

A study to identify the obstacles to optimal function of the polio eradication program in the high risk districts of Pakistan

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Abstract

Pakistan is one of two remaining countries yet to interrupt wild-type poliovirus transmission. The aim of this study was to identify obstacles to optimal function of the polio eradication program in high risk districts in Pakistan, with the specific objective of finding health workers' views and experiences relevant to function of the immunization program and polio immunization. Pakistan accounted for 86% of the global polio wild poliovirus (WPV) case count in 2014. It has been the only country with an increase in cases from 2009 to 2014. The majority of cases appear in known reservoir areas in FATA and Khyber-Pukhtoonkhwa (KP). The Peshawar conveyor belt of transmission to the large surrounding geographical areas was highlighted by The Independent Monitoring Board (IMB) of the Global Polio Eradication Initiative (GPEI) published their 12th report named “Now is the time for peak performance”. (1) In 2014, 94% of Polio affected children in Pakistan belonged to mobile Pashto-speaking families. Most cases in Afghanistan the same year came from cross-border contamination from Pakistan. In 2015 there were endemic areas in the south and east of Afghanistan. Security threats still pose a threat to vaccination of children in these areas. (2)

Research design and methods: A cross-sectional study was conducted from October 2013 to March 2014. Exponential non-discriminative snow-ball sampling was used to distribute 400 questionnaires (386 returned completed questionnaires) with quantitative type questions (interview or self-administrated) by the researcher among professionally trained health workers at six teaching hospital in KP and Islamabad. Questback, SPSS and STATA software was used to analyse data.

Results: 57.5 % of the health personnel, majority of Pashtun origin, thought that gastroenteritis was the most important health challenge. Only 1.6% thought that poliomyelitis was the most important health challenge. 77.5% said that BCG was the most important vaccine compared to 4.4% who said that OPV for polio was the most important. When asked whether the campaign was running effectively, 49.7% said yes. However, 40.4% and 8.8% thought that the campaign was either deficient or poor respectively. Safety and security issues tops the reasons for the campaign being poor while supportive follow-up and supervision are second and third respectively. 88% of said that the oral polio vaccine via SIA must be continued compared to 6% who opinioned for its cessation. 85% supported the establishment of permanent vaccination centers as a way of eradicating polio compared to 5% who were not in support. 64% had no knowledge about anyone who had refused polio vaccination of their children while 29% had knowledge about a few individuals who had refused. Lack of awareness was the most important reason for refusal according to 61.9% of the health workers. 39.1% thought that the refusals were due to believing that the vaccination was harmful whereas 35.5% thought that the head of family/ elders not giving their permission was the most important reason for refusal.

Conclusion: This study shows that the health personnel, working at the public teaching hospitals and Polio campaign field supervisors or Area-In-Charges (AICs) in KP and Islamabad are open and honest about the challenges facing the polio eradication campaign. IMB of the GPEI recommends using qualitative research to pinpoint the reasons for children being consistently missed. (1) This study shows that in spite of security issues it is possible to approach health personnel in the affected areas with a qualitative study. The quantitative data from this cross-sectional study is suited to generate hypothesis that can be tested later.

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List of Abbreviations	
AFP	Acute Flaccid Paralysis
ATH	Ayub Teaching Hospital
BHU	Basic Health Unit
bOPV	bivalent Oral Polio Vaccine
CIA	Central Intelligence Agency
CIOMS	International Organization of Medical Sciences
cVDPV	Circulating Vaccine Derived Polio Virus
DALYs	Disability-Adjusted Life Years
DHC	District Health Center
DHQ	District Headquarters
EMRO	Regional Health System Observatory, Eastern Mediterranean Region, WHO
EPI	Expanded Programme for Immunization
FATA	Federally Administered Tribal Areas
FCR	Frontier Crimes Regulations
GIS	Geographic Information System
GPEI	Global Polio Eradication Initiative
GPS	Geographic Positioning System
HMC	Hayatabad Medical Complex
IDP	Internally Displaced Person
IMB	International Monitoring Board
IPV	Inactivated Polio Vaccine
iVDPV	Immunodeficiency-related vaccine-derived poliovirus
IPV	Inactivated Polio Vaccine
KP	Khyber Pukhtoonkhwa / Khyber Pukhtunkhwa
KPK	Khyber Pukhtoonkhwa / Khyber Pukhtunkhwa
KTH	Khyber Teaching Hospital
LRH	Lady Reading Hospital
MCHCs	Maternal and Child Health Centers

MoH	Ministry of Health
NIDs	National Immunization Days
NGO	Non Governmental Organization
NSL	Non-Sabin-Like
NTH	Naseer Teaching Hospital
OPV	Oral Polio Vaccine
PIMS	Pakistan Institute of Medical Sciences
RHC	Rural Health Center
SIA	Supplementary Immunization Activities
SL	Sabin Like
SPSS	Statistical Package for the Social Sciences
tOPV	trivalent Oral Polio Vaccine
VAPP	Vaccine-Associated Paralytic Polio
VDPV	Vaccine Derived Polio Virus
WHO	World Health Organization
WPV	Wild Polio Virus
YLD	Years of healthy Life lost due to Disability
YLL	Years of Life Lost due to premature mortality

Chapter 1 Introduction

1 General Introduction

1.1 Virology of the poliovirus

The poliovirus is a sub-microscopic intracellular, obligate, non-enveloped icosahedral-shaped virus. It is a human enterovirus belonging to the viral family picornaviruses which are the smallest of the RNA-viruses. The poliovirus exists in three serotypes- types 1, 2 and 3 and infects cells via a specific receptor of human origin. That is why man is the only host for the virus. (3, 4). The virus consists of three antibody types tagged serotypes 1, 2 and 3.

Polioviruses have error-prone virus encoded RNA polymerase enzyme which lacks proof reading activities. This leads to rapid accumulation of mutations upon replication.

Epidemiologically, there are two categories of the poliovirus (Wild Polio Virus = WPV) which are also known as non-Sabin-like (NSL) and the Vaccine virus also known as Sabin-Like (SL). All 3 serotypes have NSL and SL types. The wild polioviruses irrespective of their serotypes consists of many genotypes, they are of high genetic diversity, highly transmissible and are usually highly neurovirulent. In contrast, the vaccine viruses originate from one original strain, are of low genetic diversity and low transmissibility. Figure 1 shows the genetic clusters of wild type virus type 1 in Pakistan and the areas affected by the conveyor belt. (5, 6)

Replication error rates, the virus population size and growth rate, frequency of genetic bottlenecks, the intensity of selective forces and the mechanism of the genetic exchange are among the factors that combine to determine overall rate of virus evolution. Polioviruses are among the most rapidly evolving viruses known. The rapid evolution occurs during replication in human intestine in addition to that which happens during person-to-person transmission. Many poliovirus clinical isolates are recombinants (7-11).

Circulating vaccine-derived poliovirus (cVDPV) are revertant excreted recipient poliovirus vaccine strain OPV derived from the strain as a result of accumulating quantitative genetic change. These viruses are usually related to the OPV strains from which they are derived but with more than 1% difference. They behave much like the wild type virus and multiply very well at the optimal temperature of 39,5 C. cVDVs outbreaks usually occur where the corresponding serotypes have earlier been eradicated or eliminated. Factors favouring the appearance of cVDPVs include a major gap in OPV coverage and other general environmental conditions favouring poliovirus spread. Circulating vaccine-derived poliovirus constitute a threat to the eradication campaign. The WHO has therefore recommended a global transition to IPV. This requires careful environmental surveillance, after OPV use is eliminated, to ensure that VDPVs are no longer present.

In 2014, all 342 cases of poliomyelitis were caused by type 1 poliovirus in 9 countries, mainly Pakistan and Afghanistan.

In 2015, 26 cases of poliomyelitis were reported caused by type 1 or type 2 vaccine viruses. Nine cases of type 2 vaccine-associated polio were detected in these countries: Pakistan, Guinea, Lao People's Democratic Republic, and Myanmar. Removing the type 2 strain from OPV will eliminate vaccine-associated poliomyelitis in recipients caused by this serotype. Switching from trivalent to bivalent vaccine is that type 2 poliovirus will likely still be circulating somewhere. The last two reported cases of type 2 vaccine-associated polio were reported from Myanmar in 2015. The problem is that if these viruses continue to circulate past the time that immunization against type 2 virus stops, they could pose a threat to the growing numbers of infants and children who have not been immunized against this serotype.

The polio eradication plan eventually calls for eradication of the oral polio vaccination. The global number of immunocompromised poliovirus shedders, pose a threat to future unimmunized individuals. Treatment is not available. Administration of antibodies does not clear the infection. The development of antivirals that eliminates chronic poliovirus infection is needed. Environmental surveillance for the presence of cVDPVs is essential in this plan.

(12)

WHO recommends the following vaccine regimens due to the fact that IPV is more effective than OPV at boosting intestinal immunity in children who have previously been immunized with OPV. Both OPV and IPV should be used together: (12)

- In all countries using OPV only, at least 1 dose of type 2 IPV should be added to the schedule
- In polio-endemic countries and in countries with high risk for wild poliovirus importation and spread: one OPV birth dose, followed by 3 OPV and at least 1 IPV dose.
- In countries with high immunization coverage (90-95%) and low wild poliovirus importation risk: an IPV-OPV sequential schedule when vaccine-associated paralytic poliomyelitis is a concern, comprising 1-2 doses of IPV followed by 2 or more doses of OPV.
- In countries with both sustained high immunization coverage and low risk of wild poliovirus importation and transmission: an IPV only schedule.

1.1.1 Clinical effects of the poliovirus

When the poliovirus infects the nervous system it may lead to partial or full paralysis. The virus spreads by: direct person-to-person contact, contact with infected mucus or phlegm from the nose or mouth and contact with infected feces. There are three basic symptomatic patterns of polio infection: subclinical infections (95% of all cases), non-paralytic (4 - 4,9% of all cases), and paralytic (0,1 - 1% of all cases). Subclinical infection is characterized by passing flu-like symptoms. Non-paralytic is characterized by muscular spasms and meningitis like symptoms. Paralytic is divided into spinal poliomyelitis and bulbar poliomyelitis. Spinal poliomyelitis is characterized by myalgia, muscular spasms and asymmetric muscular weakness which reach its peak within 48 hours. If respiratory muscles are affected the vital

capacity is reduced. Bulbar poliomyelitis leads to weakness in the muscles that are innervated by the cranial nerves. In children this has a high mortality. Post Polio Syndrome can occur many years after the acute illness. This is not infectious, but can lead to increasing weakness of the affected motor neurons. (13-16)

1.2 Vaccines, types and distribution

There are two types of vaccines currently in use: live attenuated vaccine (Sabin vaccine, oral polio vaccine) and killed vaccine (Salk, inactivated polio vaccine).(17) The Sabin Oral Polio Vaccine (OPV) is used in low-income countries because it is cheaper and more easily administered in the form of oral drops. It contains all three serotypes of the vaccine. In September 2015 WHO declared that wild type polio poliovirus type 2 had been eradicated from the planet since no cases had been detected since 1999. In 2015, however, there were 9 cases of poliomyelitis caused by type 2 vaccine. WHO therefore decided to remove the type 2 Sabin strain from the OPV making it bivalent in April 2016.

