



Vaccination Awareness Among Population in Canton Sarajevo, Bosnia and Herzegovina

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Abstract

One of the most successful inventions for modern medicine and public health are vaccines since they greatly influence our society. Administration of vaccine, vaccination, is a process in which an individual becomes immune to certain infectious diseases. Many diseases are eradicated with the usage of vaccines. The human population is a bit skeptical about vaccine safety and their side effects. Countries have developed their calendar of mandatory immunizations, and people are supposed to follow it regularly. In Bosnia and Herzegovina, immunization against some diseases, such as hepatitis b, rubella, diphtheria etc., is mandatory, and each individual should be vaccinated by 7 different vaccines, throughout their lifetime. Some vaccines are given once in the lifetime, and some should be repeated, according to the calendar. This research was conducted in Canton Sarajevo, and the survey was done by 330 persons of different gender, age, and education level. According to the results, 91,2% of respondents are supporting vaccination. Nevertheless, not all the respondents, or their children, have received all vaccines. There is no significant correlation between the level of education and vaccine awareness of respondents. This survey was done to see the awareness of vaccination of people living in Canton Sarajevo. The study was limited by the geographical area but could be improved if the whole country responds to the survey.

Keywords: Vaccine; Vaccination; Immunization; Health; Awareness.

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1. Introduction

Vaccines are one of the most successful inventions for modern medicine and public health, since not many medical inventions have influenced our society as much as vaccination. Before the development of highly effective vaccines, people often got sick or died quickly from various diseases. Those diseases are now vaccine-preventable diseases, thanks to successful immunization programs. A very often topic that can be found in media stories is vaccine safety. These concerns about the safety of vaccines can lead to decreased vaccination coverage among the population [4].

A known concept that increased vaccination acceptance protects your community is called herd immunity and is a beneficial way of extending the effect of direct vaccination. It applies to the indirect defense of individuals who are not vaccinated. This is realized by prohibiting the circulation of infectious agents among groups that are susceptible [4]. The herd effect played a major role in the eradication of specific diseases in the past, such as smallpox and pertussis [5]. If the vaccine coverage is lowered for certain diseases, there's a high chance of those diseases being reintroduced in the future. Although herd immunity is beneficial as high vaccination coverage, the best way of protecting an individual from vaccine-preventable diseases is direct protection [4]. However, it is somehow believed that vaccines cause diseases such as autism, multiple sclerosis, and asthma. While public media are likely to publish preliminary data from case reports, in controlled trials, there was no proof that vaccination causes any of the aforementioned diseases [8]. Since this research study was limited to Bosnia and Herzegovina, specifically to the area of the capital city of Sarajevo – Canton Sarajevo, it is important to go through a calendar of mandatory immunization in the Federation of BiH against infectious diseases.

Table 1: Calendar of mandatory immunization of the population in the Federation of BiH against infectious diseases

Age	At Birth	End of 1st Month	End of 2nd Month	End of 4th Month	End of 6th Month	End of 12th Month	2 y/o	5 y/o	6 y/o	14 y/o (Last grade of Primary Education)	18 y/o (last year of High School)
BCG	I										
HBV	I	II			III					*	
DtaP			I	II	III		R	R			
IPV			I	II	III		R	R			
Hib			I	II	III		R				
MMR						I			II		
dT										I	**

Immunization (mandatory prophylaxis) in health institutions in the Federation of Bosnia and Herzegovina (FBiH) is being implemented by following the recommended immunization schedule for that year and specific legal acts of FBiH. In FBiH, immunization against the following infectious diseases is mandatory: tuberculosis, Hepatitis B, diphtheria, tetanus, pertussis, poliomyelitis, Haemophilus influenzae type b infections, measles, mumps, and rubella.

Legend:

* Only for children that have incomplete HBV immunization status.

** Only for children that missed revaccination in the last grade of Primary Education.

R – revaccination

I, II, III – the dosage

Note: DTaP, IPV, and Hib are combined and administrated together. DTaP-IPV-Hib vaccine is a combination vaccine whose generic name is diphtheria and tetanus toxoids and acellular pertussis adsorbed, inactivated poliovirus and Haemophilus B conjugate vaccine.

