, respectively), and they estimated the risk of the diseases against which children are vaccinated to be moderately high (Mean=3.56, SD=0.94). Parents/caregivers also expressed a moderately high level of trust in societal factors (Mean=3.69, SD=0.65), with the family (85.4%, n=854) and family physician (74.4%, n=744) being the most trusted sources for most parents. The results also showed that the parents surveyed had an average level of factual knowledge about vaccines (Mean=2.19; SD=1.09). Almost all parents/caregivers claimed (98.9%, n= 986) that as parents they have a high responsibility to protect their children from any harm, while one quarter of them (25.7%, n=255) were afraid that they might harm their child by vaccinating them. Almost one fifth of parents/caregivers (18.9%, n=187) reported that they personally know someone whose child had a serious adverse reaction to a vaccine. Parents/caregivers who participated in this study had moderately low level of alternative health beliefs and worldviews (Mean=2.46; SD=0.85).

Most of the surveyed parents/caregivers believed that healthcare providers (97.5%, n=967), national health authorities (93.6%, n=905) and government representatives (91.6%, n=877) had positive attitudes towards childhood vaccination. Most believed that healthcare providers (94.8%, n=936), national health authorities (92%, n=894), government

representatives (89%, n=845) and family members (85.3%, n=852) think it is important to vaccinate their children. The majority of parents/caregivers ranked family members (85.6%, n=856) and health care providers (71.5%, n=715) as the most influential social agents in the decision to vaccinate the child. Other parents/caregivers (54.2%; n=542), community members (54.2%, n=542), religious leaders (54.0%, n=540) and local leaders (43.9%, n=439) were perceived by the majority of parents/caregivers as least influential on their vaccination intentions. Parents/caregivers assessed communication with their child's paediatricians as high-quality (Mean=4.21, SD=0.54), and the vast majority of them followed the vaccine recommendations given by their child's paediatrician (93.9%; n=936).

Parents/caregivers participating in this study did not, on average, consider themselves lacking information about vaccines and vaccination (Mean=2.45, SD=0.87). The majority of parents/caregivers surveyed reported that their most frequently used sources of information about vaccines were their family physicians (86.2%, n=862) and family members (67.2%, n=670). The least used sources of information were national TV channels (15.8%, n=158) and religious leaders (14.2%, n=139). Parents/caregivers reported few structural barriers to vaccination (Mean=1.86, SD=0.50).

Parents/caregivers were less likely to be timely vaccine accepting when they had to vaccinate the female child if they had more children, compared to the situation when the girl was the only child (OR=0.37, $p<0.05$). They were also less likely to accept timely vaccination if they had two children (OR=0.52, $p<0.05$) or five and more children (OR=0.45, $p<0.05$), than if they had one child. Parents/caregivers living in rural areas were more likely to be vaccine accepting than those living in urban areas (OR=2.44, $p<0.001$). Those living in Batken (OR=4.89, $p<0.001$), Jalal-Abad (OR=13.81, $p<0.001$), Talas (OR=1.45, $p<0.05$), Osh region (OR=4.98, $p<0.001$) and Osh city (OR=2.47, $p<0.01$) were more likely to be vaccine accepting than those from Bishkek.

Considering psychological drivers significantly associated with parental vaccine behaviour, parents/caregivers who perceive vaccine as more safe were more likely to timely vaccinate their child (OR=3.17, $p<0.01$), whereas parents/caregivers who were more inclined to the alternative health beliefs were less likely to timely vaccinate their child (OR=0.53, $p<0.01$).

Among the sociological drivers that significantly influenced parents' vaccination behaviour, those who perceived that their family members thought vaccines were extremely important for their child's health were more likely to be vaccine accepting (OR=5.23, $p<0.05$) than those who perceived that their family members thought vaccines were not important at all. Parents/caregivers who believed that their friends thought that childhood vaccination was moderately important (OR=1.59, $p<0.01$), extremely important (1.94, $p<0.01$), or even were neutral (OR=1.41, $p<0.01$) were also more likely to be vaccine accepting than those who think that their friends considered childhood vaccination not being important at all. In addition, parents who rated communication with their child's paediatrician/family physician as more responsive (OR=2.83; $p<0.001$) were more likely to be vaccine accepting.

In terms of environmental drivers significantly influencing parental vaccine behaviour, parents/caregivers who perceived to a greater extent that there is a lack of information about childhood vaccination were less likely to timely vaccinate their child (OR=0.60, $p<0.001$). In addition, parents/caregivers who more frequently follow information regarding childhood vaccination given by their family physician (OR=1.48, $p<0.001$) and healthcare professionals in media (OR=1.39, $p<0.01$), and less frequently follow information given by religious leaders (OR=0.67, $p<0.001$) were more likely to timely vaccinate the child.

Key findings from the survey of healthcare workers

The sample of healthcare workers (HCWs) included 97.5% of female respondents, aged between 22 and 73 years. One third (32.5%; n=130) of the HCWs interviewed were physicians and 67.5% (n=270) were nurses or technicians. Of the physicians interviewed, 3.8% (n=5) were paediatricians, and 96.2% (n=125) were general/family physicians. In general, HCWs showed high level of childhood vaccine advocacy behaviour (Mean=4.69) and moderately low level (Mean=2.69) of childhood vaccine hesitancy in the professional context. Of the HCWs interviewed, 79.5% (n=318) reported that they fully adhere to the prescribed vaccination calendar.

HCWs showed highly positive attitudes towards vaccine efficacy (Mean=4.70, SD=0.41), moderately positive attitudes towards vaccine safety (Mean=4.23, SD=0.43), and perceived danger of vaccine-preventable diseases as moderately high (Mean=3.93, SD=0.82). Furthermore, HCWs demonstrated high level of societal trust (Mean=4.03, SD=0.50). Colleagues (84.9%, n=339), continuing medical education (86.4%, n=345), national (83.7%, n=329) and international scientific conferences (82%, n=319), publications and guidelines from national (79.8%, n=317) and international organizations (75.9%, n=299), government (77.4%, n=308), national (77.4%, n=302) and international scientific literature (74.2%, n=288) were the most trusted sources of vaccine-related information for the majority. Public media and social networks were rated as the least trustworthy, with 54.5% (n=216), and 34.1% (n=135) respectively. HCWs demonstrated moderately low level of factual vaccine-related knowledge (Mean=3.74; SD=1.20) high level of motivation towards advocacy for vaccination (Mean=34.22, SD=0.43). A small minority of physicians (6.2%, n=8) and nurses/technicians (3%, n=8) denied feeling responsible for their patients' parents' decisions regarding vaccination, while almost all physicians (99.3%, n=129) and nurses/technicians (99.3%, n=268) agreed that it is their duty to advise parents to vaccinate their children.

The majority of HCWs surveyed believed that National Health authorities (98%, n=389), their colleagues (98%, n=391), members of their family (97.3%, n=389) and the government (96.4%, n=382) had positive attitudes towards vaccination. The vast majority of HCWs surveyed believed that it was important vaccinate their child (99%, n=205). The majority believed that their colleagues (98.6%, n=201), members of their family (97.6%, n=202), National Health authorities (97.1%, n=200), and the government (96.1%, n=197), thought it was moderately or extremely important to get their child vaccinated. Family members (74.4%, n=154) and personal attitudes towards vaccination (73.4%, n=152) were considered to have the greatest influence on vaccination intentions.

Overall, the HCWs surveyed expressed a low level of feeling of lack of competence in answering parents' questions about vaccine efficacy, quality and safety (Mean=1.62, SD=0.52), and reported CME on vaccines (89.2%, n=356) and colleagues (86%, n=343) as the most frequently used sources of vaccine-related information. System support for childhood immunization was perceived as high by the HCWs surveyed (Mean=4.34, SD=0.47).

Among the socio-demographic characteristics that significantly predicted vaccination behaviour, vaccine promotion behaviour was more prominent among HCWs who self-identified as Muslim compared to those with no religion ($\beta=-0.18$, $p<0.001$). At the same time, vaccine hesitancy was more prominent among HCWs who identified as Muslim compared to Christians ($\beta=-0.11$, $p<0.05$).

In terms of psychological drivers that significantly influence vaccination behaviour among healthcare workers, those who manifested higher level of societal trust ($\beta=0.12$, $p<0.05$) and put more trust in information provided by colleagues ($\beta=0.14$, $p<0.05$), were more

likely to engage in vaccine promotion behaviour. Healthcare workers who perceived vaccine preventable diseases as less dangerous ($\beta=-0.16$, $p<0.01$), and who put more trust in information from social networks ($\beta=0.17$, $p<0.001$), were more likely to express vaccine hesitancy.

Considering sociological drivers significantly associated with vaccine behaviour, HCWs who had very positive general attitudes towards vaccination were more likely to engage in vaccine promotion behaviours compared to HCWs who had neutral attitudes ($\beta=-0.15$, $p<0.05$). Also, healthcare workers who perceived their friends' attitudes towards vaccination as very positive were more likely to promote childhood vaccination than HCWs who perceived their friends' attitudes towards vaccination as neutral ($\beta=0.284$, $p<0.05$) or somewhat positive ($\beta=-0.18$, $p<0.01$).

With respect to environmental drivers significantly influencing vaccine behaviour, HCWs who follow information received from colleagues more frequently ($\beta=0.168$, $p<0.001$) and were more likely to manifest childhood vaccine-promoting behaviour. At the same time, HCWs who relied more on information from social networks were significantly more likely to be vaccine hesitant ($\beta=0.152$, $p<0.05$).

1. BACKGROUND

1.1. Country context

Kyrgyz Republic is a landlocked country located in Central Asia. It emerged as an independent state from the Soviet Union in 1991. The World Bank rates Kyrgyz Republic as a Lower Middle-income country with a per capita GDP of US\$1120 in 2019. The country is divided in seven regions/oblasts and 2 cities: Bishkek and Osh (shaar status). Kyrgyz Republic has a population of 6.5 million of which 67% is under the age of 35. It is one of the poorest countries in Europe and Central Asia. As of 2019, the HDI value for Kyrgyzstan is 0.697, which puts the country in the category of the average level of human development, as it ranks 120 among 189 countries and territories¹. WHO Health Report estimates life expectancy at birth to be 72.3 years (2020), 76.4 years for females and 68.4 years for males. Maternal mortality fell gradually from 82 deaths per 100,000 live births in 2003 to 24 deaths per 100,000 in 2019. While infectious diseases such as tuberculosis and common diarrheal and pulmonary infections remain a real burden to health, increasingly non-communicable diseases (NCDs), cardiovascular diseases and diabetes in particular, are becoming the major causes of morbidity and mortality.

Health has traditionally been a priority for the public policy in the Kyrgyz Republic and the population health is one of the core indicators of the socio-economic development of the country. Since its independence in 1991, the Kyrgyz Republic (KR) has conducted successive health system reforms and currently spends over 8 per cent of its GDP on health. Through the Manas Program (1996-2005), Manas Taalimi National Health Care Reform Program (2006-2010) and Den Sooluk National Health Reform Program (2012-2018), Kyrgyzstan implemented and achieved significant improvement in: service coverage; more responsive, efficient, comprehensive, integrated service delivery system; health system financing and its service purchasing function; public health and disease control; and has begun new generation reforms in public health and medical education. In December 2018 the Kyrgyz government (GOK) adopted the new “Program of the Kyrgyz Republic Government on Public Health Protection and Health Care System Development for 2019-2030 - Healthy Person – Prosperous Country”, which aims at protecting health, ensuring access to essential quality services, strengthening primary health care and decreasing financial hardship for all people and communities, in pursuit of universal health coverage (UHC) by 2030.

The Ministry of Health of the Kyrgyz Rep. (MOH KR) is the central authority responsible for managing public healthcare in the country. The Republican Centre for Immunization (RCI) is the main responsible body for immunization services in the country. The centre is responsible for planning and following up on Routine immunization (RI) services, building systems for immunization at the national and local levels, monitoring and tracking vaccine supply and cold chain. The Health Promotion Centre, as a subdivision of the Ministry of Health and Social Protection, is responsible for health promotion aimed at enabling people to take responsibility for their own health, including vaccination.

¹ UNDP. Human Development Report. Briefing note for countries on the 2020 Human Development Report, 2020

1.2. Routine immunization

According to the immunization calendar approved by the Ministry of Health, mandatory child immunizations in Kyrgyzstan cover 12 infections using 9 types of vaccines as presented in the table below.² Until recently MOHSP KR also played a key role in COVID-19 response and vaccination. Since November 2021 that role is assigned to the Ministry of Culture with MOHSP keeping their technical role at the level of deputy minister and the Health Promotion Centre.

Antigens	Vaccine
Diphtheria	DPT3+HBV+HIB
Tetanus	DPT3+HBV+HIB+Rota
Pertussis	DPT3+HBV+HIB+Rota
Tuberculosis	BCG
Epidemic parotitis	MMR
Hepatitis B	DPT3+HBV+HIB+Rota
Poliomyelitis	OPV
Measles	MMR
Rubella	MMR
Hib infection	DPT3+HBV+HIB PCV
Pneumococcal infection	PCV

Results from the 2014 and 2018 Multiple Indicator Cluster Survey (MICS) in Kyrgyzstan^{3,4} shows a decreasing tendency of 5,1% in full immunization coverage among children aged 24–35 months who had received all vaccines recommended by the national immunization schedule, with the vaccine coverage of 73,3% in 2018. To address increasing challenges in routine immunization coverage, the communication strategy on vaccination for 2018-2021 was developed. Further, in December 2020 the Kyrgyz government adopted a new Immunoprophylaxis Program and Action Plan for 2020-2024.

Numerous studies conducted in the field of routine immunization have played a significant role in developing above strategies, immunization program and action plans enabling decision-making and creating evidence-based strategies. Some of the recent studies are listed below:

- Supported by UNICEF under the Global Alliance for Vaccines and Immunisation (GAVI) funding, the routine Knowledge, Attitudes, and Practices Towards Immunization in Kyrgyzstan Survey⁵ was conducted in the Kyrgyz Republic in 2017 in seven oblasts, in addition to Bishkek and Osh cities. The study covered 2,977 respondents including parents/caregivers of children aged under five, religious leaders, and healthcare professionals. The study showed that the main and most reliable source of information about vaccination for parents of children under the age of five are healthcare professionals. Religious leaders were found to be the most sceptical concerning vaccination with 41% of religious leaders which do not consider vaccination to be the most effective way to prevent vaccine-preventable diseases. At the same time, the awareness of religious leaders about the disease that vaccination is used against is lower than other target groups. Like

² Zh. Zhumagulova, Key Strategic Directions of Immunoprophylaxis—Kyrgyzstan, Republican Center for Immunoprophylaxis, 2017.

³ National Statistical Committee of the Kyrgyz Republic and UNICEF, (revised 2016), Multiple Indicator Cluster Survey 2014, Final Report

⁴ National Statistical Committee of the Kyrgyz Republic and UNICEF (2019), Kyrgyz Republic, Multiple Indicator Cluster Survey 2018, Survey Findings Report

⁵ Ministry of Health Kyrgyz Republic, GAVI, UNICEF. Knowledge, Attitudes, and Practices Towards Immunization in Kyrgyzstan, 2018:181p.

other target groups the most known vaccine preventable disease to religious leaders was tuberculosis. Further, the study showed that all target groups have poor knowledge about which vaccinations are mandatory for children (the most mentioned vaccines were tuberculosis, measles, and hepatitis B).

According to the public perception in Kyrgyzstan the main reason for refusing and/or delaying vaccinations is a contradiction of religious principles. However, according to the KAP survey results, the percentage of people who refused vaccinations for religious reasons was not significant. Only 8.5% of mothers who refused to have their children vaccinated, did so for religious reasons. Even the religious leaders themselves most often mentioned fear of unwanted reactions as the reason to refuse to vaccinate (45%), rather than contradiction to religious principles (18%). The main reasons for children not being vaccinated or being partially vaccinated are lack of confidence in the quality of vaccines (37%), worries about side effects after vaccination (35%) and medical exemption after consultation with a doctor (29%).

In general, the attitude of all target groups (parents of children under the age of five, healthcare professionals and religious leaders) towards vaccination is positive. Most respondents of the target groups are aware of the risk of contracting vaccine-preventable diseases. They note the vaccine high effectiveness and acknowledge the need to vaccinate children. The level of parental agreement that vaccination is necessary for children was 95 percent.

The study data informed the development of communication strategy on vaccination for 2018-2021 and planning and organisation of health promotion activities in Kyrgyzstan to address vaccination hesitancy, including role of the religious leaders.

- To complement the above quantitative data collected through KAP study towards immunization, a qualitative study which examined reasons behind vaccine refusals, resistances, and barriers was conducted in 2018⁶. The research was conducted by the Ministry of Health of the Kyrgyz Republic with technical support from UNICEF under the Global Alliance for Vaccines and Immunisation (GAVI) funding. The study used a mix of Focus Group Discussions (21 FGDs) and in-depth interviews with several categories of respondents, total 166 respondents including parents/caregivers of children aged under five, religious leaders, and healthcare professions from seven oblasts, in addition to Bishkek and Osh cities. The data enabled better understanding of the reasons behind refusing to immunize children or doubting the importance of vaccination and identified the main sources of information about immunization, as well as the groups of individuals who influence parental decisions on immunization. The qualitative study confirmed the finding of a quantitative survey that the main reason for refusing vaccinations is the fear of side effects. The overwhelming majority of study respondents stated that their refusal to vaccinate had no connection with their religious beliefs, but it is believed that there is an intention not to mention religion as a reason and keep it as a hidden reason. Most of the study respondents are disoriented by conflicting information and large number of negative information (based on hearsay) about the quality of vaccines used in Kyrgyzstan. There are also doubts about the composition of vaccines, and opinion that the vaccines contain toxic substances⁷. The study also shows that most of the mothers are unsatisfied with the information they receive from health workers about vaccination and consider that information superficial. Healthcare workers usually provide information only about disease the vaccine protects against, and do not talk in more detail about disease and consequences of contracting disease

⁶ Ministry of Health Kyrgyz Republic, GAVI, UNICEF. Informative study to examine reasons behind vaccine refusals, resistances, and barriers, 2018, 86p.

⁷ Ibid.

or about the safety and quality of the vaccines against that disease. Some mothers noted that their questions even make the healthcare professionals irritated.

With COVID-19 pandemic emerged in Kyrgyzstan in March 2020, routine immunization rates were adversely affected and access to routine vaccinations has been disrupted. With technical assistance from the WHO Country Office, Kyrgyzstan established mobile immunization teams to improve access to immunization services during the pandemic for people living in remote communities and for children of internal migrants in large urban areas. This helped to fill gaps in immunization coverage in all regions of the country.

Currently Kyrgyzstan is facing a problem of low population awareness of the vaccination benefits and safety, and the shortage of health personnel.

2. THEORETICAL FRAMEWORK

Vaccine acceptance and demand and ways to improve them is now in the focus of many countries. Understanding the drivers influencing people's immunization-related choices and practices is expected to enable government and decision makers to obtain insights into barriers and drivers to vaccination in priority target groups and enable them to design evidence-based interventions for high and equitable vaccination uptake.

There are various efforts to define the best theoretical behaviours change model or adapt existing models which consider all potential barriers for vaccine uptake and help health authorities to analyse vaccination intents and behaviours. To understand the factors (drivers) influencing people's immunization-related choices and practices in Kyrgyzstan the adapted Behavioural Drivers Model (BDM) was applied (Figure 1 and 2).

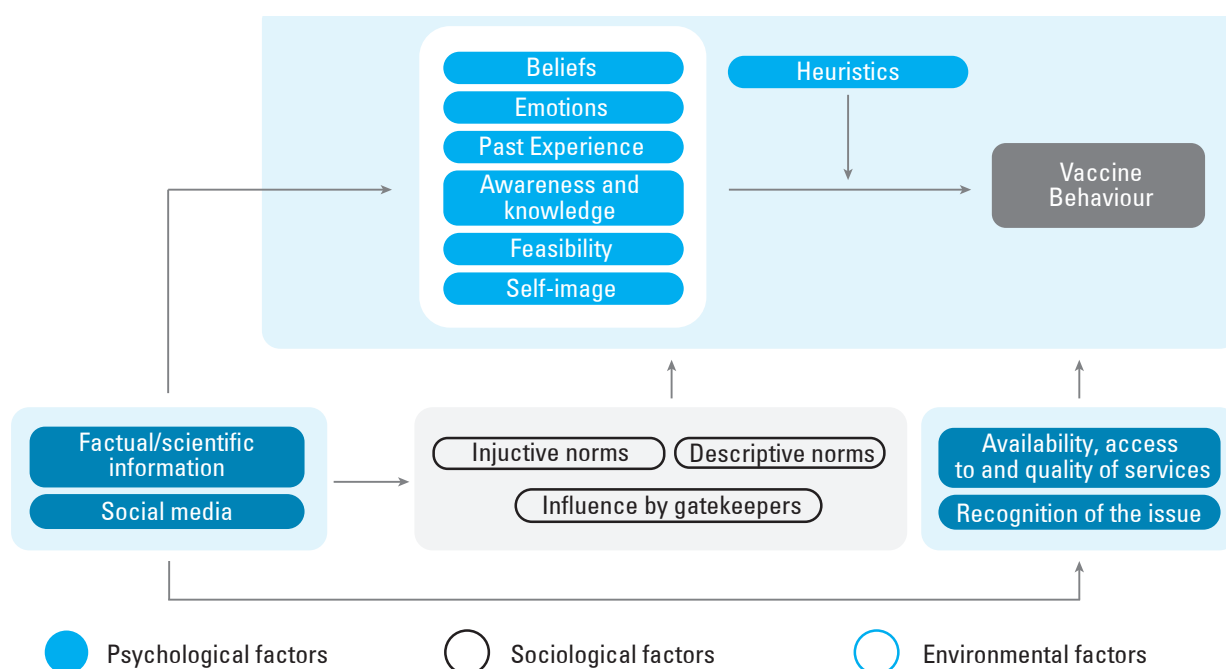


Figure 1. Adapted Behavioural Drivers Model (BDM) Model

As a transtheoretical comprehensive model, the adapted BDM applies a broad perspective and a comprehensive framework for analysis including psychological, sociological and environmental levels of behavioural drivers. Each level encompasses several complex factors and more sophisticated dimensions. Our applied BDM framework allows integrating selected drivers of vaccination behaviour of empirical importance in literature through its exhaustive dimensions and factors. In addition, the psychological level of drivers allows including innovative psychological factors that could be of great importance in explaining vaccination behaviour, such as cognitive biases and information processing. Moreover, BDM's factors and dimensions are emphasized as being relevant in designing behavioural interventions, which is of particular interest to us, since we aim to utilize results of this research in formulating programming recommendations.

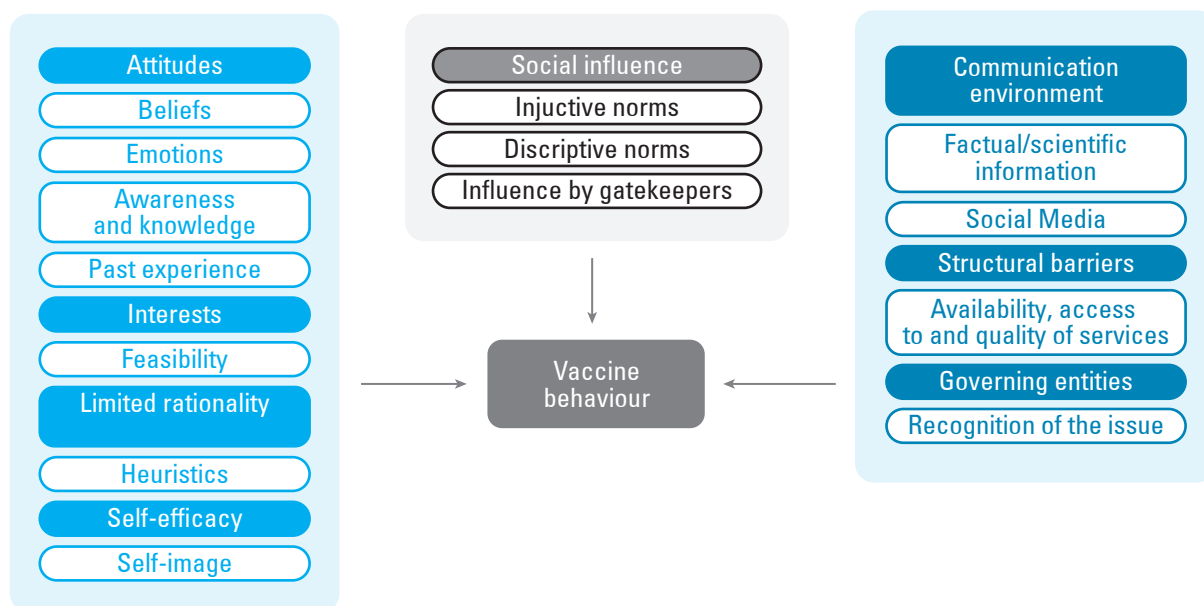


Figure 2. Adapted BDM model with selected factors (Level 1) and dimensions (Level 2)

Based on the review of the relevant literature⁸ and conducted interviews and consultations with the UNICEF Europe and Central Asia Regional Office (ECARO) and country office in Kyrgyzstan the following criteria has been developed and applied for identification, selection and prioritization of the behavioural drivers (BDs) that influence immunization-related behaviours for childhood immunization (Figure 3). As a first step (A), a literature review of relevant scientific literature was conducted identifying a list of theoretically and evidence-based factors (drivers) influencing immunization-related behaviours on the levels of the adapted BDM model. The focus was on meta-analyses and synthesis reports to quickly identify those drivers with the most substantial evidence and reliability. As a second step, the criteria relevance (B) was applied in regard to the topics focused at childhood vaccination after which assessment and prioritization (C) of the available evidence and relevance of the driver was conducted. Further, a feasibility and actionability criterion (D) was applied to limit the number of drivers for feasibility considerations while checking the sufficiency (E) to ensure the saturation of the psychological, sociological, and environmental areas of drivers. At the same time, actionability of the pre-selected drivers was considered, focusing on ones we could act on. By applying criterion (F), pre-selected drivers were confirmed as applicable for Kyrgyzstan.

⁸ Scientific literature, synthesis and meta-analysis of behaviour models and drivers influencing immunization-related behaviours, and various country specific documents, reviews and reports.

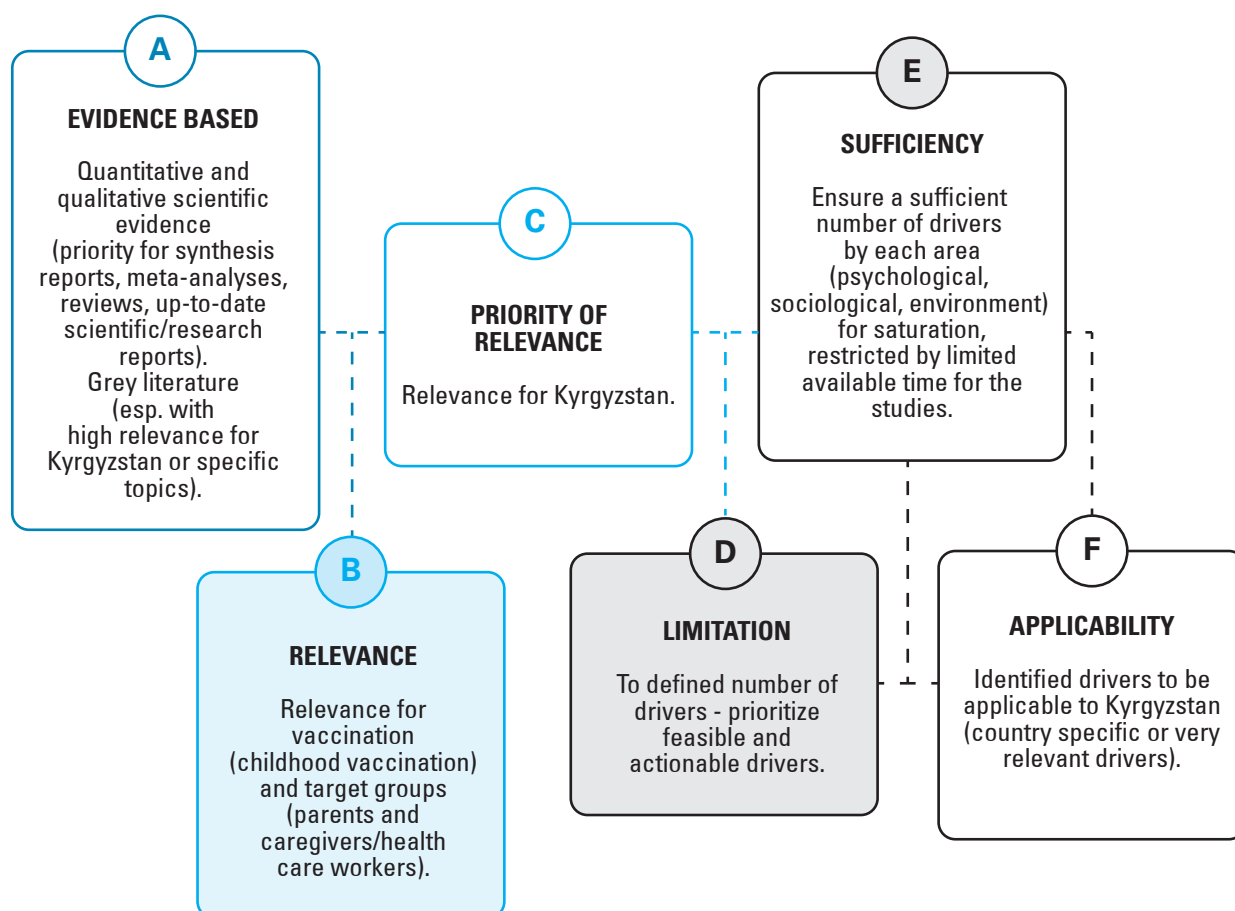


Figure 3. Selection and prioritization criteria for BDs

By applying the above-presented criteria, behaviour drivers (BDs) that influence immunization-related behaviours for childhood, both for parents/caregivers and health care workers, were selected (based on their empirical relevance in reviewed literature). Upon BDs selection they were matched with three categories of the adapted theoretical Behaviour Drivers Model (BDM- psychological, sociological and environmental) and further divided in sub-categories (Level 1- factors) and sub-sub-categories (Level 2- dimensions)⁹. The selected BDs for parents/caregivers and healthcare workers are presented in the table 1 below.

⁹ For example, perceived vaccine efficacy (the driver we have selected from the literature) belongs to the psychological category of the BDM model, attitude factor, and beliefs dimension. Social networks belong to the sociological category of the BDM model, social influence factor, and injunctive/descriptive norms dimension.

Table 1. Selected behaviour drivers that influence immunization-related behaviours for Childhood immunization (Parents/Caregivers of young children and Health Care Workers)

Behaviour Drivers Model (BDM) – CHI Parents/Caregivers and Health Care Workers					
Level 1 driver (factor)	Level 2 (dimension)	Indicator	Indicator definition	Rationale for selection	Other Literature
Psychological factors					
Attitudes	Beliefs	Perceived vaccine efficacy	Belief that the vaccine administration is the beneficial intervention to successfully reduce the disease.	Identified as one of the most important drivers of vaccine behaviour: Research show that vaccine hesitancy in parents increases in line with their concerns regarding vaccine efficacy (Victor, 2020; Wilder-Smith and Qureshi, 2020). Parents who are uncertain that getting vaccine will prevent the disease in their child may understand vaccination as a risky behaviour.	Wilder-Smith et al., 2020; Victor, 2020
Attitudes	Beliefs	Perceived vaccine safety	Belief that the vaccine is harmless, that is, the vaccine does not cause adverse effects.	Identified as the most common concern regarding vaccination (Karafillakis & Larson, 2017), and parents more prone to believe in harmless nature of vaccines are more likely to be vaccine hesitant (Victor, 2020). When a vaccine is considered to have side effects or other negative consequences, getting the vaccine will likely be perceived as a risky course of action.	Crescitelli et al., 2020; Victor, 2020; Wilder-Smith et al., 2020; Kalajj et al., 2021; Alabadi et al., 2020
Attitudes	Beliefs	Perceived danger of disease and likelihood of infection	Beliefs regarding the infectivity of vaccine preventable diseases and the severity of the clinical symptoms they cause. Observed vulnerability to the vaccine preventable disease.	Studies from different parts of the world showed that parents were more likely to vaccinate their child if they had perceived the certain disease as more severe and likelihood of infection as greater (Crescitelli et al., 2020; Wilder-Smith and Qureshi, 2020; Victor, 2020; Alabadi and Aldawood, 2020).	Crescitelli et al., 2020; Victor, 2020; Wilder-Smith et al., 2020; Alabadi et al., 2020 Wilder-Smith et al., 2020
Attitudes	Beliefs	Trust in societal factors	Confidence in political and health authorities, science, pharmaceutical companies, and healthcare professionals.	Structural crisis of trust ¹⁰ in institutions has become one of the most important issues in contemporary societies. Trust in the healthcare system, the experts defining vaccination strategies, and more generally in government bodies significantly affects vaccine acceptance (Verger & Dubé, 2020).	Crescitelli et al., 2020; Victor, 2020; Wilder-Smith et al., 2020; Bangura et al., 2020

Attitudes	Beliefs	Trust in information sources	Attitude toward the credibility of selected sources of information	The level of trust in sources of information plays an important role in motivating engagement of people in self-protective behaviours (Lep et al., 2020). It is of crucial importance that information is communicated by credible sources that would be perceived as useful by the audience. Numerous studies show that as parental concerns regarding information sources increase, their hesitancy to vaccinate children also increases (Victor et al., 2020).	https://www.unicef.org/serbia/sites/unicef.org/serbia/files/201809/Znanje_stavovi_prakse_u_vezi_sa_imunizacijom_dece_u_Srbiji.pdf (KAP regarding childhood vaccination in Serbia)
Attitudes	Awareness and knowledge	Knowledge	Factual knowledge regarding vaccines	Important determinant of vaccination behaviour. Research shows that knowledge regarding immunization leads to positive health care-seeking behaviour, which motivates parental decision to vaccinate children (Kalaj et al., 2021).	Wilder-Smith et al., 2020; Kalaj et al., 2021; Alabadi et al., 2020; Bangura et al., 2020
Attitudes	Emotions	Perceived Responsibility	Beliefs related to perceived responsibility in parents refer to strength of personal convictions about what 'needs' to be done in the vaccine decision-making situation.	Research shows that, in hesitant parents, vaccine decision making is accompanied by strong burden of perceived responsibility. Hesitant parents are often doubly concerned; scared of possibility that their child contracts an infectious disease, and at the same time worried about the adverse effects of vaccines (Crescitelli et al., 2020). This phenomenon stems from contemporary parenthood practice known as intensive parenthood (Hays, 1996; Kuan, 2022) implying that parents need to collect information and make conscious decisions in relation to all aspects of child care, including vaccination. Search for as much information as possible in the infodemic age (WHO, 2022), makes finding the optimal solution even more difficult.	Crescitelli et al., 2020; Wilder-Smith et al., 2020 Hays, 1996; Kuan, 2022
			Perceived responsibility in healthcare workers refers to the responsibility	From the ethical point of view, professional responsibility to recommend vaccination to children without contraindications is in accordance with	Chervenak et al., 2016 Tuckerman et al., 2020

¹⁰ Trust can be defined as 'a relationship that exists between individuals, as well as between individuals and a system, in which one party accepts a vulnerable position, assuming the ... competence of the other, in exchange for a reduction in decision complexity' (Larson et al., 2018).

				towards patients in accordance with the professional role.	the best interest standard, with the aim to promote and protect children health (Chervenak et al., 2016). Studies show that those healthcare workers who perceived higher responsibility were more likely to recommend vaccination to their patients (Tuckerman et al., 2020).	
Attitudes	Past experience	Past experience*		Personal experience and experience of the others regarding the side effects after getting vaccinated.	A growing body of research literature suggests that personal experience regarding vaccination, in addition to perceived effectiveness and concerns regarding vaccine safety, is the most influential factors in predicting a parent's decision to vaccinate their child (Bertoncello et al., 2020; Rosso et al., 2019; Freeman and Freed, 1999). Clearly, if their child experienced an adverse event, parents may fear vaccines and they would probably be more hesitant. At the same time, it is reasonable to assume that hesitant parents would be more prone to overestimating the severity of the reported adverse events.	Crescitelli et al., 2020; Wilder-Smith et al., 2020; Bertoncello et al., 2020; Rosso et al., 2019; Freeman and Freed, 1999
Interests	Feasibility	Alternative health beliefs and worldviews*		Beliefs relying on health practices which are contrary to the established norms around vaccination.	Previous research provide solid proofs that parents believing in alternative medicine practices, and parents holding anthroposophical worldviews respectively, are more inclined to be vaccine hesitant (Díaz Crescitelli et al., 2020; Bangura et al., 2020; Víctor, 2020; Wilder-Smith and Qureshi, 2020). Giving more credibility to alternative medicine, homeopathy, and natural remedies these people consider vaccines as artificial products being harmful for their children, and vaccination as the health practice opposing to their moral views.	Crescitelli et al., 2020; Víctor, 2020; Wilder-Smith et al., 2020; Bangura et al., 2020
Limited rationality	Heuristics	Irrational vs.rational thinking		Analytical-rational and intuitive-experiential information processing	Previous research show that vaccine hesitancy is related to thinking styles, namely intuitive decision-making (Brotherton & French, 2014; Jacobson et al., 2007; Leman & Cinnirella, 2007), indicating the important role of emotions in the context of vaccination (Brown et al., 2010; Chapman & Coups, 2006), and suggesting that thinking styles could serve as useful framework in the explanation of vaccine	Tomijenovíc et al., 2020 Reuben et al., 2020 Murphy et al., 2021 Browne et al., 2015 Martinelli et al., 2021 Brown et al., 2010;

				reasoning (Brown et al., 2010; Chapman & Coups, 2006). Intuitive decision-making is concept derived from dual-process theory that explains how people process information in two parallel but interacting channels-the analytically rational and the experientially intuitive thinking style (Epstein et al., 1996). The analytically rational one is more serial, conscious, rule based, changes with new evidence and arguments, and it is relatively free of emotions. The experientially intuitive one is automatic, fast, non-conscious and emotionally charged. Some research show that parents who are more prone to the experientially intuitive thinking style are more vaccine hesitant (Tomljenović et al., 2019). Exploring the association of people motivation to engage in rational or intuitive thinking with vaccine behaviour allows the understanding if people base their judgments and actions regarding vaccination on how they feel about.	Chapman & Coups, 2006 (Brotherton & French, 2014 Epstein et al., 1996
Self-efficacy	Self-image	Advocacy for vaccination**	Motivation towards advocacy for vaccination - presents intrinsic motivation to engage in counselling patients to get their children vaccinated.	Healthcare workers play a critical role in building trust between the public (parents/caregivers) and the immunization program. Healthcare workers therefore, must be confident in vaccination as a public health good and be able to transmit this confidence to their patients, family, friends, and community members, in other words to advocate for vaccination.	GaëlleVallée-Tourangeau et al., 2018
Social influence	Descriptive norms	Impact on General Attitudes About the Vaccine / Impact on Importance of Getting Vaccinated	Perception of the community members' and significant others' attitudes towards childhood vaccination (refers to a rule of behaviour that people engage in because they think other people in their reference group do the same thing). / Community members' and significant others' opinion regarding	Empirical evidence shows that accurate information about descriptive norms can substantially increase intentions to accept a vaccine (Moehring et al., 2023). Several studies show that participants held more positive vaccination attitudes and greater likelihood to get vaccinated or vaccinate their child when they were frequently exposed to positive attitudes and frequently discussing vaccinations with family and friends (Konstantinou et al., 2021). On the opposite, vaccination uptake was decreased when significant others were hesitant to take the vaccine. In addition, studies suggest that many parents' vaccination ideas	Bangura et al., 2020; Wilder-Smith et al., 2020; Alabadi et al., 2020 Nurzhynska, A. et al. 2022

Social influence	Injunctive norms	Self-Ranking Social Influencers	the importance of childhood vaccination.	and practices were influenced by the vaccination ideas and practices of the people they mix with socially (Cooper et al., 2021).	Bangura et al., 2020; Wilder-Smith et al., 2020; Alabadi et al., 2020 Nurzhynska, A. et al. 2022
Social influence	Influence by gatekeepers	Recommendations by HCW	Influence of social environment and significant others' opinions on decision to get the child vaccinated - a rule of behaviour that people engage in because they think others in their group expect them to do so. It could also be described as a form of social pressure imposed on individuals to engage in certain behaviours	Numerous studies suggest that perception of social support or encouragement regarding vaccination behaviour (whether positive or negative) presents important explanatory factor of the parental decision to vaccinate children (Larson et al., 2014). Lack of perceived social approval of vaccination from social networks, family members, community members, organized groups, institutions or media presents significant barrier to vaccination uptake reported in several studies (Kaufman et al., 2021).	Smith et al., 2007; Dube et al., 2008; Ansari et al., 2007
			Healthcare professional's recommendation and preparedness to address concerns	Recommendations by healthcare professionals as health system gatekeeper presents one of the most influential social factors of parental decision to vaccinate children. Healthcare providers are recognized as having a crucial role in fostering vaccine acceptance and recommendation of vaccination by a healthcare professional was recognized as one of the main predictors of vaccine acceptance (Dube et al., 2015). Several studies conducted in both developed and developing countries showed that most parents who changed their minds about not getting vaccination were largely influenced by the assurances from a healthcare provider (Gust et al., 2008; Ansari et al., 2007).	

Environmental factors

Communication environment	Factual/scientific information	Perceived lack of information	Observed lack of information, insufficient or inadequate information about childhood vaccines	In a joint report by WHO and UNICEF in 2015 in 154 WHO member states that were surveyed lack of knowledge or information on vaccines and their benefits was among the top three cited reasons for vaccine hesitancy, while in low- and lower-middle-income countries a lack of knowledge and awareness of the required vaccines, immunization or immunization services were the most frequently cited contributors to vaccine hesitancy (Marti et al., 2017). Similarly, in a large population survey of vaccine hesitancy in Canada, perceived insufficient knowledge about immunization was significantly associated with vaccine hesitancy (Guay et al., 2019).	Wilder-Smith et al., 2020; Crescitelli et al., 2020;
Communication environment	Social media	Use of the Information sources	Attitude toward the usefulness of selected sources of information	Numerous studies suggest that individuals who delay or refuse vaccination are more likely to use internet as their main source of information about vaccines (Smith et al 2011, Dube et al, 2012).	https://www.unicef.org/serbia/sites/unicef.org/serbia/files/201809/Znanje_stavovi_prakse_u_vezi_sa_imunizacijom_dece_u_Srbiji.pdf (KAP regarding childhood vaccination in Serbia)
Structural Barriers	Availability, access to and quality of services	Convenience*	The degree to which vaccination services are delivered at a time and place and in a cultural context that is convenient	Structural and health care system factors have been shown to have an important effect in achieving desired immunization rates (Kimmel et al., 1996). According to the “3C” model of vaccine hesitancy developed by WHO, convenience (structural barriers) present one of the most important component of vaccine hesitancy, besides confidence and complacency (MacDonald et al., 2015). This includes physical availability, affordability and willingness-to-pay, geographical accessibility, ability to understand (language and health literacy), the quality of the service (real and/or perceived) and the degree to which vaccination services are delivered at a time and place and in a cultural context that is convenient and comfortable	Bangura et al., 2020 Wilder-Smith et al., 2020 Alabadi et al., 2020 Kalaj et al. 2021

Governing entities	Recognition of the issue	Support from the system	Clear guidelines and recommendations for administering childhood vaccines by authorities	(MacDonald, 2015). Results of numerous studies suggest that perceived logistical barriers (such as inconvenient appointment location or timing) were significantly associated with vaccine refusal (Smith et al., 2017). Healthcare workers play important role in the implementation and administration of immunization programmes, so they should be strongly supported and encouraged to recommend vaccination to parents during routine visits.	Vadaparampil et al., 2016
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* Psychological drivers that are specifically inquired in parents

** Psychological driver specifically inquired in healthcare workers

3. OBJECTIVES

The purpose of this research is to identify key behaviour drivers and inform key stakeholders to better understand the factors that influence people's childhood immunization-related choices and practices in Kyrgyzstan. The objective is achieved by collecting and analysing data in two groups of respondents: parents/caregivers and healthcare workers in Kyrgyzstan. As per the above presented model and selected drivers (Figure 1 and Table 1) the research questions for both target groups investigated: 1) Which psychological drivers were significantly associated with childhood vaccine behaviour in parents and caregivers /HCWs? 2) Which sociological drivers were significantly associated with childhood vaccine behaviour in parents and caregivers/HCWs? 3) Which environmental drivers were significantly associated with childhood vaccine behaviour in parents and caregivers/HCWs?