Inactivated Polio Vaccine (IPV) is used in high income countries because it is more expensive and injected; therefore it is administered by qualified health personnel.(18)

The OPV is associated with reversion of the attenuated virus to virulence and Vaccine-Associated Paralytic Polio (VAPP) may be the result because of circulating vaccine derived poliovirus (cVDPV) or immunodeficiency-related vaccine-derived poliovirus (iVDPV). It can cause disease in immunodeficient persons. If there is an infection in the gastrointestinal tract by other enteroviruses it can limit the replication of the vaccine virus and reduce protection. It must also be refrigerated to prevent heat inactivation of the live virus.(17)

Vaccination teams go from door to door and administer either the bivalent (bOPV) or the trivalent (tOPV) vaccine. Both contain live, but weakened strains of the virus. The surveillance is in the form of monitoring children with Acute Flaccid Paralysis (AFP) /spinal poliomyelitis which is the main symptom of polio. Stool samples are collected and tested for

virus. Social and demographic details of each potential case of polio and the vaccination status are recorded. Number of OPV doses received by non-polio AFP case patient is also recorded.(19)

1.2.1 Background

In 1988 all member states of the World Health Assembly endorsed a resolution which entrusted the World Health Organization (WHO) with the authority to eradicate poliomyelitis by 2000. (20)

Polio eradication (PE) strategies:

- Achieve the highest possible routine immunization coverage (<80%) with a minimum of 3 doses of Oral Polio Vaccine (OPV)
- Immunizing all children below the age of 5 through supplementary mass campaigns, including national immunization days (NIDs)
- Strengthen the surveillance systems to detect and investigate virologically every case of acute flaccid paralysis (AFP) in children under 15 years of age + strengthening laboratory services
- Mop-up immunization campaigns in areas with persistent polio incidence or outbreaks (20)

In 1974, the World Health Organization (WHO) founded the Expanded Program on Immunization (EPI) to deliver basic vaccines to developing countries (21). The target for EPI in Pakistan is to immunize all children between 0 and 23 months against eight vaccine preventable diseases which include infant tuberculosis, poliomyelitis, diphtheria, pertussis, neonatal tetanus, hepatitis B, Haemophilus Influenza type b (Hib), and measles. The EPI

coverage has been stagnant the last decade. Only 40-60 % of children receive the vaccines age appropriately. (22). According to the Expanded Program on Immunization (EPI) schedule in Pakistan OPV is administered at birth, 6, 10 and 14 weeks of age.(22) Polio immunization (vaccine) effectively prevents poliomyelitis in most people (immunization is over 90% effective) (16, 17)

1.3 Research problem statement

Pakistan is one of two remaining countries yet to interrupt wild-type poliovirus transmission. The other country yet to interrupt transmission is Afghanistan. Nigeria was removed from the list of polio endemic countries by the WHO September 25th 2015 (1, 23).

The increasing incidence of poliomyelitis in Pakistan in 2010-2011 led the Executive Board of WHO in January, 2012, to declare polio eradication a “programmatic emergency for global public health” (24)

The Global Polio Emergency Action Plan 2012–2013 was launched in May 2012, during the Sixty-fifth World Health Assembly, in support of national emergency action plans.(25)

The plan targets high risk areas. It calls for increased government oversight, enhanced accountability, and increased access to children. Suggestions are deployment of permanent vaccination teams in high risk areas, new methods to track the movement of migrant and nomadic population, and the use of Geographic Information System (GIS) and Geographic Positioning System (GPS) to monitor the work of vaccinators.

The 5th of May 2014 the World Health Organization (WHO) Director-General determined that that the spread of wild polio virus to three countries, during what is normally the low-transmission season (January to April), is an “extraordinary event” and a public health risk to other countries. The Director-General is declaring this to be a public health emergency of international concern (PHEIC) because a coordinated international response is essential to

prevent this from worsening at the start of the high season for poliovirus transmission. This year during the low transmission season the virus had been carried to three countries: in Central Asia (from Pakistan to Afghanistan), in the Middle East (Syria to Iraq) and in Central Africa (Cameroon to Equatorial Guinea). The movement of people could spread the outbreaks of active wild polio virus to more countries. (26)

The Government of Pakistan published a statement on 13th of May 2014 where it announced that it had initiated implementation of the Temporary Recommendations to reduce the international spread of wild poliovirus. The WHO published Temporary Recommendations under the International Health Regulations (IHR 2005) to reduce the international spread of polio.(27, 28)

1.4 Target population

There has been a decrease in in estimated vaccination coverage and population immunity against poliomyelitis in specific regions of Pakistan since 2006. This correlates with an increased incidence in cases. In response to this epidemiological situation the President of Pakistan launched a National Emergency Action Plan in early 2011 (29, 30). This included a focus on 33 districts with a high incidence of poliomyelitis, largely in Khyber-Pukhtoonkhwa (KPK), FATA, Balochistan and Sindh (31).

Table 1: 33 High risk districts 2011

PROVINCE	33 HIGH RISK DISTRICTS (36)
BALUCHISTAN	Kabdulah Pishin Jafarabad Nasirabad Quetta
FATA	Bajour Orakzai North Waziristan South Waziristan Kurram Khyber Mohmand
KP	Peshawar Mardan Nowshera Charsadda
SINDH	Hyderabad Kambar Ghotki Kashmore Khairpur Larkana Shikarpur Sukkur Jacobabad Khibaldia Khigadap Khigiqbal
PUNJAB	Multan DG Khan Rajanpur Rykhan Muzfargarh

In 2014 Pakistan reported 306 wild poliovirus (WPV) cases compared to 93 in 2013. This accounted for 86% of the global case count (32). Proportion of Pashto speaking polio cases in Pakistan increased from 69% in 2009 to 94% in 2014. Forty-four districts in Khyber-Pukhtoonkhwa (KP), Balochistan, Punjab, Sindh and Federally Administered Tribal Areas (FATA) experienced cases in 2014. In 2013 only 23 districts were affected. The virus spread from KP to Sindh and Punjab due to conflicts which lead to intense transmission and extensive population movement (32).

Remaining reservoir districts according to the National Emergency Action Plan for Polio Eradication 2015-2016 (32):

Table 2: Reservoir districts 2015-2016

PROVINCE	RESERVOIR DISTRICTS
BALUCHISTAN	Kabdulah
	Pishin
	Quetta
FATA	North Waziristan
	South Waziristan
	Khyber
KP	Peshawar
	Bannu
SINDH	Khibaldia
	Khigadap
	Khigiqbal

Table 3: Total polio cases

Year	Total Polio Cases N	Total number of Union Councils Infected N	Pashto Speaking Polio Cases N	Pashto Speaking Polio Cases %
2009	89	82	61	69
2010	144	115	108	75
2011	198	159	144	73
2012	58	53	50	88
2013	93(32)	32	42	98
2014	306		288	94
2015	54(33)			

Source = Polio Eradication Initiative, Islamabad, Pakistan

Balochistan struggles with a nationalist / self-determination conflict between Baloch nationalists and the Pakistani government. It has a large Pashtun population. It borders Afghanistan and Iran. There is cross-border population movement, pockets of insecurity and vaccination refusals.(30)

Federally Administered Tribal Areas (FATA) is a semi-autonomous tribal region in northwestern Pakistan bordering to Afghanistan. It is mostly inhabited by Pashtuns. It has a porous border with extensive cross-border population movement. The United States of America (USA) and NATO claims that it is a safehaven for muslim extremists from Afghanistan and the USA is therefore attacking it regularly with drones. The Pakistani army is also active in trying to flush out any extremist fighters. This has lead to a breakdown in the

administrative system with many people fleeing the areas ending up in refugee camps for internally displaced people (IDP) in Peshawar among other places. The insecurity and the continued attacks by American drones and Pakistani army has lead to mistrustfulness towards the Pakistani government and American / Europeans intentions. The vaccination campaign is often seen as a western plot to hurt their children. (34, 35)

Khyber-Pukhtoonkhwa (KPK) is has a porous border to Afghanistan. It is mostly populated by Pashtuns. There is a large cross-border movement of people. The campaign is weakened due to gaps in management, insecurity and poor quality of campaign implementation.(30)

In Sindh, Karachi has large numbers of migrant, undeserved and minority populations who live in urban slums. According to the government of Pakistan the weak management and implementation of immunization campaign in key areas with migrant population allows continued spread to the rest of the country.(30)

Other areas with mobile and migrant population in poorly covered areas leads to the greatest risk of re-introduction of Wild type Polio Virus (WPV) and of local transmission.(30)

The number of children who are persistently missed in vaccination rounds is of the greatest concern. The reasons for children being missed fall into four major groups: 1. The vaccination team did not turn up on the day and time that they were supposed to, 2. The child was not available when the team visited their home, 3. The parents refused permission to vaccinate, 4. The population needing vaccination was not accessible to the vaccination team. Deeper explanation for why children are missed exist; in Pakistans two regions where polio is still transmitting researchers found that caregivers' trust in vaccinators was at 26% and 34% against a Pakistan average of 61%. (1)

In 2011, 77% of the reported cases in Pakistan and two-thirds of all cases in known worst-performing districts in Balochistan and Federally Administered Tribal Areas (FATA) emerged from the Pashtun population.(19, 36)

The polio vaccination campaign weaknesses:

- Lack of commitment and accountability mechanisms
- Health workers are threatened with kidnapping, beatings, harassment and assassination in conflict zones. (37, 38)
- Natural disasters (earthquake in 2005 and flooding in 2010) and persistent conflict leaves a weakened health infrastructure and expose people to unhygienic conditions
- Negative perception about the campaign because of political and religious leaders warnings (Western conspiracy causing infertility) and Central Intelligence Agency (CIA) use of vaccination programs to gain access to Osama bin Laden. (19)

The common denominators of the areas with a high incidence of poliomyelitis are: a poor law-and-order situation, population displacement resulting in a refugee and migrant population both within the country and across borders, poor health system and poverty.

In late 2011 in Pakistan the National Emergency Action plan was enhanced with tighter oversight and vigorous monitoring to improve quality in vaccination campaigns (39).

However, an analysis suggests that vaccination coverage continued to decrease in 2011, especially in Balochistan. The coverage continues to be compromised by the ongoing conflict in southern Afghanistan (40). Afghanistan shares a long common porous border with Pakistan. It is uncontrolled for the most part as opposed to the India-Pakistan border which is effectively sealed. There is a significant cross-border activity between Afghanistan and Pakistan. The movement of refugees increases the chance of polio virus transmission.

In 2011, virus from Pakistan caused cases of poliomyelitis in China.