Table 2: Vaccine’s Route of Administration

Route of administration	Intramuscular (IM) injection	Intradermal (ID) injection	Subcutaneous (SC) injection	Oral administration
Vaccine				
BCG		ID		
HBV	IM			
DtaP	IM			
IPV				O
Hib	IM			
MMR			SC	
dT	IM			

Terms:

- **BCG** - Bacillus Calmette–Guérin vaccine is a vaccine that prevents tuberculosis, administered by intradermal injection as presented in table 2. The BCG vaccine contains a live but weakened form of a type of bacteria called Mycobacterium Bovis. In countries where tuberculosis or leprosy is common, one dose is recommended in healthy babies, as close to the time of birth as possible (Table 1).
- **HBV** – Hepatitis B vaccine protects from Hepatitis B. The first dose is recommended within 24 hours of birth with either two or three more doses given after that. Hepatitis B vaccines contain one of the proteins from the surface of the hepatitis B virus (HepB surface antigen, or HBsAg). This protein is made by inserting the genetic code into yeast cells, which removes any risk of viral DNA getting into the final product. Three doses are recommended (see **Table 1**). This vaccine is administered by intramuscular injection (Table 2).
- **DTaP** - DTaP is a vaccine that helps children develop immunity to three diseases caused by bacteria: diphtheria, tetanus, and pertussis. The vaccine contains inactivated forms of the toxin produced by the bacteria that cause the three diseases. It is administered by intramuscular injection (Table 2) at the end of the 2nd, 3rd and 4th month. Revaccination is done at ages 2 and 5 (Table 1).
- **IPV** - Polio vaccines are vaccines used to prevent poliomyelitis. A weakened poliovirus is administered orally (Table 2) at the end of the 2nd, 3rd and 4th month. Revaccination is done at ages 2 and 5 (Table 1).
- **Hib** – The Haemophilus influenzae type B vaccine is used to prevent Haemophilus influenzae type b infection. It is administered by intramuscular injection (Table 2) at the end of the 2nd, 3rd and 4th month. Revaccination is done at age 2 (Table 1). DTaP, IPV, and Hib are combined and administered together.
- **MMR** - MMR vaccine is a vaccine against measles, mumps, and rubella. The first dose is given by the end of the 12th month, the second dose at age 6 (Table 1). It is administered by subcutaneous injection (Table 2). MMR vaccine contains live, but attenuated, measles, mumps, and rubella viruses.
- **dT** - dT vaccine is a booster immunization that offers continued protection from diphtheria and tetanus for adolescents and adults. This vaccine is administered by intramuscular injection (Table 2). The first dosage is administered at age 14. In case that child missed vaccination at age 14, it is administered at age 18 (Table 1).

This information is adopted from *Calendar of mandatory immunization in Federation of BiH against infectious diseases. Official Newsletter of Federation of Bosnia and Herzegovina Federal Ministry of Health. Program of mandatory immunization of the population against infectious diseases in 2019. 19/04/2019 No. 26.* [1]. There were no studies previously published covering this geographical area and topic of vaccination. Neighboring countries also do not have papers covering this topic, but they researched awareness of women regarding human papillomavirus (HPV) and HPV vaccine, and they stated that respondents had low awareness for the aforementioned vaccine [3]. The objective of this study was to collect information about vaccine awareness among the population in Canton Sarajevo, Bosnia and Herzegovina.

2. Methods

The survey included questions about the adult experience of vaccination assessment, child's vaccination,

healthcare insurance coverage, knowledge of vaccine-preventable diseases and vaccines, and more. The complete set of questions is presented in Table 3.

The data was gathered through the online questionnaire. A questionnaire was done using Google forms. The number of respondents was 330. The questionnaire was done anonymously, and the obtained results are presented in the figures below in the results section.

3. Results

Table 3: Data conducted through a questionnaire

Gender?	
Male	20
Female	310
Age?	
18-30	175
31-40	130
41-50	20
51 and over	4
How long you live in Sarajevo?	
0-5 years	29
6-10 years	39
11-16 years	17
17 or more years	245
Education level?	
Dr.	7
Mr.	75
Bachelor	137
High School Diploma	110
Elementary School Diploma	1
Other	0
Employment Status	
Employed	200
Unemployed	86
Student	44
Retiree	0
Not Active	0
Do you have health insurance?	
Yes	319
No	11
Did you have or currently have disease from which you could vaccinate?	
Tuberculosis	1
Hepatitis B	0
Diphtheria or Tetanus	3
Child paralysis	0
Hemophilus Influenzae type B	1
Measles or mumps	34
No	293
Which vaccines did you receive?	
BCG	315
HBV	296