Based on the findings of this research country-specific actionable recommendations for stakeholders and policy makers are formulated.

4. METHODS

4.1. Study design

Two cross-sectional studies were conducted through the collaborative research network of the EHG team, the UNICEF Kyrgyzstan office and the Rebicon team, under the supervision of the UNICEF Regional Office for Europe and Central Asia (ECARO). The first survey included adult parents/caregivers of children under five living in Kyrgyzstan and was conducted in September and October 2022, using Computer-Assisted Personal Interviewing (CAPI)¹¹ as a data collection mode. The second survey included healthcare workers from primary health care level in Kyrgyzstan and was conducted during the same period using the same methodology (CAPI).

4.2. Ethical considerations

All activities within the project were performed under the ethical principles elaborated in the UNICEF innocenti discussion paper Ethical Considerations when Applying Behavioural Science in Projects Focused on Children. Aside from that, the highest professional ESOMAR (European Society for Opinion and Marketing Research) and ISO (International Organization for Standardization) standards, concerning survey design, data collection, processing and analysis are strictly followed.

All questions are worded in such a way as to cause no harm (physical or psychological) to the participants. Questions relating to personal practice are worded in such a way as not to cause harm to anyone and in a neutral tone.

Ethical approval was obtained from the Ethics Committee of the Scientific and Production Association "Preventive Medicine" of the Ministry of Health of the Kyrgyz Republic¹² on 12 June 2022 (Protocol #7).

4.3. Sample description

To understand the factors influencing childhood immunisation behaviour, two samples were used targeting two different audiences (parents/carers and healthcare professionals).

A) Sample – parents/caregivers

Multi-stage stratified sampling was used to select respondents (parents/caregivers). The stratification was based on the following criteria:

- Oblasts of Kyrgyzstan, cities of Bishkek and Osh;
- Area type: urban/rural.

¹¹ Data collection by in-person (face-to-face) structured interviewers using tablets to administer the questionnaire and capture the answers.

¹² This Ethics Committee is a public organization under the Ministry of Health KR. It was established as an independent institution to protect the rights and health of patients, as well as other human subjects during medical and social research studies. The Ethics Committee has the right to request the results and information after the completion of the study in the form of a report or publication.

The sample distribution was based on the National Statistical Committee of the Kyrgyz Republic's breakdown of the permanent population aged 18 and over in early 2021¹³, as data on the number of households with children aged 0-5 are not publicly available. In order to survey 1000 parents/caregivers of children aged 0-5, 100 primary sampling units (PSUs) were selected for 10 interviews each. Primary sampling units consists of election precincts. A list of election precincts with a description of their boundaries is available on the website of the Central Election Commission (CEC)¹⁴.

The distribution of the population across regions is extremely heterogeneous. In addition, the results in the cities of republican significance, Bishkek and Osh, may differ considerably from the data in other regions. Therefore, for the purposes of analysis, the sample size for these cities was increased at the expense of Jalal-Abad, Osh and Chui Oblasts. To restore the structure of the general population, the weighting coefficients were calculated on the basis of the data of the National Statistical Committee data on the distribution of the population by regions.

Sampling of respondents for the category of parents/caregivers of children aged 0-5 years was carried out in four steps.

Step 1	<p>For oblasts: The sampling of the residential areas was carried out in each stratified group using the systematic PPS-method (sampling with probability proportional to size). The list of residential areas (urban and rural settlements) with the number of population is available on the website of the National Statistical Committee of the Kyrgyz Republic¹⁵. In order to ensure uniform coverage of the Oblasts territories, the sample was distributed among Rayons with a probability proportional to the number of the population in the Rayons. Then, Ayil Aimaks are selected in the same way in the rayons. Then, settlements are selected from the list of villages of the selected Aimaks. Settlements with small a number of inhabitants (500 or less) were excluded from the list of residential areas.</p> <p>For Bishkek and Osh cities: PSUs are randomly selected from the list of polling stations.</p>
Step 2 (PSU Sampling)	In residential areas with two or more election precincts, selection of the required number of participants was sampled from the precincts using systematic selection.
Step 3 (Household sampling)	Random systematic selection by route-based sampling ¹⁶ for households was applied with the fixed step ¹⁷ . Route sampling was based on the right-hand rule ¹⁸ . Only households with children aged 0-5 were selected.
Step 4 (Respondent sampling)	Members of the selected household aged 18+ and over who are the primary caregivers for children aged 0-5 (a child's mother or another household member). Only one respondent per household could be interviewed.

Participants were informed of the purpose of the study in the introductory part of the survey, and consent was implied by completing the questionnaire. Participants were free to stop responding to the survey at any time. Participants were given incentives for their

¹³ <http://www.stat.kg/ru/publications/demograficheskij-ezhegodnik-kyrgyzskoj-respubliki/>

¹⁴ <https://shailoo.gov.kg/ru/map/>

¹⁵ <http://www.stat.kg/ru/statistics/naselenie/>

¹⁶ An interviewer consecutively walks by households and selects certain households for the survey using a fixed interval (selection step).

¹⁷ In rural settlements/urban areas with private housing, the sampling step was 3. In apartment buildings in urban settlements, the sampling step is 5. Route starting point is the center of the election precinct or central administrative building.

¹⁸ Selection of the first household: an interviewer stands with her back in front of central entrance of the building identified as the starting point. Survey starts with the first residential house, located to the right of the starting point. If successful, the interviewer follows the route using a fixed interval, otherwise chooses the next household.

participation in the form of a vaccination calendar (magnet) for parents/caregivers and a notebook and pen with UNICEF logo for HCWs. The questionnaire took about 40 minutes to complete.

B) Sample – Health care workers (HCWs)

A list of medical institutions in Kyrgyzstan by health care level was obtained from the Republican Center for Health Promotion and Mass Communication (RCHP). The database of medical workers was not available (under development) at the time of the study. Data on the number of employees were obtained from the eHealth Center (EHC) - Report on Medical Personnel by Institution and Specialty (Form #17) as of 01.01.2022. From the data available/obtained, it was not possible to split the number of staff between primary and secondary levels. Therefore, the total number of GMPCs was used to calculate the sample, while interviews were only conducted with staff working at the primary healthcare level. As of 01.01.2022, there were four integrated FMCs in Bishkek. In 2022, there was a reorganization, and 10 FMCs were formed. The total number of FMCs in Bishkek was used to calculate the sample, as the total number of staff did not change.

The sample of physicians was calculated on the basis of the number of general practitioners, paediatricians, paediatric neonatologists, and neonatologists in primary and primary-secondary levels. As the vast majority of physicians are women (89%) with a sample size of 130 respondents, it was not appropriate to increase the number of men for gender analysis. The sample is self-weighted, i.e. distributed in proportion to the distribution of the general population.

The sample of nurses/feldshers who are closely involved in childhood immunization was calculated on a basis of the number of FMG nurses, vaccination nurses, feldshers, feldsher-midwives, and midwives in treatment and preventive health care organizations of primary and primary-secondary levels. The sample is self-weighted, i.e. distributed in proportion to the distribution of the general population.

The medical institutions were selected from the list of medical institutions obtained from the RCHP. The sample was distributed according to the number of staff. Medical institutions located in the territory of Rayons not covered by the household survey were excluded from the sample. According to the list of selected institutions, the interviewer first contacted the head of the selected medical institution to obtain lists of staff actually working at the time of the survey, excluding those on vacation, business trips, etc. The field manager randomly selected the number of staff to be interviewed. If the medical institution consisted of several structural units located in different localities, the employees living as close as possible to the localities covered by the household survey were invited to participate in the survey.

In total, 400 healthcare workers from primary health care level who are closely involved in childhood immunization were interviewed and included in the analysis.

4.4. Survey instruments

4.4.1. Design

In designing the questionnaire international standards and best practices, UNICEF and WHO BI guidance and protocols, and lessons learned from similar work done by UNICEF, WHO and other partners were followed. Desk research has been conducted and distinctive

clusters of vaccine behaviour drivers for each of four target populations have been identified and selected.

For each cluster a large number of items have been produced to reflect the theoretically based and identified drivers to cover the entire continuum of vaccination behaviour. Certain items were adopted or adjusted from the previously validated instruments (annexes 2 and 3). In addition, some drivers that had not been quantitatively measured in previous research were operationalized. Therefore, in order to include these drivers, the additional items were developed specifically for the purpose of this research study and operationalized based on the results of previous qualitative systematic reviews.

In addition to the section comprised of operationalized drivers (section C), the questionnaire contains the demographic part (Section DEM) which includes variables that, based on the past studies, could be considered significant determinants of the vaccine hesitancy in parents/caregivers and items measuring vaccination behaviour (section A), representing the outcome variable in this study. These items have been carefully developed according to test theoretical and item-response (e.g. item difficulty) considerations to ensure proper psychometric characteristics.

Content analysis was performed by panel of experts from the EHG research team and UNICEF Europe and Central Asia Regional Office (ECARO). The relevance and accuracy of the items were evaluated during several panel meetings; the items were adapted where necessary until consensus was reached.

To determine cross-cultural relevance and applicability to the context of Kyrgyzstan, a systematic translation and cross-cultural evaluation of the instrument was conducted. The original version of the instrument was translated from English to Russian and Kyrgyz language following the forward-backward translation procedure. The forward translation was done separately by one language expert and one public-health expert. The reconciliation team consisted of two public-health experts who reviewed the differences between the two initial translations, evaluating the conceptual and semantic equivalence and introducing the translated version. Conceptual and semantic equivalence assessment during this phase aimed to assure that, after the translation, the meaning of each item stays the same, and that the instruments in diverse languages are measuring identical theoretical constructs. This version of the questionnaire was used for the back-translation process which was provided by the language expert and public-health expert who did the translation separately. The two back-translations were reviewed and compared with the English forms resulting in the versions on which the face validity was examined.

Face validity was tested in a pilot study. The questionnaire was disseminated among a group of 10 members of an appropriate target population to assess clarity and comprehension of the items, by providing participants a checklist for the evaluation of each item. The following criteria were used for evaluating face validity: appropriateness, the clarity and unambiguity of items, the correct structuring of the sentences, appropriateness of font size, adequacy of instruction on the instrument, the structure of the instrument in terms of construction and format, appropriateness of difficulty level of the instrument for the participants, and reasonableness of items. Approaching agreement that the items were clear and easy to understand resulted in the final version of the questionnaire.

4.4.2. Variables

4.4.2.1. Parents/Caregivers

The comprehensive instrument employed in the study included:

1) **Socio-demographic**, part with ten items inquiring: parents' gender, age, education level, employment status, family financial status, marital status of the parent, type of settlement, region, number of children in the family, and gender of the child that information is given about.

2) **Vaccination behaviour** (outcome variable) was evaluated by five items with Yes/No/Don't know responses assessing routine immunization status of a child and using the check-list of vaccines from the national immunization calendar. Variable is divided in four categories: 1) parents who fully timely vaccinated children, 2) moderately hesitant parents, 3) highly hesitant parents, and 4) vaccine refusal parents.

Behaviour drivers for childhood vaccination included three sections:

3) Psychological drivers

3a) *Attitudes towards vaccine efficacy* measured by five-point two-item Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree" ($\alpha=0.89$). Higher score indicated more positive beliefs regarding childhood vaccines efficacy.

3b) *Attitudes towards vaccine safety* measured by five-point four-item Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree" ($\alpha=0.64$). Higher score indicated more positive beliefs regarding childhood vaccines safety.

3c) *Perceived danger of disease and likelihood of infection* measured by five-point three-item Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree" ($\alpha=0.67$). Higher score indicated perception of the danger of disease as stronger and likelihood of infection as higher.

3d) *Perceived societal trust* measured by five-point six-item Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree" ($\alpha=0.75$). Higher score indicated greater trust in societal factors.

3e) *Trust in different information sources* was evaluated by twelve items inquiring parents' trust in selected sources of information regarding childhood vaccines: scientific literature, national TV channels, regional TV channels, internet portals, You Tube channels, social networks (Facebook, Viber, WhatsApp), family, friends, family physician, physician appearing in the media, religious leaders, and government. Each item presented a five-point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree". Higher score indicated higher trust in certain source of information.

3f) *Knowledge regarding childhood vaccines* was assessed with true/false questions with a "Don't know" option. Higher score indicated better knowledge.

3g) *Beliefs related to perceived responsibility* was evaluated by two individual five-point two-items Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree". Higher score indicated stronger sense of personal responsibility.

3h) *Personal experience* was evaluated by two items assessing direct and indirect past personal experience using five-point agreement Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree". Higher score indicated greater trend of bad experience.

3i) *Alternative health beliefs and worldviews* were evaluated with five-point three-item Likert scale ranging from 1 “strongly disagree” to 5 “strongly agree” ($\alpha=0.68$). Higher score indicated stronger alternative health beliefs.

4) 4) Sociological drivers

4a) *Descriptive norms* were assessed by five-point Likert scale (ranging from 1 “very negative” to 5 “very positive”) items inquiring impact that various social influencers (family, friends, other parents, local leaders, National Health Authorities, Institute for Public Health, respondents themselves, community, religious leaders, healthcare providers, government) have on parents’ general attitudes about vaccination.

4b) *Descriptive norms* were assessed by five-point Likert scale (ranging from 1 “not at all important” to 5 “extremely important”) items inquiring perception of the importance that childhood vaccination has for various social influencers (family, friends, other parents, local leaders, National Health Authorities, Institute for Public Health, respondents themselves, community, religious leaders, healthcare providers, government) have on parents’ general attitudes about vaccination.

4c) *Injunctive norms* were assessed asking participants to pick three of the listed social influencers (family, friends, other parents, local leaders, National Health Authorities, respondent, community, religious leaders, healthcare providers, government) and rank them from 1 (highest) to 3 in order of influence.

4d) *Influence by gatekeepers* was evaluated with five-point four-item Likert scale ranging from 1 “strongly disagree” to 5 “strongly agree” ($\alpha=0.71$).

5) 5) Environmental drivers

5a) *Perceived lack of information* was evaluated with five-point four-item Likert scale ranging from 1 “strongly disagree” to 5 “strongly agree” ($\alpha=0.87$). Higher score indicated stronger feeling of the lack of information;

5b) *Use of the information sources* was evaluated by twelve items inquiring frequency of use of selected sources of information regarding childhood vaccines: scientific literature, national TV channels, regional TV channels, internet portals, YouTube channels, social networks (Facebook, Viber, WhatsApp), family, friends, family physician, physician appearing in the media, religious leaders, and government. Each item presented a five-point Likert scale ranging from 1 “never” to 5 “regularly”. Higher score indicated higher frequency of use of certain source of information.

5c) *Structural barriers* was evaluated with five-point six-item Likert scale ranging from 1 “strongly disagree” to 5 “strongly agree” ($\alpha=0.69$). Higher score indicated stronger structural barriers.

4.4.2.2. Healthcare workers

The comprehensive instrument employed in the study of HCWs’ vaccine behaviour and vaccine behaviour drivers included:

1) **Socio-demographic part** with ten items inquiring: gender, age, level of healthcare where HCW is working, profession (physician/nurse/technician), field of specialisation, years of practice, number of children in the family, and gender of the child that information is given about.

2) **Vaccination behaviour** (outcome variable) of healthcare workers' was evaluated in two aspects; vaccination behaviour in professional context and private vaccination behaviour.

2a) Vaccination behaviour in professional context was assessed by five-point six-item Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree". The items were subjected to Principal Component Analysis with Varimax rotation and two factors with eigenvalues 1.84 and 1.09 explaining 48.8% of the variance were extracted. Factor 1 included three items referring to the vaccine promotion and we named that subscale Childhood vaccine advocacy, while Factor 2 consisted of three items related to reluctance towards vaccines and the subscale was entitled Childhood vaccine hesitancy.

2b) Private vaccination behaviour was evaluated by multi-choice question with six options; items with Yes/No/Don't know responses assessing routine immunization status of a child. Answers are sorted in three categories: 1) parents who fully timely vaccinated the children, 2) moderately hesitant parents, 3) highly hesitant and vaccine refusal parents. In addition, the check-list of vaccines from the national immunization calendar was used and healthcare workers were asked to check the childhood vaccines they missed.

Behaviour drivers for childhood vaccination included three sections:

3) Psychological factors

3a) *Attitudes towards vaccine efficacy* measured by five-point two-item Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree" ($\alpha=0.83$). Higher score indicated more positive beliefs regarding childhood vaccines efficacy.

3b) *Attitudes towards vaccine safety* measured by five-point four-item Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree" ($\alpha=0.73$). Higher score indicated more positive beliefs regarding childhood vaccines safety.

3c) *Perceived danger of disease and likelihood of infection* measured by five-point two-item Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree" ($\alpha=0.58$). Higher score indicated perception of the danger of disease as stronger and likelihood of infection as higher.

3d) *Perceived societal trust* measured by five-point four-item Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree" ($\alpha=0.55$). Higher score indicated greater trust in societal factors.

3e) *Trust in different information sources* was evaluated by twelve items inquiring parents' trust in selected sources of information regarding childhood vaccines: Continual Medical Education (CME) on vaccines, international scientific and professional conferences, national scientific conferences, national scientific literature, international scientific literature, publications and guidelines of relevant national institutions and organizations, publications and guidelines of relevant international organizations, Public media: Trust in information sources, colleagues, social networks, government. Each item presented a five-point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree". Higher score indicated higher trust in certain source of information.

3f) *Knowledge regarding childhood vaccines* was assessed with eight true/false questions with a "Don't know" option. Higher score indicated better knowledge.

3g) *Beliefs related to perceived responsibility* was evaluated by two items assessing perceived responsibility related to patients' parents decisions and responsibility related to patients' parents advising, using five-point agreement Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree". Higher score indicated stronger sense of personal responsibility.

3h) *Healthcare workers' advocacy for vaccination* was measured by MovAd (Motivation for advocacy scale) (Vallée-Tourangeau et al., 2018) consisting of eleven five-point Likert-scale items ($\alpha=0.87$) classified in four dimensions: the sentiment that vaccination advocacy is important, the sentiment that it is impactful, the feeling of knowing how to advocate vaccination, and the sentiment of autonomy regarding the decision to advocate vaccination.

4) Sociological drivers

4a) *Descriptive norms* were assessed by five-point Likert scale (ranging from 1 "very negative" to 5 "very positive") items inquiring impact that various social influencers (family, friends, other parents, local leaders, National Health Authorities, respondents themselves, community, religious leaders, colleagues, government) have on healthcare workers' general attitudes about vaccination.

4b) *Injunctive norms* were assessed asking HCWs to pick three of the listed social influencers (family, friends, other parents, local leaders, National Health Authorities, respondent, community, religious leaders, peers/colleagues, government, Media (TV, radio, newspaper, internet)), and rank them from 1 (highest) to 3 in order of influence.

5) Environmental drivers

5a) *Healthcare workers perception of lack of information* was evaluated with five-point three-item Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree" ($\alpha=0.86$). Higher score indicated stronger feeling of the lack of information.

5b) *Healthcare workers perception of the support from the system* was evaluated with five-point five-item Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree" ($\alpha=0.86$).

4.5. Procedures

4.5.1. Field force

Four categories of personnel were involved in the data collection: field manager, supervisors, interviewers, and controllers. The criteria for selecting the personnel were their qualifications, communication skills, field experience, and knowledge of the area in which the research was conducted.

Based on the defined criteria, the following staff were recruited: 7 supervisors (one per each region surveyed and 54 interviewers (7-8 interviewers per each region), plus reserves. The reserves allowed for attrition or replacement of interviewers who might not be able to meet the needs of the project. All supervisors and interviewers were native Kyrgyz speakers.

The work of the interviewers was monitored by supervisors, who were familiar with the region to which they were assigned. The supervisors managed all the activities of the assigned interviewers and monitored their interviews. They all received specific project-related training, as described below. All interviewers received the training, which also

served as a screening process for qualified interviewers. The role of the supervisor was crucial in ensuring that interviewers met the high standards expected for this study. As such, defined common standards for supervision were set and supervisors were responsible for:

- Ensuring that all interviewers assigned to the project have the necessary knowledge and experience to work on the study,
- Ensuring that all interviewers attend the interviewer briefing and read the training materials,
- Supervising interviewers during data collection and providing feedback on their performance.
- Preparing the survey strategy, particularly with regard to the specificity of his/her region
- Carry out the selection of survey units, together with the interviewers (according to the instructions)
- Visiting several households together with the interviewer during the initial phase of the interview
- Controlling the accuracy of filling in the questionnaires (electronic form)
- Controlling work of the interviewers in the chosen households.

Field manager was responsible for conducting the training of supervisors and interviewers, providing additional explanations to supervisors and interviewers in the event of challenges in the field, and checking materials obtained from the fieldwork.

4.5.2. Engagement

Four project partners contributed to the achievement of the project goals: UNICEF Regional Office for Europe and Central Asia (ECARO), UNICEF country office in Kyrgyzstan, Euro Health Group, Denmark and Rebicon Research Group, Kyrgyzstan.

Conceptualization of the research and research methodology was developed by Euro Health Group, Denmark in consultation with UNICEF country office in Kyrgyzstan and UNICEF Regional Office for Europe and Central Asia (ECARO). Data collection process was prepared and conducted by Rebicon Research Group, Kyrgyzstan, supervised and supported by Euro Health Group, Denmark and UNICEF country office in Kyrgyzstan. Data analysis and research report development was carried out by Euro Health Group, Denmark. Overall coordination and supervision of the research was led by UNICEF Regional Office for Europe and Central Asia.

4.5.3. Training for the fieldwork

In preparation of the fieldwork two one-day trainings were organised. The first training was conducted in Bishkek, prior the pilot, face to face with all supervisors who would participate in the pilot survey. The second training was conducted prior to the main survey. Both trainings were led by Rebicon, with the Euro Health Group team support and in-country presence and was supervised by UNICEF Country Office in Kyrgyzstan.

The trainings covered a full briefing on the aims and objectives of the study, training on the sampling method, and detailed instructions on how the data collection should operate on the ground with special attention to contact data and quality control procedures. Each question in the questionnaire was analysed with the focus on uniform understanding of the question's meaning and how it is logically related to other questions. The ways how interviewers should deal with any refusals and "don't knows" were also discussed. The trainings also covered potential challenges and how to deal with different situations throughout data collection. This provided an opportunity to set out the data quality standards and procedures that would be required at the outset of the project.

All the interviewers have got I-pad with the survey application installed and had to complete several 'practice' interviews in the real settings (health facilities), so they could get familiar with the questionnaires and the script.

4.5.4. Pilot testing

The pilot survey was conducted to test all methods and procedures (including all questionnaires and interviewers), the clarity and applicability of the designed instruments, the comprehensiveness of the questions and the time required for responses. The pilot survey included 20 interviews in both Kyrgyz and Russian.

The health worker survey was conducted in a primary-secondary institution in Chui oblast at the GMPC in the town of Tokmok. This facility was selected as a primary-secondary facility with a sufficient number of staff to interview 10 health workers; it is relatively close to Bishkek, which allowed a team consisting of an EHG expert, Rebicon managers and interviewers to travel, and it was possible to agree with the head of the GMPC on the possibility of conducting the pilot in a short period of time. The parents/caregivers of children aged 0-5 pilot was conducted in the cities of Osh and Bishkek at the precincts selected for the study. The pilot included 10 face-to-face interviews in each of two target groups.

The pre-test was also used to gather interviewer feedback on the survey administration process and to ensure that the length of the survey did not lead to respondent fatigue and dropout. All interviewers assigned to the pre-test were given a briefing on the survey, which included the background to the survey, the purpose of the pre-test exercise, the contact procedures, the I-pads with the questionnaire application and the type and format of feedback required.

The pilot report detailed key feedback from the interviewer questionnaires and challenges encountered, and provided clear recommendations for the main fieldwork phase, including actionable solutions to potential problems. The research tools were revised and finalised in consultation with the EHG team and the UNICEF country office, based on the results of the testing.

4.5.5. Organisation of field work

For the survey with healthcare workers each health institution was contacted prior to the interviewers' visit to obtain permission to interview healthcare workers and to schedule the interviewers' visits. Where possible, the list of health care workers scheduled to work on the day of the visit was obtained in advance.

In the survey of parents/caregivers of children aged 0-5, once eligible respondents had been identified (aged 18 and over from households with children aged 0-5) has been identified, interviewers proceeded with the interview after respondents explicitly agreed to participate. No substitutions could be made once the individual had been selected. Wherever possible, the interview was conducted immediately. In situations where respondents were unavailable, the interview was rescheduled for another day or time and the interviewer made a repeat visit to the household (up to three visits at different times). All visits were recorded on the route registration form, including the time and outcome of the visit.

4.5.6. Quality assurance mechanisms for data collection

In order to ensure the quality of the data and to apply a unique methodology, the data collection process was standardised. This was ensured by: developing guidelines for the preparation and organisation of the survey, developing appropriate methodological guidelines for data collection (filling in the questionnaires), supervising the interview process, close cooperation and daily communication between supervisors and their teams of interviewers, reviewing the collected data on a daily basis, data processing.

Multi-staged control was applied:

- **GPS positioning:** Each interviewer was provided with a geo-locating equipment to identify the coordinates of surveyed household. The coordinates were sent to the head office and checked online by Rebicon's technical specialist. The geolocating equipment allowed the company to control the routes of the interviewers and their movements in the surveyed areas.
- **Actual interview checks:** Checks are carried out by telephone calls from controllers and by revisiting households in the field. 10% of the questionnaires were selected for telephone control checks and physical re-visits. During the control, the actual interview process was checked and the duration of the interview. Three control questions were asked and cross-checked with the answer given in the questionnaires.
- **Automated 100% control:** An automated 100% check was carried out using a mobile application. When designing a data collection form, logical and arithmetic checks are included wherever possible. These procedures helped to minimise input errors at the data collection stage.

Weekly fieldwork updates were provided by Rebicon to the EHG and UNICEF country office, providing an overview of progress with a brief written summary of any issues that arose and how they were being addressed.

4.6. Data analysis

4.6.1. Parents/Caregivers

The total score for the drivers measured by Likert scale was calculated by summing the responses to the items belonging to certain scale, and dividing that sum with their number. Items with negative connotation were reversely coded when calculating the total scores. In order to describe the prevalence of certain drivers, the total score range for each scale was divided in four quartiles: 1-1.99 (highly negative), 2-2.99 (moderately negative), 3-3.99 (moderately positive) and 4-5 (highly positive). Percentages, means and standard deviations were used to present these results.

Categorical variables were presented as frequencies and percentages. Original responses for two categorical variables (level of education and vaccination behaviour) were reduced to a smaller number of categories. Level of education was merged into 1) primary education and below, 2) secondary education, 3) college and 4) university. Vaccination behaviour was also collapsed into four groups: 1) parents who timely fully vaccinated their children, 2) moderately hesitant parents, 3) highly hesitant parents, and 4) vaccine refusing parents. In the regression analysis age was used as continuous variable, but in order to illustrate the differences in vaccination behaviour it was divided into four categories: 1) 18-27, 2) 28-37, 3) 38-47, and 4) 47+.

The association between the individual items and vaccination behaviour was verified by χ^2 test and the Fisher exact test (in case the number of participants in a group is lower than 5). In order to establish how parents belonging to diverse socio-demographic groups differ in their perception of various vaccine behaviour drivers, the Mann-Whitney U or Kruskal-Wallis test is used.

The association between thinking styles and other psychological variables was assessed with linear regression analysis. Multivariate analysis contained variables that were significant in univariate analyses ($p < 0.05$).

Two binary logistic regression models were developed to ensure a more comprehensive understanding of the drivers influencing vaccination behaviour. The first model was constructed to estimate the behaviour drivers by comparing moderately vaccine hesitant parents with those who timely fully vaccinated their children. The second model estimated behaviour drivers by comparing highly vaccine hesitant parents with parents who timely fully vaccinated their children. In order to include categorical variables with multiple values in the regression models dummy variables were created. Variables exhibiting significant associations in univariate analyses ($p < 0.05$) were then used in multivariate analyses in both models.

All analyses were performed in Statistical Package for Social Sciences (SPSS) for Windows, version 25 (IBM Corp., Armonk, NY) and $p < 0.05$ was considered statistically significant.

4.6.2. Healthcare workers

The total score for the drivers measured by Likert scale was calculated by summing the responses to the items belonging to certain scale, and dividing that sum by their number. Items with negative connotation were reversely coded when calculating the total scores. In order to describe the prevalence of certain drivers, the total score range for each scale was divided in four quartiles: 1-1.99 (highly negative), 2-2.99 (moderately negative), 3-3.99 (moderately positive) and 4-5 (highly positive). Percentages, means and standard deviations were used to present these results.

Categorical variables were presented as frequencies and percentages. Original responses for private vaccination behaviour of HCWs was merged into three groups: 1) HCWs who timely fully vaccinated their children, 2) moderately hesitant HCWs, and 3) highly hesitant and vaccine refusing HCWs.

The association between the individual items and private vaccination behaviour was verified by χ^2 test and the Fisher exact test (in case the number of participants in a group is lower than 5). In order to establish how parents belonging to diverse socio-demographic groups differ in their perception of various vaccine behaviour drivers, the Mann-Whitney U or Kruskal-Wallis test is used.

The association between different groups of drivers (psychological, sociological and environmental) and vaccination behaviour (vaccine promotion, and vaccine hesitancy respectively), was assessed with linear regression analysis. Linear regression analysis was also employed to establish the relationship between thinking styles and other psychological variables. Multivariate analysis contained variables that were significant in univariate analyses ($p < 0.05$).

All analyses were performed in Statistical Package for Social Sciences (SPSS) for Windows, version 25 (IBM Corp., Armonk, NY) and $p < 0.05$ was considered statistically significant.

4.7. Limitations of the research

The team identified several limitations to the research:

- A cross-sectional study cannot assess possible causality between a predictor variable (behavioural drivers) and an outcome variable (vaccine behaviour).
- Limitations of self-reported vaccination decision estimates include the possibility of recall bias and social desirability bias.
- Although the survey was designed to be representative of the population of parents/caregivers in Kyrgyzstan, the sample of parents/caregivers can be considered biased, as the proportion of male participants is extremely low. Only 34 men (3.4% of the total sample of parents) were recruited, mainly because the mother was the main caregiver while the men were either at work or abroad. Taking this into account, we omitted comparison of parents by gender.
- Similarly, as most physicians working at the primary health care level are women (with only 4% of the total number of physicians working at the primary health care being men) and even 98% of nursing staff are women, the proportion of male participants recruited for among HCWs was extremely low - only 10 (2.5%) men were recruited from the total sample of HCWs. Taking this into account, we omitted comparison of HCWs by gender.

5. RESULTS OF THE RESEARCH ON PARENTS/CAREGIVERS

5.1. Description of the sample of parents/caregivers

Almost all of interviewed parents/caregivers were female (96.6%, n=966), and age ranged from 19 to 70. More than one third of them had secondary education (38.2%, n=382), somewhat more than one third held university degree (27.9%, n=279), while 9.1% (n=91) had basic education only. The largest number of parents/caregivers were unemployed (70.5%, n=705), and just 13.7% (n=137) were full-time employed. Most described their financial situation as average (53.9%, n=539) or good (40.1%, n=401). The majority of parents/caregivers were married (95.9%, n=959) and more than half of them lived in rural areas (52.0%, n=520). Most of them had one (20.7%, n=207), two (25.9%, n=259) or three children (27.2%, n=272). In 11.4% (n=106) of cases gained data referred to the vaccine behaviour in relation to boy being the only child, and in 10.8% (n=101) of the cases referred to the vaccine behaviour with respect to the girl being the only child.

Table 1. Description of the sample of parents/caregivers

Variables	N	%
Gender		
Male	34	3.4%
Female	966	96.6%
Age		
18-28	385	38.5%
29-49	562	56.2%
50+	53	5.3%
Education		
Basic education	91	9.1%
Secondary education	382	38.2%
Basic and secondary vocational education	210	21%
Incomplete university	38	3.8%
University	279	27.9%
Employment		
Unemployed	705	70.5%
Part-time employed	57	5.7%
Full-time employed	137	13.7%
Self-employed	73	7.3%
Pensioner	28	2.8%
Financial situation		
Very good	46	4.6%
Good	401	40.1%
Average	539	53.9%
Bad	11	1.1%
Very bad	2	0.2%

Relationship status		
Single	11	1.1%
Married	959	95.9%
Divorced	16	1.6%
Widowed	14	1.4%
Settlement		
Urban	480	48%
Rural	520	52%
Region		
Batken	80	8.0%
Jalal-Abad	130	13.0%
Issyk-Kul	80	8.0%
Naryn	40	4.0%
Osh	130	13.0%
Talas	40	4.0%
Chuy	130	13.0%
Bishkek	250	25.0%
Osh	120	12.0%
Number of children		
One	207	20.7%
Two	259	25.9%
Three	272	27.2%
Four	175	17.5%
Five	67	6.7%
Six	12	1.2%
Seven	4	0.4%
Eight	3	0.3%
Nine	1	0.1%
Child that information is given about		
Girl	101	10.8%
Boy	106	11.4%
Girl-one of more children	112	12.0%
Boy-one of more children	614	65.8%

5.2. Vaccination behaviour in parents/caregivers/caregivers

The majority of parents/caregivers reported that they vaccinated their child on time and according to the vaccination calendar (86.8%, n=866), while 5.1% (n=51) were moderately hesitant; they delayed the administration of one or more mandatory vaccines, but still fully vaccinated their child. Additional 3.1% (n=31) were highly hesitant, vaccinating their child with some, but refusing to vaccinate their child with one or more mandatory vaccines. In addition, 5% (n=50) of the parents/caregivers reported that their child had not received any vaccines.

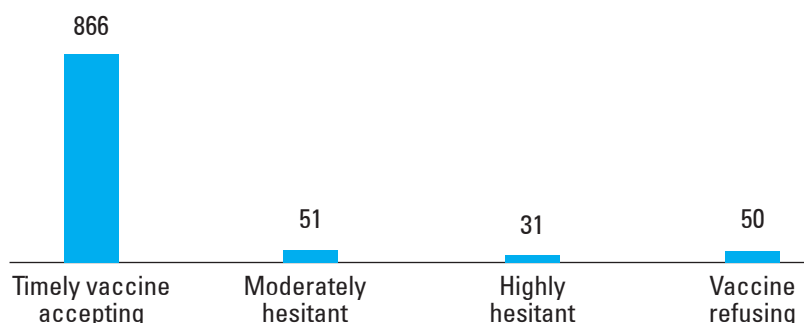


Figure 4. Vaccination behaviour in parents/caregivers/caregivers

A statistically significant difference in vaccination behaviour was found between diverse settlements. Parents/caregivers from rural areas (91.5%, n=476) were significantly more likely to vaccinate their children on time according to the vaccination calendar, than parents/caregivers from urban areas (81.6%, n=390).

The percentage of vaccine refusal is slightly higher among parents/caregivers who started university but did not graduate (7.9%, n=3), among those who rated their income as low (18.0%, n=2), and among those living in Issyk-Kul (10.0%, n=8) and Bishkek (8.1%, n=20).

Table 2. Description of vaccination behaviour according to different socio-demographics.

		Fully timely vaccinated	Moderately hesitant	Highly hesitant	Vaccine refusal	Total	p
		N (%)	N (%)	N (%)	N (%)	N (%)	
Parents/ caregivers' age	18-28	334 (87.0%)	17 (4.4%)	16 (4.2%)	17 (4.4%)	384 (100%)	N/A
	29-49	486 (86.6%)	32 (5.7%)	13 (2.3%)	30 (5.3%)	561 (100%)	
	50+	46 (86.8%)	2 (3.8%)	2 (3.8%)	3 (5.7%)	53 (100%)	
Education level	Basic education	82 (90.1%)	1 (1.1%)	6 (6.6%)	2 (2.2%)	91 (100%)	N/A
	Secondary education	326 (85.3%)	20 (5.2%)	11 (2.9%)	25 (6.5%)	382 (100%)	
	Basic and secondary vocational education	185 (88.5%)	8 (3.8%)	3 (1.4%)	13 (6.2%)	209 (100%)	
	Incomplete university	31 (81.6%)	2 (5.3%)	2 (5.3%)	3 (7.9%)	38 (100%)	
	University	242 (87.1%)	20 (7.2%)	9 (3.2%)	7 (2.5%)	278 (100%)	
Income	Very good	40 (87.0%)	1 (2.2%)	0 (0.0%)	5 (10.9%)	46 (100%)	N/A
	Good	360 (90.2%)	16 (4.0%)	9 (2.3%)	14 (3.5%)	399 (100%)	
	Average	455 (84.4%)	33 (6.1%)	22 (4.1%)	29 (5.4%)	539 (100%)	
	Bad	8 (72.7%)	1 (9.1%)	0 (0.0%)	2 (18.2%)	11 (100%)	
	Very bad	2 (100%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (100%)	

Marital status	Single	10 (90.9%)	0 (0.0%)	1 (9.1%)	0 (0.0%)	11 (100%)	N/A
	Married	831 (86.8%)	49 (5.1%)	29 (3.0%)	48 (5.0%)	957 (100%)	
	Divorced	14 (87.5%)	0 (0.0%)	0 (0.0%)	2 (12.5%)	16 (100%)	
	Widowed	11 (78.6%)	2 (14.3%)	1 (7.1%)	0 (0.0%)	14 (100%)	
Settlement	Urban	390 (81.6%)	32 (6.7%)	22 (4.6%)	34 (7.1%)	478 (100%)	<0.01
	Rural	476 (91.5%)	19 (3.7%)	9 (1.7%)	16 (3.1%)	520 (100%)	
Region	Batken	75 (93.8%)	3 (3.8%)	0 (0.0%)	2 (2.5%)	80 (100%)	N/A
	Jalal-Abad	127 (97.7%)	1 (0.8%)	1 (0.8%)	1 (0.8%)	337 (100%)	
	Issyk-Kul	64 (80.0%)	7 (8.8%)	1 (1.3%)	8 (10.0%)	80 (100%)	
	Naryn	40 (100%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	40 (100%)	
	Osh	122 (93.8%)	6 (4.6%)	1 (0.8%)	1 (0.8%)	130 (100%)	
	Talas	38 (95.0%)	1 (2.5%)	0 (0.0%)	1 (2.5%)	40 (100%)	
	Chuy	107 (82.3%)	6 (4.6%)	7 (5.4%)	10 (7.7%)	130 (100%)	
	Bishkek	187 (75.4%)	23 (9.3%)	18 (7.3%)	20 (8.1%)	248 (100%)	
	Osh	106 (88.3%)	4 (3.3%)	3 (2.5%)	7 (5.8%)	120 (100%)	
Child that information is given about	Girl-only child	94 (93.1%)	4 (4.0%)	3 (3.0%)	0 (0.0%)	101 (100.0%)	N/A
	Boy-only child	94 (88.7%)	5 (4.7%)	3 (2.8%)	4 (3.8%)	106 (100%)	
	Girl-one of more children	93 (83.0%)	6 (5.4%)	4 (3.6%)	9 (8.0%)	112 (100.0%)	
	Boy-one of more children	531 (86.8%)	34 (5.6%)	17 (2.8%)	30 (4.9%)	612 (100.0%)	

The interviewed parents/caregivers postponed the DTP vaccine to the greatest extent. Less than 5% (4.1%, n=41) of the parents/caregivers surveyed had postponed the DTP vaccine, either intentionally or unintentionally. Of these, 61.0% (n=25) intentionally missed the vaccination, while 39.0% (n=16) reported that it happened unintentionally. Somewhat a smaller number of parents/caregivers postponed the DTP-IPV-HiB (2.5%, n=25), but among them also there was similar proportion of those who missed the vaccine intentionally (56%, n=14), compared with those who missed it unintentionally (44.0%, n=11).

Smaller, approximately equal proportion of the total number of parents/caregivers being surveyed postponed PCV (1.8%, n=18), MMR (1.7%, n=17) and OPV/Polio (1.4%, n=14) vaccines, and the percentage of these who intentionally missed them ranged from 41.2% to 50.0%.

The lowest percentage of surveyed parents/caregivers postponed BCG vaccines (0.4%, n=4).

Table 3. Number of postponed/missed vaccines

	Intentionally postponed/ missed	Unintentionally postponed	Total
Vaccines	N (%)	N (%)	N (%)
BCG	2 (50.0%)	2 (50.0%)	4 (100%)
DTP-IPV-HiB	14 (56.0%)	11 (44.0%)	25 (100%)
DTP	25 (61.0%)	16 (39.0%)	41 (100%)

PCV	9 (50.0%)	9 (50.0%)	18 (100%)
RV	7 (58.3%)	5 (41.7%)	12 (100%)
Hepatitis B	7 (58.3%)	5 (41.7%)	12 (100%)
OPV/Polio	7 (50.0%)	7 (50.0%)	14 (100%)
MMR	7 (41.2%)	10 (58.8%)	17 (100%)

5.3. Psychological factors

According to BDM psychological factors refer to individual cognitive and emotional drivers of health behaviours. Applying the criteria described in the introduction section we selected 9 indicators of psychological factors related to childhood vaccination behaviour: perceived vaccine efficacy, perceived vaccine safety, perceived danger of disease and likelihood of infection, trust in societal factors, trust in information sources, knowledge, perceived responsibility, past experience, and alternative health beliefs and worldviews.

5.3.1. Parents'/caregivers' perception of vaccine efficacy

In general, attitudes towards vaccine efficacy among the interviewed parents/caregivers are highly positive (Mean=4.10, SD=0.78), whereby even more than one third of them (36.5%, n=358) consider childhood vaccines to be completely efficient.

While one third of the parents/caregivers (31.5 %, n=312) strongly believe that childhood vaccines are important for their child's health, only 2.1% (n=21) strongly opposes this view. Also, more than a quarter of the parents/caregivers (26.9%, n=265) strongly agree that vaccines do a good job in preventing the diseases they are supposed to prevent, while just 2.3% (n=23) of them strongly disagree with this perspective.

Table 4. Distribution of parents/caregivers' scores on individual items of attitudes towards vaccine efficacy according to vaccination behavior.

Items		Vaccination Behavior				Total	p
		Timely vaccine accepting	Moderately hesitant	Highly hesitant	Vaccine refusing		
		N (%)	N (%)	N (%)	N (%)	N (%)	
C1.1.1 I believe that childhood vaccines are important for my child's health.	Strongly disagree	1 (0.1%)	3 (5.9%)	7 (24.1%)	10 (20.4%)	21 (2.1%)	<0.01
	Disagree	8 (0.9%)	4 (7.8%)	6 (20.7%)	18 (36.7%)	36 (3.6%)	
	Neither disagree nor agree	33 (3.8%)	9 (17.6%)	3 (10.3%)	2 (4.1%)	47 (4.7%)	
	Agree	531 (61.6%)	23 (45.1%)	6 (20.7%)	15 (30.6%)	575 (58%)	
	Strongly agree	289 (33.5%)	12 (23.5%)	7 (24.1%)	4 (8.2%)	312 (31.5%)	
	Total	862 (100%)	51 (100%)	29 (100%)	49 (100%)	991 (100%)	

C1.1.2 I believe that vaccines do a good job in preventing the diseases they are supposed to prevent.	Strongly disagree	5 (0.6%)	3 (6.4%)	6 (20.7%)	9 (18.8%)	23 (2.3%)	<0.01
	Disagree	7 (0.8%)	4 (8.5%)	5 (17.2%)	16 (33.3%)	32 (3.2%)	
	Neither disagree nor agree	44 (5.1%)	7 (14.9%)	6 (20.7%)	5 (10.4%)	62 (6.3%)	
	Agree	555 (64.5%)	26 (55.3%)	6 (20.7%)	16 (33.3%)	603 (61.2%)	
	Strongly agree	250 (29.0%)	7 (14.9%)	6 (20.7%)	2 (4.2%)	265 (26.9%)	
	Total	861 (100%)	47 (100%)	29 (100%)	48 (100%)	985 (100%)	

Parents/caregivers who timely vaccinated their children (Mean=4.24) had significantly stronger belief in vaccine efficacy compared to moderately (Mean=3.70) and highly hesitant (Mean=2.98) parents/caregivers, and vaccine refusal (Mean=2.70) as well. Among parents/caregivers who vaccinated their children on time 33.5% (n=289) strongly agreed that childhood vaccines are important for their child's health, whereas this belief was less supported among moderately (23.5%, n=12), and highly hesitant parents/caregivers (24.1%, n=7), as well as among vaccine refusal (8.2%, n=4). Similarly, the belief that vaccines do a good job in preventing the diseases they are supposed to prevent, was strongly supported by 29.0% (n=250) of parents/caregivers who timely vaccinated their child. Moderately hesitant (14.9%, n=7), highly hesitant (20.7%, n=6), and vaccine refusal parents/caregivers (4.2%, n=2) were less prone to strongly support this view.