The figure below shows active genetic clusters in Pakistan:

Figure 1: Active genetic clusters in Pakistan

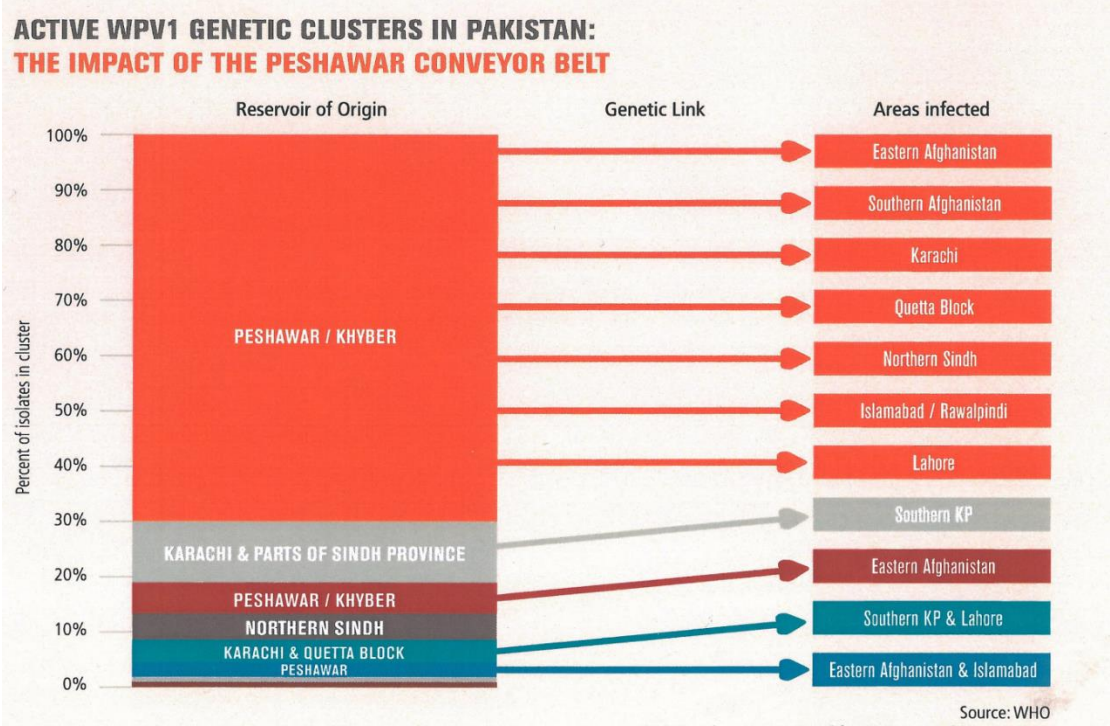
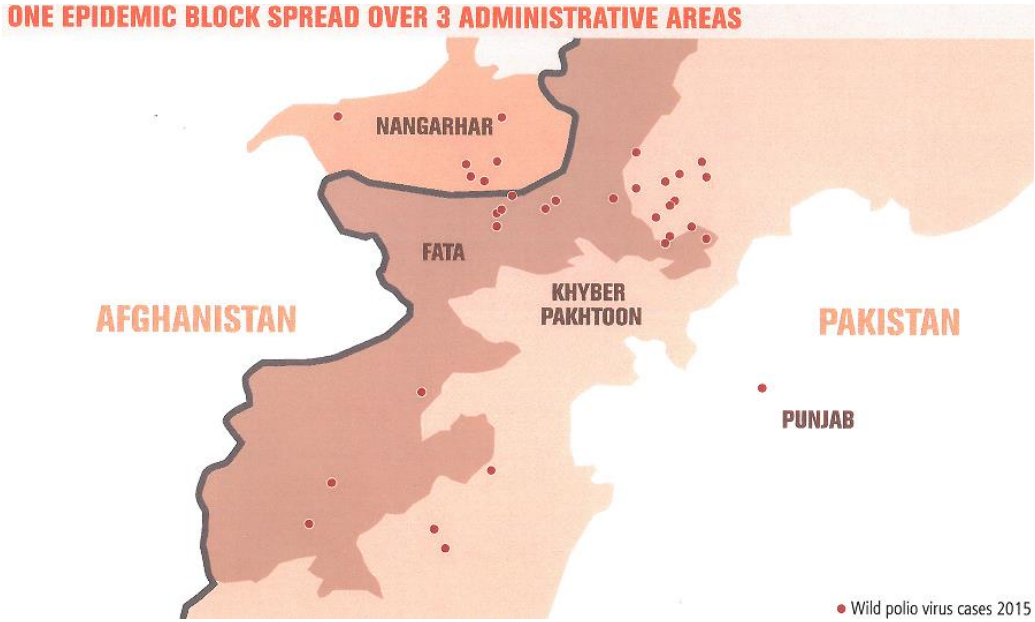


Figure 2: One epidemic block spread over 3 administrative areas



Source: (1)

1.5 Objectives and research question

1.5.1 Main objective

Identify obstacles to optimal function of the polio eradication program in high risk districts in Pakistan.

1.5.2 Specific objective

1. Health workers' views and experiences relevant to function of the immunization program and polio immunization in particular

1.6 Country profile

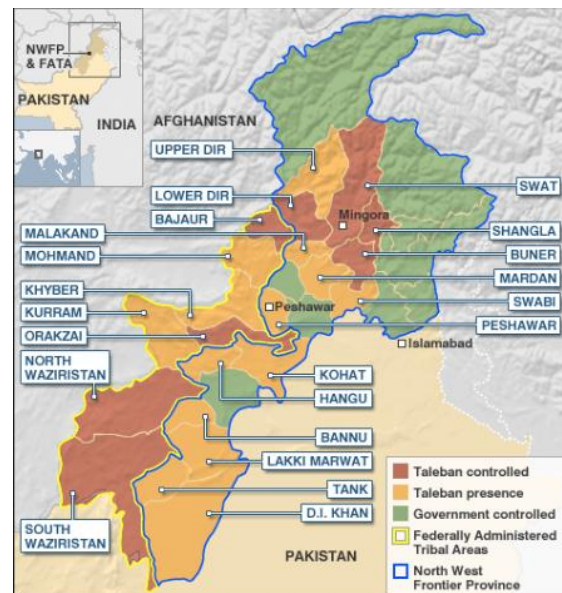


Figure 3: Map over provinces in Pakistan and a detailed map describing districts in FATA and KPK(previously named NWFP).

1.6.1 Brief history of Pakistan

Pakistan was born out of the partition of the Indian sub-continent 14th of August 1947. The separation in 1947 of British India into the Muslim state of Pakistan (with West and East sections) and largely Hindu India was never satisfactorily resolved. Since then, three wars have been fought between Pakistan and India, and the relationship is still rocky.(41)

Pakistan is a federal state comprising of five provinces: Punjab, Azad Jammu and Kashmir, Sindh, Khyber Pukhtoonkhwa (previously named North-Western Frontier Province) and Balochistan. Major ethnic groups constitute Punjabi, Sindhi, Baloch, Pashtuns and Mohajir (migrated from India at time of migration) . In addition to this Pakistan has a semi-autonomous tribal region in the northwestern Pakistan. The Federally Administered Tribal Areas (FATA) comprise seven tribal agencies (districts) and six frontier regions and are directly governed by Pakistan's federal government through a special set of laws called the Frontier Crimes Regulations (FCR). The territory is almost exclusively inhabited by Pashtuns who also live in the neighbouring Khyber Pakhtunkhwa and Afghanistan. (41, 42)

Figure 4: Location of FATA in Pakistan



1.6.2 Origins of FATA

FATA was annexed by the British in the 19th century. The British never succeeded in completely calming unrest in the region, but it afforded them some protection from Afghanistan. The British Raj attempted to control the population of the annexed tribal regions with the Frontier Corps Regulations (FCR), which allowed considerable power to govern to local nobles so long as these nobles were willing to meet the needs of the British. Due to the unchecked discretionary power placed into the hands of the jirga put into place by these nobles and to the human rights violations that ensued, the FCR has come to be known as the "black law." The annexed areas continued under the same governance after the Partition of India, through the Dominion of Pakistan in 1947 and into the Islamic Republic of Pakistan in 1956.

Looking at figure 1 and 2 it has become increasingly clear that the majority of cases originate from the KPK-province and FATA –province in Pakistan. This area borders to Afghanistan and is mostly inhabited by the Pashtuns. Table 3 also shows an increased percentage of new cases of Pashtun origin from 69% in 2009 to 94% in 2014.

1.6.3 Brief ethnographic presentation of the Pashtuns

The Pashtuns are divided into clans and families, but all claim a common ancestor Qais Abdur Rashid (575–661 A.C.) . They speak Pashto which is an eastern-Iranian language, use a modified Arabic alphabet and are Sunni-Muslim. Figures from 2015 suggests a total of 50 million people in the world who claim Pashtun origin which make them one of the largest tribes in the world. Approximately 50% of inhabitants in Afghanistan are Pashtun. The northwestern part of Pakistan is also inhabited by Pashtun (15% of the total inhabitants in Pakistan). Some Pashtuns emigrated to India before the partition. The Pashtuns have commanded states and dynasties in Afghanistan, Persia and India (see Dynastic Framework in the Appendices).

The Durand Line

The Durand-line is a boundary between Afghanistan and Pakistan which was established in 1893 between Sir Mortimer Durand, a British diplomat, and Abdur Rahman Khan, the Afghan Amir, to establish the limit of their respective spheres of influence and improve diplomatic relations and trade. Afghanistan ceded various frontier areas to British India to prevent invasion of further areas of the country. The Durand Line cut through the Afghan tribal areas, and politically divided ethnic Pashtuns and Baloch people who live on both sides of the border. This line later demarcated the “Great Game” buffer zone between British and Russian interests in the region. Although shown on maps as the western international border of Pakistan, it remains unrecognized by Afghanistan and leaders of the Pashtun people in Pakistan. (43, 44)

Pashtunwali-code

Most of them live by the tribal honor code **Pashtunwali**. It is a non-written ethical code and traditional lifestyle. The main principles of Pashtunwali are: 1. **Hospitality** – showing profound hospitality and respect to visitors 2. **Forgiveness and Asylum** – this refers to the protection given to a person against his enemies. People are protected at all costs; even those running from the law must be given refuge until the situation can be clarified 3. **Justice and Revenge** - seek justice or take revenge against the wrongdoer. No time limit restricts the period in which revenge can be taken. 4. **Bravery** – A Pashtun must defend his land, property, and family from incursions 5. **Loyalty** - Pashtuns owe loyalty to their family, friends and tribe members. Pashtuns can never become disloyal as this would be a matter of shame for their families and themselves. 6. **Righteousness** - A Pashtun must always strive for good in thought, word, and deed. 7. **Faith** - A wider notion of trust in God. 8. **Respect, pride and courage** - Pashtuns must demonstrate courage. Their pride has great importance in Pashtun society and must be preserved. They must respect themselves and others in order to be able to do so, especially those they do not know. Respect begins at home, among family members and relatives. If one does not have these qualities they are not considered worthy of being a Pashtun. 9. **Protection of women**- A Pashtun must defend the honour of women at all costs and must protect them from vocal and physical harm. 10. **Honour** - A Pashtun must defend

the weak around him.11. **Country** - A Pashtun is obliged to protect the land of the Pashtuns. Defence of the nation means the defence of Pashtun culture, countrymen and of the self. A drawing of a traditional Pashtun may be found in Appendices.

The Pashtunwali-code may explain, in part, why Pashtuns have fiercely protected their land and culture against invaders throughout history. The British unsuccessfully tried colonizing Pashtun areas several times. The Russian had to withdraw from Afghanistan. After the attack on World Trade Centre, New York, in September 2001 the United States of America and the North Atlantic Treaty Organization launched a military campaign to catch and kill Osama bin Laden. Osama bin Laden was successfully killed in Abbottabad, Khyber-Pukhtoonkhwa, Pakistan, but the other goals have still not been achieved. Reports suggest Taleban did not support Osama bin Ladens methods, but due to the Pushtunwali-code of Hospitality and Asylum they felt they had to protect him even if it cost them their lives.

Mistrustfulness

The Pashtun national leader Bacha Khan was a close friend and ally of Mahatma Gandhi. The Pashtuns were not the most active in fighting for a separate homeland for Muslims in India (Pakistan). This topic has remained a sore issue and is written about in Pakistani schoolbooks regarding the partition of Pakistan and India. Since the partition in 1947 they have felt neglected in Pakistan and their areas are consistently underfunded.