DTaP	305
IPV	298
HiB	282
MRP	303
dT	295
Do you have chronic medical diseases?	
Asthma or chronic lung diseases	9
Liver diseases	0
Heart diseases	10
Diabetes	7
Immunological diseases	21
No	285
If you have a child did you vaccinated him or her?	
Yes	227
No	20
Do not have a child	83
If you have a child did the child received all vaccines to the required age?	
Yes	184
No	63
Are you against vaccination?	
Yes	29
No	301
If you have a child how old is he/she?	
0-2 years	115
3-6 years	80
7-10 years	36
11-16 years	16
17 and over	10
Which vaccines have children received so far?	
BCG	218
HBV	215
DTaP	198
IPV	173
Hib	165
MRP	151
dT	132

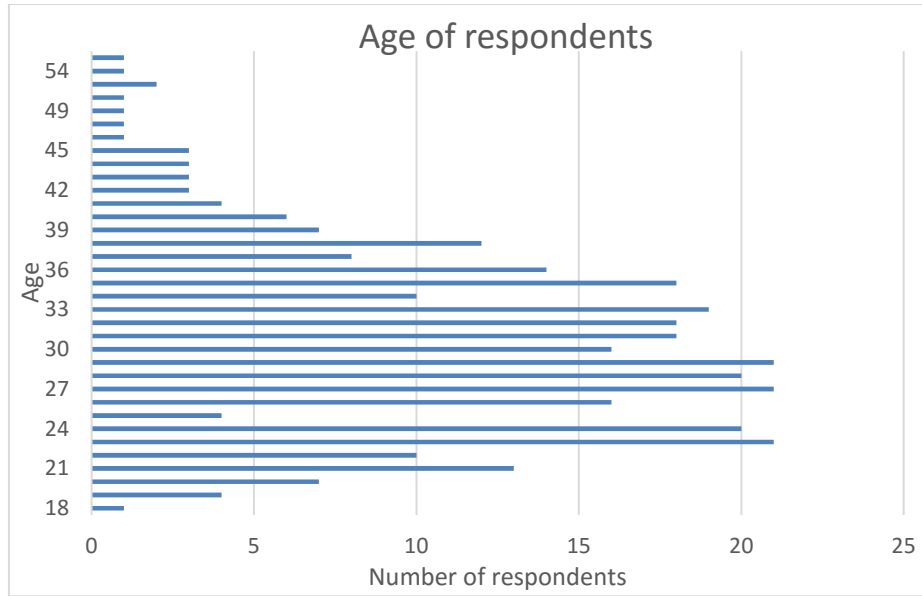


Figure 1: Graph showing the number and age of respondents.

Table 3 presents questions and answers obtained during the questionnaire. All results can be used in any other research for comparative methods as well as statistical methods. Results are interpreted by analyzing the data obtained, in the Excel program. The age of respondents ranges from 18 to 55 as shown in Figure 1.