Table 5. Differences in attitudes towards vaccine efficacy between the parents/caregivers exhibiting different vaccine behaviour

Vaccination Behavior	N	Mean	SD	Min	Max	p
Timely vaccine accepting	858	4.24	0.50	1.00	5.00	< 0.01
Moderately hesitant	47	3.70	0.15	1.00	5.00	
Highly hesitant	27	2.98	0.29	1.00	5.00	
Vaccine refusal	48	2.70	0.18	1.00	5.00	

Although it can be noted that older participants considered vaccines to be efficient to greater extent, differences among parents/caregivers belonging to the diverse age groups were not statistically significant. Parents/caregivers with basic and secondary vocational education (Mean=4.26) put more trust in the vaccine efficacy compared to those with basic (Mean=4.13), secondary (Mean=4.07), incomplete university (Mean=3.85) and university (Mean=4.06) education (p<0.01).

The results of this study suggest that there were no statistically significant differences in attitudes towards vaccine efficacy between parents/caregivers living in urban and rural areas.

Table 6. Differences in perception of vaccine efficacy between diverse groups of parents/caregivers

	N	Mean	SD	Min	Max	p
Parents/caregivers' age						
18-28	377	4.06	0.80	1.00	500	0.333
29-49	553	4.12	0.79	1.00	500	
50+	52	4.72	0.57	1.00	500	
Education						
Basic education	90	4.13	0.63	1.00	500	< 0.01
Secondary education	372	4.07	0.79	1.00	500	
Basic and secondary vocational education	207	4.26	0.91	1.00	500	
Incomplete university	38	3.85	0.91	1.00	500	
University	275	4.06	0.85	1.00	500	
Settlement						
Urban	464	4.00	0.95	1.00	500	0.151
Rural	518	4.19	0.58	1.00	500	

5.3.2 Parents'/caregivers' perception of vaccine safety

Overall, attitude towards vaccine safety was moderately positive among the parents/caregivers interviewed in this study (Mean=3.81, SD=0.63).

Less than one quarter of the parents/caregivers (16.9%, n=167) strongly believe that childhood vaccines are safe overall, while 1.6% (n=16) of them strongly oppose that opinion. In addition, 8.0% (n=77) of parents/caregivers strongly agreed that children get more shots than is good for them. Only 12.5% (n=111) of parents/caregivers strongly supported the opinion that there is no connection between vaccines and autism, while even 73.7% (n=657) of them supported this view. A total of 19.7% (n=192) of parents/caregivers agreed or strongly agreed that they doubt the safety of certain vaccines, and 13.3% (n=130) were unsure whether vaccines are safe.

Table 7. Distribution of parents/caregivers' scores on individual items of attitudes towards vaccine safety according vaccination behavior.

Items		Vaccination Behavior				Total	p
		Timely vaccine accepting	Moderately hesitant	Highly hesitant	Vaccine refusing		
		N (%)	N (%)	N (%)	N (%)	N (%)	
C1.2.1 Overall, I believe that vaccines are safe.	Strongly disagree	1 (0.1%)	1 (2.0%)	5 (16.7%)	9 (18.4%)	16 (1.6%)	<0.01
	He Disagree	53 (6.2%)	9 (17.6%)	6 (20.0%)	15 (30.6%)	83 (8.4%)	

	Neither disagree nor agree	101 (11.7%)	9 (17.6%)	8 (26.7%)	9 (18.4%)	127 (12.8%)	
	Disagree	551 (64.1%)	25 (49.0%)	9 (30.0%)	12 (24.5%)	597 (60.3%)	
	Genderностью Disagree	154 (17.9%)	7 (4.2%)	2 (6.7%)	4 (8.2%)	167 (16.9%)	
	Total	860 (100.0%)	51 (100.0%)	30 (100.0%)	49 (100.0%)	990 (100.0%)	
C1.2.2 I think that children get more shots than is good for them.*	Strongly disagree	72 (8.6%)	1 (0.1%)	0 (0.0%)	1 (2.2%)	74 (7.7%)	<0.01
	He Disagree	285 (33.9%)	15 (34.1%)	11 (25.5%)	11 (24.4%)	322 (33.5%)	
	Neither disagree nor agree	104 (12.4%)	8 (18.2%)	3 (9.7%)	6 (13.3%)	121 (12.6%)	
	Disagree	312 (37.1%)	19 (43.2%)	16 (51.6%)	20 (44.4%)	367 (38.2%)	
	Genderностью Disagree	68 (8.1%)	1 (2.3%)	1 (3.2%)	7 (15.6%)	77 (8.0%)	
	Total	841 (100.0%)	44 (100.0%)	31 (100.0%)	45 (100.0%)	961 (100.0%)	
C1.2.3 I believe that there is no connection between vaccines and autism	Strongly disagree	0 (0.0%)	3 (7.5%)	1 (4.3%)	2 (5.4%)	6 (0.7%)	<0.01
	He Disagree	0 (0.0%)	10 (25.0%)	5 (21.7%)	4 (10.8%)	19 (2.1%)	
	Neither disagree nor agree	77 (9.7%)	7 (17.5%)	5 (21.7%)	9 (24.3%)	98 (11.0%)	
	Disagree	608 (76.9%)	18 (45.0%)	11 (47.8%)	20 (54.1%)	657 (73.7%)	
	Genderностью Disagree	106 (13.4%)	2 (5.0%)	1 (4.3%)	2 (5.4%)	111 (12.5%)	
	Total	791 (100.0%)	40 (100.0%)	23 (100.0%)	37 (100.0%)	891 (100.0%)	
	Strongly disagree	133 (15.7%)	3 (6.0%)	1 (3.2%)	2 (4.1%)	139 (14.2%)	
C1.2.4 I doubt the safety of certain vaccines.	He Disagree	488 (57.5%)	16 (32.0%)	6 (19.4%)	8 (16.3%)	518 (52.9%)	<0.01
	Neither disagree nor agree	111 (13.1%)	8 (16.0%)	6 (19.4%)	5 (10.2%)	130 (13.3%)	
	Disagree	111 (13.1%)	22 (44.0%)	13 (41.9%)	21 (42.9%)	167 (17.1%)	
	Genderностью Disagree	6 (0.7%)	1 (2.0%)	5 (16.1%)	13 (26.5%)	25 (2.6%)	
	Total	849 (100.0%)	50 (100.0%)	31 (100.0%)	49 (100.0%)	979 (100.0%)	

Again, as in the case of vaccine efficacy, parents/caregivers who timely vaccinated their child had the most positive attitudes towards vaccine safety (Mean=3.91), while the most negative attitudes were observed in vaccine-refusing parents/caregivers (Mean=2.88).

Compared with the parents/caregivers who timely vaccinated their child (17.9%, n=154), those who were moderately (4.2%, n=7) and highly hesitant (6.7%, n=2), or were vaccine-refusal (8.2%, n=4) believed to a lesser extent that childhood vaccines are generally safe. Claim that children get more shots than is good for them was strongly supported by 8.1% (n=68) of parents/caregivers who timely vaccinated their child, 43.2% (n=19) of moderately hesitant parents/caregivers, 51.6% (n=16) of highly hesitant and 44.4% (n=20) of vaccine-

refusal. A large number of parents/caregivers (90.3%; n=74) of vaccine accepting, 50% (n=20) of moderately hesitant, 52,1% (n=12), and 59.5% (n=22) of vaccine refusing) believed that there is no connection between childhood vaccination and autism. Less percent of vaccine accepting parents/caregivers (13.8, n=117) doubted the safety of certain vaccines, compared to moderately hesitant (46%, n=23), highly hesitant (59.0%, n=18) and vaccine refusing parents/caregivers (69.4%, n=34).

Table 8. Differences in perception of vaccine safety between the parents/caregivers exhibiting different vaccine behaviour

Vaccination Behavior	N	Mean	SD	Min	Max	p
Timely vaccine accepting	777	3.91	0.51	2.25	5.00	< 0.01
Moderately hesitant	39	3.24	0.62	1.67	4.67	
Highly hesitant	22	3.02	0.78	1.67	4.67	
Vaccine refusal	37	2.88	0.76	1.00	5.00	

Parents/caregivers who expressed doubts about vaccines were also asked to specify which vaccines they had doubts about. The largest number of parents/caregivers, even 66 of them, suspected the safety of the DTP-IPV-HiB vaccine. Furthermore, 59 parents/caregivers doubted the safety of DTP, while 57 of them questioned the safety of BCG. The least number of parents/caregivers doubted the safety of OPV/Polio (n=34) and DT vaccine (n=37).

In all cases, out of the total number of parents/caregivers who doubted the safety of vaccines, the largest percentage are vaccine accepting and vaccine refusing parents/caregivers.

Table 9. Distribution of parents/caregivers doubting the safety of certain vaccines.

Vaccines	Vaccination Behavior				Total
	Timely vaccine accepting	Moderately hesitant	Highly hesitant	Vaccine refusing	
	N (%)	N (%)	N (%)	N (%)	N (%)
BCG	36 (63.2%)	1 (1.8%)	5 (8.8%)	15 (26.3%)	57 (100%)
DTP-IPV-HiB	31 (47.0%)	5 (7.6%)	12 (18.2%)	18 (27.3%)	66 (100%)
PCV	20 (40.8%)	5 (10.2%)	7 (14.3%)	17 (34.7%)	49 (100%)
RV	16 (40.0%)	5 (12.5%)	6 (15.0%)	13 (32.5%)	40 (100%)
DTP	27 (45.8%)	9 (15.3%)	9 (15.3%)	14 (23.7%)	59 (100%)
Hepatitis B	18 (42.9%)	4 (9.5%)	7 (16.7%)	13 (31.0%)	42 (100%)
KPK	17 (37.8%)	4 (8.9%)	8 (17.8%)	16 (35.6%)	45 (100%)
OPV/Polio	12 (35.3%)	3 (8.8%)	6 (17.6%)	13 (38.2%)	34 (100%)
DT	12 (32.4%)	2 (5.4%)	9 (24.3%)	14 (37.8%)	37 (100%)
Other	0 (0.0%)	16 (94.1%)	1 (5.9%)	0 (0.0%)	17 (100%)

There were statistically significant differences in the perception of childhood vaccine safety with regard to the settlement ($p < 0.05$); parents/caregivers living in rural areas considered vaccines to be more safe (Mean=3.88) compared to those living in urban areas (Mean=3.74).

Table 10. Differences in perception of vaccine safety between diverse groups of parents/caregivers.

	N	Mean	SD	Min	Max	p
Parents/caregivers' age						
18-28	333	3.80	0.65	1.00	5.00	0.105
29-49	497	3.84	0.62	1.67	5.00	
50+	46	3.69	0.61	2.33	5.00	
Education						
Basic education	81	3.80	0.44	2.67	4.67	0.695
Secondary education	337	3.85	0.58	1.67	5.00	
Basic and secondary vocational education	191	3.83	0.66	1.67	5.00	
Incomplete university	31	3.69	0.82	1.00	5.00	
University	236	3.78	0.69	1.67	5.00	
Settlement						
Urban	402	3.74	0.71	1.00	5.00	<0.05
Rural	474	3.88	0.55	1.67	5.00	

5.3.3 Parents'/Caregivers' perception of danger of disease and likelihood of infection

According to the results of this study, parents/caregivers estimate that there is a moderately high danger of diseases that children are vaccinated against (M=3.56; SD=0.94).

Less than a quarter of the surveyed parents/caregivers (17.8%, n=176) strongly agreed or agreed that vaccination is unnecessary because many vaccine preventable diseases are no longer common, while 30.4% (n=300) strongly supported or supported the opinion that many of the diseases against which children are being vaccinated are not serious and can be overcome by natural immunity. More than half of them (52.6%, n=512) strongly believed or believed that their child has a very low risk of contracting any of the vaccine preventable diseases.

Table 11. Distribution of parents'/caregivers' scores on individual items of perceived danger of disease and likelihood of infection according to vaccination behaviour.

Items		Vaccination Behavior				Total	p
		Timely vaccine accepting	Moderately hesitant	Highly hesitant	Vaccine refusing		
		N (%)	N (%)	N (%)	N (%)	N (%)	
C1.3.1 I believe that vaccination is unnecessary because many vaccine preventable diseases are not common anymore.	Strongly disagree	179 (20.9%)	5 (10.2%)	6 (19.4%)	5 (10.6%)	195 (19.8%)	<0.01
	Disagree	492 (57.3%)	26 (53.1%)	8 (25.8%)	8 (17.0%)	534 (54.2%)	
	Neither disagree nor agree	63 (7.3%)	8 (16.3%)	3 (9.7%)	6 (12.8%)	80 (8.1%)	
	Agree	120 (14.0%)	9 (18.4%)	11 (35.5%)	18 (38.3%)	158 (16.0%)	
	Strongly agree	4 (0.5%)	1 (2.0%)	3 (9.7%)	10 (21.3%)	18 (1.8%)	
	Total	858 (100.0%)	49 (100.0%)	31 (100.0%)	47 (100.0%)	985 (100.0%)	

C1.3.2 I think that many of the diseases against which children are being vaccinated are not serious and can be overcome by natural immunity.	Strongly disagree	146 (17.1%)	2 (4.0%)	1 (3.2%)	1 (2.0%)	346 (15.2%)	<0.01
	Disagree	392 (45.8%)	22 (44.0%)	6 (19.4%)	4 (8.0%)	424 (43.0%)	
	Neither disagree nor agree	100 (11.7%)	5 (10.0%)	3 (9.7%)	5 (10.0%)	113 (11.4%)	
	Agree	209 (24.4%)	16 (32.0%)	10 (32.3%)	24 (48.0%)	259 (26.2%)	
	Strongly agree	9 (1.1%)	5 (10.0%)	11 (35.5%)	16 (32.0%)	41 (4.2%)	
	Total	856 (100.0%)	50 (100.0%)	31 (100.0%)	50 (100.0%)	987 (100.0%)	
C1.3.3 I believe my child has a very low risk of contracting any of the vaccine preventable diseases*	Strongly disagree	31 (3.7%)	1 (2.1%)	0 (0.0%)	3 (6.3%)	35 (3.6%)	0.096
	Disagree	281 (33.1%)	19 (39.6%)	9 (30.0%)	16 (33.3%)	325 (33.3%)	
	Neither disagree nor agree	76 (9.0%)	7 (14.6%)	9 (30.0%)	11 (22.9%)	103 (10.6%)	
	Agree	368 (43.3%)	20 (41.7%)	9 (30.0%)	14 (29.2%)	411 (42.2%)	
	Strongly agree	93 (11.0%)	1 (2.1%)	3 (10.0%)	4 (8.3%)	101 (10.4%)	
	Total	849 (100.0%)	48 (100.0%)	30 (100.0%)	48 (100.0%)	975 (100.0%)	

Parents/caregivers who timely vaccinated their child had a more serious comprehension of the danger of vaccine preventable diseases (Mean=3.69) compared to moderately (Mean=3.24) and highly hesitant (Mean=2.66) parents/caregivers, and vaccine refusal (Mean=2.29) as well. The degree to which vaccine preventable diseases were perceived to be serious decreased as vaccine hesitancy increased.

Compared to the parents/caregivers who timely vaccinated their child (14.5%, n=124), moderately hesitant (20.4%, n=10), highly hesitant (45.2%, n=14) and vaccine refusal parents/caregivers (59.6%, n=28) believed to a greater extent that childhood vaccination is unnecessary because many of vaccine preventable diseases are no longer common. Similarly, moderately hesitant (42.0%, n=21) and highly hesitant parents/caregivers (67.8%, n=21), and those who are vaccine refusing (90%, n=40), were more prone to support the opinion that the diseases against which children are being vaccinated can be overcome by natural immunity, than parents/caregivers who timely vaccinated their child (25.5%, n=218). The opinion that their child has a very low risk of contracting any of the vaccine preventable diseases was shared by 54.3% (n=461) of parents/caregivers who timely vaccinated their child. However, that opinion was less supported by moderately hesitant (43.8%, n=21), highly hesitant (40.0%, n=12) and vaccine refusal parents/caregivers (37.5%, n=18).

Table 12. Differences in perceived danger of disease and likelihood of infection between the parents/caregivers exhibiting different vaccine behaviour.

Vaccination Behavior	N	Mean	SD	Min	Max	p
Timely vaccine accepting	849	3.69	0.85	1.00	5.00	< 0.01
Moderately hesitant	48	3.24	0.92	1.00	5.00	
Highly hesitant	31	2.66	1.12	1.00	5.00	
Vaccine refusal	47	2.29	1.05	1.00	5.00	

Parents/caregivers living in urban areas (Mean=3.48) perceived the danger of vaccine preventable disease to be higher ($p<0.05$) than those living in rural area (Mean=3.64).

Table 13. Differences in perceived danger of disease and likelihood of infection between diverse groups of parents/caregivers.

	N	Mean	SD	Min	Max	p
Parents/caregivers' age						
18-28	372	3.57	0.94	1.00	5.00	0.068
29-49	554	3.58	0.94	1.00	5.00	
50+	51	3.30	0.87	2.00	5.00	
Education						
Basic education	88	3.47	0.89	2.00	5.00	0.058
Secondary education	380	3.51	0.92	1.00	5.00	
Basic and secondary vocational education	204	3.63	0.99	1.00	5.00	
Incomplete university	36	3.34	0.93	1.00	5.00	
University	269	3.65	0.95	1.00	5.00	
Settlement						
Urban	462	3.48	1.03	1.00	5.00	<0.05
Rural	515	3.64	0.85	1.00	5.00	

5.3.4 Parents'/Caregivers' trust in societal factors

In this study the results indicate a moderately high level of trust in societal factors related to childhood immunization (Mean=3.69, SD=0.65).

In general, the parents/caregivers surveyed demonstrated a high level of trust in political authorities, with 79.8% (n=788) of them reported that they have full confidence in recommendations on childhood vaccination given by the authorities. However, a smaller number of parents/caregivers (66.8%, n=649) considered the official data on the quality and frequency of adverse reactions to vaccines to be true. Furthermore, 27.6% (n=254) of parents/caregivers strongly agreed or agreed with the opinion that pharmaceutical companies cover up the dangers of vaccines, while 25.5% (n=239) of them supported the view that the principal motive for scientists who participate in the creation of the vaccines is profit. Parents/caregivers had the most confidence in their child's paediatrician; 90.7% (n=902) of them strongly agreed or agreed that they trust their child's paediatrician's recommendation.

Table 14. Distribution of parents'/caregivers' scores on individual items of societal trust according to vaccination behavior.

Items		Vaccination Behavior				Total	p
		Timely vaccine accepting	Moderately hesitant	Highly hesitant	Vaccine refusing		
		N (%)	N (%)	N (%)	N (%)	N (%)	
C3.1.1 I am fully confident in the recommendations given by the authorities regarding the vaccination of children.	Strongly disagree	7 (0.8%)	2 (4.0%)	3 (9.7%)	9 (18.8%)	21 (2.1%)	<0.01
	Disagree	35 (4.1%)	3 (6.0%)	8 (25.8%)	12 (25.0%)	58 (5.9%)	
	Neither disagree nor agree	86 (10.0%)	15 (30.0%)	5 (16.1%)	14 (29.2%)	120 (12.2%)	
	Agree	488 (56.9%)	21 (42.0%)	12 (38.7%)	10 (20.8%)	531 (53.8%)	
	Strongly agree	242 (28.2%)	9 (18.0%)	3 (9.7%)	3 (6.3%)	257 (26.0%)	
	Total	858 (100.0%)	50 (100.0%)	31 (100.0%)	48 (100.0%)	987 (100.0%)	
C3.1.2 I believe that the official data on the quality and frequency of adverse reactions to vaccines are true.	Strongly disagree	12 (1.4%)	3 (6.3%)	4 (13.8%)	5 (10.2%)	24 (2.5%)	<0.01
	Disagree	100 (11.8%)	6 (12.5%)	3 (10.3%)	12 (24.5%)	121 (12.4%)	
	Neither disagree nor agree	153 (18.1%)	10 (20.8%)	7 (24.1%)	8 (16.3%)	178 (18.3%)	
	Agree	474 (56.0%)	28 (58.3%)	15 (51.7%)	23 (46.9%)	540 (55.6%)	
	Strongly agree	107 (12.6%)	1 (2.1%)	0 (0.0%)	1 (2.0%)	109 (11.2%)	
	Total	846 (100.0%)	48 (100.0%)	29 (100.0%)	49 (100.0%)	972 (100.0%)	
C3.1.3 I think that pharmaceutical companies cover up the dangers of vaccines.	Strongly disagree	98 (12.2%)	0 (0.0%)	1 (3.4%)	0 (0.0%)	99 (10.8%)	<0.01
	Disagree	339 (42.3%)	15 (32.6%)	6 (20.7%)	4 (9.1%)	364 (39.6%)	
	Neither disagree nor agree	173 (21.6%)	11 (23.9%)	5 (17.2%)	14 (31.8%)	203 (22.1%)	
	Agree	174 (21.7%)	17 (37.0%)	13 (44.8%)	17 (38.6%)	221 (24.0%)	
	Strongly agree	17 (2.1%)	3 (6.5%)	4 (13.8%)	9 (20.5%)	33 (3.6%)	
	Total	801 (100.0%)	46 (100.0%)	29 (100.0%)	44 (100.0%)	920 (100.0%)	
C3.1.4 I think that the principal motive for scientists who participate in the creation of the vaccines is profit.	Strongly disagree	108 (13.2%)	2 (4.3%)	2 (7.1%)	0 (0.0%)	112 (12.0%)	<0.01
	Disagree	399 (48.6%)	20 (43.5%)	4 (14.3%)	7 (17.1%)	430 (45.9%)	
	Neither disagree nor agree	124 (15.1%)	14 (30.4%)	7 (25.0%)	10 (24.4%)	155 (16.6%)	
	Agree	171 (20.8%)	8 (17.4%)	12 (42.9%)	17 (41.5%)	208 (22.2%)	
	Strongly agree	19 (2.3%)	2 (4.3%)	3 (10.7%)	7 (17.1%)	31 (3.3%)	
	Total	821 (100.0%)	46 (100.0%)	28 (100.0%)	41 (100.0%)	936 (100.0%)	

C3.1.5 I trust my child's paediatrician's recommendation	Strongly disagree	0 (0.0%)	1 (2.0%)	1 (3.3%)	2 (4.2%)	4 (0.4%)	<0.01
	Disagree	7 (0.8%)	3 (6.0%)	3 (10.0%)	10 (20.8%)	23 (2.3%)	
	Neither disagree nor agree	38 (4.4%)	12 (24.0%)	5 (16.7%)	10 (20.8%)	65 (6.5%)	
	Agree	585 (67.6%)	29 (58.0%)	17 (56.7%)	24 (50.0%)	655 (65.9%)	
	Strongly agree	236 (27.3%)	5 (2.0%)	4 (13.3%)	2 (4.2%)	247 (24.8%)	
	Total	866 (100.0%)	50 (100.0%)	30 (100.0%)	48 (100.0%)	994 (100.0%)	

As level of social trust in parents/caregivers decreased, their vaccine hesitancy increased; the highest level of societal trust was observed in timely vaccine accepting parents/caregivers (Mean=3.77) and lowest in vaccine refusing (Mean=2.75).

Mistrust regarding recommendations given by the authorities was the most pronounced in vaccine refusing (43.8%, n=21) and highly hesitant parents/caregivers (35.5%, n=11), less manifested in moderately hesitant (10%, n=5), and the least manifested in those who timely vaccinated their child (5.9%, n=42). Compared to parents/caregivers who timely vaccinated their child (68.6%, n=581), moderately hesitant (60.4%, n=29), highly hesitant (51.7%, n=15) and vaccine refusing parents/caregivers (48.9%, n=24) believed to a lesser extent that the official data on the quality and frequency of adverse reactions to vaccines are true. Also, moderately hesitant (43.5%, n=20) and highly hesitant parents/caregivers (58.6%, n=17), and those who are vaccine refusing (59.1%, n=26), were more prone to support the opinion that pharmaceutical companies cover up the dangers of vaccines, compared to parents/caregivers who timely fully vaccinated their child (23.8%, n=191). The view that profit is the principal motive for scientists who involved in vaccine development was shared by almost one quarter of parents/caregivers who timely vaccinated their child (23.1%, n=190) and also by moderately hesitant (21.7%, n=10). Still, the same opinion had stronger support in highly hesitant (53.6%, n=15) and vaccine refusing parents/caregivers (58.6%, n=24). Almost all parents/caregivers who timely vaccinated their child (94.9%, n=821) trusted recommendation of their child's paediatrician's. However, trust in the paediatrician's recommendation was lower in moderately hesitant (60%, n=34), highly hesitant (70.0%, n=21) and vaccine refusing parents/caregivers (54.2%, n=26).

Table 15. Differences in social trust between the parents/caregivers exhibiting different vaccine behaviour

Vaccination Behavior	N	Mean	SD	Min	Max	p
Timely vaccine accepting	754	3.77	0.58	1.80	5.00	< 0.001
Moderately hesitant	41	3.40	0.73	1.00	4.40	
Highly hesitant	24	3.05	0.81	1.00	4.60	
Vaccine refusal	36	2.75	0.81	1.00	4.20	

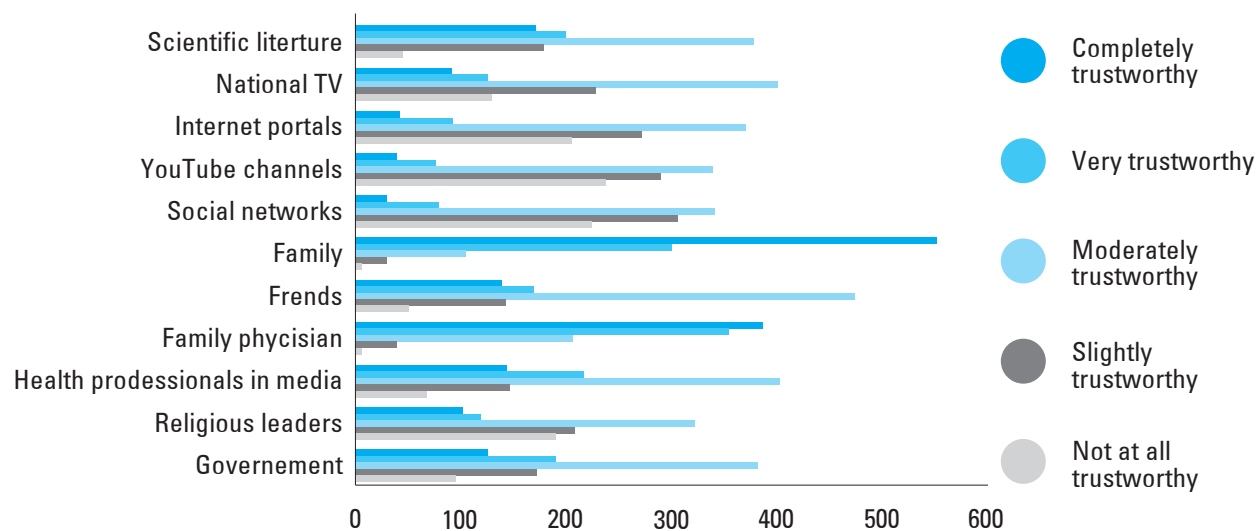
Parents/caregivers living in urban areas (Mean=3.58) demonstrated significantly lower (p<0.01) level of societal trust than those from rural areas (Mean=3.78).

Table 16. Differences in social trust between diverse groups of parents/caregivers.

	N	Mean	SD	Min	Max	p
Parents/caregivers' age						
18-28	329	3.72	0.62	1.80	5.00	0.647
29-49	478	3.68	0.58	1.00	5.00	
50+	49	3.64	0.63	2.20	5.00	
Education						
Basic education	78	3.71	0.58	2.00	5.00	0.060
Secondary education	327	3.74	0.57	1.60	5.00	
Primary and secondary vocational education	185	3.74	0.66	1.20	5.00	
Incomplete university	30	3.56	0.79	1.00	5.00	
University	236	3.60	0.74	1.00	5.00	
Settlement						
Urban	391	3.58	0.74	1.00	5.00	<0.01
Rural	465	3.78	0.56	1.00	5.00	

5.3.5 Parents'/Caregivers' trust regarding information sources

The results of this study show that the largest proportion of parents/caregivers surveyed consider family (85.4%, n=854) and family physician (74.4%, n= 744) as the sources of highest credibility. The least trusted sources are internet portals (48.6%, n=479), You tube channels (53.6%, n=529) and social networks (54.0%, n=531).

Figure 5. Score distribution of trust in information sources in parents/caregivers.

Parents/caregivers who timely vaccinated their children considered scientific literature as trustworthy in significantly larger proportion (39.2%, n=334) compared with parents/

caregivers who were highly hesitant (16.6%, n=5). Also, 22.5% (n=192) of parents/caregivers who timely vaccinated their children believed that scientific literature was slightly, or not at all trustworthy, compared with vaccine refusing parents/caregivers (33%, n=16).

Even 35.1% (n=300) of timely vaccine accepting parents/caregivers, 35.5% (n=17) of moderately hesitant, 51.7% (n=15) of highly hesitant and 52.1% (n=25) of vaccine refusing parents/caregivers did not consider National TV channels to be a credible source.

Large percent of respondents in all groups; 48.6% (n=408) of timely accepting, 38.8% (n=19) of moderately hesitant, 73.3% (n=22) of highly hesitant and 59.1% (n=29) of vaccine refusing believed that internet portals are slightly or not at all trustworthy.

Vaccine refusing parents/caregivers (58.3%, n=28) and highly hesitant (72.0%, n=22) believed in larger extent that YouTube channels are not trustworthy compared to those who timely vaccinated children (53.3%, n=458), and moderately hesitant (41.7%, n=20). Similarly, vaccine refusing (64.6%, n=31) and highly hesitant parents/caregivers (74.2%, n=23) were more likely to believe that social networks (Facebook, Viber, Twitter, WhatsApp) are not a trustworthy source, compared with moderately hesitant (41.7%, n=20) parents/caregivers and those who timely vaccinated their children (53.3%, n=456).

Majority of respondents considered family as a trustworthy source of information regardless of their vaccination behaviour; 86.8% (n=750) of parents/caregivers who timely vaccinated children, 80.0% (n=40) of moderately and 74.2% (n=23) of highly hesitant, as well as 79.6% (n=39) of vaccine refusal. Considerably smaller number of parents/caregivers (31.9% (n=272) who timely vaccinated children, 27.5% (n=14) of moderately and 23.3% (n=7) of highly hesitant, 36.9% (n=17) of vaccine refusal) believed that friends can be the trustful source of information related to vaccines.

While even 78.4% (n=679) of respondents who timely vaccinated their child and 72.7% (n=32) of moderately hesitant parents/caregivers believed that the family physician is a trustworthy source, only 29.1% (n=9) of highly hesitant and 47.9% (n=23) of vaccine refusing parents/caregivers shared this view.

Regarding the perception of the credibility of healthcare professionals in the media it can be noted that 38.9% (n=333) of respondents who timely vaccinated children believed that healthcare professionals in the media are trustworthy source, 31.3% (n=15) of those who were moderately hesitant believed this, and only 13.8% (n=14) of highly hesitant and 21.2% (n=10) of vaccine refusing parents/caregivers shared this attitude.

Only 24% (n=198) of parents/caregivers who timely vaccinated children, 15.2% (n=7) of moderately hesitant, 30% (n=9) of highly hesitant and 21% of vaccine refusing parents/caregivers believed in the credibility of religious leaders. Also, parents/caregivers who timely vaccinated their child were more likely to believe that government is trustworthy source (35.2%, n=298), compared with moderately hesitant (19.5%, n=9), highly hesitant (10.0%, n=3) and vaccine refusing parents/caregivers (19.2%, n=9).

Table 17. Distribution of parents'/caregivers' trust in information sources according to vaccination behaviour.

Information sources	Trustworthiness	Vaccination Behavior				Total	p
		Timely vaccine accepting	Postponed one or more	Intentionally	Не вакцинировались	N (%)	
Information sources		N (%)	missed one or more	Not vaccinated	N (%)	N (%)	p
C3.2.1 Scientific literature:	Not at all trustworthy	28 (3.3%)	3 (6.7%)	7 (23.3%)	7 (14.9%)	45 (4.6%)	<0.01
	Slightly trustworthy	164 (19.2%)	4 (8.9%)	1 (3.3%)	9 (19.1%)	178 (18.3%)	
	Moderately trustworthy	326 (38.3%)	17 (37.8%)	17 (56.7%)	19 (40.4%)	379 (38.9%)	
	Very trustworthy	182 (21.4%)	10 (22.2%)	1 (3.3%)	7 (14.9%)	200 (20.5%)	
	Completely trustworthy	152 (17.8%)	11 (24.4%)	4 (13.3%)	5 (10.6%)	172 (17.7%)	
	Total	852 (100.0%)	45 (100.0%)	30 (100.0%)	47 (100.0%)	974 (100.0%)	
C3.2.2 National TV channels	Not at all trustworthy	95 (11.1%)	9 (18.8%)	12 (41.4%)	12 (25.0%)	128 (13.1%)	<0.05
	Slightly trustworthy	205 (24.0%)	8 (16.7%)	3 (10.3%)	13 (27.1%)	229 (23.4%)	
	Moderately trustworthy	350 (41.0%)	23 (47.9%)	11 (37.9%)	18 (37.5%)	402 (41.1%)	
	Very trustworthy	118 (13.8%)	3 (6.3%)	2 (6.9%)	4 (8.3%)	127 (13.0%)	
	Completely trustworthy	85 (10.0%)	5 (10.4%)	1 (3.4%)	1 (2.1%)	92 (9.4%)	
	Total	853 (100.0%)	48 (100.0%)	29 (100.0%)	48 (100.0%)	978 (100.0%)	
C3.2.3 Internet portals	Not at all trustworthy	167 (19.5%)	7 (14.3%)	13 (43.3%)	18 (36.7%)	205 (20.8%)	<0.05
	Slightly trustworthy	241 (28.1%)	12 (24.5%)	9 (30.0%)	11 (22.4%)	273 (27.7%)	
	Moderately trustworthy	330 (38.5%)	23 (46.9%)	5 (16.7%)	14 (28.6%)	372 (37.8%)	
	Very trustworthy	82 (9.6%)	5 (10.2%)	2 (6.7%)	3 (6.1%)	92 (9.3%)	
	Completely trustworthy	37 (4.3%)	2 (4.1%)	1 (3.3%)	3 (6.1%)	43 (4.4%)	
	Total	857 (100.0%)	49 (100.0%)	30 (100.0%)	49 (100.0%)	985 (100.0%)	
C3.2.4 YouTube channels	Not at all trustworthy	200 (23.3%)	7 (14.6%)	14 (45.2%)	16 (33.3%)	237 (24.0%)	0.097
	Slightly trustworthy	258 (30.0%)	13 (27.1%)	8 (25.8%)	12 (25.0%)	291 (29.5%)	
	Moderately trustworthy	296 (34.5%)	22 (45.8%)	7 (22.6%)	15 (31.3%)	340 (34.5%)	
	Very trustworthy	68 (7.9%)	5 (10.4%)	1 (3.2%)	3 (6.3%)	77 (7.8%)	

	Completely trustworthy	37 (4.3%)	1 (2.1%)	1 (3.2%)	2 (4.2%)	41 (4.2%)	
	Total	859 (100.0%)	48 (100.0%)	31 (100.0%)	48 (100.0%)	986 (100.0%)	
C3.2.5 Social networks (Facebook, Viber, Twitter, WhatsApp):	Not at all trustworthy	183 (21.4%)	9 (18.8%)	12 (38.7%)	19 (39.6%)	223 (22.7%)	<0.01
	Slightly trustworthy	273 (31.9%)	11 (22.9%)	11 (35.5%)	12 (25.0%)	307 (31.3%)	
	Moderately trustworthy	299 (35.0%)	22 (45.8%)	7 (22.6%)	13 (27.1%)	341 (34.7%)	
	Very trustworthy	70 (8.2%)	5 (10.4%)	1 (3.2%)	4 (5.0%)	80 (8.1%)	
	Completely trustworthy	30 (3.5%)	1 (2.1%)	0 (0.0%)	0 (0.0%)	31 (3.2%)	
	Total	855 (100.0%)	48 (100.0%)	31 (100.0%)	48 (100.0%)	982 (100.0%)	
C3.2.6 Family	Not at all trustworthy	3 (0.3%)	0 (0.0%)	1 (3.2%)	1 (2.0%)	5 (0.5%)	0.090
	Slightly trustworthy	19 (2.2%)	4 (8.0%)	3 (9.7%)	5 (10.2%)	31 (3.1%)	
	Moderately trustworthy	92 (10.6%)	6 (12.0%)	4 (12.9%)	4 (8.2%)	106 (10.7%)	
	Very trustworthy	273 (31.6%)	13 (26.0%)	7 (22.6%)	7 (14.3%)	300 (30.2%)	
	Completely trustworthy	477 (55.2%)	27 (54.0%)	16 (51.6%)	32 (65.3%)	552 (55.5%)	
	Total	864 (100.0%)	50 (100.0%)	31 (100.0%)	49 (100.0%)	994 (100.0%)	
C3.2.7 Friends	Not at all trustworthy	39 (4.6%)	6 (11.8%)	1 (3.3%)	5 (10.9%)	51 (5.2%)	0.353
	Slightly trustworthy	127 (14.9%)	5 (9.8%)	8 (26.7%)	4 (8.7%)	144 (14.7%)	
	Moderately trustworthy	415 (48.7%)	26 (51.0%)	14 (46.7%)	20 (43.5%)	475 (48.5%)	
	Very trustworthy	145 (17.0%)	11 (21.6%)	4 (13.3%)	10 (21.7%)	170 (17.3%)	
	Completely trustworthy	127 (14.9%)	3 (5.9%)	3 (10.0%)	7 (15.2%)	140 (14.3%)	
	Total	853 (100.0%)	51 (100.0%)	30 (100.0%)	46 (100.0%)	980 (100.0%)	
C3.2.8 Your family physician	Not at all trustworthy	0 (0.0%)	0 (0.0%)	3 (9.7%)	2 (4.2%)	5 (0.5%)	<0.01
	Slightly trustworthy	26 (3.0%)	3 (5.9%)	4 (12.9%)	8 (16.7%)	41 (4.1%)	
	Moderately trustworthy	161 (18.6%)	16 (31.4%)	15 (48.4%)	15 (31.3%)	207 (20.8%)	
	Very trustworthy	326 (37.6%)	15 (29.4%)	3 (9.7%)	10 (20.8%)	354 (35.5%)	
	Completely trustworthy	353 (40.8%)	17 (33.3%)	6 (19.4%)	13 (27.1%)	389 (39.1%)	
	Total	866 (100.0%)	51 (100.0%)	31 (100.0%)	48 (100.0%)	996 (100.0%)	

C3.2.9 Healthcare professionals in media	Not at all trustworthy	44 (5.1%)	7 (14.6%)	8 (11.8%)	9 (13.2%)	68 (6.9%)	<0.01
	Slightly trustworthy	125 (14.6%)	5 (10.4%)	6 (20.7%)	11 (23.4%)	147 (15.0%)	
	Moderately trustworthy	355 (41.4%)	21 (43.8%)	11 (37.9%)	17 (36.2%)	404 (41.2%)	
	Very trustworthy	197 (23.0%)	12 (25.0%)	13 (10.4%)	5 (10.6%)	217 (22.1%)	
	Completely trustworthy	136 (15.9%)	3 (6.3%)	1 (3.4%)	5 (10.6%)	145 (14.8%)	
	Total	857 (100.0%)	48 (100.0%)	29 (100.0%)	47 (100.0%)	981 (100.0%)	
C3.2.10 Religious leaders	Not at all trustworthy	163 (19.7%)	14 (10.4%)	6 (20.0%)	7 (16.3%)	190 (20.1%)	0.752
	Slightly trustworthy	190 (23.0%)	7 (12.2%)	3 (10.0%)	10 (23.3%)	210 (22.2%)	
	Moderately trustworthy	275 (33.3%)	18 (39.1%)	12 (40.0%)	17 (39.5%)	322 (34.1%)	
	Very trustworthy	107 (13.0%)	4 (8.7%)	7 (23.3%)	2 (4.7%)	120 (12.7%)	
	Completely trustworthy	91 (11.0%)	3 (6.5%)	2 (6.7%)	7 (16.3%)	103 (10.9%)	
	Total	826 (100.0%)	46 (100.0%)	30 (100.0%)	43 (100.0%)	945 (100.0%)	
C3.2.11 Government	Not at all trustworthy	70 (8.3%)	8 (17.4%)	6 (20.0%)	10 (21.3%)	94 (9.7%)	<0.01
	Slightly trustworthy	144 (17.0%)	9 (19.6%)	9 (30.0%)	12 (25.5%)	174 (18.0%)	
	Moderately trustworthy	334 (39.5%)	20 (43.5%)	12 (40.0%)	16 (34.0%)	382 (39.4%)	
	Very trustworthy	178 (21.0%)	6 (13.0%)	2 (6.7%)	6 (12.8%)	192 (19.8%)	
	Completely trustworthy	120 (14.2%)	3 (6.5%)	1 (3.3%)	3 (6.4%)	127 (13.1%)	
	Total	846 (100.0%)	46 (100.0%)	30 (100.0%)	47 (100.0%)	969 (100.0%)	

5.3.6 Parents'/Caregivers' knowledge regarding vaccines

The study results suggest that parents/caregivers have an average level of factual knowledge about vaccines (Mean=2.19; SD=1.09).

The largest proportion of parents/caregivers answered all of three knowledge questions correctly (57.8%, n=578). However, 13.0% (n=130) did not give correct answer to any of the questions, or gave one (12.4%, n=124) or two correct answers (16.8%, n=168).

Table 18. Distribution of parents'/caregivers' vaccine knowledge according to vaccination behavior.

		Timely vaccine accepting	Moderately hesitant	Highly hesitant	Vaccine refusing	Total	
		N (%)	N (%)	N (%)	N (%)	N (%)	p
C6.1 BCG vaccine is given against tuberculosis	True	696 (80%)	31 (61%)	20 (65%)	27 (54%)	774 (77.6%)	<0.01
	False	38 (4.4%)	5 (9.8%)	1 (3.2%)	6 (12%)	50 (5.0%)	
	Not sure	132 (15%)	15 (29%)	10 (32%)	17 (34%)	174 (17.4%)	
	Total	866 (100%)	51 (100%)	31 (100%)	50 (100%)	998 (100%)	
C6.2 MMR vaccine is given against mumps.	True	656 (76%)	30 (59%)	17 (55%)	18 (36%)	721 (72.2%)	<0.01
	False	22 (2.5%)	1 (2.0%)	0 (0%)	4 (8.0%)	27 (2.7%)	
	Not sure	188 (22%)	20 (39%)	14 (45%)	28 (56%)	250 (25.1%)	
	Total	866 (100%)	51 (100%)	31 (100%)	50 (100%)	998 (100%)	
C6.3 DiTePer vaccine is given against whooping cough.	True	632 (73%)	31 (61%)	19 (61%)	17 (34%)	699 (70.0%)	<0.01
	False	23 (2.7%)	2 (3.9%)	1 (3.2%)	4 (8.0%)	30 (3.0%)	
	Not sure	211 (24%)	18 (35%)	11 (35%)	29 (58%)	269 (27.0%)	
	Total	866 (100%)	51 (100%)	31 (100%)	50 (100%)	998 (100%)	

The highest proportion of correct answers was obtained for the question related to BCG vaccine (77.6%, n=774), while 72.2% (n=721) of respondents answered correctly the question related to MMR vaccine, and 70.0% (n=699) for the DiTePer vaccine.