The Pashtuns are a minority in Pakistan. Many feel discriminated against in the educational system and the work place. The Khyber-Pukhtoonkhwa has many natural resources, like electricity producing dams. Most of this goes to Punjab (largest province). They are also suspicious of the Pakistani Government due to the drone-attacks (which many think is a co-operation between Pakistani Government and the United States of America) and Pakistani military campaigns in Pashtun areas. Many Pashtuns are wary of the Pakistani Government due to all of the factors above. One of the reasons the Global Polio Eradication Initiative might have been experiencing problems among the Pashtuns is that it is thought of as a Pakistani and Western campaign. (43, 45-48)

1.6.4 Present situation – briefly presented

Pakistan is ruled by a democratic government. The present population count is 199 085 847. The economy is heavily depended on agriculture and it is the main livelihood of Pakistanis. The GDP per capita US \$ 4900 and GDP real growth rate is 4,2%. The country has a rapidly growing and urbanizing population, more than half under the age of 22, and has long standing issues related to the electricity and natural gas sector (41).

The transmission of poliovirus is very efficient in Pakistan's hot climate, high population density and poor water and sanitation infrastructure. The eradication of poliomyelitis in in parts of Pakistan has been complicated by armed conflict, security concerns, and the movement of families to escape potential conflict, cultural barriers and natural disasters that have limited the accessibility of vaccination teams to target population. It has also been affected by weak delivery services which has resulted from poor management and scarcity of local accountability (31, 49)

Children in: resource poor areas, with an open sewage system, rising militancy and a critical law-and-order system have an increased risk of contracting polio. Poor nutrition leads to immunodeficiency and an increased risk of contracting both the poliovirus and other enterovirus which interact with each other and decreases the efficiency of the poliovaccine.

The rising militancy and critical law-and-order situation leads to the breakdown in the vaccination campaign when vaccination workers are threatened and killed.(37, 38, 50, 51) There is a "brain-drain" in these areas because qualified health personnel leave for more peaceful pastures. This leads to a weakened health system with few qualified health workers and poor health services (52).

1.7 Health profile

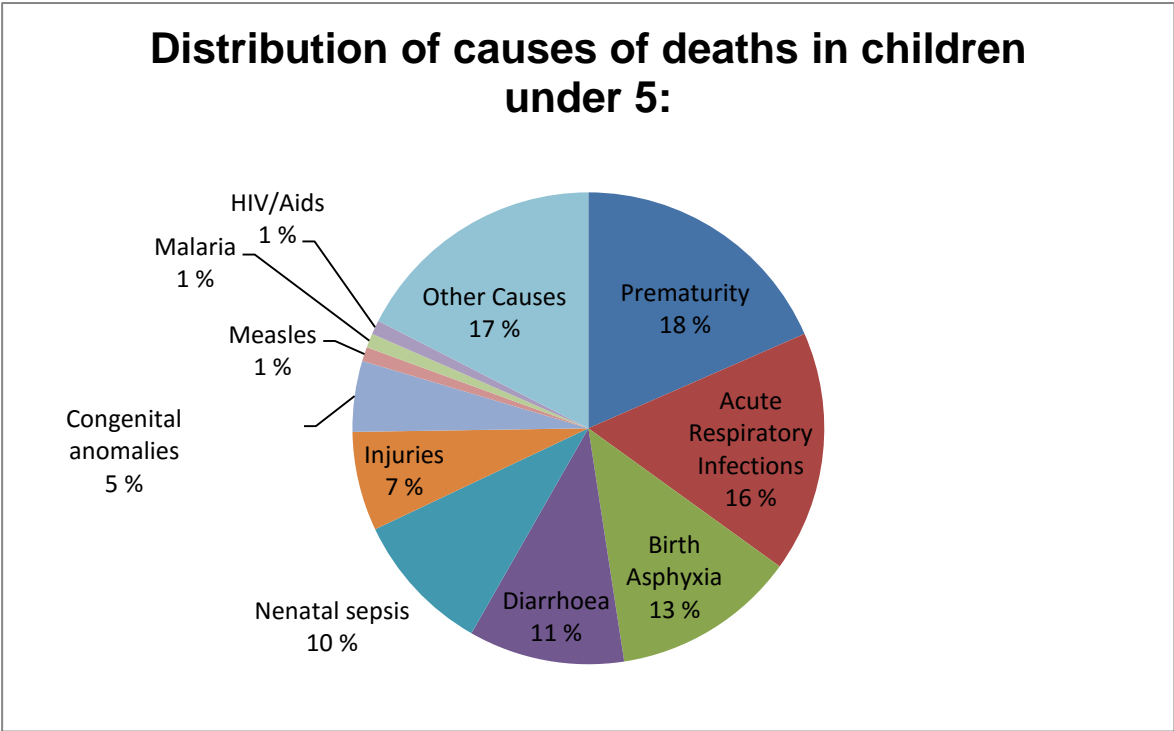
The health profile of Pakistan is characterized by high population growth rate, high infant and child mortality rate and a dual burden of communicable and non-communicable diseases.

1.7.1 Some health indicators in Pakistan (2015) (53-55):

Table 4

2015	
Life expectancy at birth (years)	65
Median age (years)	23
Total fertility rate (per woman)	3,2
Birth registration coverage	34 %
Child (under 5 year) mortality rate (per 1000 live births)	86
Annual population growth rate	1,46 %
Maternal mortality rate (per 100000 live births)	170
Literacy rate (age 15 and over can read and write)	57,90 %

Figure 5



1.7.2 Disability-adjusted life years (DALYs)

Disability-adjusted life years (DALYs) are the sum of years of life lost due to premature mortality (YLL) and years of healthy life lost due to disability (YLD).

DALYs, YLL and YLD by broad cause group in order of decreasing size:

1. Maternal, Neonatal, Nutritional
2. Infectious diseases other than acute respiratory diseases, HIV, TB and Malaria (Including Poliomyelitis)
3. Other non-communicable diseases including non-malignant neoplasms; endocrine, blood and immune disorders; sense organ, digestive, genitourinary, and skin diseases; oral conditions; and congenital anomalies
4. Unintentional injuries
5. Cardiovascular diseases and diabetes
6. Acute Respiratory infections
7. Neuro-psychiatric conditions
8. Cancers
9. Chronic Respiratory Diseases
10. HIV, TB, Malaria

11. Suicide, Homicide and Conflict

12. Musculoskeletal diseases

1.8 Immunization services

Pakistan officially initiated the Expanded Program on Immunization (EPI) in 1978. It currently aims to vaccinate children aged 0-11 months against nine target diseases (Childhood Tuberculosis, Poliomyelitis, Diphtheria, Pertussis, Tetanus, Hepatitis B, Haemophilus Influenza Type b, Pneumonia, Measles) and the pregnant ladies against Tetanus.(56)

Since the launch of the program, the implementation of immunization activities has been carried out by the provinces themselves. The role of federal cell is restricted to the provision of policy and technical guidelines, coordination for international assistance, surveillance and monitoring. Additionally, the program also facilitate provincial health departments by procurement and supply of requisite vaccines and other logistics.(56)

EPI in Pakistan is implemented through various clinics and outreach clinics and activities. Immunization in rural areas are done at health centers, which are responsible for primary health care and also outreach sites in the villages by EPI spots and satellite clinics. It is the health workers who are responsible for administrating vaccination at the health centers. In urban areas the city corporation (public sector) and the NGOs (Non Governmental Organizations) deliver immunization.

1.8.1 The pillars of the Global Polio Eradication Campaign

The Global Polio Eradication Campaign have four ways to fight poliomyelitis, these are routine immunization, supplementary immunization , surveillance and targeted “mop-up” campaigns.

Routine immunization

The aim of the Polio eradication campaign is to reach at least 80% immunization coverage of children in the first year of life with at least three doses of oral polio vaccine as part of national routine immunization schedules.

Supplementary immunization

Mass immunization campaigns are known as National Immunization Days (NIDs) / supplementary immunization activities (SIAs). This supplementary immunization is intended to complement routine immunization. The aim of mass campaigns is to interrupt circulation of poliovirus by immunizing every child under five years of age with two doses of oral polio vaccine, regardless of previous immunization status.

National Immunization Days are conducted in two rounds, one month apart. Because oral polio vaccine does not require a needle and syringe, volunteers with minimal training can serve as vaccinators, increasing the number of vaccinators well beyond the existing trained health staff.

Surveillance

The four steps of acute flaccid paralysis (AFP) surveillance:

1. Finding and reporting children with acute flaccid paralysis (AFP),
2. Transporting stool samples for analysis,
3. Isolating poliovirus (is it vaccine derived or wild type? If wild type, is it type 1 or 2?),
4. Mapping the virus (Origin of strain? Genetic make-up?)

Environmental surveillance: testing sewage or other environmental samples for the presence of poliovirus.

Targeted campaigns

Targeted mop-up campaigns are door-to-door immunizations that are carried out in specific focal areas where the virus is known or suspected to still be circulating. Priority areas include those where polio cases have been found over the previous three years and where access to health care is difficult. Other criteria include high population density, high population mobility, poor sanitation, and low routine immunization coverage.(57)

The four pillars of GPEI have been successful in most countries of the world. In my discussion I will look at reasons why these means to eradication poliomyelitis has not had a 100% success in Pakistan.

1.9 Organization of the health system

Figure 6: Health systems profile

Organization of the Public Health Care System (Figure 1)

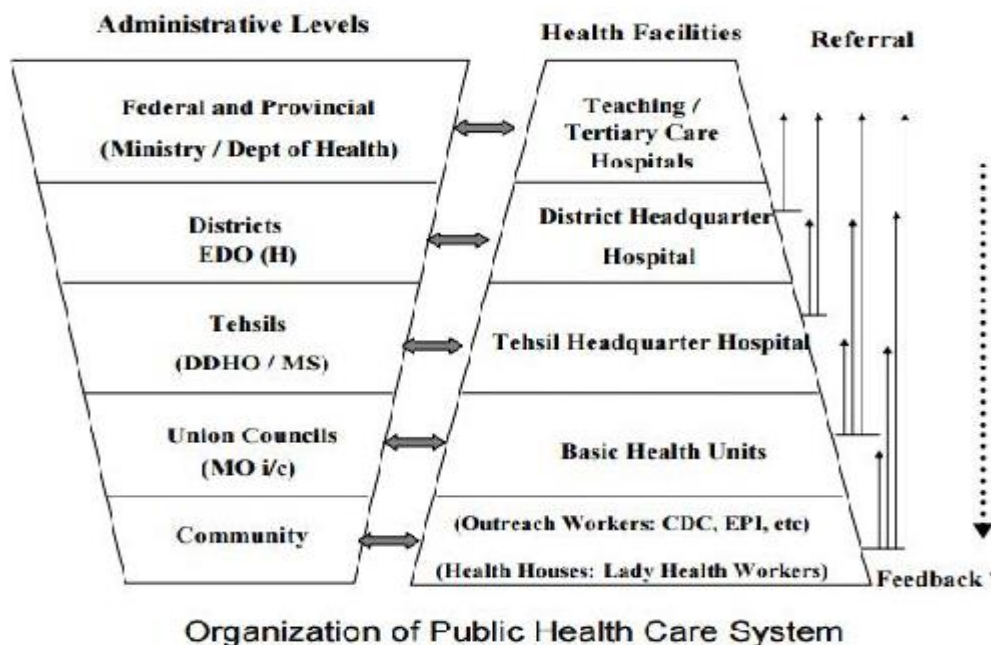


Figure 6 Source: Regional Health System Observatory, Eastern Mediterranean Region (EMRO), World Health Organization (58)

The health system in Pakistan consists of public, private and traditional sectors.