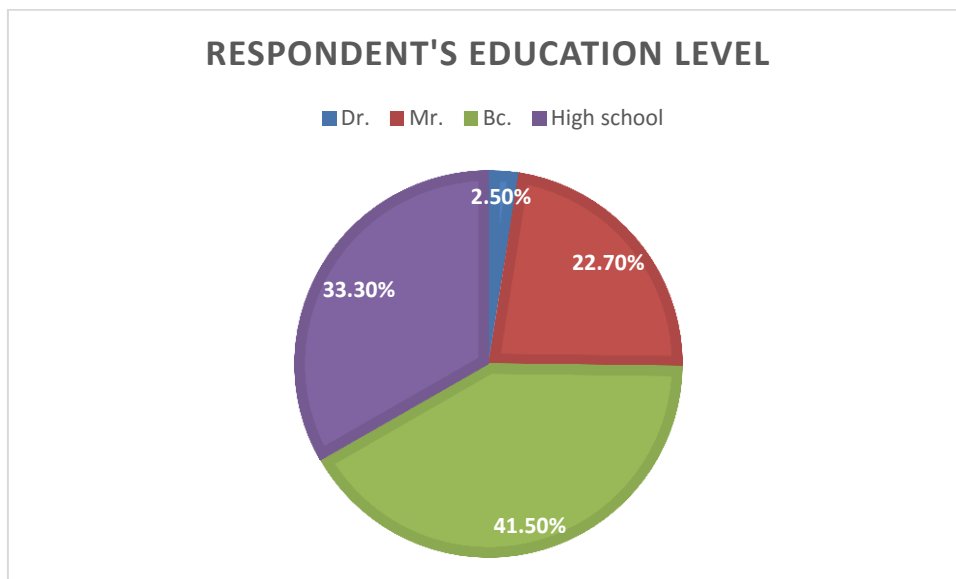


Figure 2: Level of education among respondents.

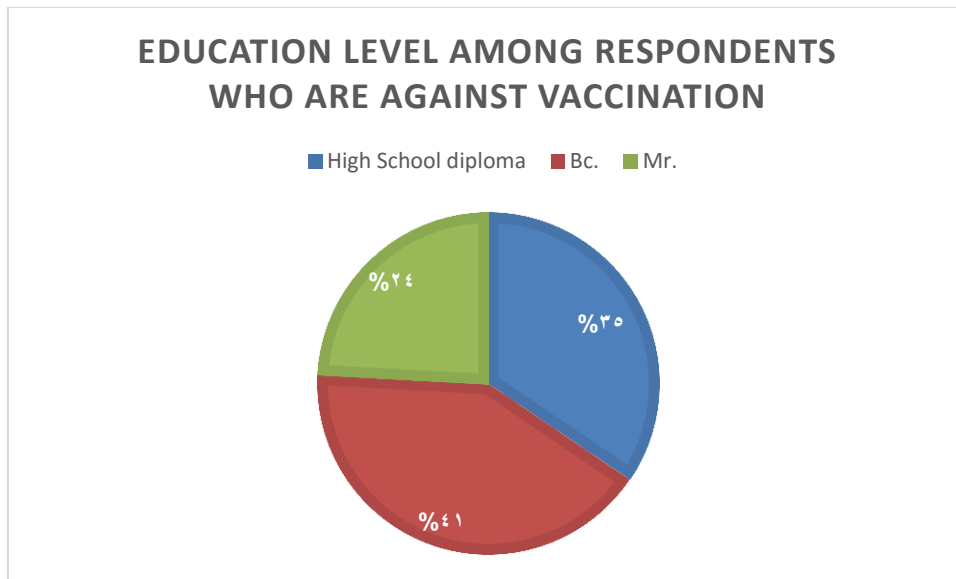


Figure 3: Education level among respondents who are against vaccination

Figure 2 presents the level of education of respondents, where 33.3% of respondents have High School Diploma, 41.5% Bc. (Bachelor degree), 22.7% Mr. (Master degree), and 2.5% Dr. (Ph.D.). As presented in figure 3, there is no significant correlation between the level of education and vaccine awareness.

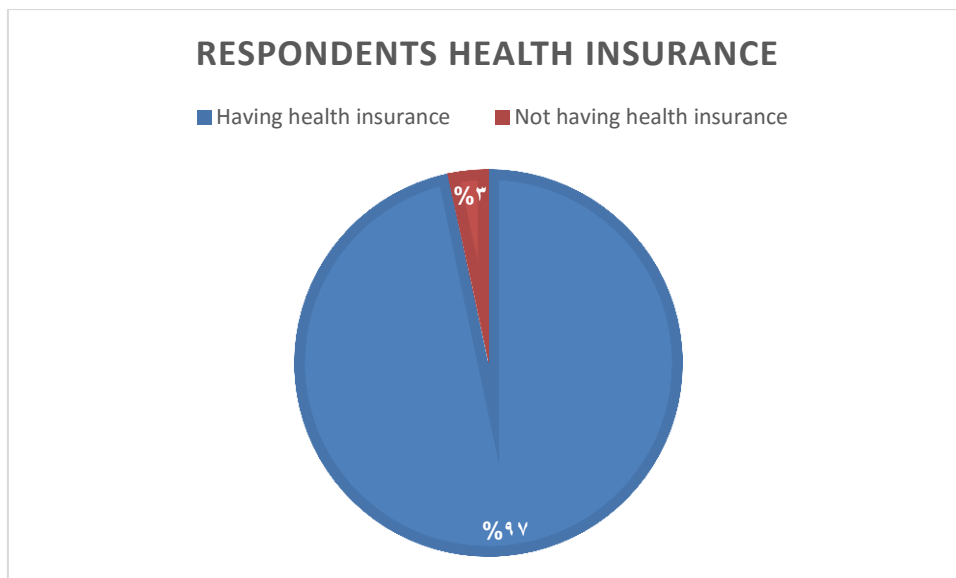


Figure 4: Health insurance among respondents

The figure above presents the results of respondents having health insurance. 97% of respondents have insurance while only 3% do not have health insurance.