There was a statistically significant difference in the vaccine knowledge between parents/caregivers exhibiting different vaccination behaviour ($p < 0.001$). The highest vaccine knowledge score was achieved by parents/caregivers who timely vaccinated their children (Mean=2.29), followed by moderately hesitant parents/caregivers (Mean=1.80) and highly hesitant (Mean=1.80). Vaccine refusing parents/caregivers had the lowest vaccine knowledge score (Mean=1.24).

Table 19. Differences in vaccine knowledge between the parents/caregivers exhibiting different vaccine behaviour.

Vaccination Behavior	N	Mean	SD	Min	Max	p
Timely vaccine accepting	866	2.29	1.15	.00	3.00	< 0.001
Moderately hesitant	51	1.80	1.07	.00	3.00	
Highly hesitant	31	1.80	1.13	.00	3.00	
Vaccine refusal	50	1.24	1.16	.00	3.00	

Parents/caregivers of different age demonstrated similar level of knowledge about childhood immunization (Mean=2.18, Mean=2.20 and Mean=2.20; $p > 0.05$ respectively). The lowest knowledge score was achieved by parents/caregivers who had started university but had not completed (Mean=1.79). Parents/caregivers with basic education (Mean=2.18) and secondary education (Mean=2.10) had lower scores compared to those with primary and secondary vocational education (Mean=2.28) and university education (Mean=2.31), who had the highest scores ($p < 0.01$).

There were significant differences in the level of knowledge between parents/caregivers from urban and rural areas. However, parents/caregivers living in rural areas (Mean=2.32) had statistically significant lower scores ($p<0.05$) compared to those from urban areas (Mean=2.05).

Table 20. Differences in vaccine knowledge between different groups of parents/caregivers

	N	Mean	SD	Min	Max	p
Parents/caregivers' age						
18-28	385	2.18	1.06	0	3	0.961
29-49	562	2.20	1.10	0	3	
50+	53	2.20	1.10	0	3	
Education						
Basic education	91	2.18	1.09	0	3	<0.05
Secondary education	382	2.10	1.12	0	3	
Primary and secondary vocational education	210	2.28	1.03	0	3	
Incomplete university	38	1.79	1.32	0	3	
University	279	2.31	0.06			
Settlement						
Urban	480	2.05	1.14	0	3	<0.01
Rural	520	2.32	1.03	0	3	

5.3.7 Parents'/Caregivers' beliefs related to perceived responsibility

In general, almost all parents/caregivers agree or strongly agree (98.9%, $n=986$) that as a parent they have a high responsibility to protect their children from any harm. At the same time, one quarter of them (25.7%, $n=255$) were afraid that they could harm their child by vaccinating them.

Table 21. Distribution of parents'/caregivers' scores on individual items of perceived responsibility according to vaccination behaviour.

Items		Vaccination Behavior				Total	p
		Timely vaccine accepting	Moderately hesitant	Highly hesitant	Vaccine refusing		
		N (%)	N (%)	N (%)	N (%)	N (%)	
C1.5.1 As a parent I have a high responsibility to protect my children of any harm.	Strongly disagree	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	N/A
	Disagree	5 (0.6%)	0 (0%)	0 (0%)	0 (0%)	5 (0.5%)	
	Neither disagree nor agree	5 (0.6%)	0 (0%)	0 (0%)	1 (2.0%)	6 (0.6%)	
	Agree	383 (44%)	23 (45%)	5 (16%)	9 (18%)	420 (42.1%)	
	Strongly agree	473 (55%)	28 (55%)	26 (84%)	39 (78%)	566 (56.8%)	
	Total	866 (100%)	51 (100%)	31 (100%)	49 (100%)	997 (100%)	

C1.5.2 I am afraid that I may harm my child by getting him/her vaccinated.	Strongly disagree	171 (20%)	4 (7.8%)	4 (13%)	2 (4.0%)	181 (18.3%)	N/A
	Disagree	434 (50%)	12 (24%)	4 (13%)	8 (16%)	458 (46.2%)	
	Neither disagree nor agree	90 (10%)	4 (7.8%)	1 (3.2%)	2 (4.0%)	97 (9.8%)	
	Agree	140 (16%)	23 (45%)	10 (32%)	14 (28%)	187 (18.9%)	
	Strongly agree	26 (3.0%)	7 (14%)	12 (39%)	23 (46%)	68 (6.8%)	
	Total	861 (100%)	50 (100%)	31 (100%)	49 (100%)	991 (100%)	

Approximately the same number of vaccine accepting (98.8%, n=856), moderately hesitant (100%, n=51), highly hesitant (100%, n=31) and vaccine refusing parents/caregivers (99%, n=48) claimed that as parents they have a high responsibility to protect their children from any harm. Among the highly hesitant (71%, n=22) and vaccine refusing parents/caregivers (74%, n=37) fear that they could bring the harm to their child by vaccinating them was higher compared with moderately hesitant (59%, n=30) and vaccine accepting (19%, n=166).

5.3.8 Parents'/Caregivers' beliefs regarding direct and indirect personal experience

Almost one fifth of parents/caregivers (18.9%, n=187) agreed or strongly agreed that they personally know someone whose child had a serious adverse reaction after receiving a vaccine.

While only 14.9% (n=128) of respondents who timely vaccinated their children reported that they personally knew someone whose child had a serious adverse reaction after receiving a vaccine, 35.3% (n=18) of those moderately hesitant claimed so, and even 51.6% (n=17) of highly hesitant and 51.0% (n=25) of vaccine refusing parents/caregivers shared that knowledge.

Table 22. Distribution of parents'/caregivers' indirect personal experience according to vaccination behaviour.

Items		Vaccination Behavior				Total
		Timely vaccine accepting	Moderately hesitant	Highly hesitant	Vaccine refusing	
		N (%)	N (%)	N (%)	N (%)	N (%)
C1.4.2 I personally know someone whose child experienced a serious adverse reaction after receiving a vaccine.	Strongly disagree	238 (27.6%)	8 (15.7%)	10 (32.3%)	10 (3.8%)	266 (100%)
	Disagree	487 (56.6%)	24 (47.1%)	5 (16.1%)	13 (26.5%)	529 (53.3%)
	Neither disagree nor agree	8 (0.9%)	1 (2.0%)	0 (0.0%)	1 (2.0%)	10 (1.0%)
	Agree	104 (12.1%)	12 (23.5%)	5 (16.1%)	12 (24.5%)	133 (13.4%)
	Strongly agree	24 (2.8%)	6 (11.8%)	11 (35.5%)	13 (26.5%)	54 (5.4%)
	Total	861 (100%)	51 (100%)	31 (100%)	49 (100%)	992 (100%)

It should be noted that only 5.3% (n=53) of parents/caregivers refused to answer about their personal experience with serious adverse reactions in children after vaccination. Only 7% (n=70) of parents/caregivers agreed or strongly agreed that their child had experienced a serious adverse reaction, 85.8% (n=858) disagreed or strongly disagreed, while 1.9% (n=19) were unsure.

Table 23. Distribution of parents'/caregivers' direct personal experience

Пункт		N (%)
C1.4.1 My child experienced a serious adverse reaction after receiving a vaccine.	Strongly disagree	313 (31.1%)
	Disagree	545 (54.5%)
	Neither disagree nor agree	19 (1.9%)
	Agree	62 (6.2%)
	Strongly agree	8 (0.8%)
	Didn't answer	53 (5.3%)
	Total	1000 (100.0%)

5.3.9 Parents'/Caregivers' alternative health beliefs and worldviews

Parents/caregivers being part of in this study demonstrated moderately low level of alternative health beliefs and worldviews (Mean=2.46; SD=0.85).

Overall, 33.6% (n=322) of parents/caregivers supported the opinion that vaccines are unnatural formation that interferes with the body's ability to protect itself from a disease, while 12.9% (n=124) of them were unsure regarding this matter. Furthermore, 23.6% (n=221) of parents/caregivers claimed that vaccines conflict with their belief that children should use natural products and avoid toxins, and 13.4% (n=126) expresses uncertainty regarding this topic. A slightly smaller number of parents/caregivers (15.1%, n=150) report being morally opposed to vaccinating their child. However, 6.4% (n=64) of them were unsure regarding the issue.

Table 24. Correlation between vaccine behaviour and individual items of Alternative health beliefs and worldviews.

Items		Vaccination Behavior				Total	p
		Fully vaccinated without postponing	Postponed one or more	Intentionally	Не вакцировались		
		missed one or more	Not vaccinated	N (%)	N (%)	N (%)	
C1.6.1 In my opinion vaccines are an unnatural formation that interferes with the body's ability to protect itself from a disease.	Strongly disagree	112 (13.5%)	1 (2.1%)	1 (3.2%)	2 (4.2%)	116 (12.1%)	<0.01
	Disagree	370 (44.5%)	14 (29.2%)	6 (19.4%)	7 (14.6%)	397 (41.4%)	
	Neither disagree nor agree	107 (12.9%)	10 (20.8%)	3 (9.7%)	4 (8.3%)	124 (12.9%)	
	Agree	217 (26.1%)	19 (39.6%)	13 (41.9%)	24 (50.0%)	273 (28.5%)	

	Strongly agree	26 (3.1%)	4 (8.3%)	8 (25.8%)	11 (22.9%)	49 (5.1%)	
	Total	832 (100%)	48 (100%)	31 (100%)	48 (100%)	959 (100%)	
C1.6.2 Vaccines conflict with my belief that children should use natural products and avoid toxins.	Strongly disagree	128 (15.6%)	2 (4.3%)	1 (3.7%)	1 (2.2%)	132 (14.1%)	<0.01
	Disagree	424 (51.7%)	19 (40.4%)	6 (22.2%)	11 (24.4%)	460 (49.0%)	
	Neither disagree nor agree	106 (12.9%)	10 (21.3%)	5 (18.5%)	5 (11.1%)	126 (13.4%)	
	Agree	150 (18.3%)	15 (31.9%)	12 (44.4%)	18 (40.0%)	195 (20.8%)	
	Strongly agree	12 (1.5%)	1 (2.1%)	3 (11.1%)	10 (22.2%)	26 (2.8%)	
	Total	820 (100%)	47 (100%)	27 (100%)	45 (100%)	939 (100%)	
C1.6.3 I'm morally opposed to vaccinating my child.	Strongly disagree	224 (25.9%)	6 (12.0%)	5 (16.1%)	2 (4.1%)	237 (23.8%)	<0.01
	Disagree	503 (58.2%)	22 (44.0%)	8 (25.8%)	10 (20.4%)	543 (54.6%)	
	Neither disagree nor agree	53 (6.1%)	7 (14.0%)	2 (6.5%)	2 (4.1%)	64 (6.4%)	
	Agree	73 (8.4%)	11 (22.0%)	7 (22.6%)	15 (30.6%)	106 (10.7%)	
	Strongly agree	11 (1.3%)	4 (8.0%)	9 (29.0%)	20 (40.8%)	44 (4.4%)	
	Total	864 (100%)	50 (100%)	31 (100%)	49 (100%)	994 (100%)	

The parental vaccine hesitancy increased in line with their alternative health beliefs and worldviews. Vaccine refusing parents/caregivers, as well as moderately and highly hesitant were significantly more inclined to the health beliefs which are contrary to the established norms regarding vaccination than parents/caregivers who timely vaccinated their children (Mean=3.75, Mean=3.42, Mean=2.89, vs. Mean=2.33; respectively $p < 0.001$).

Table 25. Differences in alternative health beliefs between the parents/caregivers exhibiting different vaccination behaviour.

Vaccination Behavior	N	Mean	SD	Min	Max	p
Timely vaccine accepting	796	2.33	0.74	1.00	5.00	< 0.001
Moderately hesitant	44	2.89	0.87	1.00	5.00	
Highly hesitant	27	3.42	1.01	1.00	5.00	
Vaccine refusal	42	3.75	0.99	2.00	5.00	

It can be noted that parents/caregivers who timely fully vaccinated their children (29.2%, $n=243$) were less likely to believe that vaccines are an unnatural formation that interferes with the body's ability to protect from a disease, compared to moderately hesitant (47.9%, $n=23$), highly hesitant (67.7%, $n=21$) and vaccine refusal (72.9%, $n=35$). Parents/caregivers who timely vaccinated their children (19.8%, $n=162$) were less prone to support the opinion that vaccines conflict with their belief that children should use natural products and avoid toxins, compared to moderately hesitant (34.0%, $n=16$), highly hesitant parents/caregivers (55.5%, $n=15$), and those who are vaccine refusal (62.2%, $n=28$). Similarly, vaccine refusal parents/caregivers (71.4%, $n=35$) were more morally opposed to vaccinate their child than

moderately hesitant (30.0%, n=15), highly hesitant (39.6%, n=16) and parents/caregivers who fully vaccinated their child (9.7%, n=84).

Alternative health beliefs were approximately equally spread among the parents/caregivers of different ages (Mean=2.48, Mean= 43, Mean=2.64; $p>0.05$ respectively). Although stronger alternative health beliefs were observed in parents/caregivers with basic education (Mean=2.62) and parents/caregivers who did not complete the university (Mean=2.57), they did not differ significantly from those with secondary education (Mean=2.47), primary and secondary vocational education (Mean=2.40) and those holding university degree (Mean=2.42). Also, even though parents/caregivers living in urban areas (Mean=2.52) exhibited tougher alternative health beliefs compared to those living in rural areas (Men=2.41), the difference was not significant.

Table 26. Differences in alternative health beliefs and worldviews between diverse groups of parents/caregivers

	N	Mean	SD	Min	Max	p
Parents/caregivers' age						
18-28	342	2.48	0.84	1.00	5.00	0.187
29-49	524	2.43	0.86	1.00	5.00	
50+	45	2.64	0.76	1.00	4.00	
Education						
Basic education	79	2.62	0.78	1.00	4.67	0.270
Secondary education	346	2.47	0.84	1.00	5.00	
Primary and secondary vocational education	192	2.40	0.83	1.00	5.00	
Incomplete university	34	2.57	0.93	1.00	5.00	
University	260	2.42	0.88	1.00	5.00	
Settlement						
Urban	426	2.52	0.94	1.00	5.00	0.120
Rural	485	2.41	0.75	1.00	5.00	

5.4. Sociological factors

5.4.1 Parents'/Caregivers' descriptive norms regarding childhood vaccination (impact on general attitudes towards vaccination)

Majority of parents/caregivers surveyed had a generally positive attitudes towards vaccination (85.4%, n=852). The largest proportion of them believed that healthcare providers (97.5%, n=967), national health authorities (93.6%, n=905) and government representatives (91.6%, n=877) had positive attitudes towards childhood vaccination. Somewhat smaller percentage of the surveyed parents/caregivers perceived their own family members (80.3%, n=800), local leaders (76.8%, n=669), community members (66.5%, n=620) and friends (65.7%, n=619) as agents holding the positive attitudes. About half of the parents/caregivers felt that other parents/caregivers are supportive of childhood vaccination (53.6%, n=477), while the smallest proportion of them believed that religious leaders (34.8%, n=303) have positive attitudes.

Table 27. Distribution of parents'/caregivers' perception of descriptive norms – general attitudes towards vaccination

Attitudes	Very negative	Somewhat negative	Neutral	Somewhat positive	Very positive
	N (%)	N (%)	N (%)	N (%)	N (%)
Family's attitudes	27 (2.7%)	56 (5.6%)	113 (11.3%)	598 (60.0%)	202 (20.3%)
Friends' attitudes	12 (1.4%)	47 (5.0%)	264 (28.0%)	543 (57.6%)	76 (8.1%)
Other parents/ caregivers' attitudes	16 (1.8%)	60 (6.7%)	337 (37.9%)	434 (48.8%)	43 (4.8%)
Local leaders' attitudes	6 (0.7%)	16 (1.9%)	159 (18.7%)	563 (66.2%)	106 (10.6%)
National Health Authorities attitudes	4 (0.4%)	8 (0.8%)	50 (5.2%)	479 (49.5%)	426 (44.1%)
Own attitudes	23 (2.3%)	36 (3.6%)	87 (8.7%)	557 (55.8%)	295 (29.6%)
Peoples from community attitudes	14 (1.4%)	44 (4.7%)	254 (27.3%)	560 (60.1%)	60 (6.4%)
Religious leaders' attitudes	65 (7.5%)	278 (31.9%)	225 (25.8%)	276 (31.7%)	27 (3.1%)
Healthcare providers' attitudes	0 (0.0%)	5 (0.5%)	20 (2.0%)	520 (52.4%)	447 (45.1%)
Governments' attitudes	1 (0.1%)	7 (0.7%)	72 (7.5%)	582 (60.8%)	295 (30.8%)

Compared with vaccine refusing (32.6%, n=14), 46.7% (n=14) of highly hesitant parents/caregivers, 69% (n=567) of timely vaccine accepting and 50% (n=23) of moderately hesitant parents/caregivers believed that their family members have positive attitudes towards vaccination. Similarly, while 69% (n=567) of timely vaccine accepting parents/caregivers perceived that their friends have positive attitudes towards vaccination, this proportion was lower in moderately hesitant (50%, n=23), highly hesitant (46.7%, n=14) and vaccine refusing parents/caregivers (32.6%, n=14).

While 55.6% (n=435) of timely vaccine accepting parents believed that other parents/caregivers support vaccination, 47.5% (n=19) of moderately hesitant, 38.5% (n=10) of highly hesitant and 32.5% (N=13) of vaccine refusing parents/caregivers shared this belief.

However, the majority of respondents in all groups believed that local leaders are supportive of vaccination: 89.8% (n=597) of timely vaccine accepting, 75% (n=27) of moderately hesitant, 76.9% (n=20) of highly hesitant and 64.1% (n=25) of vaccine refusing parents/caregivers).

Similarly, the vast majority of respondents believed that national health authorities support vaccination: 94.1% (n=792) of timely vaccine accepting, 90% (n=45) of moderately hesitant, 100% (n=27) of highly hesitant and 85.1% (n=40) of vaccine refusing parents/caregivers.

When it comes to the parents'/caregivers' own attitudes towards vaccination, the difference is obvious: even 52% (n=26) of vaccine refusing parents/caregivers had a negative attitude towards vaccination, compared to 1.06% (n=14) of timely vaccine accepting, 13.7% (n=7) of moderately hesitant, and 38.7% (n=10) of highly hesitant parents/caregivers.

While only 27.7% (n=13) of vaccine refusing parents/caregivers believed that people from the community support vaccination, 51.8% (n=14) of highly hesitant, 58.4% (n=28) of

moderately hesitant and 69.8% (n=565) of timely vaccine accepting parents/caregivers believed so.

Only 18.2% (n=8) of vaccine refusing and 20.0% (n=5) of highly hesitant parents/caregivers perceived that religious leaders do support vaccination, while somewhat larger proportion of vaccine accepting (36.4%, n=275) and moderately hesitant parents/caregivers (34.1%, n=15) shared this view.

A large majority of parents in all groups believed that healthcare providers are supportive of vaccination: 97.5% (n=840) of vaccine accepting, 98% (n=40) of moderately hesitant, 100% (n=30) of highly hesitant and 93.9% (n=46) of vaccine refusing parents/caregivers.

Similarly, even 92.6% (n=773) of vaccine accepting, 91.5% (n=43) of moderately hesitant, 85.2% (n=23) of highly hesitant and 80.9% (n=38) of vaccine refusing parents/caregivers believed that the government representatives have a positive attitude towards vaccination.

Table 28. Distribution of parents'/caregivers' scores on descriptive norms (general attitudes towards vaccination) according to vaccination behaviour.

Описательные нормы		Vaccination Behavior				Total	p
		Timely vaccine accepting	Moderately hesitant	Highly hesitant	Vaccine refusing		
		N %	N %	N %	N %	N %	
Family's attitudes	Very negative	9 (1.1%)	0 (0.0%)	0 (0.0%)	4 (9.3%)	13 (1.4%)	<0.001
	Somewhat negative	34 (4.1%)	2 (4.3%)	6 (20.0%)	5 (11.6%)	47 (5.0%)	
	Neutral	212 (25.8%)	21 (45.7%)	10 (33.3%)	20 (46.5%)	263 (27.9%)	
	Somewhat positive	497 (60.5%)	20 (43.5%)	14 (46.7%)	11 (25.6%)	542 (57.6%)	
	Very positive	70 (8.5%)	3 (6.5%)	0 (0.0%)	3 (7.0%)	76 (8.1%)	
	Total	822 (100.0%)	46 (100.0%)	30 (100.0%)	40 (100.0%)	941 (100.0%)	
Friends' attitudes	Very negative	9 (1.1%)	0 (0.0%)	0 (0.0%)	4 (9.3%)	13 (1.4%)	<0.001
	Somewhat negative	34 (4.1%)	2 (4.3%)	6 (20.0%)	5 (11.6%)	47 (5.0%)	
	Neutral	212 (25.8%)	21 (45.7%)	10 (33.3%)	20 (46.5%)	263 (27.9%)	
	Somewhat positive	497 (60.5%)	20 (43.5%)	14 (46.7%)	11 (25.6%)	542 (57.6%)	
	Very positive	70 (8.5%)	3 (6.5%)	0 (0.0%)	3 (7.0%)	76 (8.1%)	
	Total	822 (100%)	46 (100%)	30 (100%)	43 (100%)	941 (100%)	
Other parents/caregivers' attitudes	Very negative	15 (1.9%)	0 (0.0%)	0 (0.0%)	1 (2.5%)	16 (1.8%)	0.13
	Somewhat negative	47 (6.0%)	3 (7.5%)	4 (15.4%)	5 (12.5%)	59 (6.6%)	
	Neutral	285 (36.4%)	18 (45.0%)	12 (46.2%)	21 (52.5%)	336 (37.8%)	
	Somewhat positive	394 (50.4%)	17 (42.5%)	10 (38.5%)	13 (32.5%)	434 (48.9%)	
	Very positive	41 (5.2%)	2 (5.0%)	0 (0.0%)	0 (0.0%)	43 (4.8%)	
	Total	782 (100%)	40 (100%)	26 (100%)	40 (100%)	888 (100%)	

Local leaders' attitudes	Very negative	6 (0.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	6 (0.8%)	0.23
	Somewhat negative	12 (1.6%)	0 (0.0%)	2 (7.7%)	1 (2.6%)	15 (1.8%)	
	Neutral	133 (17.8%)	9 (25.0%)	4 (15.4%)	13 (33.3%)	159 (18.7%)	
	Somewhat positive	503 (67.2%)	21 (58.3%)	18 (69.2%)	21 (53.8%)	563 (66.3%)	
	Very positive	94 (12.6%)	6 (16.7%)	2 (7.7%)	4 (10.3%)	106 (12.5%)	
	Total	748 (100%)	36 (100%)	26 (100%)	39 (100%)	849 (100%)	
National Health Authorities' attitudes	Very negative	4 (0.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (0.5%)	<0.001
	Somewhat negative	8 (1.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	8 (1.0%)	
	Neutral	38 (4.5%)	5 (10.0%)	0 (0.0%)	7 (14.9%)	50 (5.2%)	
	Somewhat positive	416 (49.4%)	24 (48.0%)	14 (51.9%)	24 (51.1%)	478 (49.5%)	
	Very positive	376 (44.7%)	21 (42.0%)	13 (48.1%)	16 (34.0%)	426 (44.1%)	
	Total	842 (100%)	50 (100%)	27 (100%)	47 (100%)	966 (100%)	
Own attitudes	Very negative	5 (0.6%)	3 (5.9%)	3 (9.7%)	12 (24.0%)	23 (2.3%)	<0.001
	Somewhat negative	9 (1.0%)	4 (7.8%)	9 (29.0%)	14 (28.0%)	36 (3.6%)	
	Neutral	66 (7.6%)	6 (11.8%)	4 (12.9%)	10 (20.0%)	86 (8.6%)	
	Somewhat positive	506 (58.5%)	29 (56.9%)	11 (35.5%)	11 (22.0%)	557 (55.9%)	
	Very positive	279 (32.3%)	9 (17.6%)	4 (12.9%)	3 (6.0%)	295 (29.6%)	
	Total	865 (100%)	51 (100%)	32 (100%)	50 (100%)	997 (100%)	
Peoples' from community attitudes	Very negative	9 (1.1%)	2 (4.2%)	0 (0.0%)	3 (6.4%)	14 (1.5%)	<0.001
	Somewhat negative	33 (4.1%)	0 (0.0%)	3 (11.1%)	8 (17.0%)	44 (4.7%)	
	Neutral	202 (25.0%)	18 (37.5%)	10 (37.0%)	23 (48.9%)	253 (27.2%)	
	Somewhat positive	508 (62.8%)	26 (54.2%)	13 (48.1%)	13 (27.7%)	560 (60.2%)	
	Very positive	57 (7.0%)	2 (4.2%)	1 (3.7%)	0 (0.0%)	60 (6.4%)	
	Total	809 (100%)	48 (100%)	27 (100%)	47 (100%)	931 (100%)	
Religious leaders' attitude	Very negative	49 (6.5%)	3 (6.8%)	5 (20.0%)	8 (18.2%)	65 (7.5%)	<0.001
	Somewhat negative	235 (31.0%)	15 (34.1%)	10 (40.0%)	18 (40.9%)	278 (32.0%)	
	Neutral	198 (26.2%)	11 (25.0%)	5 (20.0%)	10 (22.7%)	224 (25.7%)	
	Somewhat positive	248 (32.8%)	15 (34.1%)	5 (20.0%)	8 (18.2%)	276 (31.7%)	
	Very positive	27 (3.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	27 (3.1%)	
	Total	757 (100%)	44 (100%)	25 (100%)	44 (100%)	870 (100%)	
Healthcare providers' attitudes	Very negative	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.70
	Somewhat negative	5 (0.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (0.5%)	
	Neutral	16 (1.9%)	1 (2.0%)	0 (0.0%)	3 (6.1%)	20 (2.0%)	
	Somewhat positive	447 (51.9%)	28 (54.9%)	17 (56.7%)	27 (55.1%)	519 (52.4%)	

	Very positive	393 (45.6%)	22 (43.1%)	13 (43.3%)	19 (38.8%)	447 (45.1%)	
	Total	861 (100%)	51 (100%)	30 (100%)	49 (100%)	991 (100%)	
Governments' attitudes	Very negative	1 (0.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.1%)	0.26
	Somewhat negative	7 (0.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	7 (0.7%)	
	Neutral	54 (6.5%)	4 (8.5%)	4 (14.8%)	9 (19.1%)	71 (7.4%)	
	Somewhat positive	512 (61.3%)	31 (66.0%)	14 (51.9%)	25 (53.2%)	582 (60.9%)	
	Very positive	261 (31.3%)	12 (25.5%)	9 (33.3%)	13 (27.7%)	295 (30.9%)	
	Total	835 (100%)	47 (100%)	27 (100%)	47 (100%)	956 (100%)	

5.4.2 Parents'/Caregivers' descriptive norms regarding childhood vaccination (impact on importance of getting vaccinated)

The majority of parents/caregivers surveyed felt it was important to get their children vaccinated (88.7%, n=882). Most of them believed that healthcare providers (94.8%, n=936), national health authorities (92%, n=894), government representatives (89%, n=845) and family members (85.3%, n=852) think it is important to vaccinate their children. Somewhat smaller percentage of the surveyed parents/caregivers perceived local leaders (68.3%, n=610), community members (63.6%, n=597), and friends (61.7%, n=580) as agents holding the positive attitudes towards the importance of getting their children vaccinated. Around half of the parents/caregivers have the impression that other parents (51.1%, n=463) think it is important to get their children vaccinated, while the smallest proportion of them believed that religious leaders (34.3%, n=302) shared this belief.

Table 29. Distribution of parents'/caregivers' perception of descriptive norms – importance of getting vaccinated

Attitudes	Not at all important	Low importance	Neutral	Moderately important	Extremely important
	N (%)	N (%)	N (%)	N (%)	N (%)
Family's attitudes	32 (3.2%)	47 (4.7%)	68 (6.8%)	315 (31.5%)	537 (53.8%)
Friends' attitudes	56 (6.0%)	70 (7.4%)	234 (24.9%)	365 (38.8%)	215 (22.9%)
Other parents/caregivers' attitudes	66 (7.3%)	84 (9.3%)	294 (32.4%)	310 (34.2%)	153 (16.9%)
Local leaders attitudes	40 (4.5%)	55 (6.2%)	188 (21.1%)	386 (43.2%)	224 (25.1%)
National Health Authorities attitudes	8 (0.8%)	17 (1.7%)	53 (5.5%)	274 (28.2%)	620 (63.8%)
Own attitudes	31 (3.1%)	29 (2.9%)	52 (5.2%)	233 (23.4%)	649 (65.3%)
People from community attitudes	57 (6.1%)	68 (7.2%)	216 (23.0%)	380 (40.5%)	217 (23.1%)
Religious leaders' attitudes	169 (19.2%)	176 (20.0%)	234 (26.6%)	219 (24.9%)	83 (9.4%)

Healthcare providers' attitudes	6 (0.6%)	10 (1.0%)	36 (3.6%)	220 (22.3%)	716 (72.5%)
Governments' attitudes	13 (1.4%)	15 (1.6%)	77 (8.1%)	319 (33.6%)	526 (55.4%)

While even 90.5% (n=784) of timely vaccine accepting and 68% (n=34) of moderately hesitant parents/caregivers believed that their family members think it is important to get their children vaccinated, 45.2% (n=14) of highly hesitant and 38% of vaccine refusing parents/caregivers thought so.

Even 65.9% (n=540) of timely vaccine accepting parents/caregivers assessed their friends as believing that getting their children is important, while 40.4% (n=19) of moderately hesitant, 28.6% (n=8) of highly hesitant and 29.5% (n=13) of vaccine refusing parents/caregivers thought so.

While 30.3% (n=12) of vaccine refusing, 39.5% (n=8) of highly hesitant and 27.3% (n=12) of moderately hesitant parents/caregivers believed that other parents/caregivers don't think that it is important to get their children vaccinated, 14.5% (n=115) of timely vaccine accepting parents/caregivers shared this belief.

That local leaders appreciate the importance of getting their children vaccinated was believed by 70.3 (n=551) of timely vaccine accepting, 62.9% (n=26) of moderately hesitant, 42.3% (n=11) of highly hesitant and 53.6% (n=22) of vaccine refusing parents/caregivers.

Furthermore, majority of respondents in all groups believed that National health authorities have positive attitudes towards the importance of getting children vaccinated: 93.7% (n=794) of timely vaccine accepting, 87.5% (n=42) of moderately hesitant, 60% (n=18) of highly hesitant and 86.7% (n=39) of vaccine refusing parents/caregivers.

Regarding their own general attitudes towards vaccination, even 93.5% (n=808) of timely vaccine accepting, 80% (n=40) of moderately hesitant, 45.1% (n=14) of highly hesitant and 41.7% (n=20) of vaccine refusing parents/caregivers believed that it is important to get their children vaccinated.

While 67.7% (n=554) of timely vaccine accepting parents/caregivers believed that people from their community appreciate the importance of getting their children vaccinated, 45.8% (n=22) of moderately hesitant, 33.3% (n=9) of highly hesitant and 27.3% (n=12) of vaccine refusing parents/caregivers shared this belief.

Around third of vaccine accepting (36.3%, n=279) and moderately hesitant parents/caregivers (27.9%, n=12) believed that religious leaders appreciate the importance of getting children vaccinated, while 14.8% (n=4) of highly hesitant and 16.7% (n=7) of vaccine refusing parents/caregivers believed so.

Majority of respondents in all groups believed that healthcare providers think that it is important to get their children vaccinated: 96.1% (n=827) of timely vaccine accepting, 94% (n=47) of moderately hesitant, 65.5% (n=19) of highly hesitant and 87.5% (n=42) of vaccine refusing parents/caregivers.

While 91.2% (n=758) of timely vaccine accepting, 91.2% (n=39) of moderately hesitant and 84.7% (n=33) of vaccine refusing parents/caregivers believed that government representatives appreciate the importance of getting children vaccinated, 51.2% (n=14) of highly hesitant believed so.

Table 30. Distribution of parents'/caregivers' scores on descriptive norms (importance of getting vaccinated) according to vaccination behaviour

		Vaccination Behavior				Total	p
		Timely vaccine accepting	Moderately hesitant	Highly hesitant	Vaccine refusing		
Описательные нормы		N (%)	N (%)	N (%)	N (%)	N (%)	
Family's attitudes	Not at all important	8 (0.9%)	2 (4.0%)	8 (25.8%)	14 (28.0%)	32 (3.2%)	<0.001
	Low importance	27 (3.1%)	7 (14.0%)	4 (12.9%)	8 (16.0%)	46 (4.6%)	
	Neutral	47 (5.4%)	7 (14.0%)	5 (16.1%)	9 (18.0%)	68 (6.8%)	
	Moderately important	278 (32.1%)	16 (32.0%)	8 (25.8%)	12 (24.0%)	314 (31.5%)	
	Extremely important	506 (58.4%)	18 (36.0%)	6 (19.4%)	7 (14.0%)	537 (53.9%)	
	Total	866 (100%)	50 (100%)	31 (100%)	50 (100%)	997 (100%)	
Friends' attitudes	Not at all important	25 (3.1%)	9 (19.1%)	13 (46.4%)	9 (20.5%)	56 (6.0%)	<0.001
	Low importance	57 (7.0%)	5 (10.6%)	1 (3.6%)	7 (15.9%)	70 (7.5%)	
	Neutral	197 (24.1%)	14 (29.8%)	6 (21.4%)	15 (34.1%)	232 (24.7%)	
	Moderately important	335 (40.9%)	12 (25.5%)	7 (25.0%)	11 (25.0%)	365 (38.9%)	
	Extremely important	205 (25.0%)	7 (14.9%)	1 (3.6%)	2 (4.5%)	215 (22.9%)	
	Total	819 (100%)	47 (100%)	28 (100%)	44 (100%)	938 (100%)	
Other parents/caregivers' attitudes	Not at all important	39 (4.9%)	8 (18.2%)	10 (35.7%)	9 (22.0%)	66 (7.3%)	<0.001
	Low importance	76 (9.6%)	4 (9.1%)	1 (3.6%)	3 (7.3%)	84 (9.3%)	
	Neutral	252 (31.8%)	19 (43.2%)	7 (25.0%)	15 (36.6%)	293 (32.3%)	
	Moderately important	282 (35.6%)	11 (25.0%)	8 (28.6%)	9 (22.0%)	310 (34.2%)	
	Extremely important	144 (18.2%)	2 (4.5%)	2 (7.1%)	5 (12.2%)	153 (16.9%)	
	Total	793 (100%)	44 (100%)	28 (100%)	41 (100%)	906 (100%)	
Local leaders' attitudes	Not at all important	21 (2.7%)	2 (4.8%)	10 (38.5%)	7 (17.1%)	40 (4.5%)	<0.001
	Low importance	47 (6.0%)	5 (11.9%)	0 (0.0%)	3 (7.3%)	55 (6.2%)	
	Neutral	164 (20.9%)	9 (21.4%)	5 (19.2%)	9 (22.0%)	187 (21.0%)	
	Moderately important	351 (44.8%)	16 (38.1%)	8 (30.8%)	11 (26.8%)	386 (43.3%)	
	Extremely important	200 (25.5%)	10 (23.8%)	3 (11.5%)	11 (26.8%)	224 (25.1%)	
	Total	783 (100%)	42 (100%)	26 (100%)	41 (100%)	892 (100%)	

National Health Authorities' attitudes	Not at all important	4 (0.5%)	0 (0.0%)	3 (10.0%)	1 (2.2%)	8 (0.8%)	<0.001
	Low importance	13 (1.5%)	2 (4.2%)	1 (3.3%)	1 (2.2%)	17 (1.8%)	
	Neutral	37 (4.4%)	4 (8.3%)	8 (26.7%)	4 (8.9%)	53 (5.5%)	
	Moderately important	238 (28.1%)	14 (29.2%)	8 (26.7%)	14 (31.1%)	274 (28.2%)	
	Extremely important	556 (65.6%)	28 (58.3%)	10 (33.3%)	25 (55.6%)	619 (63.7%)	
	Total	848 (100%)	48 (100%)	30 (100%)	45 (100%)	971 (100%)	
Own attitudes	Not at all important	4 (0.5%)	2 (4.0%)	11 (35.5%)	14 (29.2%)	31 (3.1%)	<0.001
	Low importance	15 (1.7%)	3 (6.0%)	3 (9.7%)	7 (14.6%)	28 (2.8%)	
	Neutral	37 (4.3%)	5 (10.0%)	3 (9.7%)	7 (14.6%)	52 (5.2%)	
	Moderately important	206 (23.8%)	13 (26.0%)	5 (16.1%)	9 (18.8%)	233 (23.5%)	
	Extremely important	602 (69.7%)	27 (54.0%)	9 (29.0%)	11 (22.9%)	649 (65.4%)	
	Total	864 (100%)	50 (100%)	31 (100%)	48 (100%)	993 (100%)	
Peoples' from community attitudes	Not at all important	36 (4.4%)	4 (8.3%)	8 (29.6%)	9 (20.5%)	57 (6.1%)	<0.001
	Low importance	51 (6.2%)	4 (8.3%)	5 (18.5%)	8 (18.2%)	68 (7.3%)	
	Neutral	177 (21.6%)	18 (37.5%)	5 (18.5%)	15 (34.1%)	215 (22.9%)	
	Moderately important	350 (42.8%)	16 (33.3%)	6 (22.2%)	8 (18.2%)	380 (40.6%)	
	Extremely important	204 (24.9%)	6 (12.5%)	3 (11.1%)	4 (9.1%)	217 (23.2%)	
	Total	818 (100%)	48 (100%)	27 (100%)	44 (100%)	937 (100%)	
Religious leaders' attitudes	Not at all important	128 (16.7%)	10 (23.3%)	13 (48.1%)	18 (42.9%)	169 (19.2%)	<0.001
	Low importance	156 (20.3%)	7 (16.3%)	4 (14.8%)	9 (21.4%)	176 (10.0%)	
	Neutral	205 (26.7%)	14 (32.6%)	6 (22.2%)	8 (19.05%)	233 (26.5%)	
	Moderately important	199 (25.9%)	12 (27.9%)	2 (7.4%)	6 (14.3%)	219 (24.9%)	
	Extremely important	80 (10.4%)	0 (0.0%)	2 (7.4%)	1 (2.4%)	83 (9.4%)	
	Total	768 (100%)	43 (100%)	27 (100%)	42 (100%)	880 (100%)	
Healthcare providers' attitudes	Not at all important	4 (0.5%)	0 (0.0%)	2 (6.9%)	0 (0.0%)	6 (0.6%)	<0.001
	Low importance	8 (0.9%)	1 (2.0%)	0 (0.0%)	1 (2.1%)	10 (1.0%)	
	Neutral	21 (2.4%)	2 (4.0%)	8 (27.6%)	5 (10.4%)	36 (3.6%)	
	Moderately important	192 (22.3%)	11 (22.0%)	7 (24.1%)	10 (20.8%)	220 (22.3%)	

	Extremely important	635 (73.8%)	36 (72.0%)	12 (41.4%)	32 (66.7%)	715 (72.4%)	
	Total	860 (100%)	50 (100%)	29 (100%)	48 (100%)	987 (100%)	
Governments' attitudes	Not at all important	9 (1.1%)	1 (2.1%)	2 (7.1%)	1 (2.6%)	13 (1.4%)	<0.001
	Low importance	13 (1.6%)	0 (0.0%)	1 (3.6%)	1 (2.6%)	15 (1.6%)	
	Neutral	53 (6.4%)	8 (16.7%)	11 (39.3%)	4 (10.3%)	76 (8.0%)	
	Moderately important	280 (33.6%)	17 (35.4%)	6 (21.4%)	15 (38.5%)	526 (55.5%)	
	Extremely important	478 (57.4%)	22 (45.8%)	8 (28.6%)	18 (46.2%)	526 (55.5%)	
	Total	833 (100%)	48 (100%)	28 (100%)	39 (100%)	948 (100%)	

5.4.2 Parents'/Caregivers' injunctive norms regarding childhood vaccination

For 78.3% (n=783) of parents/caregivers surveyed, personal attitudes towards vaccination were among the strongest determinants of their intention to vaccinate their children. The most influential social agents were family members (ranked among the top three biggest influential factors by 85.6%, n=856) and health care providers (71.5%, n=715), having the strongest influence on vaccination intention. The least influence on vaccination intention was ascribed to other parents/caregivers (ranked among the three least influential factors by 54.2% (n=542) of parents/caregivers), community members (54.2%, n=542), religious leaders (54.0%, n=540) and local leaders (43.9%, n=439).

Table 31. Biggest and smallest self-ranked influence on vaccination intention.

Potential influences	Biggest self-reported influence			Smallest self-reported influence		
	1st rank	2st rank	3rd rank	1st rank	2st rank	3rd rank
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Own attitudes	529 (52.9%)	159 (15.9%)	95 (9.5%)	15 (1.5%)	6 (0.6%)	6 (0.6%)
Family	320 (32.0%)	455 (45.5%)	81 (8.1%)	33 (3.3%)	14 (1.4%)	3 (0.3%)
Friends	6 (0.6%)	62 (6.2%)	102 (10.2%)	213 (21.3%)	76 (7.6%)	68 (6.8%)
Other parents/caregivers	8 (0.8%)	33 (3.3%)	53 (5.3%)	250 (25.0%)	174 (17.4%)	118 (11.8%)
Local leaders	4 (0.4%)	10 (1.0%)	12 (1.2%)	105 (10.5%)	197 (19.7%)	137 (13.7%)
Community members	1 (0.1%)	7 (0.7%)	20 (2.0%)	94 (9.4%)	224 (22.4%)	224 (22.4%)
National Health Authorities	27 (2.7%)	66 (6.6%)	130 (13.0%)	12 (1.2%)	30 (3.0%)	25 (2.5%)
Religious leaders	1 (0.1%)	10 (1.0%)	19 (1.9%)	188 (18.8%)	160 (16.0%)	192 (19.2%)
Healthcare providers	106 (10.6%)	174 (17.4%)	435 (43.5%)	9 (0.9%)	6 (0.6%)	7 (0.7%)
Government	4 (0.4%)	15 (1.5%)	29 (2.9%)	25 (2.5%)	54 (5.4%)	95 (9.5%)
Media (TV, radio, newspapers, internet)	4 (0.4%)	9 (0.9%)	24 (2.4%)	56 (5.6%)	59 (5.9%)	125 (12.5%)

5.4.3 Parents'/Caregivers' perception of recommendations given by HCW

Parents/caregivers reported having a high-quality communication with their HCWs regarding vaccination (Mean=4.21, SD=0.54). A large majority of surveyed parents/caregivers stated that they followed recommendation about vaccines given by their child's paediatrician/family doctor (93.9%; n=936), their child's paediatrician/family doctor recommended them to get the child vaccinated (95.7%; n=956), paediatrician/family doctor answered all their question related to vaccines and immunization (93.6%; n=932) and listened to all their concerns (93.3%; n=929).

Timely vaccine accepting parents/caregivers reported, to the greatest extent, having a high-quality communication with their child paediatrician (Mean=4.28), followed by moderately hesitant (Mean=4.05) and vaccine refusing parents/caregivers (Mean=3.62). The highly hesitant parents/caregivers give the lowest rating to the quality of this communication (Mean=3.56).