1.10 Public sector

Ministry of Health (MoH) at the Federal level has the major role to develop national policies and strategies for the entire population of the country. (59) Under Pakistan constitution, health is primarily responsibility of the provincial government, except in the federally administrated areas. Ministry of Health consists of one division and several departments. The Provincial Health Secretary translates the provincial health policy, exercises control over the budget and has direct control over the teaching hospitals and other special institutions.

Pakistan's health sector is constitutionally a provincial subject but health care delivery has traditionally been jointly administered by the federal and provincial governments with districts mainly responsible for implementation. Service delivery is being organized through preventive, promotive, curative and rehabilitative services. The curative and rehabilitative services are being provided mainly at the secondary and tertiary care facilities. Preventive and promotive services, on the other hand, are mainly provided through various national programs; and community health workers' interfacing with the communities through primary healthcare facilities and outreach activities. Public health delivery system functions as an integrated health complex that is administratively managed at a district level. The state provide healthcare through Basic Health Units (BHUs) and Rural Health Centers (RHCs) forming the core of the primary healthcare structure and a range of public health interventions. Secondary care including first and second referral facilities providing acute, ambulatory and inpatient care is provided through Tehsil Headquarter Hospitals (THQs), and District Headquarter Hospitals (DHQs) which are supported by tertiary care from teaching hospitals. Maternal and Child Health Centers (MCHCs) are also a part of the integrated health system; however, the number of MCHC remains limited. The District Health System under the District Government is now responsible for planning, development and management including implementation of health care delivery from DHQ hospitals right down to the outreach programs. (58, 60)

1.10.1 Private sector

Most people in Pakistan use private health care, and only 23 % use the public health sector. In 2012 there were just below 1000 public hospitals in the whole country and 73000 private health facilities. The population growth has lead to a gap between the number of health care facilities needed and the supply. Due to this the number private hospitals, clinics, and diagnostic labs have been growing rapidly during the last few years. Pharmacies have sprouted up in the market unregulated and unchecked. The commercial approach to health has constrained the access to health services for the poor. This is an important issue because 75 percent of Pakistanis use private healthcare. In the absence of any regulatory mechanism the private sector in health care system it also assumes exploitative role, at times.

Patients look for care besides cure. They perceive that the private hospitals are more responsive than public hospitals. They also find that the public health facilities lack the empathy and respect which they expect when visiting for treatment.(55, 61, 62)

1.10.2 Non-governmental organizations (NGOs)

NGOs are also active in the health and social sector. In urban parts of the country, some public– private partnership and franchising of private health outlets is also contributing to service delivery. (63-65)

1.10.3 Traditional Medicine

In addition to this untrained healers are practicing medicine without any fear. Many - homeopaths, *hakeems*, traditional/spiritual healers, herbalists and bonesetters are practising unchecked.(63, 64)

Chapter 2 Literature Review

2 Chapter Literature review

2.1 Introduction

Pakistan is one of two remaining countries yet to interrupt wild-type poliovirus transmission. The other country yet to interrupt transmission is Afghanistan. Nigeria was removed from the list of polio endemic countries by the WHO September 25th 2015 (1, 23, 31, 40, 51, 66). The increasing incidence during 2010-2011 led the Executive Board of WHO in January, 2012, to declare polio eradication a “programmatically emergency for global public health” (24, 25, 67)

The feco-oral transmission of poliovirus is very efficient in Pakistan’s climate, high population density and poor water and sanitation infrastructure. (13-17, 68, 69) The eradication of poliomyelitis in parts of Pakistan has been complicated by armed conflict, security concerns, and the movement of families to escape potential conflict, cultural barriers and natural disasters that have limited the accessibility of vaccination teams to target population. (35, 52, 62, 70-73) It has also been affected by weak delivery services which have resulted from poor management and scarcity of local accountability. (20, 22, 31, 49, 74)

2.2 Keywords, databases and selection criteria

The databases: Global Health, Medline Ovid, PubMed, Cochrane, Google Scholar and Primo (the University of Oslo’s own database) were used from the period of July 2012 to May 2016. Key words used while searching were synonyms and combinations of vaccination, campaign, polio, eradication, trust, healthcare, system, Khyber-Pukhtunkhwa (previously named North Western Frontier Province), Pashtoons / Pashtuns, Pakistan, Global Alliance for Vaccines and Immunization, supplementary immunization activities (SIA), global health, politics, Federally Administered Tribal Areas (FATA) and conflict. Boolean terms AND and OR was used to link words during the search process. Reference lists were examined in order to identify additional relevant articles. Websites used: WHO, Polio Eradication Organization, GAVI

Alliance (21), UNICEF. Non-English studies and studies done in high-income countries have been excluded.

2.3 Main results

There has been a decrease in estimated vaccination coverage and population immunity against poliomyelitis in specific regions of Pakistan since 2006. This correlates with an increased incidence in cases. In response to this epidemiological situation the President of Pakistan launched a National Emergency Action Plan in early 2011 (29, 30). This included a focus on 33 districts with a high incidence of poliomyelitis, largely in Khyber-Pukhtoonkhwa (KPK), Federally Administered Tribal Areas (FATA), Balochistan and Sindh (31). In late 2011 the National Emergency Action plan was enhanced with tighter oversight and vigorous monitoring to improve quality in vaccination campaigns (39). However, an analysis suggests that vaccination coverage continued to decrease in 2011, especially in Balochistan. The coverage continues to be compromised by the ongoing conflict in southern Afghanistan due to the population movement across the porous Afghanistan-Pakistan border. (19, 40, 75, 76) In spite of conflict in many other countries they have successfully managed to eliminate polio (75-77).

2.4 Conclusion

In this literature review no study was found that aimed to find health workers' views, working in Khyber-Pukhtoonkhwa, and experiences relevant to function of the immunization program and polio immunization in Khyber-Pukhtoonkhwa.(40, 75, 76, 78, 79) The Global Polio Emergency Action Plan 2012–2013 was launched in May 2012, during the Sixty-fifth World Health Assembly, in support of national emergency action plans.(24, 25). The plan targets high risk areas. It calls for increased government oversight, enhanced accountability, and increased access to children.(22, 80-85) The fact that Polio lingers on in Pakistan with cross-border transmission to Afghanistan and China, and that health workers have been targeted and

killed from December 2012 to April 2013 makes it imperative to finalize the Polio eradication campaign.(36-38, 50, 67)

Chapter 3 Methodology

3 Methodology

3.1 Study population

The aim was to reach professionally trained health workers, at vaccination centres, District Health Office and hospitals, for them to participate in the study. Personal details of the researcher were kept confidential. The reason for this is that several doctors, vaccinators and lady health workers associated with the polio eradication have been attacked and killed. (38, 50) . The researcher was distributing questionnaires asking questions about the polio eradication campaign alone and without any security personnel available. Health personnel distributed paper copies of the questionnaire among their colleagues. Some of the participants were interviewed face to face, using English questionnaires. Unclear questions were explained in the participants' local language, which was Pashto or Urdu. All of the participants were approached at their places of work by the researcher. 386 questionnaires were completed and returned to the researcher.

3.1.1 Inclusion and exclusion criterion

The study population was professionally trained health personnel and personnel involved with the Polio Eradication Campaign. People who are not health personnel or involved in the campaign will be excluded from the study. As described in table 1 the majority of respondents were working at the teaching hospitals in Khyber-Pukhtoonkhwa and the majority of them were Pashtun.

3.2 Research setting

400 questionnaires were distributed in six teaching hospitals among trained health personnel, of which five are situated in the province Khyber Pukhtoonkhwa and one in Islamabad in the

province Punjab. The province Khyber-Pukhtoonkhwa borders to Afganistan and has the largest obstacles to the polio vaccination campaign. Islamabad is the capital of Pakistan.

3.3 Area of study

Peshawar is the provincial capital and the most populous city of Khyber-Pukhtoonkhwa (KPK). In 1998 Peshawar had 2982816 inhabitants. (86) There is a large influx of refugees from Afghanistan (around 1,5 million) and the province also hosts internally displaced people (IDPs) from Federally Administered Areas (FATA). The latest figures of IDPs in 2015 was approximately 1,5 million. (87) Peshawar hosts the oldest and biggest teaching hospitals in Khyber-Pukhtoonkhwa, the oldest and biggest being Lady Reading Hospital situated in the old part of the city. All the teaching hospitals in my study host patients from the lower middle-class and the poorest socio-economic background. A large amount of the patients are IDPs and Afghan refugees. Health workers at the five biggest teaching hospitals in KPK were included in my study: Lady Reading Hospital (LRH) (88), Khyber Teaching Hospital (KTH) (89), Hayatabad Medical Complex (HMC) (90), Naseer Teaching Hospital (NTH) (91), Ayub Teaching Hospital (ATH) (92). The Pakistan Institute of Medical Sciences (PIMS) (93, 94) is a national medical post-graduate institution in the capital Islamabad which is situated in Punjab. Punjab is the most populous province of Pakistan.

3.4 Study design

The rationale for this research project led to the use of a cross-sectional study, as this method is suitable for conducting a survey of a population at a single point in time, being both relative quick and easy to perform. (95) It is also the most suited method to answer the research objectives and questions.

This method is also suitable because it is possible to conduct within the scope of the planned master project. In a cross-sectional study, a questionnaire (interview or self-administered) are used to assess the knowledge and attitudes of in this case, the polio eradication campaign

in a clearly defined population. This method is special suited to generate hypothesis that can be tested later. The method has disadvantages related to the fact that both data on knowledge and practices are collected at the same time, and thus it is not possible to find any causative links between knowledge, attitude and practices. Also this method is not very useful when it is a rapid occurring disease that needs to be measured, or to test hypothesis. (95)

It is a cross-sectional study which per definition is a survey of a population at a single point in time. This design method has both advantages and disadvantages. One of the advantages is that it is relatively easy and quick to complete. It is also the most suited method to answer the research objectives and questions.

A disadvantage in this design is that it is not possible to determine the causative relations between for instance the disease and risk factors even if associations are present. (95) Hence, in the planned study possible associations cannot be of any conclusive character, nor can it reveal any causative chain.

This method is also suitable because it is possible to conduct within the scope of the planned master project. In a cross-sectional study, a questionnaire (interview or self-administrated) are used to assess the knowledge and attitudes of in this case, the polio eradication campaign in a clearly defined population. This method is special suited to generate hypothesis that can be tested later. The method has disadvantages related to the fact that both data on knowledge and practices are collected at the same time, and thus it is not possible to find any causative links between knowledge, attitude and practices. Also this method is not very useful when it is a rapid occurring disease that needs to be measured, or to test hypothesis. (95)

3.5 Sample size

This is a descriptive study which means that no hypothesis is tested. Therefore it is not necessary to calculate sample size.

I personally interviewed as many health professionals as possible with background in the districts with high incidence of poliomyelitis which has been focused on in The National Emergency Plan (2011) (96). I also asked colleagues at the five teaching hospitals in Khyber-Pukhtoonkhwa and one teaching hospital in the capital to distribute questionnaires at their place of work. With the help of my colleagues I distributed 400 questionnaires among health workers. 386 were filled out and returned as depicted in figure 1 in the results section.

3.5.1 Selection and definition of sample

The study population is professionally trained health personnel and personnel involved with the Polio Eradication Campaign. People who are not health personnel or involved in the campaign will be excluded from the study.