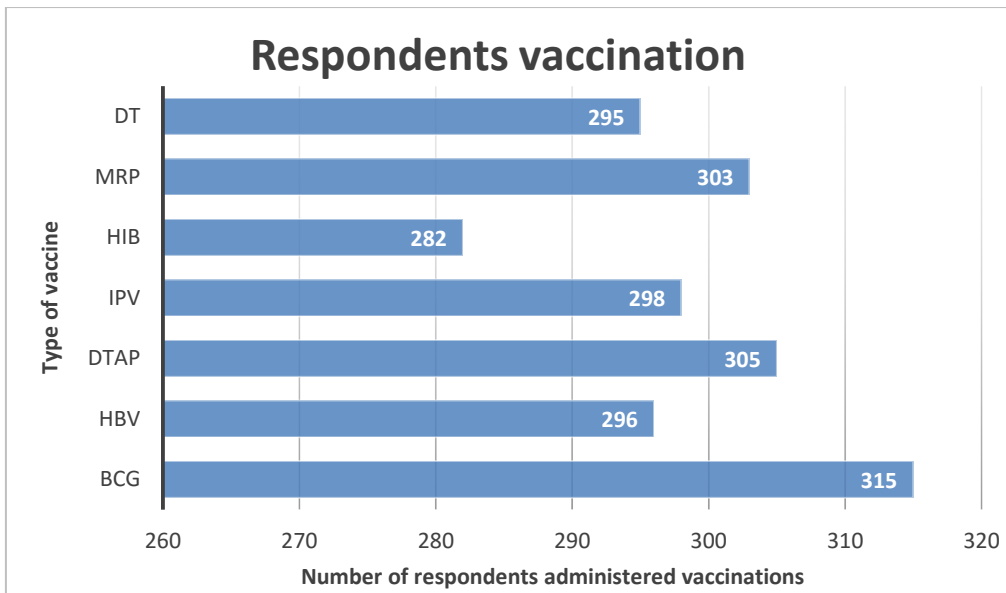


Figure 5: Type and number of vaccines administered among respondents

Figure 5 presents the type of vaccines and the number of respondents who have administered them during their lifetime.

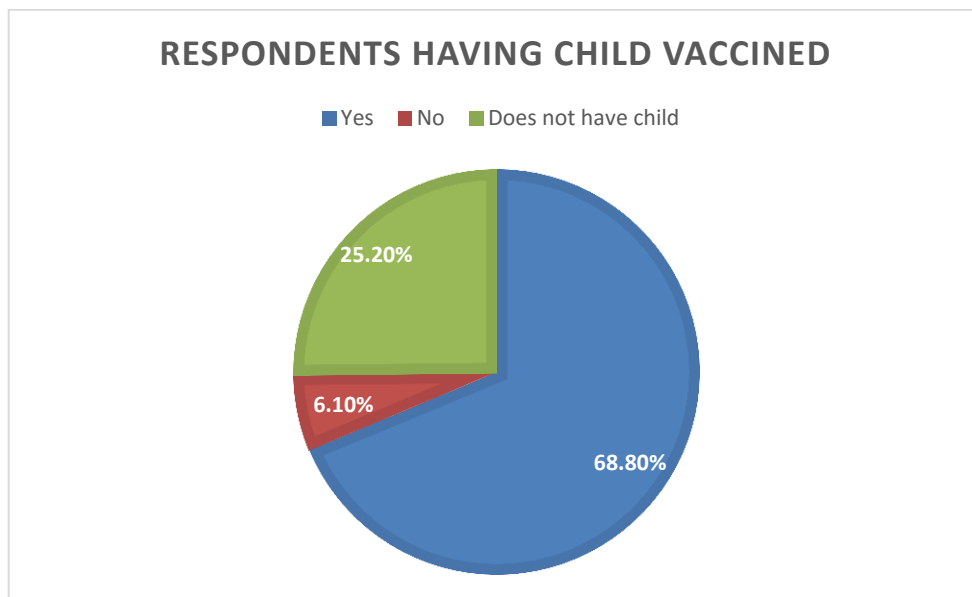


Figure 6: Vaccination coverage among respondent's children

Figure 6 presents respondents having a child vaccinated, not having a vaccinated child or not having a child at all. 66.8% have vaccinated children, 6.1% did not vaccinate child while 25.2% of respondents don't have a child.