Table 32. Differences in the perception of HCW's recommendations between the parents exhibiting different vaccination behaviour.

Vaccination Behavior	N	%	Mean	SD	Min	Max	p
Timely vaccine accepting	864	86.4	4.28	0.46	2.50	5.00	< 0.001
Moderately hesitant	51	5.1	4.05	0.56	1.50	5.00	
Highly hesitant	31	3.1	3.56	1.01	1.75	5.00	
Vaccine refusal	48	4.8	3.62	0.74	1.25	5.00	

While even 98.4% (n=849) of timely vaccine accepting and 80.3% (n=41) of moderately hesitant parents/caregivers agreed and strongly agreed that they follow the recommendations of the paediatrician/family doctor, 61.3% (n=19) of highly hesitant and 50% (n=25) of vaccine refusing parents/caregivers shared this attitude. The majority of timely vaccine accepting (97.5%; n=845), moderately hesitant (86.3%; n=44), highly hesitant (83.9%; n=26) and vaccine refusing parents/caregivers (80%, n=40) agreed and strongly agreed that their child's paediatrician/family doctor recommended vaccination. Larger proportion of timely vaccine accepting (96.2%; n=832) and moderately hesitant parents/caregivers (96.1%, n=49) agreed and strongly agreed that their paediatrician/family doctor answers all their questions regarding vaccines, compared to highly hesitant (58%; n=18), and vaccine refusing parents/caregivers (67.4%; n=33). Majority of timely vaccine accepting (95%; n=823), moderately hesitant (94.2%; n=48), highly hesitant (64.6%, n=20) and vaccine refusing parents/caregivers (79.2%, n=38) agreed and strongly agreed that paediatrician/family doctor listens to all their concerns related to vaccination.

Table 33. Distribution of parents'/caregivers' scores on individual items of recommendations by HCWs according to vaccination behaviour

		Vaccination Behavior				Total	p
		Timely vaccine accepting	Moderately hesitant	Highly hesitant	Vaccine refusing		
Items		N (%)	N (%)	N (%)	N (%)	N (%)	
Generally, I do what my child's paediatrician/family doctor recommends about vaccines for my child/children	Strongly disagree	0 (0.0%)	2 (3.9%)	3 (9.7%)	9 (18.0%)	14 (1.4%)	<0.001
	Disagree	9 (1.0%)	2 (3.9%)	6 (19.4%)	9 (18.0%)	26 (2.6%)	
	Neither disagree nor agree	5 (0.6%)	6 (11.8%)	3 (9.7%)	7 (14.0%)	21 (2.1%)	
	Agree	546 (63.1%)	32 (62.7%)	13 (41.9%)	20 (40.0%)	611 (61.3%)	
	Strongly agree	305 (35.3%)	9 (17.6%)	6 (19.4%)	5 (10.0%)	325 (32.6%)	
	Total	865 (100%)	51 (100%)	31 (100%)	50 (100%)	997 (100%)	
My child's paediatrician/family doctor recommended me to get my child/children vaccinated.	Strongly disagree	0 (0.0%)	1 (2.0%)	0 (0.0%)	1 (2.0%)	2 (0.2%)	<0.001
	Disagree	10 (1.2%)	4 (7.8%)	4 (12.9%)	4 (8.0%)	22 (2.2%)	
	Neither disagree nor agree	11 (1.3%)	2 (3.9%)	1 (3.2%)	5 (10.0%)	19 (1.9%)	
	Agree	552 (63.7%)	33 (64.7%)	16 (51.6%)	30 (60.0%)	631 (63.2%)	
	Strongly agree	293 (33.8%)	11 (21.6%)	10 (32.3%)	10 (20.0%)	324 (32.5%)	
	Total	866 (100%)	51 (100%)	31 (100%)	50 (100%)	998 (100%)	
My child's paediatrician/family doctor answers all my questions related to vaccines and immunization	Strongly disagree	2 (0.2%)	1 (2.0%)	5 (16.1%)	3 (6.1%)	11 (1.1%)	<0.001
	Disagree	18 (2.1%)	0 (0.0%)	7 (22.6%)	6 (12.2%)	31 (3.1%)	
	Neither disagree nor agree	13 (1.5%)	1 (2.0%)	1 (3.2%)	7 (14.3%)	22 (2.2%)	
	Agree	556 (64.3%)	35 (68.6%)	9 (29.0%)	24 (49.0%)	624 (62.7%)	
	Strongly agree	276 (31.9%)	14 (27.5%)	9 (29.0%)	9 (18.4%)	308 (30.9%)	
	Total	865 (100%)	51 (100%)	31 (100%)	49 (100%)	996 (100%)	
My child's paediatrician/family doctor listens all my concerns related to vaccines and immunization	Strongly disagree	1 (0.1%)	1 (2.0%)	3 (9.7%)	1 (2.1%)	6 (0.6%)	<0.001
	Disagree	20 (2.3%)	0 (0.0%)	5 (16.1%)	3 (6.3%)	28 (2.8%)	
	Neither disagree nor agree	22 (2.5%)	2 (3.9%)	3 (9.7%)	6 (12.5%)	33 (3.3%)	
	Agree	569 (65.7%)	34 (66.7%)	14 (45.2%)	30 (62.5%)	647 (65.0%)	
	Strongly agree	254 (29.3%)	14 (27.5%)	6 (19.4%)	8 (16.7%)	282 (28.3%)	
	Disagree	866 (100%)	51 (100%)	31 (100%)	48 (100%)	996 (100%)	

Parents/caregivers of diverse age and educational level, and those living in rural and urban areas did not differ in their assessment of the quality of communication with their child's paediatrician/family doctor.

Table 34. Differences in the perception of recommendations by HCW between diverse groups of parents/caregivers

	N	%	Mean	SD	Min	Max	p
Parents/caregivers' age							
18-28	382	38.2	4.21	0.54	1.25	5.00	0.93
29-49	560	56.0	4.21	0.53	1.75	5.00	
50+	53	53.0	4.23	0.60	1.50	5.00	
Education							
Basic education	91	9.1	4.21	0.45	3.25	5.00	0.17
Secondary education	382	38.2	4.18	0.56	1.25	5.00	
Primary and secondary vocational education	208	20.8	4.27	0.49	2.50	5.00	
Incomplete university	37	3.7	4.01	0.64	1.75	5.00	
University	277	27.7	4.23	0.55	2.50	5.00	
Settlement							
Urban	475	47.5	4.17	0.60	1.25	5.00	0.16
Rural	520	52.0	4.25	0.47	2.50	5.00	

5.5. Environmental factors

5.5.1 Parents'/Caregivers' perception of lack of information

Surveyed parents/caregivers, overall, manifested moderately low level of perceived lack of information regarding vaccines and vaccination (Mean=2.45, SD=0.87). A minority of parents/caregivers in the total sample (18.8%, n=187) claimed that it is hard to make a decision about vaccination because of the lack of information. Similarly, more than half (59.9%, n=596) of parents/caregivers do not agree that incomplete information regarding vaccines make them confused. One third (31.7%, n=315) of parents/caregivers feel confused due to the contradictory information regarding childhood vaccines and around half of parents/caregivers in the total sample (66.0%, n=656) believe they have all the information regarding vaccination they need.

Approximately the same proportion of moderately (38%, n=19) and highly hesitant parents/caregivers (38.7, n=12) supported the view that it is hard to make decision regarding vaccination because of a lack of information. This view was less common among vaccine accepting (15.8%, n=136) and vaccine refusing parents/caregivers (18.8%, n=187). Even 58% (n=29) of vaccine refusing parents/caregivers and 48.4% (n=15) of highly hesitant parents/caregivers agree and strongly agree that incomplete information regarding vaccines make them confused, compared to 41.2% (n=21) of moderately and only 27.7% (n=239) of timely vaccine accepting parents/caregivers. The proportion of those who felt confused by contradictory information was highest among vaccine refusing (55.1%, n=27) and highly hesitant parents/caregivers (54.9%, n=17), followed by moderately hesitant (37.3%, n=19) and vaccine accepting (29.2%, n=252). Finally, the percentage of parents/

caregivers who were satisfied with the information they had was much lower among highly hesitant (35.5%, n=11) and vaccine refusing parents/caregivers (42.9%, n=21), whereas even 68.9% (n=596) of timely vaccine accepting parents/caregivers and 54.9% (n=28) felt they had enough information about vaccination.

Table 35. Distribution of parents'/caregivers' scores on individual items measuring lack of information according to vaccination behaviour

		Vaccination Behavior				Total	p
		Timely vaccine accepting	Moderately hesitant	Highly hesitant	Vaccine refusing		
Items		N (%)	N (%)	N (%)	N (%)	N (%)	
It is hard to make the decision whether to vaccinate my child since there is a lack of information about vaccines.	Strongly disagree	220 (15.5%)	6 (12.0%)	15 (48.4%)	4 (8.0%)	245 (24.6%)	<0.001
	Disagree	457 (53.0%)	19 (38.0%)	4 (12.9%)	18 (36.0%)	498 (50.1%)	
	Neither disagree nor agree	50 (5.8%)	6 (12.0%)	0 (0.0%)	8 (16.0%)	64 (6.4%)	
	Agree	123 (14.3%)	15 (30.0%)	12 (38.7%)	17 (34.0%)	167 (16.8%)	
	Strongly agree	13 (1.5%)	4 (8.0%)	0 (0.0%)	3 (6.0%)	20 (2.0%)	
	Total	863 (100%)	50 (100%)	31 (100%)	50 (100%)	994 (100%)	
Incomplete information regarding the childhood vaccines I come across, make me confused	Strongly disagree	153 (17.7%)	8 (15.7%)	10 (32.3%)	2 (4.0%)	173 (17.4%)	<0.001
	Disagree	392 (45.4%)	16 (31.4%)	3 (9.7%)	12 (24.0%)	423 (42.5%)	
	Neither disagree nor agree	80 (9.3%)	6 (11.8%)	3 (9.7%)	7 (14.0%)	96 (9.6%)	
	Agree	223 (25.8%)	16 (31.4%)	13 (41.9%)	26 (52.0%)	278 (27.9%)	
	Strongly agree	16 (1.9%)	5 (9.8%)	2 (6.5%)	3 (6.0%)	26 (2.6%)	
	Total	864 (100%)	51 (100%)	31 (100%)	50 (100%)	996 (100%)	
Contradictory information regarding the childhood vaccines I come across make me confused	Strongly disagree	147 (17.0%)	7 (13.7%)	7 (22.6%)	2 (4.1%)	163 (16.4%)	<0.001
	Disagree	381 (44.1%)	15 (29.4%)	3 (9.7%)	10 (2.4%)	409 (41.1%)	
	Neither disagree nor agree	83 (9.6%)	10 (19.6%)	4 (12.9%)	10 (20.4%)	107 (10.8%)	
	Agree	238 (27.6%)	14 (27.5%)	15 (48.4%)	24 (49.0%)	291 (29.3%)	
	Strongly agree	14 (1.6%)	5 (9.8%)	2 (6.5%)	3 (6.1%)	24 (2.4%)	
	Total	863 (100%)	51 (100%)	31 (100%)	49 (100%)	994 (100%)	
I have all the information I need regarding childhood vaccination	Strongly disagree	20 (2.3%)	2 (3.9%)	5 (16.1%)	2 (4.1%)	29 (2.9%)	<0.001
	Disagree	132 (15.3%)	14 (27.5%)	11 (35.5%)	16 (32.7%)	173 (17.4%)	

	Neither disagree nor agree	116 (13.4%)	7 (13.7%)	4 (12.9%)	10 (20.4%)	137 (13.8%)
	Agree	492 (56.9%)	26 (51.0%)	7 (22.6%)	14 (28.6%)	539 (54.2%)
	Strongly agree	104 (12.0%)	2 (3.9%)	4 (12.9%)	7 (14.3%)	117 (11.8%)
	Total	864 (100%)	51 (100%)	31 (100%)	49 (100%)	995 (100%)

Significant differences in the perception of lack of information regarding vaccination were found between parents/caregivers manifesting different vaccination behavior ($p < 0.001$). While vaccine refusing (Mean=3.10), highly hesitant (Mean=2.84) and moderately hesitant parents/caregivers (Mean=2.85) perceived lack of information as higher timely vaccine accepting parents/caregivers perceived lack of information as moderately low (Mean=2.38).

Table 36. Differences in perception of lack of information between the parents/caregivers exhibiting different vaccine behaviour.

Vaccination Behavior	N	Mean	SD	Min	Max	p
Timely vaccine accepting	857	2.38	0.82	1.00	5.00	< 0.001
Moderately hesitant	50	2.85	1.04	1.00	5.00	
Highly hesitant	31	2.84	1.05	1.00	4.50	
Vaccine refusal	48	3.10	0.88	1.25	5.00	

Parents/caregivers living in urban areas (Mean=2.56) had a greater sense of lack of information about childhood vaccination than those living in rural areas (Mean=2.36).

Table 37. Differences in perception of lack of information between diverse groups of parents/caregivers

	N	Mean	SD	Min	Max	p
Parents/caregivers' age						
18-28	378	2.46	0.83	1.00	4.25	0.227
29-49	558	2.43	0.89	1.00	5.00	
50+	52	2.65	0.83	1.25	4.00	
Education						
Basic education	90	2.39	0.83	1.00	4.50	0.106
Secondary education	379	2.43	0.83	1.00	5.00	
Primary and secondary vocational education	207	2.38	0.85	1.00	4.74	
Incomplete university	38	2.70	0.85	1.25	4.50	
University	274	2.53	0.93	1.00	5.00	
Settlement						
Urban	468	2.56	1.13	1.00	5.00	<0.001
Rural	520	2.36	1.12	1.00	5.00	

5.5.2 Parents'/Caregivers' use of the information sources

Family physicians (used often and regularly as a source by 86.2%, n=862) and family members (67.2%, n=670) were found to be the most frequently used sources of information on childhood vaccination followed by health care professionals in media (29.5%, n=293) and friends (23.4%, n=252).

Least used (rarely or never) were information from national TV channels (15.8%, n=158) and religious leaders (14.2%, n=139).

Table 38. Frequency of use of different sources

Sources	Never	Rarely	Sometimes	Often	Regularly
	N (%)	N (%)	N (%)	N (%)	N (%)
Scientific literature	294 (29.7%)	273 (27.6%)	231 (23.4%)	114 (11.5%)	77 (7.8%)
National TV channels	295 (29.6%)	271 (27.2%)	273 (27.4%)	93 (9.3%)	65 (6.5%)
Internet portals	247 (24.8%)	238 (23.9%)	271 (27.3%)	150 (15.1%)	88 (8.9%)
YouTube channels	286 (28.8%)	230 (23.2%)	259 (26.1%)	141 (14.2%)	77 (7.8%)
Social networks	283 (28.6%)	234 (23.6%)	255 (25.7%)	121 (12.2%)	98 (9.9%)
Family	41 (4.1%)	84 (8.4%)	202 (20.3%)	256 (25.7%)	414 (41.5%)
Friends	160 (16.1%)	170 (17.1%)	410 (41.3%)	141 (12.2%)	111 (11.2%)
Your family physician	3 (0.3%)	53 (5.3%)	181 (18.1%)	312 (31.2%)	450 (45.0%)
Healthcare professionals in media	186 (18.7%)	215 (21.7%)	299 (30.1%)	168 (16.9%)	125 (12.6%)
Religious leaders	443 (45.4%)	211 (21.6%)	182 (18.7%)	87 (8.9%)	52 (5.3%)
Government	348 (35.3%)	181 (18.4%)	237 (24.1%)	131 (13.3%)	88 (8.9%)

Highly hesitant parents/caregivers reported using scientific literature to a lesser extent (13%, n=4) compared to vaccine accepting (19.7%, n=170), moderately hesitant (16.7%, n=8) and vaccine refusing parents/caregivers (19.1%, n=9). Irrespective of their vaccination behaviour, a small number of parents/caregivers report often and regular use of National TV channels to obtain information about vaccination; with the lowest proportion of highly hesitant parents/caregivers (6.4%, n=2), followed by vaccine accepting (16.4%, n=142), moderately hesitant (12.7%, n=7) and vaccine refusing parents/caregivers (14.6%, n=7). Again, regardless of their vaccination behaviour, a small number of parents/caregivers report often and regular use of internet portals; with the highest proportion of vaccine accepting parents/caregivers (24.4%, n=211), followed by moderately hesitant (20.4%, n=10), vaccine refusing (20.9%, n=10) and highly hesitant (19.4%, n=6).

Vaccine refusing parents/caregivers use YouTube channels to a lesser extent (10.6%, n=9) compared to vaccine accepting (22.8%, n=197), moderately hesitant (14.3%, n=7), and highly hesitant (16.1%, n=5) parents/caregivers. Social networks are used less frequently by highly hesitant parents/caregivers (6.4%, n=2) compared to vaccine accepting (23%, n=198), moderately hesitant (18.4%, n=9) and vaccine refusing (18.8%, n=9).

In addition, 68.7% (n=595) of timely vaccine accepting parents/caregivers, 60% (n=30) of moderately and 35.5% (n=11) of highly hesitant, and 66.7% (n=22) of vaccine refusing relied on family as a source of information about vaccination. Vaccine refusing parents/caregivers (32.6%, n=16) were more likely to rely on friends as a source of information, compared to vaccine accepting (26.5%, n=220), moderately hesitant (24%, n=12), and highly hesitant (13%, n=4) parents/caregivers. Information provided by family physician

was used often and regularly by even 79.7% (n=691) of timely vaccine accepting and moderately hesitant parents/caregivers (72%, n=36), whereas this proportion was lower among highly hesitant (21.3%, n=10) and vaccine refusing parents/caregivers (48%, n=24). Similarly, information given by healthcare professionals in the media were used more by timely vaccine accepting (31.2%, n=169) than by moderately hesitant (25%, n=12), highly hesitant (9.7%, n=3) and vaccine refusing parents/caregivers (18.8%, n=9).

While even 25.8% (n=8) of highly hesitant parents/caregivers often and regularly use the information on vaccination given by religious leaders, less proportion of vaccine accepting (13.7%, n=116), moderately hesitant (12.3%, n=6) and vaccine refusal parents/caregivers (19.2%, n=9) do so. Information on vaccination provided by government is never or rarely used by 64.2% (n=26) of vaccine refusing, 86.6% (n=26) of highly hesitant, 59.2% (n=29) of moderately hesitant and 52.1% (n=446) of timely vaccine accepting parents/caregivers.

Table 39. Distribution of parents'/caregivers' use of information sources according to vaccination behaviour.

		Vaccination Behavior				Total	p
		Timely vaccine accepting	Moderately hesitant	Highly hesitant	Vaccine refusing		
Information sources		N (%)	N (%)	N (%)	N (%)	N (%)	
Scientific literature:	Never	248 (28.8%)	17 (35.4%)	11 (35.5%)	16 (34.0%)	292 (29.6%)	0.340
	Rarely	243 (28.2%)	8 (16.7%)	10 (32.3%)	12 (25.5%)	273 (27.7%)	
	Sometimes	200 (23.2%)	15 (31.3%)	6 (19.4%)	10 (21.3%)	231 (23.4%)	
	Often	101 (11.7%)	6 (12.5%)	2 (6.5%)	5 (10.6%)	114 (11.6%)	
	Regularly	69 (8.0%)	2 (4.2%)	2 (6.5%)	4 (8.5%)	77 (7.8%)	
	Total	861 (100,0%)	48 (100,0%)	31 (100,0%)	47 (100,0%)	987 (100,0%)	
National TV channels	Never	235 (27.2%)	23 (45.1%)	16 (51.6%)	20 (41.7%)	294 (29.5%)	<0.05
	Rarely	250 (28.9%)	7 (13.7%)	7 (22.6%)	7 (14.6%)	271 (27.2%)	
	Sometimes	238 (27.5%)	14 (27.5%)	6 (19.4%)	14 (29.2%)	272 (27.3%)	
	Often	84 (9.7%)	5 (9.8%)	1 (3.2%)	3 (6.3%)	93 (9.3%)	
	Regularly	58 (6.7%)	2 (3.9%)	1 (3.2%)	4 (8.3%)	65 (6.5%)	
	Total	865 (100,0%)	51 (100,0%)	31 (100,0%)	48 (100,0%)	995 (100,0%)	
Internet portals	Never	207 (24.0%)	11 (22.4%)	12 (38.7%)	16 (33.3%)	246 (24.8%)	0.109
	Rarely	211 (24.4%)	10 (20.4%)	5 (16.1%)	12 (25.0%)	238 (24.0%)	
	Sometimes	235 (27.2%)	18 (36.7%)	8 (25.8%)	10 (20.8%)	271 (27.3%)	
	Often	134 (15.5%)	6 (12.2%)	3 (9.7%)	7 (14.6%)	150 (15.1%)	
	Regularly	77 (8.9%)	4 (8.2%)	3 (9.7%)	3 (6.3%)	87 (8.8%)	
	Total	864 (100,0%)	49 (100,0%)	31 (100,0%)	48 (100,0%)	992 (100,0%)	
YouTube channels	Never	241 (27.9%)	11 (22.4%)	12 (38.7%)	21 (43.8%)	285 (28.8%)	0.050
	Rarely	203 (23.5%)	13 (26.5%)	6 (19.4%)	8 (16.7%)	230 (23.2%)	
	Sometimes	222 (25.7%)	18 (36.7%)	8 (25.8%)	10 (20.8%)	258 (26.0%)	
	Often	127 (14.7%)	4 (8.2%)	4 (12.9%)	6 (4.3%)	141 (14.2%)	
	Regularly	70 (8.1%)	3 (6.1%)	1 (3.2%)	3 (6.3%)	77 (7.8%)	
	Total	863 (100,0%)	49 (100,0%)	31 (100,0%)	48 (100,0%)	991 (100,0%)	

Social networks (Facebook, Viber, Twitter, WhatsApp):	Never	236 (27.4%)	12 (24.5%)	16 (51.6%)	19 (39.6%)	283 (28.6%)	<0.05
	Rarely	213 (24.7%)	8 (16.3%)	3 (9.7%)	10 (20.8%)	234 (23.7%)	
	Sometimes	214 (24.9%)	20 (40.8%)	10 (32.3%)	10 (20.8%)	254 (25.7%)	
	Often	109 (12.7%)	4 (8.2%)	1 (3.2%)	6 (12.5%)	120 (12.1%)	
	Regularly	89 (10.3%)	5 (10.2%)	1 (3.2%)	3 (6.3%)	98 (9.9%)	
	Total	861 (100,0%)	49 (100,0%)	31 (100,0%)	48 (100,0%)	989 (100,0%)	
Family	Never	39 (4.5%)	0 (0.0%)	1 (3.2%)	1 (2.1%)	41 (4.1%)	0.070
	Rarely	64 (7.4%)	8 (16.0%)	5 (16.1%)	7 (14.6%)	84 (8.4%)	
	Sometimes	168 (19.4%)	12 (24.0%)	14 (45.2%)	8 (16.7%)	271 (20.3%)	
	Often	224 (25.9%)	14 (28.0%)	5 (16.1%)	12 (25.0%)	255 (25.6%)	
	Regularly	371 (42.8%)	16 (32.0%)	6 (19.4%)	20 (41.7%)	413 (41.5%)	
	Total	866 (100,0%)	50 (100,0%)	31 (100,0%)	48 (100,0%)	995 (100,0%)	
Friends	Never	137 (15.9%)	10 (20.0%)	7 (22.6%)	6 (12.2%)	160 (16.2%)	0.586
	Rarely	145 (16.9%)	8 (16.0%)	2 (6.5%)	14 (28.6%)	169 (17.1%)	
	Sometimes	358 (41.6%)	20 (40.0%)	18 (58.1%)	13 (26.5%)	409 (41.3%)	
	Often	119 (13.8%)	9 (18.0%)	2 (6.5%)	11 (22.4%)	141 (14.2%)	
	Regularly	101 (11.7%)	3 (6.0%)	(6.5%)	(10.2%)	(11.2%)	
	Total	860 (100,0%)	50 (100,0%)	31 (100,0%)	49 (100,0%)	940 (100,0%)	
Your family physician	Never	0 (0.0%)	1 (2.0%)	0 (0.0%)	2 (4.0%)	3 (0.3%)	<0.001
	Rarely	29 (3.3%)	1 (2.0%)	12 (38.7%)	10 (20.0%)	52 (5.2%)	
	Sometimes	146 (16.9%)	12 (24.0%)	9 (29.0%)	14 (28.0%)	181 (18.2%)	
	Often	281 (32.4%)	17 (34.0%)	4 (12.9%)	9 (18.0%)	311 (31.2%)	
	Regularly	410 (47.3%)	19 (38.0%)	6 (19.4%)	15 (30.0%)	450 (45.1%)	
	Total	866 (100,0%)	50 (100,0%)	31 (100,0%)	50 (100,0%)	997 (100,0%)	
Healthcare professionals in media	Never	140 (16.2%)	14 (29.2%)	17 (54.8%)	15 (31.3%)	186 (18.8%)	<0.001
	Rarely	193 (22.3%)	6 (12.5%)	3 (9.7%)	12 (25.0%)	214 (21.6%)	
	Sometimes	262 (30.3%)	16 (33.3%)	8 (25.8%)	12 (25.0%)	298 (30.1%)	
	Often	151 (17.5%)	8 (16.7%)	1 (3.2%)	8 (16.7%)	168 (17.0%)	
	Regularly	118 (13.7%)	4 (8.3%)	2 (6.5%)	1 (2.1%)	125 (12.6%)	
	Total	864 (100,0%)	48 (100,0%)	31 (100,0%)	48 (100,0%)	991 (100,0%)	
Religious leaders	Never	390 (46.1%)	23 (46.9%)	12 (38.7%)	17 (36.2%)	442 (45.4%)	<0.05
	Rarely	189 (22.3%)	8 (16.3%)	3 (9.7%)	11 (23.4%)	211 (21.7%)	
	Sometimes	151 (17.8%)	12 (24.5%)	8 (25.8%)	10 (21.3%)	181 (18.6%)	
	Often	73 (8.6%)	4 (8.2%)	7 (22.6%)	3 (6.4%)	87 (8.9%)	
	Regularly	43 (5.1%)	2 (4.1%)	1 (3.2%)	6 (12.8%)	52 (5.3%)	
	Total	846 (100,0%)	49 (100,0%)	31 (100,0%)	47 (100,0%)	973 (100,0%)	
Government	Never	286 (33.4%)	24 (49.0%)	19 (63.3%)	17 (45.4%)	346 (35.2%)	<0.01
	Rarely	160 (18.7%)	5 (10.2%)	7 (23.3%)	9 (18.8%)	181 (18.4%)	
	Sometimes	207 (24.2%)	15 (30.6%)	2 (5.7%)	13 (27.1%)	237 (24.1%)	
	Often	119 (13.9%)	4 (8.2%)	2 (6.7%)	6 (12.5%)	131 (13.3%)	
	Regularly	84 (9.8%)	1 (2.0%)	0 (0.0%)	3 (6.3%)	88 (9.0%)	
	Total	856 (100,0%)	49 (100,0%)	30 (100,0%)	48 (100,0%)	983 (100,0%)	

5.5.3 Parents'/Caregivers' perception of structural barriers

On average, parents/caregivers reported low structural barriers to vaccination (Mean=1.86, SD=0.50). A large majority of parents/caregivers disagreed with the claim that they did not know where and how to get vaccines for their children (96.4%, n=962). That there is vaccination center close by, reported 96.2% (n=959) parents/caregivers. Most parents/caregivers did not find getting to the vaccination center burdensome in terms of time (93.1%, n=929) or money spent on travelling (94.2%, n=932). The claim that getting the vaccine is easy was endorsed by 82.2% (n=834) of surveyed parents/caregivers, while 15% (n=149) of parents/caregivers found getting the vaccine stressful.

There were statistically significant differences between parents/caregivers with diverse vaccine behaviour in their perception of structural barriers ($p < 0.001$). Vaccine refusing parents/caregivers perceived structural barriers as higher (Mean=2.37) compared to timely accepting (Mean=1.83), moderately hesitant (Mean=2.12) and highly hesitant parents/caregivers/caregivers (Mean=1.82).

Table 40. Differences in perception of structural barriers between the parents/caregivers exhibiting different vaccine behaviour

Vaccination Behavior	N	%	Mean	SD	Min	Max	p
Timely vaccine accepting	864	86.4	1.83	0.47	1.00	3.50	< 0.001
Moderately hesitant	50	5.0	2.12	0.56	1.00	3.83	
Highly hesitant	30	3.0	1.82	0.53	1.00	3.33	
Vaccine refusal	44	4.4	2.37	0.65	1.17	3.83	

Compared to vaccine refusing (20%, n=10), highly hesitant (9.7%, n=3), 3.9% (n=2) of moderately hesitant parents/caregivers (8.5%, n=17), and not a single one vaccine accepting parents/caregivers did not know where and how to get vaccines. While only 2.0% (n=17) of timely vaccine accepting parents/caregivers did not have a vaccination center close by, 11.8% (n=6) of moderately hesitant, 9.7% (n=3) of highly hesitant and 6% (n=3) of vaccine refusing parents/caregivers encountered this barrier. A small proportion of respondents in all groups perceived getting to the vaccination center burdensome in terms of time: 3.4% (n=30) of timely vaccine accepting, 9.8% (n=5) of moderately hesitant, 3.2% (n=1) of highly hesitant and 16% (n=8) of vaccine refusing parents/caregivers. Similarly, only 3.6% (n=31) of timely vaccine accepting, 2% (n=1) of moderately hesitant, 3.3% (n=1) of highly hesitant and 10% (n=5) of vaccine refusing parents perceived vaccination burdensome in terms of money spent on travelling. While even 85.7% (n=742) of timely vaccine accepting parents supported the view that getting the vaccine is easy, 70% (n=35) of moderately hesitant, 76.7% (n=23) of highly hesitant and 31.1% (n=14) of vaccine refusing parents shared this view. While 11.7% (n=101) of timely vaccine accepting and 27.4% (n=14) of moderately hesitant parents/caregivers perceived that getting the vaccine is stressful, 48.4% (n=15) of highly hesitant and 41.3% (n=19) of vaccine refusing parents/caregivers had this perception.

Table 41. Distribution of parents'/caregivers' scores on individual items measuring structural barriers according to vaccination behaviour

		Vaccination Behavior				Total	p
		Timely vaccine accepting	Moderately hesitant	Highly hesitant	Vaccine refusal		
Items		N (%)	N (%)	N (%)	N (%)	N (%)	
I do not know where and how I can get vaccines for my child/children	Strongly disagree	326 (37.6%)	13 (25.5%)	19 (61.3%)	14 (28.0%)	372 (37.3%)	<0.001
	Disagree	524 (60.5%)	32 (62.7%)	9 (29.0%)	25 (50.0%)	590 (59.1%)	
	Neither disagree nor agree	16 (1.8%)	4 (7.8%)	0 (0.0%)	1 (2.0%)	21 (2.1%)	
	Agree	0 (0.0%)	2 (3.9%)	3 (9.7%)	7 (14.0%)	12 (1.2%)	
	Strongly agree	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (6.0%)	3 (0.3%)	
	Total	866 (100%)	51 (100%)	31 (100%)	50 (100%)	998 (100%)	
There is no vaccination center close by.	Strongly disagree	331 (38.3%)	13 (25.5%)	19 (61.3%)	17 (34.0%)	380 (38.1%)	<0.001
	Disagree	510 (59.0%)	31 (60.8%)	9 (29.0%)	29 (58.0%)	579 (58.1%)	
	Neither disagree nor agree	7 (0.8%)	1 (2.0%)	0 (0.0%)	1 (2.0%)	9 (0.9%)	
	Agree	17 (2.0%)	6 (11.8%)	1 (3.2%)	2 (4.0%)	26 (2.6%)	
	Strongly agree	0 (0.0%)	0 (0.0%)	2 (6.5%)	1 (2.0%)	3 (0.3%)	
	Total	865 (100%)	51 (100%)	31 (100%)	50 (100%)	997 (100%)	
It is too burdensome to get to the vaccination center in terms of time.	Strongly disagree	307 (35.5%)	12 (23.5%)	21 (67.7%)	15 (30.0%)	355 (35.6%)	<0.001
	Disagree	510 (58.9%)	32 (62.7%)	8 (25.8%)	24 (48.0%)	574 (57.5%)	
	Neither disagree nor agree	19 (2.2%)	2 (3.9%)	1 (3.2%)	3 (6.0%)	25 (2.5%)	
	Agree	27 (3.1%)	5 (9.8%)	1 (3.2%)	7 (14.0%)	40 (4.0%)	
	Strongly agree	3 (0.3%)	0 (0.0%)	0 (0.0%)	1 (2.0%)	4 (0.4%)	
	Total	866 (100%)	51 (100%)	31 (100%)	50 (100%)	998 (100%)	
It is too burdensome to get to the vaccination center in terms of money spent on travelling.	Strongly disagree	318 (36.7%)	11 (21.6%)	20 (66.7%)	16 (32.0%)	365 (36.6%)	<0.05
	Disagree	500 (57.7%)	38 (74.5%)	9 (30.0%)	27 (54.0%)	574 (57.6%)	
	Neither disagree nor agree	17 (2.0%)	1 (2.0%)	0 (0.0%)	2 (4.0%)	20 (2.0%)	
	Agree	30 (3.5%)	1 (2.0%)	1 (3.3%)	4 (8.0%)	36 (3.6%)	
	Strongly agree	1 (0.1%)	0 (0.0%)	0 (0.0%)	1 (2.0%)	2 (0.2%)	
	Total	866 (100%)	51 (100%)	30 (100%)	50 (100%)	997 (100%)	

It will be easy for me to get the vaccine for my child/children.	Strongly disagree	35 (4.0%)	0 (0.0%)	3 (10.0%)	11 (24.4%)	49 (4.9%)	<0.001
	Disagree	48 (5.5%)	10 (20.0%)	1 (3.3%)	16 (35.6%)	75 (7.6%)	
	Neither disagree nor agree	41 (4.7%)	5 (10.0%)	3 (10.0%)	4 (8.9%)	53 (5.3%)	
	Agree	592 (68.4%)	30 (60.0%)	12 (40.0%)	11 (24.4%)	645 (65.1%)	
	Strongly agree	150 (17.3%)	5 (10.0%)	11 (36.7%)	3 (6.7%)	169 (17.1%)	
	Total	866 (100%)	50 (100%)	30 (100%)	45 (100%)	991 (100%)	
It will be stressful for me to get the vaccine for my child/children	Strongly disagree	190 (22.0%)	5 (9.8%)	7 (22.6%)	7 (15.2%)	209 (21.0%)	<0.001
	Disagree	520 (60.1%)	28 (54.9%)	8 (25.8%)	17 (37.0%)	573 (57.7%)	
	Neither disagree nor agree	54 (6.2%)	4 (7.8%)	1 (3.2%)	3 (6.5%)	62 (6.2%)	
	Agree	91 (10.5%)	9 (17.6%)	10 (32.3%)	11 (23.9%)	121 (12.2%)	
	Strongly agree	10 (1.2%)	5 (9.8%)	5 (16.1%)	8 (17.4%)	28 (2.8%)	
	Total	865 (100%)	51 (100%)	31 (100%)	46 (100%)	993 (100%)	

Parents/caregivers in various age groups had significantly different perception of structural barriers ($p < 0.001$). Structural barriers were perceived as highest by the parents/caregivers aged 50 and older (Mean=2.07), compared to those in the age group 29-49 (Mean=1.85) and those in the age group 18-28 (Mean=1.87). There were no significant differences in perception of structural barriers between parents/caregivers with diverse levels of education and between ones living in urban or rural setting.

Table 42. Differences in perception of structural barriers between diverse groups of parents/caregivers.

	N	%	Mean	SD	Min	Max	p
Parents/caregivers' age							
18-28	383	38.3	1.87	0.51	1.00	3.67	<0.05
29-49	555	55.5	1.85	0.49	1.00	3.83	
50+	52	5.2	2.07	0.50	1.00	3.83	
Education							
Basic education	91	9.1	1.94	0.46	1.00	3.33	0.13
Secondary education	378	37.8	1.89	0.49	1.00	3.50	
Basic and secondary vocational education	207	20.7	1.85	0.50	1.00	3.83	
Incomplete university	38	3.8	1.94	0.44	1.00	2.83	
University	276	27.6	1.82	0.52	1.00	3.83	
Settlement							
Urban	476	47.6	1.87	0.55	1.00	3.83	0.78
Rural	514	51.4	1.86	0.45	1.00	3.83	

5.6. Relationship between behaviour drivers/factors and vaccination behaviour

5.6.1 Socio-demographic characteristics and vaccination behaviour

Binary logistic linear regression analysis was used to determine whether socio-demographic characteristics predict parental vaccination behaviour. The analysis was conducted in order to assess the impact of socio-demographic characteristics on likelihood of being vaccine accepting relative to vaccine hesitant/refusing.

Parents/caregivers were less likely to be timely vaccine accepting if they had to vaccinate the female child when they had more children, relative to situation when the girl was the only child (OR=0.37, $p<0.05$). Also, they were less likely to be timely vaccine accepting if they had two (OR=0.52, $p<0.05$) or five and more children (OR=0.45, $p<0.05$), then if they had one.

Parents/caregivers living in rural areas were more likely to be vaccine accepting than those living in urban areas (OR=2.44, $p<0.001$). Parents/caregivers living in Batken (OR=4.89, $p<0.001$), Jalal-Abad (OR=13.81, $p<0.001$), Talas (OR=1.45, $p<0.05$), Osh region (OR=4.98, $p<0.001$) and Osh city (OR=2.47, $p<0.01$) were more likely to be vaccine accepting than those from Bishkek.

Table 43. Association between socio-demographic characteristics and likelihood of being vaccine accepting relative to hesitant/ refusing (univariate binary logistic regression analysis)

Socio-demographic characteristics	β	SE	Wald	Exp(B)	95%C.I.		p
Parents/caregivers' age	-0.006	0.011	0.290	0.994	0.974	1.015	0.590
Education							
Basic education							
Secondary education	-0.448	0.380	1.391	0.639	0.304	1.345	0.639
Общее и Secondary education							
профтехEducation	-0.167	0.413	0.164	0.846	0.377	1.900	0.846
Incomplete university	-0.721	0.546	1.744	0.486	0.167	1.418	0.187
University	-0.304	0.394	0.596	0.738	0.341	1.597	0.440
Income							
Very good							
Good	0.325	0.469	0.481	1.385	0.552	3.473	0.488
Average	-0.208	0.454	0.210	0.813	0.334	1.977	0.647
Bad	-0.916	0.806	1.292	0.400	0.082	1.942	0.256
Very bad	19.306	28420.72	0.000	242321226.1	0.000		0.999
Relationship status							
Single							
Married	-0.597	1.083	0.304	0.550	0.066	4.601	0.582
Divorced	-1.367	1.124	1.478	0.255	0.028	2.309	0.224
Widowed	-1.099	1.633	0.453	0.333	0.014	8.182	0.501

Child that information is given about							
Girl-only child							
Boy-only child	-0.539	0.497	1.174	0.583	0.220	1.547	0.279
Girl-one of more children	-1.009	0.466	4.696	0.365	0.146	0.908	<0.05
Boy-one of more children	-0.717	0.410	3.066	0.488	0.219	1.089	0.080
Number of children							
One							
Two	-0.650	0.294	4.888	0.522	0.294	.929	<0.05
Three	-0.384	0.301	1.621	0.681	0.378	1.230	0.203
Four	-0.251	0.338	0.550	0.778	0.401	1.510	0.459
Five and more	-0.802	0.367	4.780	0.448	0.219	.920	<0.05
Settlement							
Urban							
Rural	0.892	0.197	20.549	2.441	1.660	3.590	<0.001
Region							
Bishkek							
Batken	1.588	.485	10.725	4.893	1.892	12.65	<0.001
Jalal-Abad	2.625	.602	18.990	13.809	4.240	44.97	<0.001
Issyk-Kul	.266	.316	.709	1.305	.702	2.424	.400
Naryn	20.083	6355.066	.000	5269730	.000	.	.997
Osh region	1.604	.394	16.613	4.975	2.300	10.76	<0.001
Talas	1.824	.740	6.072	6.198	1.452	26.44	<0.05
Chuy	.417	.273	2.333	1.518	.889	2.592	.127
Osh city	.904	.320	7.967	2.470	1.318	4.627	<0.01

5.6.2 Psychological factors as predictors of vaccination behaviour

Multiple binary logistic regression analysis was performed to assess the impact of psychological factors on the likelihood of being vaccine accepting relative to hesitant/refusing.

Parents/caregivers who perceive vaccine as more safe have higher odds to timely vaccinate their child (OR=3.17, $p < 0.01$). Also, parents/caregivers who were more inclined to the alternative health beliefs were less likely to timely vaccinate their child (OR=0.53, $p < 0.01$).

The model was statistically significant $\chi^2(12) = 129.030$, $p < .001$, and explained 35% (Nagelkerke R²) of variance in vaccination behaviour.

Table 44. Association between psychological factors and likelihood of being vaccine accepting relative to hesitant/refusing (multivariate binary logistic analysis)

Psychological factors	β	SE	Wald	Exp(B)	95%C.I.		p
Vaccine efficacy	0.416	0.258	2.611	1.516	0.915	2.512	0.106
Vaccine safety	1.154	0.333	12.046	3.172	1.653	6.087	<0.01
Danger of disease	0.001	0.236	0.000	1.001	0.631	1.590	0.996

Societal trust	-0.196	0.342	0.328	0.822	0.421	1.606	0.567
Trust in family physician	-0.342	0.191	3.196	0.710	0.488	1.034	0.074
Trust in healthcare professional in media	0.226	0.170	1.763	1.254	0.898	1.751	0.184
Trust in religious leaders	0.083	0.149	0.308	1.086	0.811	1.456	0.579
Trust in Government	0.249	0.174	2.040	1.282	0.912	1.804	0.153
Knowledge	0.205	0.139	2.168	1.227	0.935	1.611	0.141
Alternative health beliefs	-0.636	0.285	4.968	0.529	0.302	0.926	<0.05
Perceived responsibility*	-0.084	0.117	0.505	0.920	0.731	1.158	0.477
Indirect personal experience	-0.098	0.135	0.525	0.907	0.695	1.182	0.469

* I am afraid that I can harm my child by getting him vaccinated.

5.6.3 Sociological factors as predictors of vaccination behaviour

Binary logistic regression analyses was conducted in order to assess the impact of sociological factors on likelihood of being vaccine accepting relative to hesitant/refusing.

Parents/caregivers who perceived that their family members think that vaccines are extremely important for their child's health were more likely to be vaccine accepting (OR=5.23, $p<0.05$), than those who perceived that their family believe that vaccines are not important at all. Also, parents/caregivers who believed that their friends think that childhood vaccination is moderately important (OR=1.59, $p<0.01$), extremely important (1.94, $p<0.01$), or even are neutral (OR=1.41, $p<0.01$) were also more likely to be vaccine accepting than those who think that their friends considered childhood vaccination not being important at all. In addition, parents who rated communication with their child's paediatrician/family physician as more responsive (OR=2.83; $p<0.001$) had higher odds to be vaccine accepting.

The model was statistically significant $\chi^2(16) = 174.415$, $p < .001$, and explained 32% (Nagelkerke R²) of variance in vaccination behaviour.