It is usually unnecessary to study the whole population in order to obtain useful and valid information about the population. The investigation of a smaller sample has some advantages such as reduced number of subjects who have to be interviewed, examined or investigated. It provides highly detailed information on smaller numbers. If a sample is used, it is essential to ensure that the subjects included in the sample are representative of the population being investigated.

3.6 Data collection methods

The questionnaire used in this project included questions covering the research objectives and questions.

All the interviews and filling out of questionnaires was done in places where the participants felt comfortable and secure.

3.7 Pilot testing

An early version of the questionnaire was distributed among a sample of 10 medical doctors. They commented on the language and the form of the questionnaire. The researcher followed some of their suggestions and changes were made.

3.8 Limitations and advantages of the methods

The method snowball sampling was used to recruit large number of respondents. It entails asking your subjects to nominate another person with the same trait as your next subject. The researcher then observes the nominated subjects and continues in the same way until the obtaining sufficient number of subjects.

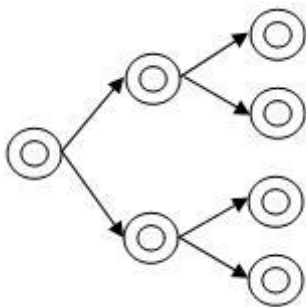


Figure 7: Exponential Non-Discriminative Snowball Sampling

3.8.1 Advantages

The chain referral process allows the researcher to reach populations that are difficult to sample when using other sampling methods.

The process is cheap, simple and cost-efficient.

This sampling technique needs little planning and fewer workforce compared to other sampling techniques.

3.8.2 Disadvantages

The researcher has little control over the sampling method. The subjects that the researcher can obtain rely mainly on the previous subjects that were observed.

Representativeness of the sample is not guaranteed. The researcher has no idea of the true distribution of the population and of the sample.

Sampling bias: Initial subjects tend to nominate people that they know well. Because of this, it is highly possible that the subjects share the same traits and characteristics, thus, it is possible that the sample that the researcher will obtain is only a small subgroup of the entire population.

3.9 Ethical issues

In 1964 the World Medical Association Declaration of Helsinki developed ethical principles for medical research including human subjects as well as human material and data. Furthermore, International Organization of Medical Sciences (CIOMS) also proposed guidelines for medical research. These guidelines were revised in 1993 and published with the name of: “International ethical guidelines for biomedical research involving human subjects.”
(97)

Ethical approval is an important issue while conducting research and need to be discussed. It is a crucial and first stage for conducting research after completion of the protocol. If human subjects are involved in research than we must seek approval from ethical committee to

ensure that rights and safety of the participants will be protected and to reduce the risks related to physical and mental discomfort. It is a necessary requirement of all researches with human participants, that it should be conducted in accordance with an approved research ethics application. Research conducted with human participants without ethical approval described as misconduct or wrongdoing.

The study protocol was approved by the Office of director research and development cell which is the institutional review board at Khyber Medical College, Peshawar, Pakistan. The study protocol has also been approved by the Norwegian ethical committee (Regionale Komiteer for Medisinsk og Helsefaglig forskningsetikk)(98, 99). The office of Polio Pakistan, UNICEF, also issued a Letter of No Objection.

Below, I have discussed major ethical issues that need to be considered in relation to my study project.

3.9.1 Informed consent

Informed consent is a legal procedure to ensure that all participants know about the risk, benefits and cost related to the study. Participants must be made aware by investigators in a way that they can reach a truly informed decision about whether or not to participate in the research. Informed consent must be given freely, without pressure, and must be clear to understand about what participation involves. My cross-sectional quantitative study where I distributed questionnaires among health workers they gave consent by answering the questionnaire in writing. The study was explained in the introduction of the questionnaire. Participants was informed that they had right to withdraw their consent any time during the study period.

3.9.2 Power imbalance

In a hierarchical society like Pakistan there is a high chance that the health workers that are invited to participate in the study feel it is compulsory because a researcher from abroad is

distributing it. They might feel that they have to obey their supervisors (who I must have the permission from to be able to conduct the study in the first place) and that they might lose benefits if they do not participate. It is the researcher job to make sure that they understand that it is voluntary. There is a danger that the health workers answer the questionnaires in a way that they think is correct, rather than answering like it is, because there is very little trust in the health system and in the authorities. It is the researchers' job to make sure there is a conducive environment that makes the health workers feel safe and able to answer the questionnaires honestly.

3.9.3 Confidentiality and privacy

Confidentiality means privacy in research about the information given by the participants.

Regarding the protection of the privacy and confidentiality of the participants in my study project, it was maintained by giving serial numbers to participants. Therefore, by using serial numbers instead of using the names or personal numbers of the participants in their questionnaire, and keeping the separate document that links the serial numbers to the participants', the confidentiality is assured. Identifying information is secured by locking it in a separate place and restricting access to it.

3.9.4 Risk and benefit analysis

It is the duty of investigator to ensure that the potential risk and benefits are balanced in medical research in which human subjects are the participants. The risks should be minimum. The study should be of future benefit to the study participants. My project aims to make the voice of local health personnel heard. Right now many of them feel like the Polio eradication campaign is forced upon them, but if they feel like they are participating more in the development of the campaign it would increase the efficiency of the project and might make their work easier. The Declaration of Helsinki discusses the wellbeing of research subjects and the avoiding of the risk in several paragraphs. According to the declaration of Helsinki

“every project should be preceded by careful assessment of predictable risks and burdens in comparison with foreseeable benefits to the subject or to others”.

I distributed a questionnaire among health workers. There is a strong international focus on the Polio Eradication Campaign. My questionnaire aimed to find out the health workers in Pakistan point of view regarding the failure of the Polio Eradication Campaign in Pakistan. There is a gap in the knowledge here. By finding out what the concerns of the people on the ground is one can get a better idea of the weaknesses in the system.

3.9.5 Personal liberty and autonomy

Exchangeability exists between respecting individual’s choice and the wider public health benefits. Respect for autonomy requires that those who are capable of deciding about their personal choices should be treated with respect in regards to capacity for self-determination.

In this study, the choices made by health professionals regarding the vaccination of children should be respected. They should be made to feel empowered and safe.

3.9.6 Vulnerability

The CIOMS guidelines, Belmont report and Declaration of Helsinki define different groups as vulnerable. The most extensive is the CIOMS guidelines. Among other groups they state that junior or subordinate members of a hierarchical group and members of particular ethnic and racial groups can be deemed vulnerable. In my project, the lady health workers and vaccination workers who partake in Supplementary Immunization Activities going from door to door distributing the Oral Polio Vaccine are the most junior members in the Polio Eradication Organization. They are often scared of losing their job if there are discrepancies in the numbers of children vaccinated in their area. The junior health workers in the organization and at the hospitals are also vulnerable in a country where human rights are weak. The health workers are always scared that there might be negative consequences for their future career and pay if they do not follow the wishes of those from the higher

hierarchical level. The lady health workers and other junior female health workers have an added layer of vulnerability because Pakistan is patriarchal society. Females have to follow the lead of their male co-workers even if they are on the same level in the hierarchy. The highest incidence of Polio can be found among the Pashtuns. It is of utmost importance that research is conducted in a way that it protects vulnerable groups.

3.9.7 Limited resources

There is an increased importance to eradicate polio once and for all due to the fact that there have been incidents of cross border contamination to Afghanistan and China. This virus has severe implications for children's health and it is important to focus the eradication initiative on the weak links. My project is a low-cost way to see the campaign from the point of view of the health workers on the ground.

3.9.8 Respect

All participants involved in research have right to be treated with respect. Everyone should be treated equally, regardless of age, gender, social wellbeing or education status. There should be no discrimination. In my study project participants are of different age groups, with different social and health professional background. I plan to include several participants from local vaccinators / lady health workers up to the level of District Commissioners. They will be treated equally, with respect and dignity.

In conclusion, it is important to take all possible measures in order to protect participants from potential physical, psychological and social harm during research. Ethical issues discussed above are the essential requirement for most types of epidemiological research conducted on human subjects and must be considered prior to research.

3.10 Data management and statistical analysis

The questionnaires, which were 100% confidential, were read and the data entered into Questback software. Later this data was converted into the software package SPSS version 20.0 (Statistical Package for Social Sciences Study). SPSS and STATA software was used to analyze data.

The main variables for analysis are included in table 1. We started with frequency analysis of all the variables in the survey form and cross tabulation of the main variables.

Chapter 4 Results

4 Results

4.1 Demographic characteristics

400 questionnaires were distributed at six teaching hospitals, of which five were in Khyber-Pukhtoonkhwa (KP) province. Figure 7 shows the distribution by gender among respondents who both accepted and declined the questionnaire. Further breakdown by percentage of the demographic characteristics are described in table 5.

Figure 7 Distribution of questionnaires

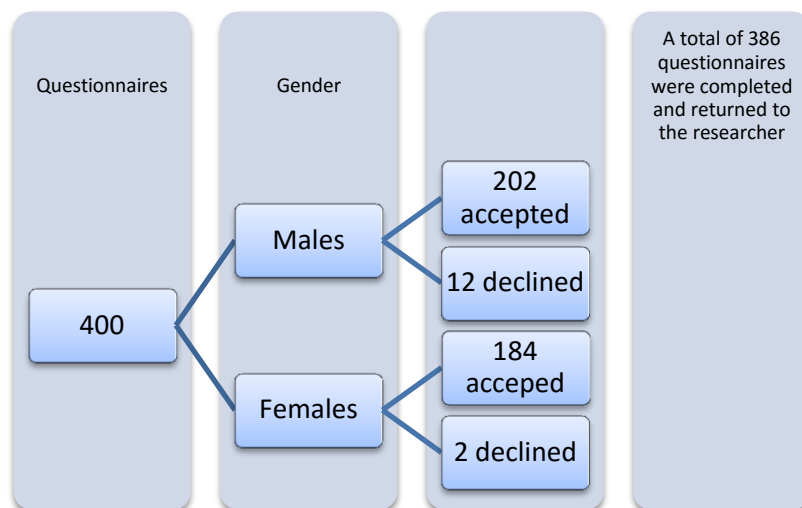


Table 5 Demographic characteristics of the study population

Demographic factors	Females n (%)	Males n (%)	Total n (%)
N	184 (47.7)	202 (52.3)	386 (100)
Age group			
20 – 30	151 (39.1)	149 (38.6)	300 (77.7)
31 – 40	27 (7.0)	41 (10.6)	68 (17.6)
41 – 50	4 (1.0)	10 (2.6)	14 (3.6)
51+	2 (0.5)	2 (0.5)	4 (1.0)
Profession			
Medical doctor	138 (35.8)	192 (49.7)	330 (85.5)
Nurse	41 (10.6)	4 (1.0)	45 (11.7)
Vaccinator	2 (0.5)	3 (0.8)	5 (1.3)
Other	3 (0.8)	3 (0.8)	6 (1.6)
Specialization			
Ear nose throat	0 (0)	9 (2.3)	9 (2.3)
Plastic surgery	1 (0.3)	0 (0)	1 (0.3)
Gyneacology	11 (2.9)	0 (0)	11 (2.9)
Medicine	6 (1.6)	26 (6.8)	32 (8.3)
Surgery	4 (1)	8 (2.1)	12 (3.1)
Paediatrics	23 (6)	33 (8.6)	56 (14.6)
Gastroenterology	2 (0.5)	3 (0.8)	5 (1.3)
Cardiology	0 (0)	1 (0.3)	1 (0.3)
** Other	136 (35.4)	121 (31.5)	257 (66.9)
Ethnicity			
Pashtun	112 (29.0)	180 (46.6)	292 (75.6)
Punjabi	35 (9.1)	11 (2.8)	46 (11.9)
Sindhi	4 (1.0)	3 (0.8)	7 (1.8)
Balochi	4 (1.0)	0 (0)	4 (1.0)
Kashmiri	15 (3.9)	5 (1.3)	20 (5.2)
Other	14 (3.6)	3 (0.8)	17 (4.4)
Work place			
Pakistan Institute of Medical Sciences (PIMS)	50 (13.0)	34 (8.8)	84 (21.8)
Khyber Teaching Hospital (KTH)	25 (6.5)	26 (6.7)	51 (13.2)
Hayatabad Medical Complex (HMC)	62 (16.1)	64 (16.6)	126 (32.6)
Naseer Teaching Hospital (NTH)	4 (1.0)	11 (2.8)	15 (3.9)
Ayub Teaching Hospital (ATH)	16 (4.1)	17 (4.4)	33 (8.5)
Lady Reading Hospital (LRH)	27 (7.0)	50 (13.0)	77 (19.9)
Years of working in the health services			
Less than 2 years	118 (30.6)	103 (26.7)	221 (57.3)
2 - 4	39 (10.1)	53 (13.7)	92 (23.8)
5 – 7	20 (5.2)	31 (8.0)	51 (13.2)
More than 7 years	7 (1.8)	15 (3.9)	22 (5.7)
Years of higher education			
Less than 3 years	16 (4.1)	3 (0.8)	19 (4.9)
3 – 5	24 (6.2)	7 (1.8)	31 (8.0)
More than 5 years	144 (37.3)	192 (49.7)	336 (87.0)