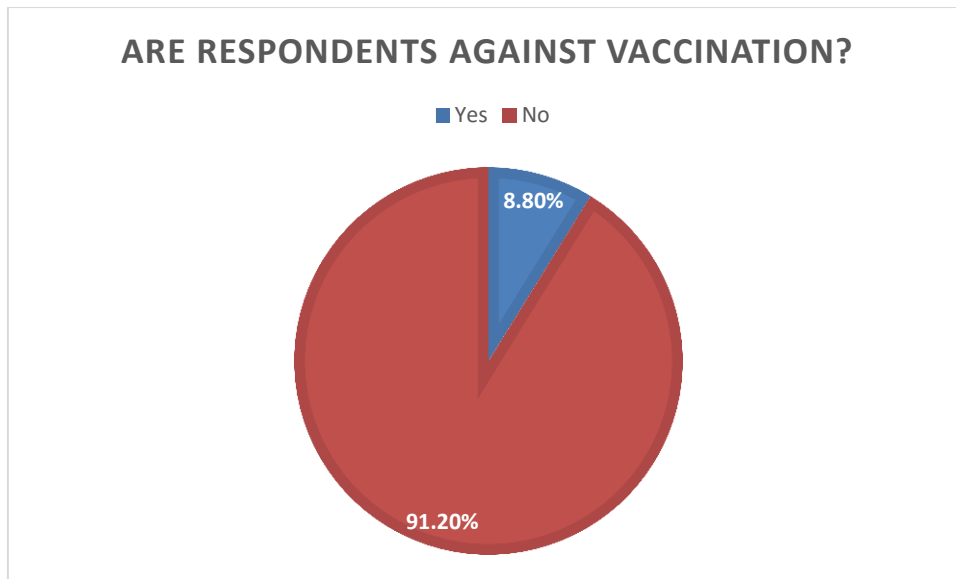


Figure 7: Vaccination awareness

As figure 7 presents, 91.2% (301 out of 330) of respondents were not against vaccination while 8.8% (29 out of 330) were against vaccination.

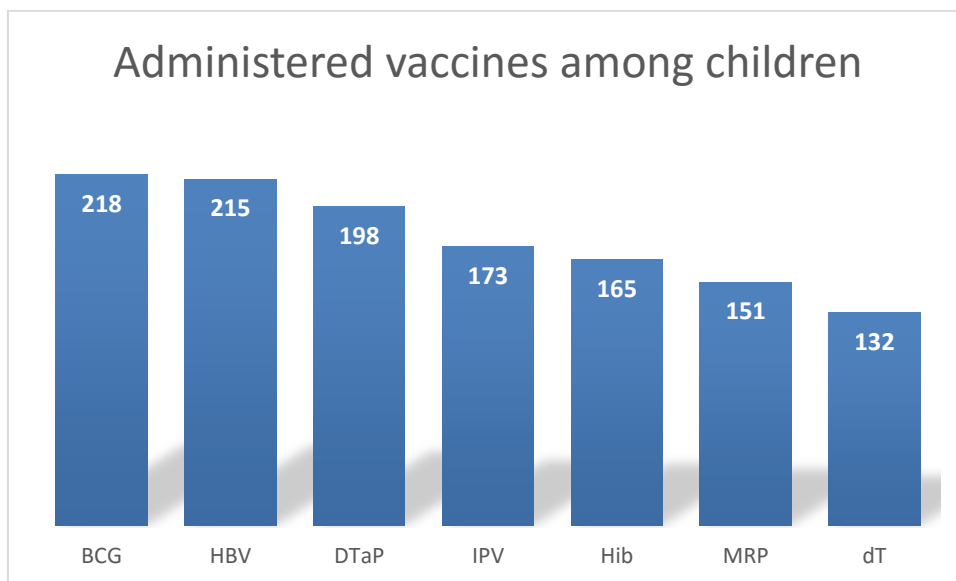


Figure 8: Number and type of vaccines administered among children

Figure 8 presents the number of specific vaccines that the children have received. As can be seen from the figure, neither vaccine was received by all the children. The vaccines which most children have received were BCG and HBV, while MRP and dT were received by far the least.