Table 45. Association between sociological factors and likelihood of being vaccine accepting relative to hesitant/refusing (multivariate binary logistic regression analysis)

Социологические факторы	B	SE	Wald	Exp(B)	95% C.I.	p	
Familys' attitude							
Negative (ref)							
Somewhat negative	0.448	0.677	0.438	1.565	0.416	5.894	0.508
Neutral	0.576	0.647	0.793	1.779	0.501	6.319	0.373
Somewhat positive	1.095	0.652	2.817	2.990	0.832	10.739	0.093
Very positive	1.055	0.737	2.048	2.873	0.677	12.190	0.152
Family's attitude regarding importance							
Not at all important (ref)							
Low importance	0.542	0.668	0.657	1.719	0.464	6.367	0.418
Neutral	0.482	0.654	0.543	1.620	0.449	5.843	0.461

Moderately important	1.106	0.653	2.866	3.022	0.840	10.877	0.090
Extremely important	1.654	0.680	5.921	5.230	1.380	19.830	<0.05
Frend's attitude regarding importance							
Not at all important (ref)							
Low importance	1.493	0.488	9.347	4.450	1.709	11.590	<0.01
Neutral	1.137	0.405	7.868	3.118	1.409	6.903	<0.01
Moderately important	1.283	0.417	9.464	3.608	1.593	8.172	<0.01
Extremely important	1.726	0.542	10.132	5.617	1.941	16.257	<0.01
National Health Authorities (as important influencers)	0.251	0.133	3.576	1.286	.991	1.668	.059
Religious leaders (as important influencers)	-0.0356	0.202	3.101	.701	.472	1.041	.078
Community members (as unimportant influencers)	0.144	0.096	2.239	1.154	.956	1.393	.135
HCPs recommendations	1.040	0.241	18.637	2.828	1.764	4.535	<0.001

5.6.4 Environmental factors as predictors of vaccination behaviour

Binary logistic regression analysis was conducted in order to assess the impact of environmental factors on likelihood of being vaccine accepting relative to hesitant/refusing.

Parents who perceived to a greater extent that there is a lack of information about childhood vaccination were less likely to timely vaccinate their child (OR=0.60, $p<0.001$). Furthermore, parents who more frequently follow information regarding childhood vaccination given by their family physician (OR=1.48, $p<0.001$) and healthcare professionals in media (OR=1.39, $p<0.01$), and less frequently follow information given by religious leaders (OR=0.67, $p<0.001$) had higher odds to timely vaccinate the child. The model was statistically significant $\chi^2(6) = 94.465$, $p<0.001$, and explained 18% (Nagelkerke R²) of variance in vaccination behaviour.

Table 46. Association between environmental factors and likelihood of being vaccine accepting relative to moderately hesitant (multivariate binary logistic regression analysis)

Environmental factors	B	SE	Wald	Exp(B)	95% C.I		p
Perceived lack of information	-0.506	0.127	15.763	0.603	.470	.774	<0.001
Family physician (frequency of use)	0.392	0.112	12.249	1.480	1.188	1.844	<0.001
HCP in media (frequency of use)	0.327	0.112	8.493	1.387	1.113	1.728	<0.01
Religious leaders (frequency of use)	-0.403	0.106	14.311	0.669	.543	.824	<0.001
Government (frequency of use)	0.211	0.116	3.321	1.235	.984	1.549	0.068
Structural barriers	-0.207	0.184	1.267	0.813	.566	1.166	0.260

6. RESULTS OF THE RESEARCH ON HEALTHCARE WORKERS

6.1 Description of the sample of healthcare workers (HCWs)

Majority of the interviewed HCWs were female (97.5%, n=390) and age ranged from 22 to 73. Of the total number of HCWs interviewed 32.5% (n=130) were physicians and 67.5% (n=270) were nurses or technicians. Of the physicians interviewed, 3.8% (n=5) were paediatricians, while 96.2% (n=125) were general/family physicians.

Table 47. Description of the sample of healthcare workers

Variables	N	%
Gender		
Male	10	2.5%
Female	390	97.5%
Position		
Physician	130	32.5%
Nurse/technician	270	67.5%
Specialization		
General/Family physician	125	96.2%
Paediatrician	5	3.8%
Settlement		
Urban	179	44.7%
Rural	221	55.3%
Region		
Batken	44	11.0%
Jalal-Abad	81	20.3%
Issyk-Kul	27	6.8%
Naryn	19	4.8%
Osh	84	21.0%
Talas	14	3.5%
Chuy	48	12.0%
Bishkek city	60	15.0%
Osh City	23	5.8%
Religious affiliation		
Christian	9	2.3%
Muslim	375	93.9%
Not religious	15	3.8%

6.2 Vaccination behaviour in healthcare workers

In this study two aspects of HCWs' vaccine-related behaviour in professional context were evaluated—vaccine advocacy and vaccine hesitancy.

In general, HCWs showed high level of childhood vaccine advocacy behaviour (Mean=4.69) and moderately low level (Mean=2.69) of childhood vaccine hesitancy in the professional context. A weak positive correlation was found between these two aspects of HCWs' professional vaccination behaviours ($r=0.21$, $p<0.01$).

Of the HCWs interviewed, 79.5% ($n=318$) reported that they fully adhere to the prescribed vaccination calendar, while 3% ($n=12$) stated that they rarely or never adhere to the schedule. The majority of HCWs (74%, $n=296$) claimed that they always persuade parents to vaccinate their child. Even 94.8% ($n=379$) of HCW soften and always provide additional information when parents are hesitant to vaccinate their child.

Even 87.5% of the surveyed HCWs ($n=349$) often or always advise parents to give the vaccine in later age than it is recommended, and 18.5% ($n=74$) often or always postpone certain vaccines if the parent insists to do so. Even 98.5% ($n=388$) of HCWs never postpone the MMR vaccine after the child has spoken because of fears of autism.

Table 48. Descriptions of individual items measuring vaccination behaviour in professional context among the healthcare workers

Items	Never	Rarely	Sometimes	Often	Always
	N (%)	N (%)	N (%)	N (%)	N (%)
1. Adhering fully to the prescribed vaccination calendar.	2 (0.5%)	10 (2.5%)	10 (2.5%)	60 (15.0%)	318 (79.5%)
2. Persuading parents to vaccinate their child.	1 (0.3%)	5 (1.3%)	9 (2.3%)	89 (22.3%)	296 (74.0%)
3. Providing additional information if parents are hesitant to vaccinate their child.	1 (0.3%)	6 (1.5%)	14 (3.5%)	82 (20.5%)	297 (74.3%)
4. Advising parents that their child should receive the vaccine later than the recommended age.	15 (3.8%)	16 (4.0%)	19 (4.8%)	69 (17.3%)	280 (70.2%)
5. Delaying the administration of certain vaccines if the parent insists.	52 (13.0%)	92 (23.0%)	182 (45.5%)	40 (10.0%)	34 (8.5%)
6. Giving the MMR vaccine only after the child has spoken due to fear of autism	388 (98.5%)	6 (1.5%)	0 (0%)	0 (0%)	0 (0%)

There were no statistically significant differences in childhood vaccine advocacy ($p=0.43$) and vaccine hesitancy ($p=0.47$) between HCWs exhibiting diverse private vaccination behaviour (between vaccine accepting and vaccine hesitant HCWs).

Table 49. Differences in childhood vaccine advocacy between HCWs exhibiting diverse private vaccination behaviour

Private vaccination behaviour	N	Mean	SD	Min	Max	p
Vaccine accepting	202	4.71	0.40	3.33	5.00	0.43
Vaccine hesitant	4	4.67	0.27	4.33	5.00	

Table 50. Differences in childhood vaccine hesitancy between HCWs exhibiting diverse private vaccination behaviour

Private vaccination behaviour	N	Mean	SD	Min	Max	p
Vaccine accepting	200	2.78	0.50	1.00	3.67	0.47
Vaccine hesitant	4	2.67	0.27	2.33	3.00	

Physicians and nurses/technicians did not differ in their vaccine advocacy and vaccine hesitancy behaviour. There were also no differences between HCWs from urban and rural areas, nor between HCWs with different religious affiliations.

Table 51. Differences in childhood vaccine advocacy between diverse groups of HCWs

Socio-demographic variables	N	Mean	SD	Min	Max	p
Position						0.38
Physician	130	4.65	0.50			
Nurse/technician	270	4.70	0.46			
Settlement						
Urban	179	4.67	0.50			0.44
Rural	221	4.70	0.46			
Religious affiliation						0.31
Christian	9	4.59	0.76			
Muslim	375	4.71	0.42			
Not religious	15	4.24	1.07			

Table 52. Differences in childhood vaccine hesitancy between diverse groups of HCWs.

Socio-demographic variables	N	Mean	SD	Min	Max	p
Position						0.88
Physician	130	2.75	0.52			
Nurse/technician	270	2.77	0.55			
Settlement						0.91
Urban	179	2.76	0.58			
Rural	221	2.77	0.52			
Religious affiliation						0.10
Christian	9	2.30	0.61			
Muslim	375	2.78	0.54			
Not religious	15	2.64	0.54			

The propensity to vaccine advocacy and for vaccine hesitant behaviour in the professional context was not associated with HCWs' age, or years of practice.

Table 53. Correlations between HCWs' vaccination behaviours in professional context, age and years of practice

	I Childhood vaccine advocacy	II Childhood vaccine hesitancy	Age	Years of practise
I Childhood vaccine advocacy	1	0.15**	-.03	-.02
II Childhood vaccine hesitancy		1	-.07	-.04
Age			1	0.94***
Years of practice				1

** $p < 0.01$

*** $p < 0.001$

Out of 122 HCWs with children under five, 2.5% (n=3) stated that they had missed DTP vaccine for their child, while one HCW stated that he/she missed dT vaccine.

Table 54. Frequencies and percentages of missed vaccines.

	Missed vaccine
Vaccines	N (%)
BCG	0 (0.0%)
DTP-IPV-HiB	0 (0.0%)
PCV	0 (0.0%)
RV	0 (0.0%)
Hepatitis B	0 (0.0%)
OPV/Polio	0 (0.0%)
MMR	0 (0.0%)
DTP	3 (2.5%)
dT (AԁC-M)	1 (0.8%)

6.3 Psychological factors

6.3.1 Healthcare workers' perception of vaccine efficacy

In general, attitudes towards vaccine efficacy among the interviewed HCWs were highly positive (Mean=4.70, SD=0.41). Almost all interviewed HCWs agreed and strongly agreed (99.7%, n=399) with the belief that childhood vaccines are important for child's health. Similarly, 100% (n=400) believed and strongly believed that vaccines do a good job in preventing the diseases they are intended to prevent.

Table 55. Distribution of healthcare workers' scores on individual items of attitudes towards vaccine efficacy

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
	N (%)	N (%)	N (%)	N (%)	N (%)
C1.1b.1 I believe that childhood vaccines are important for a child's health.	0 (0.0%)	1 (0.3%)	0 (0.0%)	114 (28.5%)	285 (71.2%)
C1.1b.2 I believe that vaccines do a good job in preventing the diseases they are intending to prevent.	0 (0.0%)	0 (0.0%)	0 (0.0%)	122 (30%)	278 (70%)

The vast majority of surveyed healthcare workers considered BCG (99%, n=396), DTP-IPV-Hib (99.2%, n=395), PCV (97.5%, n=387), vaccine against rotavirus (98.2%, n=390), DTP (99.2%, n=397), vaccine against Hepatitis B (98.7%, n=395), OPV/Polio (99.2%, n=396), MMR (98.7%, n=394) and DT vaccine (99%, n=396) as mostly or very effective.

Table 56. Individual vaccine efficacy ratings

Vaccines	Not effective at all	Mostly not effective	Neither effective nor non-effective	Mostly effective	Very effective
	N (%)	N (%)	N (%)	N (%)	N (%)
BCG (tuberculosis vaccination)	0 (0%)	1 (0.3%)	3 (0.8%)	64 (16%)	332 (83%)
DTP-IPV-HiB (pentavalent) (cough, diphtheria, tetanus, haemophilic infection and viral hepatitis B)	0 (0%)	1 (0.3%)	2 (0.5%)	67 (16.8%)	328 (82.4%)
PCV (vaccination against pneumococcal infection)	1 (0.3%)	2 (0.5%)	7 (1.8%)	65 (16.4%)	322 (81.1%)
RV (vaccination against Rotavirus)	0 (0%)	1 (0.3%)	6 (1.5%)	93 (23.4%)	297 (74.8%)
DTP (diphtheria, pertussis, tetanus vaccination)	0 (0%)	1 (0.3%)	2 (0.5%)	53 (13.2%)	344 (86%)
Hepatitis B (vaccination against viral hepatitis B)	0 (0%)	2 (0.5%)	3 (0.8%)	48 (12%)	347 (86.7%)
OPV/Polio (polio vaccination)	0 (0%)	1 (0.3%)	2 (0.5%)	44 (11%)	352 (88.2%)

MMR (vaccine against measles, mumps, and rubella)	0 (0%)	2 (0.5%)	3 (0.8%)	45 (11.2%)	349 (87.5%)
DT - vaccine against diphtheria and tetanus	0 (0%)	1 (0.3%)	3 (0.8%)	50 (12.5%)	346 (86.5%)

There were no significant differences in attitudes towards vaccine efficacy between physicians and nurses/technicians, or between HCWs living in urban and rural areas. Also, HCWs with different religious affiliations demonstrated no difference regarding attitudes towards vaccine efficacy.

Table 57. Differences in perception of childhood vaccine efficacy between diverse groups of HCWs

Socio-demographic variables	N	Mean	SD	Min	Max	p
Position						0.43
Physician	130	4.72	0.42			
Nurse/technician	270	4.69	0.41			
Type of settlement						0.96
Urban	179	4.70	0.43			
Rural	221	4.71	0.40			
Religious affiliation						0.81
Christian	9	4.78	0.36			
Muslim	375	4.70	0.42			
Not religious	15	4.70	0.37			

There was no significant association between HCWs' age and years spent in practice with attitudes towards the efficacy of childhood vaccines'.

Table 58. Correlations between HCWs' age and years of practice, and beliefs regarding vaccine efficacy

	Beliefs regarding childhood vaccine efficacy	Age	Years of practise
Beliefs regarding childhood vaccine efficacy	1	0.03	0.02
Age		1	0.94***
Years of practise			1

*** $p < 0.001$

6.3.2 Healthcare workers' perception of vaccine safety

Overall, attitudes towards vaccine safety among the interviewed HCWs were highly positive (Mean=4.23, SD=0.43). The majority of surveyed HCWs (97.7%, n=390) agreed or strongly agreed with the belief that vaccines are safe. Furthermore, 94.2% (n=373) of HCWs disagreed with the statement that children get more shots than is good for them. Even 98.9% (n=386) agreed with the statement "I believe that there is no connection between vaccines and autism". Only 9% (n=36) expressed doubts about the safety of certain vaccines.

Table 59. Distribution of healthcare workers' scores on individual items of attitudes towards vaccine safety

Items	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
	N (%)	N (%)	N (%)	N (%)	N (%)
C1.2b.1 Overall, I believe that vaccines are safe	0 (0%)	0 (0%)	9 (2.3%)	186 (46.6%)	204 (51.1%)
C1.2b.2 I think that children get more shots than is good for them.	103 (25.9%)	271 (68.3%)	23 (5.8%)	0 (0%)	0 (0%)
C1.2b.3 I believe that there is no connection between vaccines and autism	0 (0%)	0 (0%)	4 (1.0%)	263 (67.4%)	123 (31.5%)
C1.2b.4 I doubt the safety of certain vaccines	70 (17.5%)	274 (68.7%)	19 (4.8%)	36 (9.0%)	0 (0%)

When HCWs were asked to rate the safety of specific vaccines, the majority of them considered BCG (98.6%, n=394), DTP-IPV-Hib (91.8%, n=367), PCV (96.7%, n=385), Rotavirus vaccine (97.7%, n=389), DTP (95%, n=379), vaccine against Hepatitis B (98.7%, n=394), MMR (98.2%, n=392), OPV/Polio (97.8%, n=393), and DT vaccine (97%, n=388) as mostly or very safe.

Table 60. Individual vaccine safety ratings

Vaccines	Not safe at all	Mostly not safe	Neither safe nor unsafe	Mostly safe	Very safe
	N (%)	N (%)	N (%)	N (%)	N (%)
BCG (tuberculosis vaccination)	0 (0%)	0 (0%)	6 (1.5%)	129 (32.3%)	265 (66.3%)
DTP-IPV-HiB (pentavalent) (cough, diphtheria, tetanus, haemophilic infection and viral hepatitis B)	0 (0%)	1 (0.3%)	32 (8.0%)	133 (33.3%)	234 (58.5%)
PCV (vaccination against pneumococcal infection)	0 (0%)	2 (0.5%)	11 (2.8%)	127 (31.9%)	258 (64.8%)
RV (vaccination against Rotavirus)	0 (0%)	1 (0.3%)	8 (2.0%)	115 (28.9%)	274 (68.8%)

DTP (diphtheria, pertussis, tetanus vaccination)	0 (0%)	3 (0.8%)	17 (4.3%)	128 (32.1%)	251 (62.9%)
Hepatitis B (vaccination against viral hepatitis B)	0 (0%)	0 (0%)	5 (1.3%)	108 (27%)	286 (71.7%)
OPV/Polio (polio vaccination)	0 (0%)	0 (0%)	8 (2.0%)	105 (26%)	287 (71.8%)
MMR (vaccine against measles, mumps, and rubella)	0 (0%)	0 (0%)	8 (2.0%)	99 (25%)	292 (73.2%)
DT (tetanus and diphtheria vaccination)	0 (0%)	1 (0.3%)	11 (2.8%)	119 (29.8%)	269 (67.3%)

There were no significant differences in the perception of safety of childhood vaccines between HCWs with different position, type of settlement nor religious affiliation.

Table 61. Differences in perception of childhood vaccine safety between diverse groups of HCWs

Socio-demographic variables	N	Mean	SD	Min	Max	P
Position						0.71
Physician	130	4.24	0.44			
Nurse/technician	270	4.23	0.42			
Type of settlement						0.21
Urban	179	4.20	0.43			
Rural	221	4.26	0.42			
Religious affiliation						0.31
Christian	9	4.34	0.37			
Muslim	375	4.23	0.43			
Not religious	15	4.13	0.40			

There was no correlation between attitudes to vaccine safety and the age and years of practice of HCWs.

Table 62. Correlations between HCWs' age and years of practice, and beliefs regarding vaccine safety

	Beliefs regarding childhood vaccine safety	Age	Years of practice
Beliefs regarding childhood vaccine safety	1	0.06	0.07
Age		1	0.94***
Years of practice			1

*** $p < 0.001$

6.3.3 Healthcare workers' perception of danger of disease

Healthcare workers perceived that there is a moderately high danger of childhood vaccine preventable diseases (Mean=3.93, SD=0.82). Of the HCWs interviewed, 9.8% (n=39) believed or strongly believed that vaccination is unnecessary because many vaccine preventable diseases are no longer common, while 87.7% (n=350) opposed or strongly opposed that perspective. While 15.9% (n=64) of HCWs supported or strongly supported the view that many of the diseases against which children are vaccinated are not serious and can be overcome by natural immunity, 81.1% (n=321) disagree or strongly disagree with this view.

Table 63. Distribution of healthcare workers' scores on individual items of perception of danger of disease

Items	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
	N (%)	N (%)	N (%)	N (%)	N (%)
C1.3.1 I believe that vaccination is unnecessary because many vaccine preventable diseases are not common anymore.	114 (28.6%)	236 (59.1%)	10 (2.5%)	25 (6.3%)	14 (3.5%)
C1.3.2 I think that many of the diseases children are being vaccinated against are not serious and can be overcome by natural immunity	83 (21%)	238 (60.1%)	11 (2.8%)	50 (12.6%)	14 (3.5%)

There were no differences in the perceived danger of vaccine-preventable diseases between physicians and nurses/technicians, between HCWs from urban and rural areas, or between HCWs with different religious affiliations.

Table 64. Differences in perception of the danger of the childhood vaccine preventable diseases between diverse groups of HCWs

Socio-demographic variables	N	Mean	SD	Min	Max	P
Position						0.15
Physician	130	4.01	0.74			
Nurse/technician	270	3.88	0.86			
Type of settlement						0.17
Urban	179	3.85	0.87			
Rural	221	3.98	0.79			
Religious affiliation						0.17
Christian	9	4.39	0.70			
Muslim	375	3.90	0.84			
Not religious	15	4.17	0.49			

Healthcare workers of older age and more years of practice perceived the danger of the childhood vaccine preventable disease as more serious ($r=0.13$, $p<0.01$; $r=0.12$, $p<0.05$, respectively).

Table 65. Correlations between HCWs' age and years of practice, and perception of the danger of disease

	Perception of the danger of disease	Age	Years of practice
Perception of the danger of disease	1	0.13**	0.12*
Age		1	0.94***
Years of practice			1

* $p<0.05$

** $p<0.01$

*** $p<0.001$

6.3.4 Healthcare workers' trust in societal factors

Healthcare workers showed high level of trust in societal factors (Mean=4.03, SD=0.50). Overall, 98.3% (n=393) of the HCWs fully trust the recommendations given by the Ministry of Health regarding the child vaccination, while 1.8% (n=7) of them were unsure if they do so. Furthermore, 12.1% (n=47) agreed or strongly agreed with the opinion that pharmaceutical companies cover up the dangers of vaccines, while 75.2% (n=291) opposed this view. Similarly, 14% (n=54) of the interviewed HCWs supported or strongly supported the view that the motive for scientists creating vaccines is profit, while 77.9% (n=401) disagreed.

Table 66. Distribution of healthcare workers' scores on individual items of trust in societal factors

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
Items	N (%)	N (%)	N (%)	N (%)	N (%)
C4.1.1 I am fully confident in the recommendations given by the Ministry of Health regarding the vaccination of children	0 (0%)	0 (0%)	7 (1.8%)	145 (36.3%)	248 (62%)
C4.1.2 I think that pharmaceutical companies cover up the dangers of vaccines	41 (10.6%)	250 (64.6%)	49 (12.7%)	38 (9.8%)	9 (2.3%)
C4.1.3 I think that the principal motive for scientists who participate in the creation of vaccines is profit	57 (14.8%)	244 (63.2%)	31 (8.0%)	42 (10.9%)	12 (3.1%)

Position, type of settlement and religious affiliation were not significantly associated with the manifested level of trust in societal factors.

Table 67. Differences in trust in societal factors between diverse groups of healthcare workers.

Socio-demographic variables	N	Mean	SD	Min	Max	P
Position						0.39
Physician	130	4.00	0.59			
Nurse/technician	270	4.04	0.58			
Type of settlement						<0.05
Urban	179	3.95	0.61			
Rural	221	4.08	0.55			
Religious affiliation						0.34
Christian	9	4.26	0.55			
Muslim	375	4.03	0.57			
Not religious	15	3.83	0.69			

Age and years spent in practice were not associated with the level of trust in societal factors.

Table 68. Correlations between HCWs' age and years of practice, and trust in societal factors

	Trust in societal factors	Age	Years of practice
Trust in societal factors	1	0.07	0.06
Age		1	0.94***
Years of practice			1

*** $p < 0.001$

6.3.5 Healthcare workers' trust regarding information sources

For the largest proportion of surveyed HCWs the sources of highest credibility regarding vaccines were colleagues (84.9%, $n=339$), continuing medical education (86.4%, $n=345$), national (83.7%, $n=329$) and international scientific conferences (82%, $n=319$), publications and guidelines from national (79.8%, $n=317$) and international organizations (75.9%, $n=299$), government (77.4%, $n=308$), national (77.4%, $n=302$) and international scientific literature (74.2%, $n=288$). Public media and social networks were evaluated as the least trustworthy, with 54.5% ($n=216$), and 34.1% ($n=135$) respectively, of HCWs claimed to be very or completely trustworthy towards these sources.

Table 69. Score distribution of healthcare workers' trust in information sources

	Not at all trustworthy	Slightly trustworthy	Moderately trustworthy	Very trustworthy	Completely trustworthy
Source of information	N (%)	N (%)	N (%)	N (%)	N (%)
C4.2.1 Continuing Medical Education (CME) on vaccines	1 (0.3%)	6 (1.5%)	47 (11.8%)	141 (35.3%)	204 (51.1%)
C4.2.2 National scientific and professional conferences	0 (0%)	7 (1.8%)	57 (14.5%)	154 (39.2%)	175 (44.5%)
C4.2.3 International scientific and professional conferences	0 (0%)	5 (1.3%)	65 (16.7%)	159 (40.9%)	160 (41.1%)
C4.2.4 National scientific literature	0 (0%)	12 (3.1%)	75 (19.3%)	147 (37.8%)	155 (39.8%)
C4.2.5 International scientific literature	4 (1.0%)	11 (2.8%)	85 (21.9%)	148 (38.1%)	140 (36.1%)
C4.2.6 Publications and guidelines of relevant national institutions and organizations	4 (1.0%)	14 (3.5%)	62 (15.6%)	149 (37.5%)	168 (42.3%)
C4.2.7 Publications and guidelines of relevant international organizations	3 (0.8%)	10 (2.5%)	82 (20.8%)	147 (37.3%)	152 (38.6%)
C4.2.8 Public media: Trust in information sources	18 (4.5%)	46 (11.6%)	116 (29.3%)	111 (28%)	105 (26.5%)
C4.2.9 Colleagues	2 (0.5%)	5 (1.3%)	53 (13.3%)	139 (34.8%)	200 (50.1%)
C4.2.10 Social networks	58 (14.6%)	77 (19.4%)	126 (31.8%)	76 (19.2%)	59 (14.9%)
C4.2.11 Government	4 (1.0%)	13 (3.3%)	73 (18.3%)	142 (35.7%)	166 (41.7%)

There were no differences observed between physicians and nurses/technicians regarding level of trust they put in all the sources of information listed.

Table 70. Differences in trust in diverse information sources regarding vaccines among healthcare workers holding different positions

Source	Position	N	Mean	SD	Min	Max	p
C4.2.1 Continuing Medical Education (CME) on vaccines	Physician	129	4.3	0.8			0.420
	Nurse/technician	270	4.4	0.8			
C4.2.2 National scientific and professional conferences	Physician	127	4.3	0.8			0.639
	Nurse/technician	266	4.3	0.8			
C4.2.3 International scientific and professional conferences	Physician	125	4.3	0.8			0.098
	Nurse/technician	264	4.2	0.8			
C4.2.4 National scientific literature	Physician	125	4.2	0.8			0.090
	Nurse/technician	264	4.1	0.8			

C4.2.5 International scientific literature	Physician	125	4.1	0.9			0.183
	Nurse/ technician	263	4.0	0.9			
C4.2.6 Publications and guidelines of relevant national institutions and organizations	Physician	129	4.2	0.9			0.854
	Nurse/ technician	268	4.2	0.9			
C4.2.7 Publications and guidelines of relevant international organizations	Physician	129	4.2	0.9			0.233
	Nurse/ technician	265	4.1	0.9			
C4.2.8 Public media: Trust in information sources	Physician	127	3.5	1.1			0.186
	Nurse/ technician	269	3.7	1.1			
C4.2.9 Colleagues	Physician	129	4.2	0.8			0.132
	Nurse/ technician	270	4.4	0.8			
C4.2.10 Social networks	Physician	127	2.9	1.3			0.167
	Nurse/ technician	269	3.1	1.2			
C4.2.11 Government	Physician	128	4.0	0.9			0.175
	Nurse/ technician	270	4.2	0.9			

6.3.6 Healthcare workers' knowledge regarding vaccines

Only surveyed physicians responded to the knowledge questions (n=130). The study results suggest that overall physicians, demonstrated moderately low level of factual vaccine knowledge (Mean=3.74; SD=1.20).

Higher level of factual vaccine knowledge was observed in physicians from urban areas compared to rural areas (Mean=1.37 vs. Mean=1.07, $p<0.05$). Religious affiliation was not associated with the level of achieved knowledge score.

Table 71. Differences in factual vaccine knowledge between diverse groups of healthcare workers

Socio-demographic variables	N	Mean	SD	Min	Max	P
Type of settlement						<0.05
Urban	179	1.37	1.88			
Rural	221	1.07	1.86			
Religious affiliation						0.31
Christian	9	1.67	2.06			
Muslim	375	1.17	1.86			
Not religious	15	1.80	2.04			

One third of physicians (33.1%, n=43) knew that it is not contraindicated to give any of the vaccines to a child who is undergoing antibiotic therapy, while 40% (n=52) were aware that ear infections are not a contraindication to vaccination. Only 12.4% (n=16) knew that thrombocytopenia may occur after MMR administration, while about half (55.8%, n=72) knew that autism spectrum disorder is not a side effect of the MMR vaccine. Even 61.2% (n=79) knew that convulsions may develop in 1:1,000 cases after administration of the Pentaxim vaccine. While 21.5% (n=28) of physicians were aware that Guillain-Barre syndrome is a possible side effect of tetanus toxoid vaccine, 70.8% (n=92) knew that sudden infant death is not adverse reaction to the Di-Te-Per vaccine. Finally, even 77.5% (n=100) of physicians were aware that the effectiveness of a single dose of MMR vaccine is over 95%, and a double dose of MMR vaccine is over 99%.

Table 72. Distribution of healthcare workers' vaccine knowledge on individual items

Items	True	False	Not sure	Total
	N (%)	N (%)	N (%)	N (%)
C7.1 It is contraindicated to give any of the vaccines to a child who is undergoing antibiotic therapy. (False)	82 (63.1%)	43 (33.1%)	5 (3.8%)	130 (100%)
C7.2 Ear infections are a contraindication for vaccination. (False)	67 (51.5%)	52 (40.0%)	11 (8.5%)	130 (100%)
C7.3 Thrombocytopenia may develop after MMR vaccine administration. (True)	16 (12.4%)	84 (65.1%)	29 (22.5%)	129 (100%)
C7.4 Autism spectrum disorder is a very rare (1: 5,000,000) side effect of the MMR vaccine (False)	33 (25.6%)	72 (55.8%)	24 (18.6%)	129 (100%)
C7.5 After administration of the Pentaxim vaccine, convulsions may develop in 1: 1,000 cases. (True)	79 (61.2%)	35 (27.1%)	15 (11.6%)	129 (100%)
C7.6 Guillain-Barre syndrome is a possible side effect of tetanus toxoid vaccine (True)	28 (21.5%)	65 (50.0%)	37 (28.5%)	130 (100%)
C7.7 Sudden infant death is the most serious adverse reaction to the Di-Te-Per vaccine. (False)	19 (14.6%)	92 (70.8%)	19 (14.6%)	130 (100%)
C7.8 The effectiveness of a single dose of MMR vaccine is over 95%, and a double dose of MMR vaccine is over 99%. (True)	100 (77.5%)	18 (14.0%)	11 (8.5%)	129 (100%)

There was no association between childhood vaccine knowledge of physicians and their age or years of practice.

Table 73. Correlations between HCWs' age and years of practice, and childhood vaccine related knowledge

	Vaccine knowledge	Age	Years of practice
Vaccine knowledge	1	0.07	-0.03
Age		1	0.94***
Years of practice			1

*** $p < 0.001$

6.3.7 Healthcare workers' beliefs related to perceived responsibility

A small minority of physicians (6.2%, n=8) and nurses/technicians (3%, n=8) denied feeling responsible for their patients' parents' decisions regarding vaccination.

Table 74. Description of perceived responsibility related to patients' parents decisions in paediatric nurses/technicians and paediatricians

		Physicians	Nurses/ technicians	Total
Item		N (%)	N (%)	N (%)
C2.1.1 I feel responsible for the decisions regarding vaccination made by my patients' parents	Strongly disagree	0 (0.0%)	3 (1.1%)	3 (0.8%)
	Disagree	8 (6.2%)	5 (1.9%)	13 (3.3%)
	Neither disagree nor agree	1 (0.8%)	4 (1.5%)	5 (1.3%)
	Agree	74 (57.4%)	168 (62.2%)	242 (60.7%)
	Strongly agree	46 (35.7%)	90 (33.3%)	136 (34.1%)
	Total	129 (100%)	270 (100%)	399 (100%)

Almost all physicians (99.3%, n=129) and nurses/technicians (99.3%, n=268) agreed that it is their duty to advise parents to vaccinate their children.

Table 75. Description of perceived responsibility related to patients' parents advising in paediatric nurses/technicians and paediatricians

		Physicians	Nurses/ technicians	Total
Пункт		N (%)	N (%)	N (%)
C2.1.2 It is my duty to advise parents to vaccinate their children.	Strongly disagree	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Disagree	0 (0.0%)	1 (0.4%)	1 (0.3%)
	Neither disagree nor agree	1 (0.8%)	1 (0.4%)	2 (0.5%)
	Agree	60 (46.2%)	145 (53.7%)	205 (51.3%)
	Strongly agree	69 (53.1%)	123 (45.6%)	192 (48.0%)
	Total	130 (100%)	270 (100%)	400 (100%)

6.3.9 Healthcare workers' advocacy for vaccination

Healthcare workers who participated in this study demonstrated a high level of motivation towards advocacy for vaccination (Mean=34.22, SD=0.43). A large majority (94.8%, n=379) of the HCWs interviewed strongly agreed or agreed that vaccination is an important topic they want to discuss with other people, while only 1.8% (n=7) disagreed with this opinion. While 93.6% (n=374) of HCWs strongly agreed or agreed that it is important that they mention the topic of vaccination to others, 2.8% (n=11) disagreed. Even 97% (n=388) supported or strongly supported the view that it is important that they talk openly about vaccination with other people. Furthermore, 89.3% (n=365) of HCWs believed or strongly believed that when they talk openly about vaccination it has a positive impact on people's

beliefs on vaccination, while only 1.8% (n=7) disagreed, and 7% (n=28) were uncertain about that. The majority of the HCWs (89.3%, n=356) were convinced that if they discuss vaccination, it will very much change others' views on this topic. Similarly, 93% (n=371) of HCWs strongly supported or supported the opinion that people's opinions of vaccination can really be influenced by the conversations they have with them. Even 97.6% (n=390) of the HCWs were strongly confident or confident in their own capacity to answer the questions that others might ask them about vaccination. A similar percentage of the surveyed HCWs (97.8%, n=391) claimed that they exactly know how to talk to others about vaccination and that they feel able to discuss vaccination (97.3%, n=389). Even 88.2% (n=352) of HCWs feel that they are the ones who decide whether to have conversations on vaccination with others, and 85.4% (n=341) feel that it is entirely their choice to discuss vaccination with others.

Table 76. Distribution of healthcare workers' scores on individual items of Motivation for advocacy for vaccination

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
Items	N (%)	N (%)	N (%)	N (%)	N (%)
C2.3.1 Vaccination is an important topic I want to discuss with others	0 (0.0%)	7 (1.8%)	14 (3.5%)	251 (62.8%)	128 (32%)
C2.3.2 It is important that I mention the topic of vaccination to others	0 (0.0%)	11 (2.8%)	15 (3.8%)	245 (61.3%)	129 (32.3%)
C2.3.3 It is important that I talk openly about vaccination with other people	2 (0.5%)	5 (1.3%)	5 (1.3%)	244 (61.0%)	144 (36.0%)
C2.3.4 When I talk openly about vaccination, it has a positive impact on people's beliefs on vaccination	1 (0.3%)	6 (1.5%)	28 (7.0%)	233 (58.3%)	132 (33.0%)
C2.3.5 If I discuss vaccination, it will very much change others' views on this topic	2 (0.5%)	5 (1.3%)	36 (9.0%)	242 (60.7%)	114 (28.6%)
C2.3.6 People's opinions of vaccination can really be influenced by the conversations I have with them	1 (0.3%)	5 (1.3%)	22 (5.5%)	257 (64.4%)	114 (28.6%)
C2.3.7 I am confident I can answer questions that others might ask me about vaccination	0 (0.0%)	0 (0.0%)	10 (2.5%)	233 (58.3%)	157 (39.3%)
C2.3.8 I know exactly how to talk about vaccination with others	0 (0.0%)	2 (0.5%)	7 (1.8%)	252 (63.0%)	139 (34.8%)
C2.3.9 I feel able to discuss vaccination	0 (0.0%)	1 (0.3%)	10 (2.5%)	254 (63.5%)	135 (33.8%)

C2.3.10 I decide whether to have conversations on vaccination with others	8 (2.0%)	17 (4.3%)	22 (5.5%)	237 (59.4%)	115 (28.8%)
C2.3.11 Discussing vaccination with others is entirely my choice	12 (3.0%)	24 (6.0%)	22 (5.5%)	238 (59.6%)	103 (25.8%)

Position, type of settlement and religious affiliation were not significantly associated with the motivation towards advocacy for vaccination.

Table 77. Differences in motivation towards advocacy for vaccination between diverse groups of healthcare workers

Socio-demographic variables	N	Mean	SD	Min	Max	P
Position						0.50
Physician	130	4.21	0.47			
Nurse/technician	270	4.23	0.42			
Type of settlement						0.62
Urban	179	4.22	0.46			
Rural	221	4.22	0.42			
Religious affiliation						0.48
Christian	9	4.38	0.46			
Muslim	375	4.22	0.44			
Not religious	15	4.10	0.37			

Healthcare workers of different age and years of practice did not differ in their motivation for advocacy for vaccination.

Table 78. Correlations between HCWs' age and years of practice, and advocacy for childhood vaccination

	Advocacy for childhood vaccination	Age	Years of practice
Advocacy for childhood vaccination	1	0.07	0.07
Age		1	0.94***
Years of practice			1

*** $p < 0.001$

6.4 Sociological factors

6.4.1 Healthcare workers' descriptive norms regarding childhood vaccination – impact on general attitudes towards vaccination

The vast majority of surveyed HCWs had positive general attitudes towards vaccination (98.3%, n=393). The largest proportion believed that National Health authorities (98%, n=389), their colleagues (98%, n=391), members of their family (97.3%, n=389) and the government (96.4%, n=382) had positive attitudes towards vaccination.

Somewhat smaller, but still high proportion of HCWs were of the opinion that their friends (82.3%, n=329), local leaders (86.6%, n=341) and people from the community (88.3%, n=353) support vaccination. Only 36.1% (n=142) of interviewed healthcare workers believed that religious leaders have positive attitudes, while 60.3% (n=257) believed that other parents support vaccination.

Table 79. Distribution of healthcare workers' perception of descriptive norms – general attitudes towards vaccination

Attitudes	Very negative	Somewhat negative	Neutral	Somewhat positive	Very positive
	N (%)	N (%)	N (%)	N (%)	N (%)
C3.1.1 Own attitudes	0 (0%)	0 (0%)	7 (1.8%)	153 (38.3%)	240 (60.0%)
C3.1.2 Family's attitudes	0 (0%)	2 (0.5%)	9 (2.3%)	177 (44.3%)	212 (53.0%)
C3.1.3 Friends' attitudes	0 (0%)	5 (1.3%)	60 (15%)	209 (52.3%)	120 (30.0%)
C3.1.4 Other parents' attitudes	0 (0%)	14 (3.6%)	142 (36.1%)	191 (48.6%)	46 (11.7%)
C3.1.5 Local leaders attitudes	0 (0%)	3 (0.8%)	50 (12.7%)	217 (55.1%)	124 (31.5%)
C3.1.6 National Health Authorities attitudes	0 (0%)	2 (0.5%)	6 (1.5%)	91 (22.9%)	298 (75.1%)
C3.1.7 Peoples from community attitudes	0 (0%)	5 (1.3%)	42 (10.5%)	206 (51.5%)	147 (36.8%)
C3.1.8 Religious leaders' attitudes	34 (8.5%)	84 (21.0%)	134 (34.0%)	109 (27.7%)	33 (8.4%)
C3.1.9 Colleagues' attitudes	0 (0%)	3 (0.8%)	5 (1.3%)	124 (31.1%)	267 (66.9%)
C3.1.10 Governments' attitudes	0 (0%)	3 (0.8%)	11 (2.8%)	136 (34.3%)	246 (62.1%)

No differences were observed between physicians and nurses/technicians in their own general attitudes towards vaccination. Similarly, no differences were observed between physicians and nurses/technicians with respect to their appreciation of their families, friends', other parents', local leaders', national health authorities', people from the community, religious leaders', colleagues' and government's attitudes towards vaccination.

Table 80. Differences in perceptions of vaccination-related descriptive norms (general attitudes regarding vaccination) among healthcare workers holding different positions

Attitudes	Position	N	Mean	SD	Min	Max	p
Own attitudes	Physician	129	4.5	0.6			0.26
	Nurse/ technician	270	4.6	0.5			
Family's attitudes	Physician	127	4.4	0.6			0.17
	Nurse/ technician	266	4.5	0.5			
Friends' attitudes	Physician	125	4.1	0.7			0.16
	Nurse/ technician	264	4.2	0.7			
Other parents' attitudes	Physician	125	3.6	0.7			0.12
	Nurse/ technician	264	3.7	0.7			
Local leaders' attitudes	Physician	125	4.1	0.7			0.09
	Nurse/ technician	263	4.2	0.6			
National Health authorities' attitudes	Physician	129	4.8	0.5			0.39
	Nurse/ technician	268	4.7	0.5			
People from the community attitudes	Physician	129	4.2	0.7			0.36
	Nurse/ technician	265	4.3	0.7			
Religious leaders' attitudes	Physician	127	3.0	1.1			0.22
	Nurse/ technician	269	3.1	1.1			
Colleagues' attitudes	Physician	129	4.6	0.5			0.88
	Nurse/ technician	270	4.6	0.6			
Government's attitudes	Physician	127	4.5	0.6			0.44
	Nurse/ technician	269	4.6	0.6			

6.4.2 Healthcare workers' descriptive norms regarding childhood vaccination – impact on importance of getting their child vaccinated

Only HCWs who reported having a child(ren) under the age of 18 (51.7%, n=207) were asked to respond to the questionnaire items inquiring their attitudes towards the importance of getting their child vaccinated, and items inquiring HCWs' perception of the various agents' attitudes towards the importance of getting their child vaccinated. The vast majority of HCWs surveyed believed that it was important to get their child vaccinated (99%, n=205). The largest proportion believed that their colleagues (98.6%, n=201), members of their family (97.6%, n=202), National Health authorities (97.1%, n=200), and the government (96.1%, n=197), think it is moderately or extremely important to get their child vaccinated.

A slightly smaller, but still high proportion of HCWs were of the opinion that their friends (81.1%, n=167), local leaders (82.6%, n=166) and people from the community (82.5%,

n=170) think it was important to get their child vaccinated. Only 45.3% (n=92) of interviewed healthcare workers believed that religious leaders think that getting their child vaccinated is important, while 67% (n=134) were of the opinion that other parents shared this belief.

Table 81. Распределение восприятия медицинскими работниками описательных норм– важность вакцинации своих детей

Attitudes	Not at all important	Low importance	Neutral	Moderately important	Extremely important
	N (%)	N (%)	N (%)	N (%)	N (%)
C3.2.1 Own attitudes	0 (0.0%)	0 (0.0%)	2 (1.0%)	10 (4.8%)	195 (94.2%)
C3.1.2 Family’s attitudes	0 (0.0%)	2 (1.0%)	3 (1.4%)	18 (8.7%)	184 (88.9%)
C.3.2.2 Family’s attitudes	4 (1.9%)	9 (4.4%)	26 (12.6%)	69 (33.5%)	98 (47.6%)
C3.1.4 Other parents’ attitudes	4 (2.0%)	13 (6.5%)	49 (24.5%)	69 (34.5%)	65 (32.5%)
C3.2.3 Friends’ attitudes	2 (1.0%)	6 (3.0%)	27 (13.4%)	55 (27.4%)	111 (55.2%)
C3.1.6 National Health Authorities attitudes	1 (0.5%)	2 (1.0%)	3 (1.5%)	25 (12.1%)	175 (85.0%)
C3.2.4 Other parents’ attitudes	2 (1.0%)	12 (5.8%)	22 (10.7%)	54 (26.2%)	116 (56.3%)
C3.1.8 Religious leaders’ attitudes	29(14.3%)	34 (16.7%)	48 (23.6%)	58 (28.6%)	34 (16.7%)
C3.2.5 Local leaders’ attitudes	0 (0.0%)	1 (0.5%)	2 (1.0%)	49 (23.8%)	154 (74.8%)
C3.1.10 Governments’ attitudes	1 (0.5%)	0 (0.0%)	7 (3.4%)	41 (20.0%)	156 (76.1%)

No differences were observed between physicians and nurses/technicians regarding their own perception of importance of getting their child vaccinated. Similarly, no differences were observed between physicians and nurses/technicians with respect to their perception of their families, friends’, other parents’, national health authorities’, religious leaders’ and government’s beliefs regarding getting their child vaccinated. However, nurses/technicians to a significantly larger extent believed that local leaders (Mean=4.18 vs. Mean=3.43, $p<0.001$), community members (Mean=4.37 vs. Mean=3.97, $p<0.05$) and colleagues (Mean=4.78 vs. Mean=4.22, $p<0.05$) think it is important to get their child vaccinated, compared to physicians.