** Other: House officers which have not started specializing yet.

Demographic characteristics of the health workers (study sample) are presented in Table 5. The data were collected from health workers at six different teaching hospitals. Seventy-eight percent of the health workers were from five of the six teaching hospitals, which are located in Khyber-Pukhtoonkhwa province bordering Afghanistan as shown in Figure 9. However, 21.8% of the health workers were from Pakistan Institute of Medical Sciences in Islamabad. The gender distribution showed that 47.7% of the health workers were females and the rest (52.3%) were males. At least 75% of the health workers were Pashtun while 11.9% were Punjabi. The other ethnical groups represented were Sindhi (1.8%), Balochi (1%) and Kashmiri (5.2%) as shown in Figure 3. The majority of the health workers (77.7%) were in the age group 20 - 30 years while those aged 51+ represented only 1% of the study sample. The descriptive analysis also showed that the majority (85.5%) of the sample were medical doctors with nurses making up 11.7% of the sample. As shown in Figure 11, more females (30.6%) had worked for less than 2 years compared to 26.7% males. The results showed that male health workers were more experienced (worked for more years) than the female health workers.

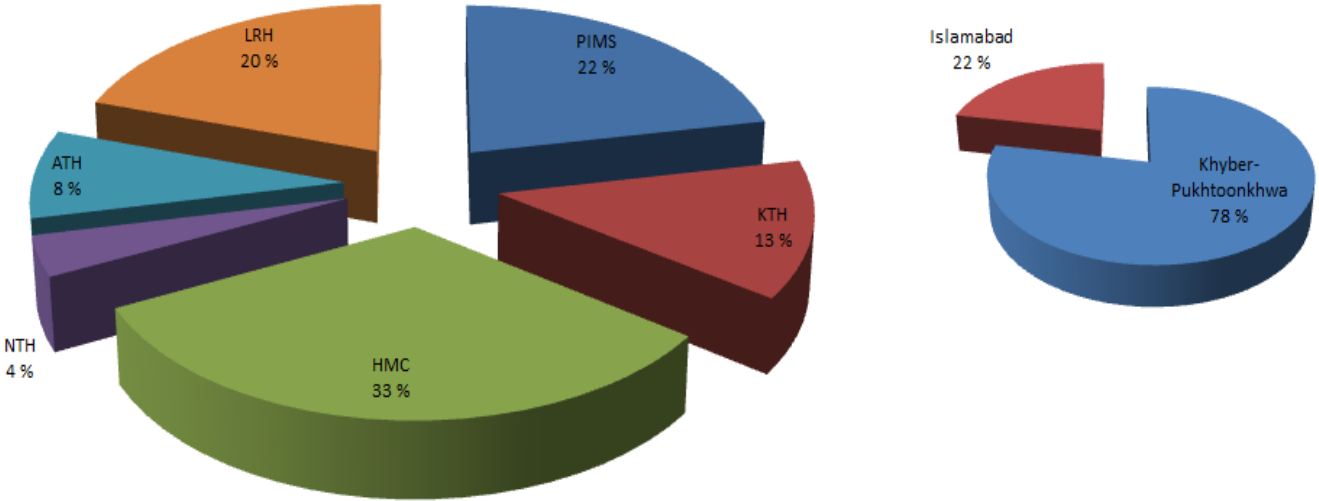


Figure 9: Distribution of the health workers by their place of work

Distribution of the health workers by their place of work

With the exception of PIMS, the other five teaching hospitals are located in the Khyber-Pukhtoonkhwa province. As shown in the pie chart in the right panel (figure 9) 78% of the health workers are from these 5 teaching hospitals.

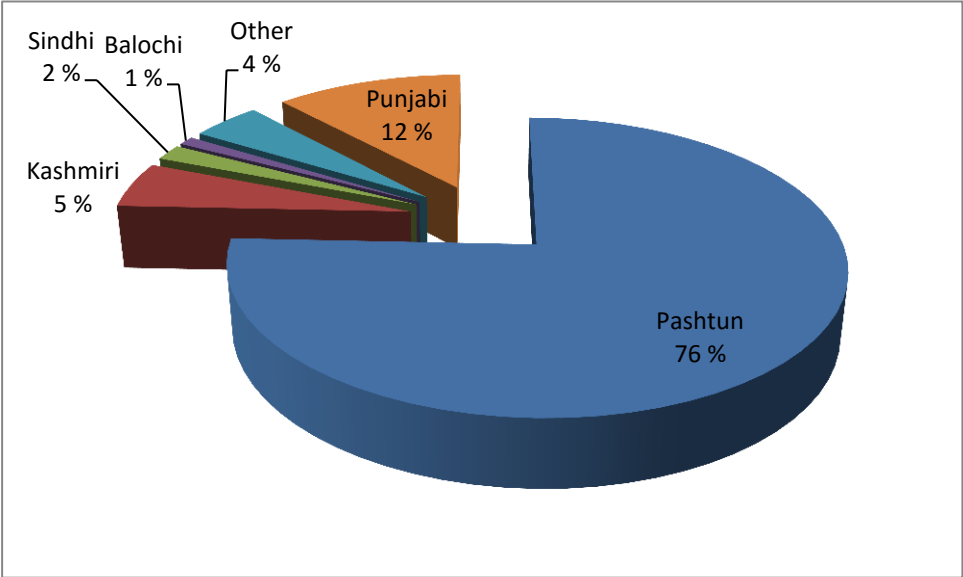


Figure10 Distribution of the health workers by ethnicity

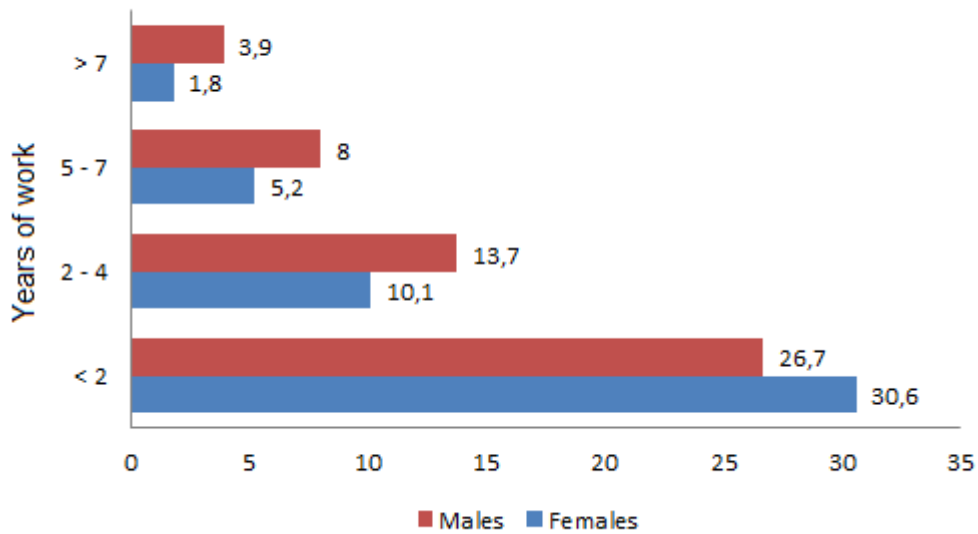


Figure 11 Percent distribution of the number of years of work by gender

4.2 Findings

4.2.1 Opinions about the 5 most important health challenges for children <5 years

Table 6 shows the distribution of the top five health challenges of children below five years according to the opinions of the health workers. As shown in the table and also depicted in Figure 12, gastroenteritis was the most important health challenge according to 57.5% of the health workers. The most surprising result in this study was that only 1.6% of the health workers thought that poliomyelitis was the most important health challenge. It was the sixth most important health challenge after the top five shown in Table 6.

Table 6: Opinion of the health workers about the five most important health challenges of children below 5 years

*Health challenge	Frequency (Percent)
Gastroenteritis	222 (57.5)
Respiratory Tract Infections	97 (25.1)
Tuberculosis	19 (4.9)
Measles	17 (4.4)
Parasite infestation	10 (2.6)

*Note that the distribution overlaps because the health workers' opinions were independent

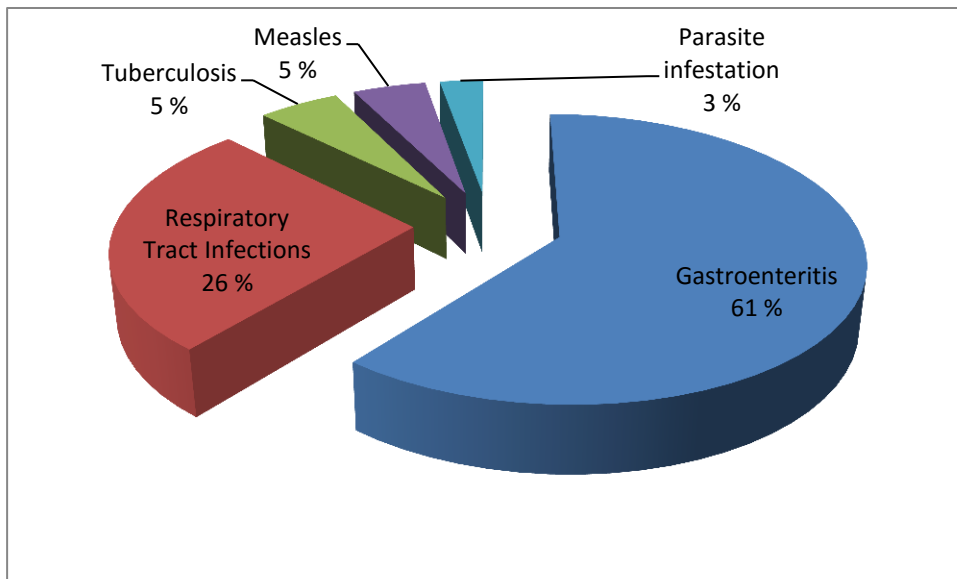


Figure 12: Distribution of the top 5 health challenges of children below 5 according to the health workers' opinions

4.2.2 Health workers' opinion about the importance of vaccines

Upon being asked about the importance of five different vaccines, 77.5% of the health workers said that BCG was the most important vaccine compared to 4.4% who said that OPV for polio was the most important as shown in Table 7. The analysis also showed that 84.7% of the health workers thought that PCV 10 for pneumonia and meningitis was the least important vaccine. The ratings for the other vaccines are also presented in Table 7.