4. Discussion and Conclusion

One of the most compelling ways of preventing disease is vaccination. The vaccine acts in a way to help the

organism recognize and fight pathogens. Numerous severe diseases, such as tetanus, meningitis, influenza, etc., can be prevented if vaccinated on time [7]. A process in which an individual becomes immune to a certain infectious disease is called immunization, and the resistance is usually achieved by administering a vaccine. It helps build natural immunity, before getting sick [6]. The main idea of this research study was to audit the awareness about vaccination among the population that lives in Canton Sarajevo, BiH. This study was conducted using an online survey that includes questions such as: how many responders are for/against vaccination, what is the main reason for opposition, educational level, are their children vaccinated, as it is presented in Table 3. Overall, the vaccination awareness among adults in Canton Sarajevo was satisfactory, with 91,20% for and 8,80% against mandatory immunization. From obtained results, it is easy to notice that 3.33% of respondents do not have health insurance which is obligatory by the law of the Federation of Bosnia and Herzegovina in which Canton of Sarajevo is stated. 8.09% of respondents who have a child did not vaccinate a child while 8.80% of respondents are against vaccination. Also, the idea was to find a significant connection between the people against vaccination and the following features: health insurance coverage, level of education or revenue through conducted responses from the questionnaire. No significant correlation was found among these features, as can be seen in figures 2, 3, and 4. By referring to figures 5 and 8, the number and type of vaccines respondent and their children have received so far is presented. The vaccines which most children received were BCG and HBV, while MRP and dT were received by far the least. From the collected data it is shown that our respondents do not have an equal number of administered vaccines. This might be due to the age of children (following the Vaccination calendar they still have to receive some of the vaccines), or children might be sick in the period of mandatory immunization, or for the adults, that they do not stick to the immunization schedule strictly. Since the questionnaire included a question “why are the respondents against vaccination” (if they are against), their answers were analyzed in one paragraph. The most common reason was the quality of vaccines in our country and the origin of vaccines, which they said was unknown. They were also against vaccination because they were never allowed to read a component of the vaccine despite the fact that declarations are available on the internet for every vaccine. Another reason why they were against vaccination is based on articles that they read on the internet that are not scientifically proven. Some of the respondents have experienced few side effects or they have read about that on the internet, such as epileptic attack, autism or immunology reactions. Also, there were some opinions from respondents that were not against vaccination, which suggested that vaccination should be a matter of choice, not an obligation. 6,10% of the respondent’s children did not receive a vaccination. The most common answers were that children in the period of vaccination had some kind of flu, infection or other health issue. Other reasons include that hospitals were out of stock for that type of vaccine, while others answered that parents were afraid of vaccine administration due to side effects and anti-vaccination opinions as described earlier. Through result analysis, it is easy to conclude that it is necessary to remind the population about the significance of vaccination and provide them with professional scientific materials about vaccines. Therefore, the population could have a reliable source of information. By making this information available, the population would read less non-scientific articles, blogs and news, which in many cases do not have any arguments against vaccination, but influence the people inappropriately. By interpreting the data obtained, the respondents are favorable towards vaccination but do not have enough knowledge of such practices. Residents of Canton Sarajevo are not aware of the types of vaccines administered and do not have faith in the country’s health system. One of the possible solutions for this type of problem is

health education and conveying accurate information, in order to minimize the non-grounded fears about vaccines.

5. Limit of the Study

The results obtained in the study are based on self-reported data. Comparing this data with the ones reported from other reliable sources, from this region (once available), should be deeply analyzed to further improve this research.

6. Recommendation

Calendar of mandatory immunization of the population in the Federation of BiH against infectious diseases should be followed by each individual since it is mandatory, as well as it benefits human health. Individuals which are against vaccination, should be more focussed on reading and researching scientific papers, rather than gathering information from non-scientific sources and media. This paper gives an overview of vaccination routine in Federation of BiH, and the respondence and awarness of the citizens.

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