Table 82. Differences in perceptions of vaccination-related descriptive norms (importance of getting their child vaccinated) among healthcare workers holding different positions

Attitudes	Position	N	Mean	SD	Min	Max	p
C3.2.4 Other parents’ attitudes	Physician	129	4.98	0.12			0.08
	Nurse/ technician	270	4.91	0.33			
C3.2.5 Local leaders’ attitudes	Physician	127	4.78	0.57			0.17
	Nurse/ technician	266	4.89	0.40			
3.2.6 National Health authorities’ attitudes	Physician	125	3.91	1.85			0.10
	Nurse/ technician	264	4.25	0.98			

C3.2.7 People's from the community attitudes	Physician	125	3.35	2.41			0.13
	Nurse/ technician	264	3.50	2.59			
C3.2.8 Religious leaders' attitudes	Physician	125	3.43	2.90			<0.001
	Nurse/ technician	263	4.18	2.11			
C3.2.9 Colleagues' attitudes	Physician	129	4.52	1.84			0.21
	Nurse/ technician	268	4.83	0.48			
C3.2.10 Government's attitudes	Physician	129	3.97	1.88			<0.05
	Nurse/ technician	265	4.37	0.96			
C3.2.8 Attitudes религиозных лидеров	Physician	127	2.65	2.44			0.17
	Nurse/ technician	269	3.06	1.94			
C3.2.9 Attitudes коллег	Physician	129	4.40	1.78			<0.05
	Nurse/ technician	270	4.78	0.48			
C3.2.10 Attitudes Правительства	Physician	127	4.22	2.45			0.06
	Nurse/ technician	269	4.75	0.56			

6.4.3 Healthcare workers' injunctive norms regarding childhood vaccination

Only HCWs who reported having a child(ren) under the age of 18 (51.7%, n=207) responded to the questionnaire items inquiring their perception of the influence of different agents on their intention to vaccinate their child. The greatest influence on the intention to vaccinate children was ascribed to family members (among the top three influential factors for 74.4% (n=154)) and personal attitudes towards vaccination (73.4%, n=152). National health authorities (58.4%, n=121) and colleagues (45.4%, n=94) were also considered by significant proportion of HCWs to have the strongest influence on vaccination intention. Religious leaders were the least influential factor on vaccination intention for the largest proportion of HCWs (62.4%, n=149). Community members (50.7%, n=105), other parents (47.9%, n=99), local leaders (40.6%, n=84), and friends (37.7%, n=78) were also considered by respondents to have the least influence on vaccination intentions.

Table 83. Biggest and smallest self-ranked influence on vaccination intention (N=251)

Potential influences	Biggest self-reported influence			Smallest self-reported influence		
	1st rank	2strank	3rd rank	1st rank	2strank	3rd rank
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Own attitudes	116 (56%)	25 (12.1%)	11 (5.3%)	3 (1.4%)	1 (0.5%)	2 (1.0%)
Family	59 (28.5%)	83 (40.1%)	12 (5.8%)	4 (1.9%)	2 (1.0%)	1 (0.5%)
Friends	3 (1.4%)	15 (7.2%)	9 (4.3%)	38 (18.4%)	17 (8.2%)	23 (11.1%)
Other parents	0 (0.0%)	7 (3.4%)	12 (5.8%)	38 (18.4%)	43 (20.8%)	18 (8.7%)
Local leaders	0 (0.0%)	3 (1.4%)	6 (2.9%)	16 (7.7%)	32 (15.5%)	36 (17.45)

Community members	1 (0.5%)	4 (1.9%)	6 (2.9%)	15 (7.2%)	44 (21.3%)	46 (22.2%)
National Health Authorities	15 (7.2%)	39 (18.8%)	67 (32.4%)	3 (1.4%)	2 (1.0%)	2 (1.0%)
Religious leaders	0 (0.0%)	2 (1.0%)	1 (0.5%)	74 (35.7%)	34 (16.4%)	41 (10.3%)
Colleagues	11 (5.3%)	22 (10.6%)	61 (29.5%)	1 (0.5%)	5 (2.4%)	2 (1.0%)
Government	2 (1.0%)	5 (2.4%)	11 (5.3%)	5 (2.4%)	9 (4.3%)	15 (7.2%)
Media (TV, radio, newspapers, internet)	0 (0.0%)	2 (1.0%)	11 (5.3%)	10 (4.8%)	18 (8.7%)	21 (10.1%)

6.5 Environmental factors

6.5.1 Healthcare workers' perception of lack of information

Overall, the HCWs surveyed expressed a low level of feeling of lack of competence when answering parents' questions about vaccines (Mean=1.62, SD=0.52). A small minority of HCWs did not feel competent when answering parents' questions about vaccines' effectiveness (0.5%, n=2), with similar proportions not feeling competent when answering parents' questions about vaccines' quality (1.8%, n=7) and vaccines' safety (1.3%, n=5).

Table 84. Distribution of healthcare workers' scores on individual items of perception of lack of information

Items	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
	N (%)	N (%)	N (%)	N (%)	N (%)
I feel completely competent when answering to parents' question about the effectiveness of vaccines	0 (0%)	2 (0.5%)	3 (0.8%)	215 (53.8%)	180 (45.0%)
I feel completely competent when answering to parents' question about the quality of vaccines	0 (0%)	7 (1.8%)	12 (3.0%)	219 (54.8%)	162 (40.5%)
I feel completely competent when answering to parents' question about the safety of vaccines	1 (0.3%)	4 (1.0%)	9 (2.3%)	223 (55.9%)	162 (40.6%)

Position, type of settlement and religious affiliation were not significantly associated with the perception of lack of knowledge of the HCWs surveyed.

Table 85. Differences in perception of lack of knowledge between diverse groups of HCWs

Socio-demographic variables	N	Mean	SD	Min	Max	P
Position						0.53
Physician	130	4.39	0.54			
Nurse/technician	270	4.37	0.51			
Type of settlement						0.09
Urban	179	4.32	0.57			
Rural	221	4.42	0.48			
Religious affiliation						0.76
Christian	9	4.22	0.47			
Muslim	375	4.38	0.51			
Not religious	15	4.29	0.72			

Age and years of practice were not associated with the perception of lack of knowledge among HCWs.

Table 86. Correlations between HCWs' age and years of practice, and perception of lack of information

	Perception of the lack of information	Age	Years of practice
Perception of the lack of information	1	0.07	0.06
Age		1	0.94***
Years of practice			1

*** $p < 0.001$

6.5.2 Healthcare workers' use of information sources

The survey revealed that the most frequently used sources of vaccine-related information by HCWs were CME on vaccines (used often and regularly by 89.2% (n=356) and colleagues (86%, n=343). Other frequently used sources included national professional and scientific conferences (75.1%, n=299), government (74.9%, n=298), and publications and guidelines of relevant national institutions and organizations (70.6%, n=282). The least used sources were social networks (45.1%, n=180), while somewhat more frequently used were international scientific literature (51%, n=202), public media (56.1%, n=224), national scientific literature (57.9%, n=230), international professional and scientific conferences (60.9%, n=241), and publications and guidelines of relevant international organizations (62.7%, n=249).

Table 85. Score distribution of healthcare workers' use of different information sources

Source of information	Never	Rarely	Sometimes	Often	Regularly
	N (%)	N (%)	N (%)	N (%)	N (%)
C5.1 Continuing Medical Education (CME) on vaccines	0 (0.0%)	10 (2.5%)	33 (8.3%)	129 (32.3%)	227 (56.9%)
C5.2 National scientific and professional conferences	5 (1.3%)	17 (4.3%)	77 (19.3%)	144 (36.2%)	155 (38.9%)
C5.3 International scientific and professional conferences	28 (7.1%)	36 (9.1%)	91 (23.0%)	121 (30.6%)	120 (30.3%)
C5.4 National scientific literature	13 (3.3%)	47 (11.8%)	107 (27.0%)	118 (29.7%)	112 (28.2%)
C5.5 International scientific literature	22 (5.6%)	50 (12.6%)	122 (30.8%)	107 (27.0%)	95 (24.0%)
C5.6 Publications and guidelines of relevant national institutions and organizations	5 (1.3%)	23 (5.8%)	89 (22.3%)	127 (31.8%)	155 (38.8%)
C5.7 Publications and guidelines of relevant international organizations	8 (2.0%)	33 (8.3%)	107 (27.0%)	119 (30.0%)	130 (32.7%)
C5.8 Public media	18 (4.5%)	53 (13.3%)	104 (26.1%)	119 (29.8%)	105 (26.3%)
C5.9 Colleagues	2 (0.5%)	8 (2.0%)	46 (11.5%)	134 (33.6%)	209 (52.4%)
C5.10 Social networks	49 (12.3%)	57 (14.3%)	113 (28.3%)	87 (21.8%)	93 (23.3%)
C5.11 Government	9 (2.3%)	23 (5.8%)	68 (17.1%)	121 (30.4%)	177 (44.5%)

6.5.3 Healthcare workers' perception of support from the system

Overall, HCWs perceived system support for childhood vaccination to be high (Mean=4.34, SD=0.47). A large majority of surveyed HCWs agreed and strongly agreed that there are clear official written guidelines for the implementation of good practice in childhood immunization (96%, n=382). A similar proportion of HCWs strongly agreed and agreed that national health authorities encourage doctors to recommend vaccinations (97%, n=388). Furthermore, 96.8% (n=387) HCWs stated that they received sufficient training regarding the application of official guidelines for childhood immunization, while 94.5% (n=379) stated that they received sufficient training on how to communicate with parents/caregivers about immunization. Similar percentage of healthcare workers stated that they have received sufficient training on how to address vaccine hesitancy (92.3%, n=368).

Table 87. Distribution of healthcare workers' scores on individual items of support from the system

Items	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
	N (%)	N (%)	N (%)	N (%)	N (%)
C6.1 There are clear official written guidelines for the implementation of good practices regarding childhood vaccination	0 (0.0%)	2 (0.5%)	14 (3.5%)	193 (48.5%)	189 (47.5%)

C6.2 National health authorities are encouraging doctors to recommend vaccinations	0 (0.0%)	1 (0.3%)	11 (2.8%)	188 (47.0%)	200 (50.0%)
C6.3 I received sufficient training regarding the application of official guidelines for childhood vaccination	0 (0.0%)	5 (1.3%)	8 (2.0%)	238 (59.5%)	149 (37.3%)
C6.4 I received sufficient training on how to communicate with parents/caregivers about immunization	0 (0.0%)	4 (1.0%)	18 (4.5%)	242 (60.7%)	135 (33.8%)
C6.5 I have sufficient training on how to address vaccine hesitancy	1 (0.3%)	6 (1.5%)	24 (6.0%)	250 (62.7%)	118 (29.6%)

There were no significant differences between HCWs of different gender, positions, living in different types of settlements, and having different religious affiliations.

Table 88. Differences in perception of system support between diverse groups of HCWs

Socio-demographic variables	N	Mean	SD	Min	Max	P
Gender						0.16
Male	10	4.16	0.31			
Female	390	4.34	0.48			
Position						0.72
Physician	130	4.33	0.48			
Nurse/technician	270	4.34	0.47			
Specialization						0.22
General/Family physician	125	4.32	0.48			
Paediatrician	5	4.60	0.47			
Type of settlement						0.59
Urban	179	4.35	0.51			
Rural	221	4.33	0.45			
Religious affiliation						0.50
Christian	9	4.56	0.43			
Muslim	375	4.34	0.47			
Not religious	15	4.21	0.53			

Healthcare workers who were older ($r=0.12$, $p<0.05$), and had more years of practice ($r=0.13$, $p<0.05$) perceived support from the system regarding childhood vaccination as significantly higher.

Table 89. Correlations between HCWs' age and years of practice, and perception of system support

	Perception of the system support	Age	Years of practice
Perception of the system support	1	0.12*	0.13*
Age		1	0.94***
Years of practice			1

* $p < 0.05$

*** $p < 0.001$

6.6. Relationship between behaviour drivers and vaccination behaviour among healthcare workers

6.6.1 Socio-demographic characteristics and vaccination behaviour in healthcare workers

Linear regression analysis was used to determine whether socio-demographic characteristics predict healthcare workers' vaccination behaviour. Two separate linear regression analyses were conducted in order to assess the association between socio-demographic characteristics and vaccine promotion behaviour, and socio-demographic characteristics and vaccine hesitancy.

6.6.1.1 Socio-demographic characteristics predicting vaccine promotion behaviour in HCWs

Vaccine promotion behaviour was more prominent among HCWs declaring as Muslims (vs. not being religious; $\beta = -0.18$, $p < 0.001$).

Table 90. Univariate linear regression analysis assessing the association of socio-demographic characteristics and vaccine promotion behaviour

Socio-demographic characteristics	B	SE	Beta	95% CI		p
Age	-0.001	0.002	-0.26	-0.005	0.003	0.60
Position						
Physician (ref)						
Nurse/technician	0.049	0.051	0.048	-0.051	0.148	0.34
Years of practice	-0.001	0.002	-0.16	-0.004	0.003	0.76
Type of settlement						
Urban (ref)						
Rural	0.029	0.048	0.031	-0.064	0.123	0.54
Religious affiliation						
Muslim (ref)						
Christian	-0.095	0.160	.030	-0.410	0.220	0.55
Not religious	-0.459	0.123	-0.184	-0.700	-0.217	<0.001

6.6.1.2 Socio-demographic characteristics predicting vaccine hesitancy in HCWs

Vaccine hesitancy was more prominent among HCWs who declared themselves as Muslims (vs. Christians; $\beta=-0.11$, $p<0.05$).

Table 91. Univariate linear regression analysis assessing the association of socio-demographic characteristics and vaccine hesitancy

Socio-demographic characteristics	B	SE	Коэффициент Beta	95% CI		p
Age	-0.002	0.002	-0.054	-0.007	0.002	0.28
Gender						
Male (ref)						
Female	-0.083	0.170	-0.025	-0.417	0.250	0.62
Position						
Physician (ref)						
Nurse/technician	0.002	0.057	0.002	-0.110	0.115	0.96
Years of practice	-0.002	0.002	-0.045	-0.006	0.002	0.38
Specialization						
Family doctor/General practitioner (ref)						
Pediatrician	-0.042	0.034	-0.111	-0.109	0.025	0.21
Type of settlement						
Urban (ref)						
Rural	0.007	0.054	0.006	-0.099	0.112	0.90
Religious affiliation						
Muslim (ref)						
Christian	-0.427	0.188	-0.114	-0.797	-0.057	<0.05
Not religious	-0.112	0.139	-0.040	-0.386	0.163	0.42

6.6.2 Psychological factors as predictors of vaccination behaviour

Two separate multiple linear regression analyses were conducted in order to assess the association between psychological factors and vaccine promotion behaviour, and between psychological factors and vaccine hesitancy.

6.6.2.1 Psychological factors predicting vaccine promotion behaviour

Healthcare workers who manifested higher level of societal trust ($\beta=0.12$, $p<0.05$) and put more trust in information provided by colleagues ($\beta=0.14$, $p<0.05$), were more inclined to manifest vaccine promotion behaviour.

Table 92. Evaluation of the association between psychological factors and vaccine promotion behaviour in HCWs

Psychological factors	B	SE	Beta	95%C.I.		P
(Constant)	2.968	0.312		2.354	3.581	<0.001
Perceived vaccine efficacy	-0.038	0.061	-0.038	-0.156	0.079	0.52
Perceived vaccine safety	0.083	0.060	0.083	-0.035	0.201	0.17
Trust in societal factors	0.089	0.043	0.121	-0.002	0.156	<0.05
Trust in CME	0.077	0.040	0.132	-0.002	0.161	0.05
Trust in national scientific and professional conferences	0.004	0.050	0.006	-0.094	0.101	0.97
Trust in international scientific and professional conferences	-0.002	0.047	-0.003	--0.093	0.090	0.99
Trust in national scientific literature	0.032	0.045	0.071	-0.051	0.121	0.43
Trust in international scientific literature	-0.017	0.044	-0.035	-0.103	0.069	0.70
Trust in publications and guidelines of relevant national institutions and organizations	0.035	0.044	0.071	-0.051	0.121	0.43
Trust in publications and guidelines of relevant international organizations	-0.042	0.048	-0.086	-0.137	0.052	0.38
Trust in public media	-0.017	0.026	-0.044	-0.074	0.028	0.38
Trust in colleagues	0.074	0.035	0.136	0.006	0.143	<0.05
Trust in government	0.042	0.031	0.087	-0.019	0.102	0.17
Perceived responsibility for parents' vaccination decision	0.018	0.038	0.028	-0.057	0.093	0.63
Perceived duty to advise parents to vaccinate children	0.035	0.050	0.043	-0.063	0.132	0.48
Advocacy for vaccination-Values	0.024	0.058	0.029	-0.091	0.138	0.68
Advocacy for vaccination-Impact	0.023	0.052	0.030	-0.080	0.126	0.66
Advocacy for vaccination-Knowledge	-0.010	0.066	-0.011	-0.139	0.119	0.89

6.6.2.2 Psychological factors predicting vaccine hesitancy

Healthcare workers who perceived vaccine preventable diseases as less dangerous ($\beta=-0.16$, $p<0.01$), and who put more trust in information gained through social networks ($\beta=0.17$, $p<0.001$), were more likely to express vaccine hesitancy.

Table 93. Evaluation of the association between psychological factors and vaccine hesitancy

Psychological factors	B	SE	Beta	95%C.I.		p
(Constant)	2.674	0.191		2.299	3.050	<0.001
Perceived danger of disease	-0.095	0.032	-0.146	-0.159	-0.031	<0.01
Trust in social networks	0.074	0.022	0.175	0.031	0.116	<0.01
Advocacy for vaccination-Autonomy	0.058	0.033	0.088	-0.008	0.123	0.08

6.6.3 Sociological factors as predictors of vaccination behaviour

Two separate multiple linear regression models were conducted to assess the impact of sociological factors on childhood vaccine promotion behaviour and childhood vaccine hesitancy in HCWs.

6.6.3.1 Sociological factors associated with childhood vaccine promotion behaviour in healthcare workers

Healthcare workers who had very positive general attitudes towards vaccination were more likely to engage in vaccine promotion behaviours (vs. HCWs who had neutral attitudes, $\beta=-0.15$, $p<0.05$). Also, healthcare workers who perceived their friends' attitudes towards vaccination as very positive were more likely to promote childhood vaccination (vs. HCWS who perceived their friends' attitudes towards vaccination as neutral $\beta=0.284$, $p<0.05$), somewhat positive ($\beta=-0.18$, $p<0.01$). The model was statistically significant ($F_{13, 376}=2.319$, $p < 0.01$), and explained 7.4% (R^2) of variance in vaccination behaviour.

Table 94. Evaluation of the impact of sociological factors on vaccine promotion behaviour in healthcare workers

Sociological factors	B	SE	Beta	95% C.I		p
Constant	4.810	0.042		4.762	4.893	<0.001
Own attitude						
Neutral	-0.550	0.236	-0.146	-1.014	-0.086	<0.05
Somewhat positive	-0.114	0.072	-0.120	-0.255	0.027	0.11
Very positive (ref)						0.148
Family's attitude						
Neutral	-0.022	0.198	-0.007	-0.411	0.366	0.911
Somewhat positive	0.009	0.074	0.010	-0.137	0.155	0.90
Very positive (ref)						
Friends' attitude						
Somewhat negative	-0.009	0.215	-0.002	-0.431	0.413	0.97
Neutral	-0.235	0.085	-0.181	-0.402	-0.067	<0.01
Somewhat positive	-0.058	0.063	-0.063	-0.183	0.066	0.36
Very positive (ref)						0.900
Colleagues' attitude						
Somewhat negative	0.104	0.356	0.020	-0.597	0.805	0.77
Neutral	-0.003	0.241	-0.001	-0.477	0.470	0.99
Somewhat positive	-0.031	0.069	-0.031	-0.168	0.105	0.65
Very positive (ref)						0.510
Government's attitude						
Somewhat negative	0.339	0.358	0.064	-0.365	1.044	0.34
Neutral	0.143	0.164	0.051	-0.179	0.465	0.38
Somewhat positive	0.003	0.065	0.003	-0.124	0.131	0.96
Very positive (ref)						

6.6.3.2 Sociological factors associated with childhood vaccine hesitancy in healthcare workers

Sociological factors were not significantly associated with childhood vaccine hesitancy among HCWs.

Table 95. Evaluation of the impact of sociological factors on childhood vaccine hesitancy in healthcare workers

Sociological factors	B	SE	Beta	95% C.I		p
Constant	2.619	0.054		2.513	2.724	<0.001
Friends' attitude						
Somewhat negative	0.235	0.238	0.051	-0.233	0.704	0.32
Neutral	-0.050	0.093	-0.034	-0.233	0.133	0.59
Somewhat positive	0.109	0.068	0.104	-0.023	0.242	0.11
Very positive (ref)						
Local leaders' attitude						
Somewhat negative	0.431	0.314	0.073	-0.186	1.048	0.17
Neutral	0.159	0.096	0.101	-0.030	0.348	0.10
Somewhat positive	0.119	0.067	0.113	-0.012	0.251	0.07
Very positive (ref)						

6.6.4 Environmental factors as predictors of vaccination behaviour

6.6.4.1 Environmental factors associated with childhood vaccine promotion behaviour in healthcare workers

Healthcare workers follow information received from colleagues more frequently ($\beta=0.168$, $p<0.001$) and were more likely to manifest childhood vaccine-promoting behaviour. The model was statistically significant ($F(12, 375)=4.783$, $p < 0.001$), and explained 13.3% (R^2) of variance in vaccination behaviour.

Table 96. Evaluation of the impact of environmental factors on childhood vaccine promotion behaviour in healthcare workers

Environmental factors	B	SE	Beta	95% C.I		p
Constant	3.490	0.292		2.916	4.064	<0.001
Lack of information	-0.053	0.049	-0.058	-0.149	0.043	0.28
Support from the system	0.079	0.057	-0.058	-0.034	0.192	0.17
CME (frequency of use)	0.067	0.039	0.104	-0.009	0.142	0.08
National scientific and professional conferences (frequency of use)	0.044	0.038	0.085	-0.031	0.119	0.25
International scientific and professional conferences (frequency of use)	0.013	0.030	0.032	-0.045	0.071	0.67
National scientific literature (frequency of use)	0.026	0.037	0.059	-0.048	0.099	0.49

International scientific literature (frequency of use)	0.006	0.039	0.015	-0.071	0.084	0.87
Publications and guidelines of relevant national organizations (frequency of use)	0.044	0.036	0.088	-0.028	0.115	0.23
Publications and guidelines of relevant international organizations (frequency of use)	-0.052	0.036	-0.112	-0.124	0.020	0.15
Public media (frequency of use)	-0.048	0.028	-0.114	-0.103	0.006	0.08
Colleagues (frequency of use)	0.100	0.036	0.168	0.029	0.172	<0.01
Government (frequency of use)	0.015	0.029	0.032	-0.042	0.073	0.60

5.6.4.2 Environmental factors associated with childhood vaccine hesitancy in healthcare workers

HCWs who relied more on information from social networks were significantly more likely to exhibit vaccine hesitancy ($\beta=0.152$, $p<0.05$). The model was statistically significant ($F(7, 377)=3.442$, $p < 0.01$), and explained 6% (R^2) of variance in vaccination behaviour.

Table 97. Evaluation of the impact of environmental factors on childhood vaccine hesitancy in healthcare workers

Environmental factors	B	SE	Beta	95% C.I		P
Constant	2.199	0.186		1.834	2.564	<0.001
CME (frequency of use)	-0.013	0.044	-0.019	-0.099	0.072	0.76
National scientific and professional conferences (frequency of use)	0.059	0.043	0.103	-0.025	0.144	0.17
International scientific and professional conferences (frequency of use)	0.035	0.034	0.080	-0.031	0.102	0.30
International scientific literature (frequency of use)	-0.022	0.035	-0.047	-0.091	0.047	0.53
Public media (frequency of use)	0.020	0.034	0.042	-0.047	0.086	0.56
Colleagues (frequency of use)	0.009	0.041	0.014	-0.071	0.089	0.82
Social networks (frequency of use)	0.063	0.026	0.152	0.012	0.114	<0.05

7. CONCLUSIONS

This section presents the conclusions based on the collective expert judgment of the team and the interpretation of evidence as presented in the findings. The conclusions have been organized following the theoretical framework (see section 2) and around the same drivers as the findings and are used to establish the case for the recommendations.

7.1 Drivers of parents'/caregivers' vaccination behaviour

7.1.1 Vaccination behaviour

- A large majority of parents, more than 85% of them, declared that they vaccinated their child timely according to the immunization schedule. Only 5.1% of them were moderately hesitant (delayed administration of one or more vaccines), 3.1% were highly hesitant (refused some of the vaccines), and 5% refused all recommended vaccines.
- Socio-demographic characteristics were not significantly associated with parental vaccination behaviour.

7.1.2 Psychological drivers

- In general, the parents/caregivers interviewed had positive attitudes towards the vaccine efficacy and safety. They estimated the danger of vaccine preventable diseases as a moderately high and expressed moderately high level of trust in societal factors.
- The highest level of trust among parents/caregivers was placed in family members and the family physician, followed by scientific literature, healthcare professionals in the media and friends, while the least trust was placed in information from sources such as social networks, YouTube channels and internet portals.
- The surveyed parents demonstrated high level of childhood vaccine related knowledge. The largest proportion of parents, more than half of them, answered all of three knowledge questions correctly, while only 13.0% gave no correct answers.
- Almost 90% of parents agreed or strongly agreed that as parents/caregivers they have a high responsibility to protect their children from harm. At the same time, one quarter of them expressed the fear that they might harm their child by vaccinated them. Parents demonstrated moderately low level of inclination towards alternative health beliefs and worldviews. About one fifth of parents/caregivers reported that they personally knew someone whose child had a serious adverse reaction after receiving a vaccine.
- Parents/caregivers living in rural areas considered childhood vaccines to be safer, perceived danger of vaccine preventable diseases to be more serious, demonstrated higher level of confidence in societal factors, and achieved significantly higher knowledge score than those living in urban areas.
- Parents with primary and secondary vocational education and those holding university degree valued vaccine efficacy significantly higher and attained significantly higher vaccine knowledge score.

- Vaccine accepting parents/caregivers had more positive attitudes towards the vaccine efficacy and safety, had the most serious comprehension of the danger of vaccine preventable diseases, demonstrated higher level of societal trust, and trusted the information obtained from scientific literature, family physician and healthcare professionals in media to a greater extent. Interestingly, vaccine refusing, and highly hesitant parents/caregivers were more likely to believe that YouTube channels and social networks were not trustworthy compared to those who timely vaccinated children and moderately hesitant.
- Vaccine accepting parents had a higher knowledge score than moderately hesitant, highly hesitant and vaccine refusing parents.
- Highly hesitant and vaccine refusing parents/caregivers were more likely to fear that their child could be harmed by vaccination than moderately hesitant and vaccine accepting. Also, highly hesitant and vaccine refusing parents were more likely to report that they personally knew someone whose child had a serious adverse reaction to a vaccine, and were significantly more likely to hold health beliefs that contradict established norms about vaccination.

7.1.3 Sociological drivers

- The largest proportion of the surveyed parents/caregivers believed that healthcare providers, national health authorities and government representatives hold positive attitudes towards childhood vaccination. Around half of the parents/caregivers had the impression that other parents support childhood vaccination, while the smallest proportion, around one third of them believed that religious leaders have positive attitudes.
- Similarly, the largest proportion of parents believed that healthcare providers, national health authorities, government representatives and family members think it is important to get their children vaccinated. Around half of the parents/caregivers have the impression that other parents think it is important to get their children vaccinated, while the smallest proportion, one third of them believed that religious leaders share this belief.
- The most influential social agents were family members (ranked among the top three biggest influential factors) and health care providers, having the strongest influence on vaccination intention. The least influence on vaccination intention was ascribed to other parents (ranked among the three least influential factors), community members, religious leaders and local leaders.
- Parents/caregivers reported having a high-quality communication with their HCWs regarding vaccination. A large majority of parents/caregivers surveyed, more than 90% of them, stated that: they followed their child's paediatrician/family doctor recommendations about vaccines; their child's paediatrician/family doctor recommended that they get their child vaccinated; the paediatrician/family doctor answered all their questions about vaccines and immunization and listened to all their concerns.
- Vaccine-accepting parents had more positive general attitudes towards vaccination and were more likely to believe that their family members, friends, other parents, local leaders, national health authorities, people from the community, religious leaders, healthcare providers and the government support vaccination.

-
- Parents who timely vaccinated children assessed the overall quality of communication with their child's paediatrician as better, were more likely to follow the paediatrician's recommendations, and perceived the paediatrician as being more responsive than vaccine hesitant and vaccine refusing parents. Vaccine refusing parents reported less frequently that their child's paediatrician recommended them vaccination.

7.1.4 Environmental drivers

- Although the majority of parents/caregivers participating in this study felt that they do not lack the information about vaccines and vaccination, vaccine refusing, highly hesitant and moderately hesitant parents perceived the lack of information about childhood vaccines as greater, compared with timely vaccine accepting parents.
- Vaccine accepting parents/caregivers believed to a lesser extent that decision-making regarding vaccination is hard because of the lack of information, that incomplete and contradictory information make them confused, and were satisfied with the amount of information they have. Parents/caregivers living in urban areas had stronger feeling of lack of information about childhood vaccination compared with those from rural areas.
- The most frequently used sources of information about childhood vaccination, by parents/caregivers, were family physicians and family members, followed by health care professionals in media and friends. The least used sources of information were national TV channels and religious leaders. Vaccine accepting parents more often used vaccine-related information coming from family physician and healthcare professionals in the media, as well as internet portals, YouTube channels and social networks, while vaccine refusing parents relied more often on friends and religious leaders.
- Although on average, parents/caregivers reported low structural barriers to vaccination, vaccine refusing parents/caregivers perceived structural barriers as higher compared to timely accepting, moderately hesitant and highly hesitant parents/caregivers.

7.1.5 Drivers significantly associated with childhood vaccine behaviour in parents/caregivers

Psychological drivers that significantly predicted the likelihood of being vaccine accepting relative to vaccine hesitant/refusing in surveyed parents/caregivers were perception of vaccine safety and holding alternative health believes. Parents/caregivers who perceived childhood vaccines as more safe had higher odds to timely vaccinate their child, while parents who were more inclined to the alternative health beliefs were less likely to timely vaccinate their child. The above emphasize the importance of vaccine safety and holding alternative health believes as most important psychological drivers of parental vaccine-behaviour, that should be targeted by behavioural interventions.

Sociological drivers that significantly predicted likelihood of being timely vaccine accepting relative to vaccine hesitant/refusing in responding parents were injunctive norms, descriptive norms, and perception of recommendation given by HCWs. Parents who perceived that their family members think that vaccines are extremely important for their child's health, were more likely to be vaccine accepting, than those who perceived that their family believe that vaccines are not important at all. Also, parents who believed that their friends think that childhood vaccination is moderately important, extremely important, or even are neutral regarding the issue, were more likely to be vaccine accepting compared to those who think that their friends considered childhood vaccination not being important

at all. In addition, parents who rated communication with their child's paediatrician/family physician as more responsive had higher odds to be vaccine accepting. This points to the importance of HCW's quality of communication and vaccine recommendations as mostly influencing parents/caregivers in their decision to vaccinate children, yet the informal instances such as family and friends is not negligible.

Environmental drivers that had largest impact on the likelihood of being vaccine accepting relative to vaccine hesitant/refusing in parents were perceived lack of information and use of information sources. Parents/caregivers who perceived a lack of information about childhood vaccination as more pronounced were less likely to timely vaccinate their child. Also, parents/caregivers who more frequently followed information regarding childhood vaccination given by their family physician and healthcare professionals in media, and less frequently information given by religious leaders had higher odds to timely vaccinate the child. From the above it can be concluded that although in general lack of information and use of information sources were perceived by parents/caregivers as low, they were reported by vaccine hesitant/refusing parents to a greater extent, and therefore deserve particular attention. Important and potentially actionable is the finding that vaccine accepting parents more often rely on official sources of information such as their family physician and healthcare professionals in the media.

7.2 Drivers of healthcare workers vaccination behaviour

7.2.1 Vaccination behaviour

- In general, HCWs showed high level of childhood vaccine promotion behaviour and moderately low level of childhood vaccine hesitancy. A large majority (over 80%) reported that they always fully adhere to the prescribed vaccination calendar, while a similar proportion always persuade parents to vaccinate their child. More than 90% provide additional information to parents who are vaccine hesitant. However, almost 90% of HCWs interviewed advise parents to delay vaccination beyond the recommended age, and almost a fifth of them postpone certain vaccines if parents insist. All the HCWs interviewed stated that they never or rarely postpone MMR vaccination after the child has spoken because of fears of autism. There were differences in childhood vaccine advocacy and vaccine hesitancy between HCWs exhibiting diverse private vaccination behaviour.

7.2.2 Psychological drivers

- Healthcare workers had highly positive attitudes towards vaccine efficacy and vaccine safety. They perceived danger of vaccine-preventable diseases to be moderately high. A large majority (over 90%) considered BCG, DTP-IPV-HiB, PCV, Rotavirus vaccine, vaccines against Hepatitis B, OPV/Polio, MMR and DT vaccine and TT vaccine to be mostly or very effective and safe.
- Healthcare workers demonstrated high level of trust in societal factors¹⁹. For the vast majority of HCWs the most trusted sources of vaccine-related information are CME, colleagues, international and national scientific literature, publications and guidelines from national and international organizations, national and international scientific and

¹⁹ This contradicts results of many other studies suggesting erosion of societal trust in healthcare workers, particularly trust in healthcare authorities and pharmaceutical companies (MacDougall et al., 2015; Manca 2018; Wilson et al., 2020). Lack of trust in other studies is explained by multiple factors, including HCW's perception of support for their public health vaccination duties by health authorities; of the health authorities' poor management of health crises; of conflict of interest between health authorities and the pharmaceutical industry (Verger et al, 2022).

professional conferences and government. Public media and social networks were evaluated as the least trustworthy sources.

- In general, the physicians surveyed demonstrated moderately low level of factual vaccine-related knowledge.
- A large majority of HCWs had a strong feeling of responsibility for the decisions regarding vaccination made by their patients' parents, and supported the statement that advising parents to vaccinate children is their duty. Furthermore, HCWs demonstrated high level of motivation for advocacy for vaccination.
- Healthcare workers who were older and had more years of practice perceived the danger of the childhood vaccine preventable disease as more serious.
- Physicians from urban areas achieved significantly higher knowledge scores.
- No significant differences were observed between physicians and nurses/technicians with respect to psychological drivers of vaccination behaviour.

7.2.3 Sociological drivers

- Almost all surveyed HCWs had a positive general attitude towards vaccination. No significant differences were observed between physicians and nurses/technicians with respect to their own attitudes towards vaccination. The majority believed that National Health authorities, their colleagues, the government, members of their family, friends, parents, local leaders, people from the community and parents hold positive attitudes towards childhood vaccination. Around a third believed that religious leaders support childhood vaccination. No differences were observed between physicians and nurses/technicians in their appreciation of descriptive norms.
- Similarly, almost all HCWs believed that it is important to get their child vaccinated. The majority believed that National Health authorities, their colleagues, the government, members of their family, friends, parents, local leaders, people from the community and parents think it is important to get their child vaccinated, while less than half believed that religious leaders share this view. Nurses/technicians to a significantly larger extent believed that local leaders, community members and colleagues think it is important to get their child vaccinated, compared to physicians.
- The vast majority of the interviewed HCWs ascribed the biggest influence on the intention to vaccinate children to their family members, and their own attitudes towards vaccination²⁰. Colleagues and National Health authorities are also among the most influential factors on vaccination decision²¹. Religious leaders were considered as the least influential factor by more than two-thirds of respondents. Community members, other parents, local leaders, and friends were also considered as agents having the least influence on vaccination intention by respondents.

7.2.4 Environmental drivers

- Overall, HCWs felt a low level of lack of information (competence) when answering

²⁰ This is in line with the results of a Canadian study showing that majority of surveyed paediatricians were largely influenced by their personal apprehension when recommending vaccines (Dube et al., 2011).

²¹ Large influence of authorities and medical experts on healthcare workers' vaccination behaviour was also observed in a study conducted in several European countries (Karafillakis, 2016).

parents' questions about vaccines' efficacy, quality and safety.

- The most frequently used sources of vaccine-related information by HCWs were CME on vaccines and colleagues. Other frequently used sources included national professional and scientific conferences, government, and publications and guidelines from relevant national institutions and organizations. Social networks, international scientific literature and public media. were the least used sources.
- System support for childhood vaccination was perceived as high by HCWs. A large majority of HCWs (over 90%) believe that there are clear official written guidelines for implementing good practice in childhood immunization, and that national authorities encourage them to recommend vaccinations. More than 90% of surveyed HCWs received sufficient trainings on how to apply official guidelines, communicate with parents about immunization and how to address vaccine hesitancy. Older healthcare workers and one with more years of practice perceived support from the system regarding childhood vaccination as significantly higher.

7.2.5 Drivers significantly associated with childhood vaccine behaviour in HCWs

Psychological drivers that were significantly associated with childhood vaccine promoting behaviour among the HCWs surveyed were trust in societal factors and trust in information sources. Healthcare workers who manifested higher level of societal trust and who put more trust in information provided by colleagues, were more inclined to manifest vaccine promotion behaviour. Psychological factors that had a significant impact on HCWs' vaccine hesitancy were perception of danger of disease, and trust in information sources. Healthcare workers who perceived vaccine preventable diseases as less dangerous and put more trust in information gained through social networks, were more prone to manifest vaccine hesitancy²². The above imply that HCWs may share concerns over complacency similar to those of laypeople, reflecting their beliefs rather than strictly medical knowledge²³. Also, our findings confirm the importance of societal trust for public health interventions in general, and vaccination practice as well. Receiving encouraging information on vaccines from trustworthy medical institutions or official organizations have the potential to increase HCWs' confidence and thus likelihood to recommend vaccines.

Sociological drivers that were significantly associated with childhood vaccine promotion behaviour in HCWs were descriptive norms. Healthcare workers who had very positive general attitudes towards vaccination and who assessed their friends' attitudes towards childhood vaccination as very positive, were more likely to promote childhood vaccination. Sociological factors were not significantly associated with vaccine hesitant behaviour in HCWs. This, as well as other studies²⁴ suggest that descriptive norms play an important role in shaping HCWs' vaccine behaviour, particularly appreciation of significant others' (friends) attitudes towards vaccination, suggesting the importance of social groups other than strictly professional ones in shaping HCWs vaccination attitudes.

²² Findings of numerous other studies suggest the association of vaccine hesitancy in healthcare workers with concerns over vaccine safety (Verger et al., 2014; Thomire et al., 2021; Tomljenovic et al., 2021; Lepiller et al., 2020) and perception of low disease severity (Stefanoff et al., 2020; Elizondo-Alzola et al., 2021).

²³ Numerous studies indicate strong association between lack of knowledge about vaccines and vaccine hesitancy in healthcare workers, with more advanced medical training being associated with better self-confidence in discussing vaccine-related issues with patients (Verger et al., 2022). Several studies confirm the existence of the positive association between trust in information from official sources and recommending vaccines to patients, but also suggest that vaccine hesitant healthcare workers more often consult unofficial sources such as news media, the internet, magazines (Lin et al., 2021).

²⁴ The perception of parental vaccine resistance may influence healthcare workers' immunization practice is recognized in other studies (Lin et al., 2021).

Environmental driver associated with vaccine promotion and vaccine hesitant behaviour in HCWs was the use of information sources. Healthcare workers who relied more on information from colleagues were more likely to promote childhood vaccination. Healthcare workers who relied more on information received from social networks were significantly more likely to exhibit vaccine hesitant behaviour. These results suggest that the information environment is an important determinant of HCW's vaccination decisions and practices and should be considered when designing vaccination promotion interventions.

8. RECOMMENDATIONS

This section presents an overview of the recommendations that are derived directly from the findings and conclusions of this research. They are associated with the different drivers that were defined in the theoretical framework (see section 2) and identified as significant drivers of vaccine hesitancy in both, parents/caregivers and HCWs, in Kyrgyzstan. Two key principles were applied when developing the recommendations: 1) That they follow directly from the conclusions and support the findings and 2) That they are 'actionable'.

1. Concerns about vaccine safety and lower level of vaccine-related knowledge, which were more prominent among vaccine hesitant parents/caregivers in Kyrgyzstan, indicate the need for interventions and education campaigns that focus on addressing safety concerns and the seriousness of childhood vaccine-preventable diseases (education based on risk communication). As the research results suggest that parents/caregivers living in rural areas and parents with higher education have more positive attitudes towards safety and perceive diseases as more dangerous, the interventions and education campaigns should target less educated parents/caregivers from urban areas particularly.
2. Since vaccine hesitant and vaccine refusing parents/caregivers were more inclined to hold alternative health beliefs and worldviews, communication interventions aimed at increasing vaccine acceptance need to be culturally sensitive and designed with input from relevant community members.
3. Given that family members and family physician are the most credible source of vaccine-related information for parents/caregivers, and that vaccine accepting parents are more likely to rely on information from official sources such as HCWs, it is of paramount importance that policy makers and health professionals make a concentrated and synchronized effort to provide complete and accurate information through sources and channels that people trust.
4. Trust in societal factors was particularly relevant for vaccine behaviour of healthcare workers, suggesting the need for additional efforts and actions to increase societal trust which should lead to increased vaccine acceptance. Interventions to promote immunization should be context-relevant, integrated, multi-component and based on community engagement and social mobilization to build trust and social cohesion, leading to increased childhood vaccine acceptance among all stakeholders.
5. Based on the finding that highly hesitant and vaccine-refusing parents were more likely to express fears that vaccines could bring harm to their children, it could be suggested that interventions aimed at addressing the issue of parental responsibility and concerns about vaccination should be dialogue-based, informed by social listening to parents' doubts, fears and misconceptions, in order to provide timely responses, support and solutions.
6. Given that the quality of communication and vaccination-related recommendations provided by the child's paediatrician were significantly associated with parents' vaccine behaviour, empowering healthcare providers by developing their communication skills, together with raising awareness of the importance of advocacy for vaccination could be an effective way to increase vaccine acceptance among the parents/caregivers and in the population.

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7. As descriptive and injunctive norms play an important role in shaping the vaccination behaviour of parents and HCWs, education and empowerment of key actors at all levels (national, regional, local) is necessary. Vaccine hesitancy is largely a community phenomenon and the influence of social communities on vaccination risk perceptions and decisions has been demonstrated in many studies²⁵. As shown in this and other studies²⁶, families have a strong influence on decision-making due to strong interpersonal dynamics and shared history. Therefore, it is important that vaccine messages and interventions also target information to families, as the potential for dissemination is very likely to influence future immunization decisions.
 8. Lack of information was a significant driver in parental vaccine hesitancy in Kyrgyzstan and can be linked to the impact of the perceived quality of communication with HCWs on parents' decision to vaccinate their child. Targeted education of both, parents and HCWs, would address these factors of vaccine behaviour, but education alone is not sufficient and needs to be accompanied by dialogue-based interventions to encourage individuals to accept vaccination.
 9. Given that the information environment was found to be a significant predictor of HCWs' vaccine promotion behaviour, an education campaign through both formal and informal channels would increase HCWs willingness and readiness to promote vaccination in their daily practice.

In summary, a multi-component strategy to promote vaccination is needed, consisting of:

- campaigns to educate parents/caregivers about vaccination, focusing on vaccine safety and the risks of vaccine-preventable diseases, preferably led by healthcare providers,
- vaccine promotion interventions that focus more on urban areas of Kyrgyzstan, where negative attitudes and vaccine hesitancy among parents/caregivers are more prominent,
- dialogue-based interventions that address specific concerns and fears of parents through direct communication,
- education of HCWs to increase their vaccine-related knowledge through formal and informal communication channels,
- Hands-on-training for HCWs to develop their communication skills and empower them to advocate for vaccination,
- community engagement and a participatory approach in the design and implementation of culturally sensitive and context-appropriate immunization strategies,
- targeting information to families as the decision-making units.

²⁵ Liu B, Chen R, Zhao M, Zhang X, Wang J, Gao L, Xu J, Wu Q, Ning N. Vaccine confidence in China after the Changsheng vaccine incident: a cross-sectional study. *BMC public health*. 2019;19(1):1564.

²⁶ Frew PM, Saint-Victor DS, Owens LE, Omer SB. Socioecological and message framing factors influencing maternal influenza immunization among minority women. *Vaccine*. 2014;32(15):1736–1744.

9. REFERENCES

Reviewed reports and documents:

10. Abi Jaoude, J., Khair, D., Dagher, H., Saad, H., Cherfan, P., Kaafarani, M. A., Jamaluddine, Z. & Ghattas, H. (2018). Factors associated with Human Papilloma Virus (HPV) vaccine recommendation by physicians in Lebanon, a cross-sectional study. *Vaccine* 36(49), 7562-7567.
11. Alabadi, M., & Aldawood, Z. (2020). Parents' knowledge, attitude and perceptions on childhood vaccination in Saudi Arabia: a systematic literature review. *Vaccines*, 8(4), 750.
12. Al-Amer, R., Maneze, D., Everett, B., Montayre, J., Villarosa, A. R., Dwekat, E., & Salamonson, Y. (2021). COVID-19 vaccination intention in the first year of the pandemic: A systematic review. *Journal of clinical nursing*. doi: 10.1111/jocn.15951
13. Al-Jayyousi, G. F., Sherbash, M. A. M., Ali, L. A. M., El-Heneidy, A., Alhussaini, N. W. Z., Elhassan, M. E. A., & Nazzal, M. A. A. (2021). Factors Influencing Public Attitudes towards COVID-19 Vaccination: A Scoping Review Informed by the Socio-Ecological Model. *Vaccines*, 9(6), 548.
14. AlShurman, B. A., Khan, A. F., Mac, C., Majeed, M., & Butt, Z. A. (2021). What demographic, social, and contextual factors influence the intention to use COVID-19 vaccines: A scoping review. *International Journal of Environmental Research and Public Health*, 18(17), 9342. doi.org/10.3390/ijerph18179342
15. Athar Ansari, M., Khan, Z., & Khan, I. M. (2007). Reducing resistance against polio drops. *The journal of the Royal Society for the Promotion of Health*, 127(6), 276-279.
16. Attwell, K., Betsch, C., Dubé, E., Sivelä, J., Gagneur, A., Suggs, L.S., Picot, V. & Thomson, A. (2021). Increasing vaccine acceptance using evidence-based approaches and policies: Insights from research on behavioural and social determinants presented at the 7th Annual Vaccine Acceptance Meeting. *Int J Infect Dis*. Apr;105:188-193. doi: 10.1016/j.ijid.2021.02.007.
17. Aw, J., Seng, J. J. B., Seah, S. S.Y., & Low, L. L. (2021). COVID-19 vaccine hesitancy—A scoping review of literature in high-income countries. *Vaccines*, 9(8), 900. doi.org/10.3390/vaccines9080900
18. Bangura, J. B., Xiao, S., Qiu, D., Ouyang, F., & Chen, L. (2020). Barriers to childhood immunization in sub-Saharan Africa: a systematic review. *BMC Public Health*, 20(1), 1-15.
19. Behavioural insights for routine immunization and COVID-19 vaccination in Kyrgyzstan. (2021). Inception Report. Rain Barrel Communications, UNICEF. 33 p.
20. Berthet, V. (2021). The Measurement of Individual Differences in Cognitive Biases: A Review and Improvement. *Frontiers in psychology*, 12, 419, doi.org/10.3389/fpsyg.2021.630177
21. Berthet, V., & de Gardelle, V. (2021). Measuring individual differences in cognitive biases: The Cognitive Bias Inventory. <https://doi.org/10.31219/osf.io/7wfvb>

-
22. Betsch, C., & Wicker, S. (2014). Personal attitudes and misconceptions, not official recommendations guide occupational physicians' vaccination decisions. *Vaccine*, 32(35), 4478-4484.
 23. Betsch, C., Schmid, P., Heinemeier, D., Korn, L., Holtmann, C., & Böhm, R. (2018). Beyond confidence: Development of a measure assessing the 5C psychological antecedents of vaccination. *PLoS one*, 13(12), e0208601.
 24. Bianco, A., Mascaro, V., Zucco, R., & Pavia, M. (2019). Parent perspectives on childhood vaccination: How to deal with vaccine hesitancy and refusal?. *Vaccine*, 37(7), 984-990.
 25. Brown, A. L., Sperandio, M., Turssi, C. P., Leite, R., Berton, V. F., Succi, R. M., Larson, H. & Napimoga, M. H. (2018). Vaccine confidence and hesitancy in Brazil. *Cadernos de saúde pública*, 34, e00011618.
 26. Browne, M., Thomson, P., Rockloff, M. J., & Pennycook, G. (2015). Going against the herd: psychological and cultural factors underlying the 'vaccination confidence gap'. *PLoS one*, 10(9), e0132562.
 27. Browne, M., Patricia T., Matthew J. R., Gordon P. (2015). Going against the herd: psychological and cultural factors underlying the 'vaccination confidence gap'. *PLoS one* 10, no. 9: e0132562.
 28. Bruno, D. M., Wilson, T. E., Gany, F., & Aragones, A. (2014). Identifying human papillomavirus vaccination practices among primary care providers of minority, low-income and immigrant patient populations. *Vaccine*, 32(33), 4149-4154.
 29. Carrieri, V., Madio, L., & Principe, F. (2019). Vaccine hesitancy and (fake) news: Quasi-experimental evidence from Italy. *Health economics*, 28(11), 1377-1382.
 30. Cooper, S., Schmidt, B. M., Sambala, E. Z., Swartz, A., Colvin, C. J., Leon, N., & Wiysonge, C. S. (2021). Factors that influence parents' and informal caregivers' views and practices regarding routine childhood vaccination: a qualitative evidence synthesis. *Cochrane Database of Systematic Reviews*, (10).
 31. Crescitelli, M. D., Ghirotto, L., Sisson, H., Sarli, L., Artioli, G., Bassi, M. C., Appicciutoli, G., & Hayter, M. (2020). A meta-synthesis study of the key elements involved in childhood vaccine hesitancy. *Public Health*, 180, 38-45.
 32. Davis, M. M., Ndiaye, S. M., Freed, G. L., & Clark, S. J. (2003). One-year uptake of pneumococcal conjugate vaccine: a national survey of family physicians and pediatricians. *The Journal of the American Board of Family Practice*, 16(5), 363-371.
 33. De Figueiredo, A., Simas, C., Karafillakis, E., Paterson, P., & Larson, H. J. (2020). Mapping global trends in vaccine confidence and investigating barriers to vaccine uptake: a large-scale retrospective temporal modelling study. *The Lancet*, 396(10255), 898-908.
 34. De Neys, W., & Glumicic, T. (2008). Conflict monitoring in dual process theories of thinking. *Cognition*, 106(3), 1248-1299.
 35. Domek, G. J., O'Leary, S. T., Bull, S., Bronsert, M., Contreras-Roldan, I. L., Ventura, G. A. B., Kempe, A. & Asturias, E. J. (2018). Measuring vaccine hesitancy: Field testing the WHO SAGE Working Group on Vaccine Hesitancy survey tool in Guatemala. *Vaccine*, 36(35), 5273-5281.
 36. Dror, A. A., Eisenbach, N., Taiber, S., Morozov, N. G., Mizrachi, M., Zigron, A., Srouji, S. & Sela, E. (2020). Vaccine hesitancy: the next challenge in the fight against COVID-19. *European journal of epidemiology*, 35(8), 775-779.

37. Dube, E., Vivion, M., MacDonald, N.E. (2015). Vaccine hesitancy, vaccine refusal and the anti-vaccine movement: influence, impact and implications. *Expert review of vaccines*, 14(1):99-117.
38. Dubé, E., Defay, F., Gilca, V., Bettinger, J. A., Sauvageau, C., Lavoie, F., & Boulianne, N. (2011). A (H1N1) pandemic influenza and its prevention by vaccination: paediatricians' opinions before and after the beginning of the vaccination campaign. *BMC Public Health*, 11(1), 1-9.
39. Dubé, E., Gilca, V., Sauvageau, C., Bradet, R., Bettinger, J. A., Boulianne, N., Boucher, F.D., McNeil, S., Gemmill, I., & Lavoie, F. (2011). Canadian paediatricians' opinions on rotavirus vaccination. *Vaccine*, 29(17), 3177-3182.
40. Dubé, E., Vivion, M., & MacDonald, N. E. (2015). Vaccine hesitancy, vaccine refusal and the anti-vaccine movement: influence, impact and implications. *Expert review of vaccines*, 14(1), 99-117.
41. Dubé, E.; Fannie, D.; Vladimir, G.; Julie, B.A.; Chantal, S.; France, L.; François, B.D.; Shelly, M.; Ian, G.; Nicole, B. (2011). A(H1N1) Pandemic Influenza and Its Prevention by Vaccination: Paediatricians' Opinions before and after the Beginning of the Vaccination Campaign. *BMC Public Health* 11, 128.
42. Esposito, S., Bosis, S., Pelucchi, C., Begliatti, E., Rognoni, A., Bellasio, M., Tel, F., Consolo, S., & Principi, N. (2007). Pediatrician knowledge and attitudes regarding human papillomavirus disease and its prevention. *Vaccine*, 25(35), 6437-6446.
43. European Center for Disease Prevention and Control (ECDC) (2015). Rapid literature review on motivating hesitant population groups in Europe to vaccinate. Stockholm: ECDC.
44. European Center for Disease Prevention and Control (ECDC) (2016). Let's talk about hesitancy. Stockholm: ECDC.
45. Ferrara, P., Stromillo, L., & Albano, L. (2018). Awareness, Attitudes, and Practices Toward Meningococcal B Vaccine among Pediatricians in Italy. *Medicina*, 54(6), 100.
46. Giambi, C., Fabiani, M., D'Ancona, F., Ferrara, L., Fiacchini, D., Gallo, T., & Rota, M. C. (2018). Parental vaccine hesitancy in Italy—results from a national survey. *Vaccine*, 36(6), 779-787.
47. Gilkey, M. B., Magnus, B. E., Reiter, P. L., McRee, A. L., Dempsey, A. F., & Brewer, N. T. (2014). The Vaccination Confidence Scale: a brief measure of parents' vaccination beliefs. *Vaccine*, 32(47), 6259-6265.
48. Gori, D., Ialonardi, M., Odone, A., Ricci, B., Pascucci, M. G., Frasca, G., Venturi, S., Signorelli, C., & Fantini, M. P. (2019). Vaccine Hesitancy and Mandatory Immunizations in Emilia-Romagna Region: the case of MMR vaccine. *Acta bio-medica: Atenei Parmensis*, 90(3), 394-397.
49. Gust, D. A., Darling, N., Kennedy, A., & Schwartz, B. (2008). Parents with doubts about vaccines: which vaccines and reasons why. *Pediatrics*, 122(4), 718-725.
50. Habersaat, K.B. & Jackson, C. (2020). Understanding vaccine acceptance and demand - and ways to increase them. *Bundesgesundheitsbl.* 63:32–39. doi.org/10.1007/s00103-019-03063-0.

-
51. Hadjipanayis, A., van Esso, D., DelTorso, S., Dornbusch, H. J., Michailidou, K., Minicuci, N., & Grossman, Z. (2020). Vaccine confidence among parents: Large scale study in eighteen European countries. *Vaccine*, 38(6), 1505-1512.
 52. Hajure, M., Tariku, M., Bekele, F., Abdu, Z., Dule, A., Mohammedhusein, M., & Tsegaye, T. (2021). Attitude towards COVID-19 vaccination among healthcare workers: a systematic review. *Infection and Drug Resistance*, 14, 3883.
 53. Hurley, L. P., Harpaz, R., Daley, M. F., Crane, L. A., Beaty, B. L., Barrow, J., & Kempe, A. (2008). National survey of primary care physicians regarding herpes zoster and the herpes zoster vaccine. *The Journal of infectious diseases*, 197 (Supplement_2), S216-S223.
 54. Jama, A., Ali, M., Lindstrand, A., Butler, R., & Kulane, A. (2018). Perspectives on the measles, mumps and rubella vaccination among Somali mothers in Stockholm. *International journal of environmental research and public health*, 15(11), 2428.
 55. Jolley, D., & Douglas, K. M. (2014). The Effects of Anti-Vaccine Conspiracy Theories on Vaccination Intentions. *PLoS ONE*, 9(2), e89177.
 56. Kahneman, D.; Slovic, B. & Tversky, A. (eds.) (1982). *Judgement under uncertainty: heuristics and biases*. Cambridge University Press.
 57. Kalaij, A. G. I., Sugiyanto, M., & Ilham, A. F. (2021). Factors Associated With Vaccination Compliance in Southeast Asian Children: A Systematic Review. *Asia Pacific Journal of Public Health*, 10105395211014640.
 58. Kalam, M.A., Davis, T.P. Jr., Shano, S., Uddin, M.N., Islam, M.A., Kanwagi, R., Islam, A., Hassan, M.M. & Larson, H. (2021) Exploring the behavioral determinants of COVID-19 vaccine acceptance among an urban population in Bangladesh: Implications for behavior change interventions. *PLoS ONE* 16(8): e0256496. doi.org/10.1371/journal.pone.0256496.
 59. Karafillakis, E., Dinca, I., Apfel, F., Cecconi, S., Wúrz, A., Takacs, J., Suk, J., Celentano, L.P., Kramarz, P., & Larson, H. J. (2016). Vaccine hesitancy among healthcare workers in Europe: A qualitative study. *Vaccine*, 34(41), 5013-5020.
 60. Kempe, A., Daley, M. F., Parashar, U. D., Crane, L. A., Beaty, B. L., Stokley, S., Barrow, J., Babbel, C., Dickinson, L.M., Widdowson, M.A., & Berman, S. (2007). Will pediatricians adopt the new rotavirus vaccine?. *Pediatrics*, 119(1), 1-10.
 61. Knowledge, Attitudes & Practices towards Immunization in Kyrgyzstan. (2018). Ministry of Health of the Kyrgyz Republic, Gavi, UNICEF. 183 p.
 62. Lane, S., MacDonald, N. E., Marti, M., & Dumolard, L. (2018). Vaccine hesitancy around the globe: Analysis of three years of WHO/UNICEF Joint Reporting Form data-2015–2017. *Vaccine*, 36(26), 3861-3867.
 63. Larson, H. J., Clarke, R. M., Jarrett, C., Eckersberger, E., Levine, Z., Schulz, W. S., & Paterson, P. (2018). Measuring trust in vaccination: A systematic review. *Human vaccines & immunotherapeutics*, 14(7), 1599-1609.
 64. Larson, H. J., De Figueiredo, A., Xiahong, Z., Schulz, W. S., Verger, P., Johnston, I. G., Cook, A.R., & Jones, N. S. (2016). The state of vaccine confidence 2016: global insights through a 67-country survey. *EBioMedicine*, 12, 295-301.
 65. Lavrakas P.J. (2008). *Encyclopedia of survey research methods*. Sage publications; Sep 12.

66. Le Maréchal, M., Agrinier, N., Fressard, L., Verger, P., & Pulcini, C. (2017). Low Uptake of Meningococcal C Vaccination in France. *The Pediatric infectious disease journal*, 36(7), e181-e188.
67. Lehmann, B. A., Eilers, R., Mollema, L., Ferreira, J., & de Melker, H. E. (2017). The intention of Dutch general practitioners to offer vaccination against pneumococcal disease, herpes zoster and pertussis to people aged 60 years and older. *BMC geriatrics*, 17(1), 1-10.
68. Li, M., Luo, Y., Watson, R., Zheng, Y., Ren, J., Tang, J., & Chen, Y. (2021). Healthcare workers' (HCWs) attitudes and related factors towards COVID-19 vaccination: A rapid systematic review. *Postgraduate medical journal*.
69. Liu, B., Chen, R., Zhao, M., Zhang, X., Wang, J., Gao, L., Xu, J., Wu, Q., & Ning, N. (2019). Vaccine confidence in China after the Changsheng vaccine incident: a cross-sectional study. *BMC public health*, 19(1), 1-11.
70. Lohr SL. (2019). *Sampling: design and analysis*. Chapman and Hall/CRC; Apr 8.
71. Luyten, J., Bruyneel, L., & van Hoek, A. J. (2019). Assessing vaccine hesitancy in the UK population using a generalized vaccine hesitancy survey instrument. *Vaccine*, 37(18), 2494-2501.
72. Martinelli, M., & Veltri, G. A. (2021). Do cognitive styles affect vaccine hesitancy? A dual-process cognitive framework for vaccine hesitancy and the role of risk perceptions. *Social Science & Medicine*, 289, 114403.
73. Matloff N. (2011). *The art of R programming: A tour of statistical software design*. No Starch Press.
74. Mattia, G., Anna, I., Alice, B., Riccardo, M., Stefania, C., & Alessandra, G. (2021). Who Is Willing to Get Vaccinated? A Study into the Psychological, Socio-Demographic, and Cultural Determinants of COVID-19 Vaccination Intentions. *Vaccines*, 9(8), 810.
75. Mohanty, S., Carroll-Scott, A., Wheeler, M., Davis-Hayes, C., Turchi, R., Feemster, K., Judell, M., & Buttenheim, A. M. (2018). Vaccine hesitancy in pediatric primary care practices. *Qualitative health research*, 28(13), 2071-2080.
76. Napolitano, F., Navaro, M., Vezzosi, L., Santagati, G., & Angelillo, I. F. (2018). Primary care pediatricians' attitudes and practice towards HPV vaccination: A nationwide survey in Italy. *PLoS one*, 13(3), e0194920.
77. Newman, R. D., & Taylor, J. A. (1998). Reactions of pediatricians to the recommendation for universal varicella vaccination. *Archives of pediatrics & adolescent medicine*, 152(8), 792-796.
78. Ngasa, N. C., Ngasa, S. N., Tchouda, L. A. S., Tanisso, E., Abanda, C., & Dingana, T. N. (2021). Spirituality and other factors associated with COVID-19 Vaccine Acceptance amongst Healthcare Workers in Cameroon.
79. Oliveira, B. L. C. A. D., Campos, M. A. G., Queiroz, R. C. D. S., Souza, B. F. D., Santos, A. M. D., & Silva, A. A. M. D. (2021). Prevalence and factors associated with covid-19 vaccine hesitancy in Maranhão, Brazil. *Revista de Saúde Pública*, 55.
80. Opel, D. J., Taylor, J. A., Mangione-Smith, R., Solomon, C., Zhao, C., Catz, S., & Martin, D. (2011). Validity and reliability of a survey to identify vaccine-hesitant parents. *Vaccine*, 29(38), 6598-6605.

-
81. Petit, V. (2019). The Behavioural Drivers Model: A Conceptual Framework for Social and Behaviour Change Programming. UNICEF.
 82. Raude, J., Fressard, L., Gautier, A., Pulcini, C., Peretti-Watel, P., & Verger, P. (2016). Opening the 'Vaccine Hesitancy' black box: how trust in institutions affects French GPs' vaccination practices. *Expert review of vaccines*, 15(7), 937-948.
 83. Raude, J.; Fressard, L.; Gautier, A.; Pulcini, C.; Peretti-Watel, P.; Verger, P. (2016). Opening the 'Vaccine Hesitancy' Black Box: How Trust in Institutions Affects French GPs' Vaccination Practices. *Expert Rev. Vaccines*. 15, 937–948.
 84. Reuben, R., Aitken, D., Freedman, J. L., & Einstein, G. (2020). Mistrust of the medical profession and higher disgust sensitivity predict parental vaccine hesitancy. *Plos one*, 15(9), e0237755.
 85. Rieger, M. O. (2020). Triggering altruism increases the willingness to get vaccinated against COVID-19. *Social Health and Behavior*, 3(3), 78.
 86. Shapiro, G. K., Tatar, O., Dube, E., Amsel, R., Knauper, B., Naz, A., Perez, S., & Rosberger, Z. (2018). The vaccine hesitancy scale: Psychometric properties and validation. *Vaccine*, 36(5), 660-667.
 87. Shay, L. A., Baldwin, A. S., Betts, A. C., Marks, E. G., Higashi, R. T., Street, R. L., & Tiro, J. A. (2018). Parent-provider communication of HPV vaccine hesitancy. *Pediatrics*, 141(6).
 88. Smith, L. E., Amlôt, R., Weinman, J., Yiend, J., & Rubin, G. J. (2017). A systematic review of factors affecting vaccine uptake in young children. *Vaccine*, 35(45), 6059-6069.
 89. Stahl, J. P., Cohen, R., Denis, F., Gaudelus, J., Martinot, A., Lery, T., & Lepetit, H. (2016). The impact of the web and social networks on vaccination. New challenges and opportunities offered to fight against vaccine hesitancy. *Medecine et maladies infectieuses*, 46(3), 117-122.
 90. Teovanović, P., Knežević, G., & Stankov, L. (2015). Individual differences in cognitive biases: Evidence against one-factor theory of rationality. *Intelligence*, 50, 75-86.
 91. Teovanović, P., Knežević, G., Stankov, L. (2015). Individual differences in cognitive biases: Evidence against one-factor theory of rationality. *Intelligence* 50: 75-86.
 92. Tomljenovic, H., Bubic, A., & Erceg, N. (2020). It just doesn't feel right—the relevance of emotions and intuition for parental vaccine conspiracy beliefs and vaccination uptake. *Psychology & health*, 35(5), 538-554.
 93. Tuckerman, J., Crawford, N.W., & Marshall, H. S. (2020). Seasonal influenza vaccination for children with special risk medical conditions: Does policy meet practice? *Journal of paediatrics and child health*, 56(9), 1388-1395.
 94. Vaccination of children in Rivne oblast: public opinion monitoring – November 2021. (2021). UNICEF. 66 p.
 95. Vaccination of children in Zakarpattia oblast: public opinion monitoring – November 2021. (2021). UNICEF. 66 p.
 96. Vadaparampil, S. T., Malo, T. L., Sutton, S. K., Ali, K. N., Kahn, J. A., Casler, A., Salmon, D., Walkosz, B., Roetzheim, R.G., Zimet, G.D, & Giuliano, A. R. (2016). Missing the target for routine human papillomavirus vaccination: consistent and strong physician recommendations are lacking for 11-to 12-year-old males. *Cancer Epidemiology and Prevention Biomarkers*, 25(10), 1435-1446.

97. Victor, A. K. (2020). Communicating About Routine Childhood Vaccines: Meta-Analysis of Parental Attitudes, Behaviors, & Vaccine Hesitancy (Doctoral dissertation, The University of Wisconsin-Milwaukee).
98. Wilcox, C. R., Calvert, A., Metz, J., Kilich, E., MacLeod, R., Beadon, K., Heath, P.T., Khalil, A., Finn, A., Snape, M.D, & Jones, C. E. (2019). Attitudes of pregnant women and healthcare professionals toward clinical trials and routine implementation of antenatal vaccination against respiratory syncytial virus: a multicenter questionnaire study. *The Pediatric infectious disease journal*, 38(9), 944-951.
99. Wilder-Smith, A. B., & Qureshi, K. (2020). Resurgence of measles in Europe: a systematic review on parental attitudes and beliefs of measles vaccine. *Journal of epidemiology and global health*, 10(1), 46-58.
100. Williams, J.T, Robinson, K., Abbott, E., Rojop, N., Shiffman, M., Rice, J. D., O'Leary, S.T., & Asturias, E. J. (2021). Adapting and piloting a vaccine hesitancy questionnaire in rural Guatemala. *Vaccine*, 39(2), 180-184.
101. Wilson, R., Zaytseva, A., Bocquier, A., Nokri, A., Fressard, L., Chamboredon, P., Carbonaro, C., Bernardi, S., Dubé, E., & Verger, P. (2020). Vaccine hesitancy and self-vaccination behaviors among nurses in southeastern France. *Vaccine*, 38(5), 1144-1151.
102. Wilson, S. L., & Wiysonge, C. (2020). Social media and vaccine hesitancy. *BMJ Global Health*, 5(10), e004206.
103. Zhang, X., Guo, Y., Zhou, Q., Tan, Z., & Cao, J. (2021). The Mediating Roles of Medical Mistrust, Knowledge, Confidence and Complacency of Vaccines in the Pathways from Conspiracy Beliefs to Vaccine Hesitancy. *Vaccines*, 9(11), 1342.
104. Zoidze, A., Sahore A., Chauhan, K., Saith, R.. (2021). Mapping of institutional capacity needs and entry points for mainstreaming demand generation in national immunisation policies, programmes, and budgets: Options for mainstreaming demand generation for immunisation in the Kyrgyz Republic. Oxford Policy Management, UNICEF. 45 p.

10. ANNEXES

Annex 1: Selection of drivers that influence immunization-related behaviour for childhood immunization

Движущий фактор Уровня 1 (фактор)	Evidence based*	Relevant for CHI	Relevant for all target groups**	Feasible***	Action-able****	Applicable for Kyrgyzstan	Selected
Psychological factors							
Cognitive bias (Belief bias)	X	X	X	∅	∅	X	No
Cognitive bias (Information avoidance- Base-rate neglect)	X	X	X	∅	∅	X	No
Attitudes (Beliefs - Perceived vaccine efficacy)	X	X	X	X	X	X	Yes
Attitudes (Beliefs - Perceived vaccine safety)	X	X	X	X	X	X	Yes
Attitudes (Beliefs - Perceived danger of disease and likelihood of infection)	X	X	X	X	X	X	Yes
Attitudes (Beliefs - Trust in societal factors)	X	X	X	X	X	X	Yes
Attitudes (Beliefs - Trust in information sources)	X	X	X	X	X	X	Yes
Interests (Alternative health beliefs and worldviews)	X	X	X	X	X	X	Yes
Attitudes (Awareness and knowledge)	X	X	X	X	X	X	Yes
Attitudes (Emotions towards vaccination)	X	X	X	∅	∅	X	No
Attitudes (Emotions - Perceived Responsibility)	X	X	X	X	X	X	Yes
Attitudes (Past experience)	X	X	X	X	X	X	Yes
Limited rationality (Heuristics – Irrational vs.rational thinking)	X	X	X	X	X	X	Yes
Self-efficacy (Self-image - advocacy for vaccination)	X	X	∅	X	X	X	Yes
Sociological factors							
Social influence (Descriptive norms - Impact on General Attitudes About the Vaccine)	X	X	X	X	X	X	Yes
Social influence (Descriptive norms - Impact on Importance of Getting Vaccinated)	X	X	X	X	X	X	Yes

Social influence (Injunctive norms - Self-Ranking Social Influencers)	X	X	X	X	X	X	X	X	Yes
Meta-norms (Moral norms – Religiousness)	X	X	∅	∅	∅	∅	∅	∅	No
Social influence (Influence by gatekeepers - Recommendations by HCP)	X	X	∅	∅	X	X	X	X	Yes
Environmental factors									
Communication environment (Factual/scientific information - Perceived lack of information)	X	X	X	X	X	X	X	X	Yes
Communication environment (Use of information sources)	X	X	X	X	X	X	X	X	Yes
Structural Barriers (Availability, access to and quality of services – Convenience)	X	X	∅	∅	∅	∅	∅	∅	Yes
Governing entities (Recognition of the issue – Support from the system)	X	X	X	X	X	X	X	X	Yes
Eligibility for inclusion: minimum of 5 criteria met									

* Grounded in scientific evidence and country experience (evidence generated from document review and KIs for each of the target groups)

** Parents/caregivers; healthcare workers;

*** How easily or conveniently we can measure each driver

**** Drivers on which we can act on (having practical value)

Annex 2: Origin of items for the questionnaire for parents/caregivers (CHI)

Indicator	Items	Origin of items
C1.1 Perceived vaccine efficacy	I believe that childhood vaccines are important for my child's health.	Adapted Vaccine Hesitancy Scale (aVHS) for measles in Sudan (Sabahelzain et al., 2015) "Measles vaccine is important for my child to have" Vaccine Confidence Index (Larson, 2015) "vaccines are important for children to have" Vaccine Hesitancy Scale (VHS) (Larson et al., 2015; Shapiro et al., 2018) "Childhood vaccines are important for my child's health (R)" Confidence
	I believe that vaccines do a good job in preventing the diseases they are supposed to prevent.	The Vaccination Confidence Scale (Gilkey et al., 2014) "Vaccines do a good job in preventing the diseases they are intending to prevent." Benefits
C 1.2 Perceived vaccine safety	Overall, I believe that vaccines are safe.	The Vaccination Confidence Scale (Gilkey et al., 2014) "Vaccines are safe." Benefits
	I think that children get more shots than is good for them.	PACV (Opel et al., 2011) „Children get more shots than are good for them." General Attitudes
	I believe that there is no connection between vaccines and autism.	Vaccine Acceptance Scale (VAC) (Sarathchandra et al., 2018) "Vaccines cause autism." Perceived safety of vaccines
	I doubt the safety of certain vaccines (include list – interviewer to ask, not read a list).	PACV (Opel et al., 2011) "How concerned are you that any one of the childhood shots might not be safe?" Safety and efficacy
C1.3 Perceived danger of disease and likelihood of infection	I believe that vaccination is unnecessary because many vaccines preventable diseases are not common anymore.	5C vaccine hesitancy scale (Betsch et al., 2018) "Vaccination is unnecessary because many vaccine preventable disease are not common anymore", Complacency
	I think that many of the diseases against which children are being vaccinated are not serious and can be overcome by natural immunity.	Qualitative studies (e.g. Brown et al., 2012)
	I believe my child has a very low risk of contracting any of the vaccine preventable diseases.	Qualitative studies (e.g. Brown et al., 2012; Bystrom et al., 2014)
C.1.4 Personal experience	My child experienced a serious adverse reaction after receiving a vaccine.	Qualitative studies (e.g. Jama et al., 2018)
	I personally know someone whose child experienced a serious adverse reaction of routine vaccination.	Qualitative studies (e.g. Jama et al., 2018)
C 1.5 Perceived responsibility	As a parent I have a high responsibility to protect my children from any harm.	Qualitative studies (e.g. Díaz Crescitelli et al., 2020)
	I am afraid that I harm my child by getting him/her vaccinated.	Qualitative studies (e.g. Díaz Crescitelli et al., 2020)

C1.6 Alternative health beliefs and worldviews	In my opinion vaccines are an unnatural formation that interferes with the body's ability to protect itself from a disease.	Qualitative studies (e.g. Wilder-Smith and Qureshi, 2020)
	Vaccines conflict with my belief that children should use natural products and avoid toxins.	Vaccine Acceptance Scale (VAC) (Sarathchandra et al., 2018) "Vaccines conflict with my belief that children should use natural products and avoid toxins." Positive values and affect toward vaccines Qualitative studies (e.g. Wilder-Smith and Qureshi, 2020)
	I'm morally opposed to vaccinating my child.	Vaccine Acceptance Scale (VAC) (Sarathchandra et al., 2018) "I'm morally opposed to vaccinating my child." Positive values and affect toward vaccines Qualitative studies (e.g. Wilder-Smith and Qureshi, 2020)
C2.1 Recommendations by HCP	Generally, I do what my child's pediatrician recommends about vaccines for my child/children.	Vaccine Hesitancy Scale (VHS) (Larson et al., 2015; Shapiro et al., 2018) Generally I do what my doctor or health care provider recommends about vaccines for my child/children Confidence
	My child's pediatrician recommended me to get my child / children vaccinated.	Qualitative studies (e.g. Wilder-Smith and Qureshi, 2020)
	My child's pediatrician answers all my questions and listens to my concerns.	
C2.2 Impact on General Attitudes About the Vaccine	What is your family's (friends/ other partners/local leaders/ national health authorities/your community/religious leaders/ healthcare providers/your government) attitude toward childhood vaccination?	Adopted/adjusted from the UNICEF research conducted in Ghana (Nurzhynska, A. et al. (2022). Using behavioural insights to understand the acceptance of COVID-19 vaccine in Ghana. Manuscript in preparation)
C2.3 Impact on Importance of Getting Vaccinated	How important does your family (friends/other partners/ local leaders/national health authorities/your community/ religious leaders/healthcare providers/your government) think it is for your child/children to get vaccinated?	Adopted/adjusted from the UNICEF research conducted in Ghana. (Nurzhynska, A. et al. (2022). Using behavioural insights to understand the acceptance of COVID-19 vaccine in Ghana. Manuscript in preparation)
C2.4 Self-Ranking Social Influencers	Who has the biggest influence over your decision about whether to vaccinate your child/children? Who has the least amount of influence over your decision about whether to get your child vaccinated? (Yourself, family, friends, other parents, local, leaders, community members, national health authorities, religious leaders, healthcare providers, government, media)	Adopted/adjusted from the UNICEF research conducted in Ghana. (Nurzhynska, A. et al. (2022). Using behavioural insights to understand the acceptance of COVID-19 vaccine in Ghana. Manuscript in preparation)

C3.1 Trust in societal factors	I am fully confident in the recommendations given by the authorities regarding the vaccination of children.	Vaccine Acceptance Scale (VAC) (Sarathchandra et al., 2018) "To protect public health, we should follow government guidelines about vaccines." Perceived legitimacy of authorities to require vaccinations Qualitative studies (e. g. Díaz Crescitelli et al., 2020)
	I believe that the official data on the quality and frequency of adverse reactions to vaccines are true.	Qualitative studies (e. g. Díaz Crescitelli et al., 2020) Vaccine Conspiracy Belief Scale (Shapiro et al., 2018) e.g. "The government is trying to cover up the link between vaccines and autism" "
	I think that pharmaceutical companies cover up the dangers of vaccines.	Vaccine Conspiracy Belief Scale (Shapiro et al., 2018) e.g. "Pharmaceutical companies cover up the dangers of vaccines." Qualitative studies (Díaz Crescitelli et al., 2020; Victor, 2020; Wilder-Smith et al., 2020)
	I think that the principal motive for scientists who participate in the creation of the vaccines is profit.	The Vaccine Attitudes Examination Scale (VAX) (Martin and Petrie, 2017) "Vaccines make a lot of money for pharmaceutical companies, but do not do much for regular people." Concerns about commercial profiteering Qualitative studies (Díaz Crescitelli et al., 2020; Victor, 2020; Wilder-Smith et al., 2020),
	I trust my child's pediatricians' recommendation.	The Vaccination Confidence Scale (Gilkey et al., 2014) In general medical professionals in charge of vaccinations have my teenager's best interest in heart. I have a good relationship with my teenager's health care professional. Trust
C3.2 Trust in information sources	Information Sources (scientific literature, national TV channels, internet portals, YouTube channels, social networks, family, friends, family physician, healthcare professionals in media, religious leaders, government).	UNICEF, 2017, Knowledge, attitudes and practice regarding childhood vaccination in Serbia
C4.1 Perceived lack of information	It is hard to make the decision whether to vaccinate my child since there is a lack of information.	Qualitative studies (e.g. Wilder-Smith and Qureshi, 2020; Díaz Crescitelli et al., 2020)
	Incomplete information regarding the childhood vaccines I come across make me confused.	
	Contradictory information regarding the childhood vaccines I come across make me confused.	
	I have absolutely all the information I need regarding childhood vaccination.	
C4.2 Use of the information sources	Information Sources (Scientific literature, national TV channels internet portals, YouTube channels, social networks, family, friends, family physician, healthcare professionals in media, religious leaders, government)	Qualitative studies (e.g. Wilder-Smith and Qureshi, 2020; Díaz Crescitelli et al., 2020)

C5. Structural barriers/ Convenience	I do not know where and how I can get vaccines for my child/children.	Qualitative studies (Bangura et al., 2020; Wilder-Smith et al., 2020; Alabadi et al., 2020; Kalaij et al. 2021)
	There is no vaccination center close by.	
	It is too burdensome to get to the vaccination center in terms of time.	
	It is too burdensome to get to the vaccination center in terms of money spent on travelling.	
	It will be easy for me to get the vaccine for my child/children.	Adopted from the UNICEF research conducted in Ghana (Nurzhyńska, A. et al. (2022). Using behavioural insights to understand the acceptance of COVID-19 vaccine in Ghana. Manuscript in preparation)
	It will be stressful for me to get the vaccine for my child/children.	
C6. Knowledge	Test of knowledge	UNICEF, 2017, Knowledge, attitudes and practice regarding childhood vaccination in Serbia
C7. Rational vs. experiential thinking	I do not like to have to do a lot of thinking.	Rational-Experiential Inventory (REI, Epstein et al., 1996)
	I try to avoid situations that require thinking in depth about something.	
	I prefer to do something that challenges my thinking abilities rather than something that requires little thought.	
	I prefer complex to simple problems.	
	Thinking hard and for a long time about something gives me little satisfaction.	
	I trust my initial feelings about people.	
	I believe in trusting my hunches.	
	My initial impressions of people are almost always right.	
	When it comes to trusting people, I can usually rely on my "gut feelings.	
	I can usually feel when a person is right or wrong even if I can't explain how I know.	

Annex 3: Origin of items for the questionnaire for healthcare workers (CHI)

Indicator	Items	Origin of items
C1.1 Perceived vaccine efficacy	I believe that childhood vaccines are important for child's health.	Adapted Vaccine Hesitancy Scale (aVHS) for measles in Sudan (Sabahelzain et al., 2015) "Measles vaccine is important for my child to have" Vaccine Confidence Index (Larson, 2015) "Vaccines are important for children to have" Vaccine Hesitancy Scale (VHS) (Larson et al., 2015; Shapiro et al., 2018) "Childhood vaccines are important for my child's health (R)" Confidence
	I believe that vaccines do a good job in preventing the diseases they are intending to prevent.	The Vaccination Confidence Scale (Gilkey et al., 2014) "Vaccines do a good job in preventing the diseases they are intending to prevent." Benefits
C 1.2 Perceived vaccine safety	Overall, I believe that vaccines are safe.	The Vaccination Confidence Scale (Gilkey et al., 2014) "Vaccines are safe." Benefits
	I think that children get more shots than is good for them.	PACV (Opel et al., 2011) „Children get more shots than are good for them “. General Attitudes
	I believe that there is no connection between vaccines and autism.	Vaccine Acceptance Scale (VAC) (Sarathchandra et al., 2018) "Vaccines cause autism." Perceived safety of vaccines
	I doubt the safety of certain vaccines.	PACV (Opel et al., 2011) "How concerned are you that any one of the childhood shots might not be safe?" Safety and efficacy
C1.3 Perceived danger of disease	I believe that vaccination is unnecessary because many vaccine preventable diseases are not common anymore.	5C vaccine hesitancy scale (Betsch et al., 2018) "Vaccination is unnecessary because many vaccine preventable disease are not common anymore", Complacency
	I think that many of the diseases, children are being vaccinated against, are not serious, and can be overcome by natural immunity.	Qualitative studies (e.g. Brown et al., 2012)
C 2.1 Perceived responsibility	I feel responsible for the decisions regarding vaccination made by my patients' parents.	Tuckerman et al., 2020; Esposito et al., 2007, Lin et al., 2021
	It is my duty to advise parents to vaccinate their children.	„A recommendation is my responsibility" Views and beliefs towards influenza and influenza vaccination (Tuckerman et al., 2020) Esposito et al., 2007, Lin et al., 2021
C2.2 Perceived lack of information	I feel completely competent when answering parents' questions about the effectiveness of vaccines.	"I feel equipped to respond to parents' questions" Views and beliefs towards influenza and influenza vaccination (Tuckerman et al., 2020)
	I feel completely competent when answering parents' questions about the quality of vaccines.	"I feel equipped to respond to parents' questions" Views and beliefs towards influenza and influenza vaccination (Tuckerman et al., 2020)
	I feel completely competent when answering parents' questions about the safety of vaccines.	"I feel equipped to respond to parents' questions" Views and beliefs towards influenza and influenza vaccination (Tuckerman et al., 2020)

C2.3 Self-image (advocacy for vaccination)	Motors of engagement with vaccination advocacy: MovAd scale	MovAd scale (Vallée-Tourangeau et al., 2018)
C3.1 Impact on General Attitudes About the Vaccine	What is your family's (friends/ other partners/local leaders/ national health authorities/your community/religious leaders/ healthcare providers/your government) attitude toward childhood vaccination?	Adopted/adjusted from the UNICEF research conducted in Ghana (Nurzhynska, A. et al. (2022). Using behavioural insights to understand the acceptance of COVID-19 vaccine in Ghana. Manuscript in preparation).
C3.2 Impact on Importance of Getting Vaccinated	How important does your family (friends/other partners/ local leaders/national health authorities/your community/ religious leaders/healthcare providers/your government) think it is for your child/children to get vaccinated?	Adopted/adjusted from the UNICEF research conducted in Ghana (Nurzhynska, A. et al. (2022). Using behavioural insights to understand the acceptance of COVID-19 vaccine in Ghana. Manuscript in preparation).
C3.3 Self-Ranking Social Influencers	Who has the biggest influence over your decision about whether to vaccinate your child/children? Who has the least amount of influence over your decision about whether to get your child vaccinated? (yourself, family, friends, other parents, local, leaders, community members, national health authorities, religious leaders, healthcare providers, government, media)	Adopted/adjusted from the UNICEF research conducted in Ghana (Nurzhynska, A. et al. (2022). Using behavioural insights to understand the acceptance of COVID-19 vaccine in Ghana. Manuscript in preparation).
C4.1 Trust in societal factors	I am fully confident in the recommendations given by the authorities regarding the vaccination of children.	Vaccine Acceptance Scale (VAC) (Sarathchandra et al., 2018) "To protect public health, we should follow government guidelines about vaccines." Perceived legitimacy of authorities to require vaccinations Qualitative studies (e. g. Díaz Crescitelli et al., 2020)
	I believe that the official data on the quality and frequency of adverse reactions to vaccines are true.	Qualitative studies (e. g. Díaz Crescitelli et al., 2020) Vaccine Conspiracy Belief Scale (Shapiro et al., 2018) e.g. "The government is trying to cover up the link between vaccines and autism" "
	I think that pharmaceutical companies cover up the dangers of vaccines.	Vaccine Conspiracy Belief Scale (Shapiro et al., 2018) e.g. "Pharmaceutical companies cover up the dangers of vaccines." Qualitative studies (Díaz Crescitelli et al., 2020; Victor, 2020; Wilder-Smith et al., 2020)
	I think that the principal motive for the scientists who participated in the creation of the vaccines is profit.	The Vaccine Attitudes Examination Scale (VAX) (Martin and Petrie, 2017) "Vaccines make a lot of money for pharmaceutical companies, but do not do much for regular people." Concerns about commercial profiteering Qualitative studies (Díaz Crescitelli et al., 2020; Victor, 2020; Wilder-Smith et al., 2020),

C4.2 Trust in information sources	Information Sources (CME on vaccines)	Adjusted from UNICEF, 2017, Knowledge, attitudes and practice regarding childhood vaccination in Serbia (also: Klett-Tammen et al., 2016).
C5. Use of the information sources	national and international scientific and professional conferences, scientific literature, national and international publications and guidelines, public media, colleagues, social networks, government)	Adjusted from UNICEF, 2017, Knowledge, attitudes and practice regarding childhood vaccination in Serbia.
C6. Support from the system	Information Sources (CME on vaccines)	Adjusted from Lin et al., 2021
	national and international scientific and professional conferences, scientific literature, national and international publications and guidelines, public media, colleagues, social networks, government).	
	There are clear official written guidelines for the implementation of good practice regarding childhood vaccination.	
	National health authorities are encouraging doctors to recommend vaccinations.	
C7. Knowledge	Test of knowledge	Adjusted from UNICEF, 2017, Knowledge, attitudes and practice regarding childhood vaccination in Serbia.
C8. Rational vs. experiential thinking	Rational-Experiential Inventory (REI, Epstein et al., 1996) See annex 9 (C7)	Rational-Experiential Inventory (REI, Epstein et al., 1996)

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