Table 7: Opinion of the health workers about the importance of five different vaccines

Importance of vaccine	Type of vaccine				
	BCG	OPV	Pentavalent vaccine	Measles	PCV 10
1. Most important	299 (77.5)	17 (4.4)	40 (10.4)	16 (4.1)	14 (3.6)
2. Fairly important	43 (11.1)	62 (16.1)	241 (62.4)	33 (8.5)	7 (1.8)
3. Important	20 (5.2)	86 (22.3)	63 (16.3)	196 (50.8)	21 (5.4)
4. Slightly important	14 (3.6)	197 (51.0)	27 (7.0)	131 (33.9)	17 (4.4)

5. Least important	10 (2.6)	24 (6.2)	15 (3.9)	10 (2.6)	327 (84.7)
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4.2.3 Opinions regarding polio eradication campaign

Eighty-six (22.3%) of the 386 health workers were either working or had worked for the campaign to eradicate polio. Of these health workers, 33 were females and 53 were males as shown in Table 8. When asked whether the campaign was running effectively, 49.7% of the health workers said yes. When asked further to rate the eradication campaign, 47.4% were satisfied and 2.6% thought that the campaign was excellent. However, 40.4% and 8.8% thought that the campaign was either deficient or poor respectively.

Table 8: Opinions regarding polio eradication campaign

Opinions regarding polio eradication campaign	*Gender		Total
	Females	Males	
Worked/ have worked with the polio vaccination campaign	33 (17.9)	53 (26.2)	86 (22.3)
Is the campaign running effectively? YES	100 (54.3)	92 (45.5)	192 (49.7)
Opinion about the polio eradication campaign			
Excellent	7 (3.8)	3 (1.5)	10 (2.6)
Satisfactory	96 (52.2)	87 (43.1)	183 (47.4)
Deficient	66 (35.9)	90 (44.6)	156 (40.4)
Poor	12 (6.5)	22 (10.9)	34 (8.8)

*Percent distribution by gender

4.2.4 Reasons for the campaign being weak

The reasons why the polio campaign was viewed as weak by the health workers, who thought the campaign was poor or deficient, are presented in Table 9. For example, 58.9% of the health workers thought that safety and security issues were making the polio campaign weak compared to 2.6% who thought that the safety and security issues were not a deterrent since safety and security issues were excellent.

Figure 13 shows the distribution of health workers who thought that issues such as planning and safety and security issues are making the polio campaign poor. Safety and security issues tops the reasons for the campaign being poor while supportive follow-up and supervision are second and third respectively. The importance of the other reasons are as shown in Figure 13.

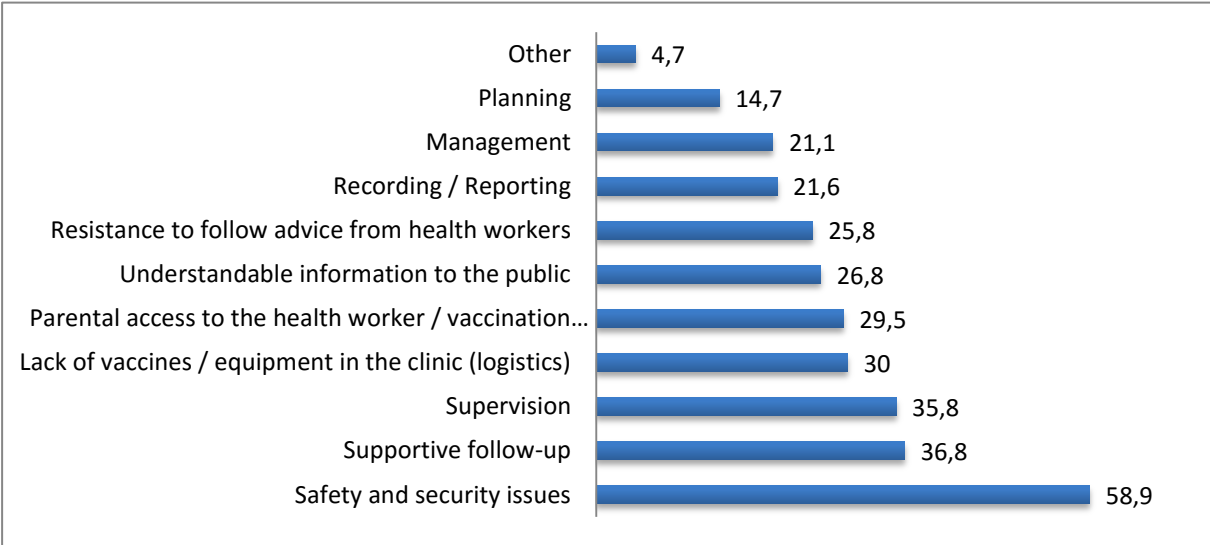


Figure 13: Reasons for the polio campaign being poor

Table 9: Reasons for the campaign being weak according to health workers who thought the campaign was poor or deficient

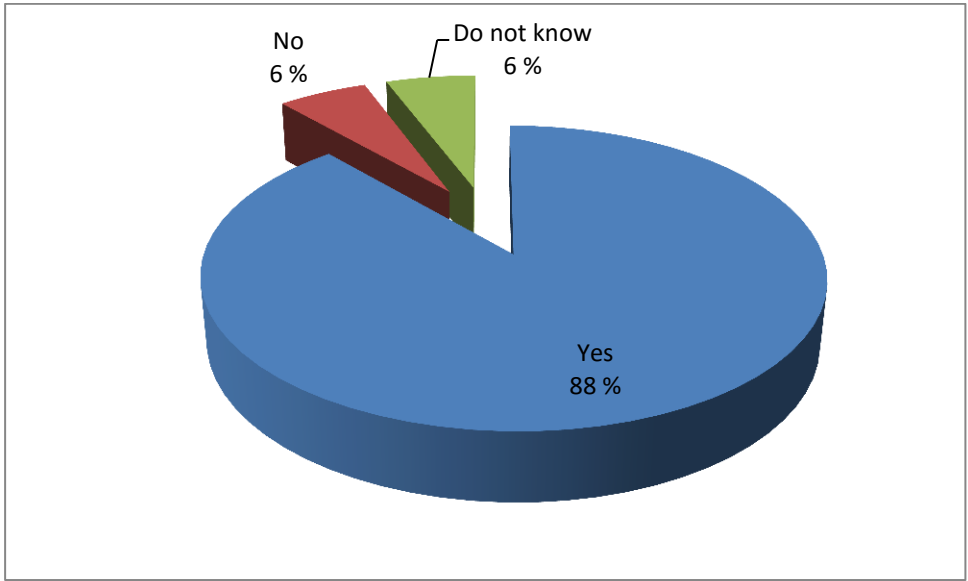
Reasons for the campaign being the weak	Poor	Deficient	Satisfactory	Excellent
Planning	28 (14.7)	33 (17.4)	88 (46.3)	39 (20.5)
Management	40 (21.1)	96 (50.5)	42 (22.1)	10 (5.3)
Supervision	68 (35.8)	71 (37.4)	43 (22.6)	6 (3.2)
Recording / Reporting	41 (21.6)	89 (46.8)	46 (24.2)	12 (6.3)
Safety and security issues	112 (58.9)	44 (23.4)	27 (14.2)	5 (2.6)
Supportive follow-up	70 (36.8)	83 (43.7)	31 (16.3)	4 (2.1)
Lack of vaccines / equipment in the clinic (logistics)	57 (30.0)	72 (37.9)	48 (25.3)	11 (5.8)
Parental access to the health worker / vaccination sites	56 (29.5)	80 (42.1)	44 (23.2)	7 (3.7)

Understandable information to the public	51 (26.8)	54 (28.4)	55 (28.9)	27 (14.2)
Resistance to follow advice from health workers	49 (25.8)	91 (47.9)	41 (21.6)	7 (3.7)
Other	9 (4.7)	6 (3.2)	2 (1.1)	1 (0.5)

4.2.5 Opinions regarding the continuation supplementary immunization activities (SIA) of oral polio vaccine

The distribution of health workers who either supported or were against the continuation supplementary immunization activities (SIA) of oral polio vaccine in the campaign to eradicate polio is shown in Figure 14. Eighty-eight percent (88%) of the health workers said that the oral polio vaccine via SIA must be continued compared to 6% who opinioned for its cessation

Figure 14: Distribution of health workers supporting the continuation of oral polio vaccine in the campaign to eradicate polio (SIA)



4.2.6 Opinions regarding establishing permanent vaccination centres as a way of eradicating polio

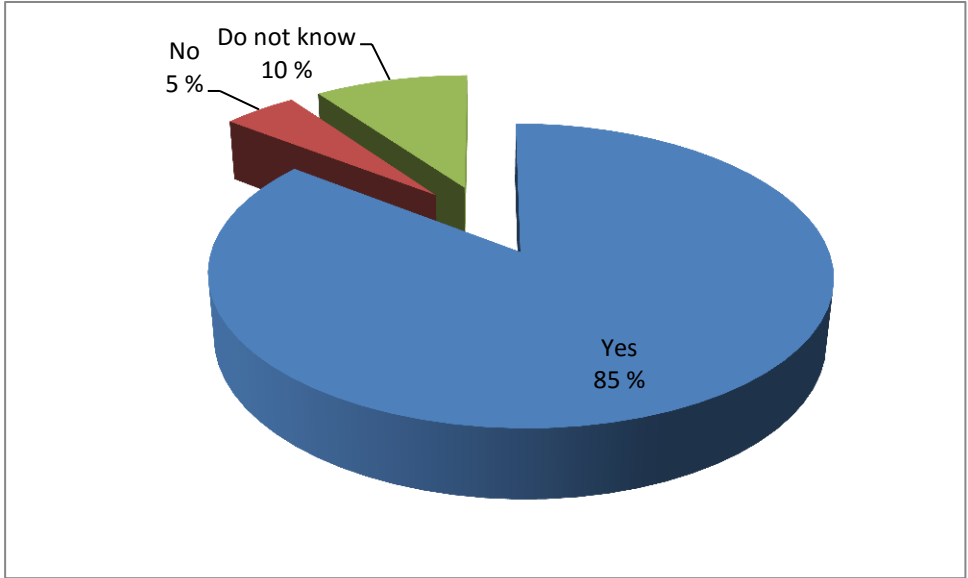


Figure 15: Distribution of health workers who were in support of establishing permanent vaccination centres

The analysis also showed that 85% of the health workers supported the establishment of permanent vaccination centres as a way of eradicating polio compared to 5% who were not in support as shown in Figure 15.

4.2.7 Comparison of the distribution of the health workers who were aware of the vaccination of children <5years of their colleagues and friends / neighbours

Figure 16 shows the distribution of health workers who were aware of the vaccination of children (0 – 5 years) of their colleagues and friends/ neighbours. The bar graph shows that 80.8% of the health workers were aware that all of their colleagues vaccinated their children against polio compared to 67.1% who were aware that all of their friends/ neighbours vaccinate their children against polio. However, only 0.8% and 1.3% of the health workers were not aware about the vaccination of children of either their colleagues or their friends/ neighbours.

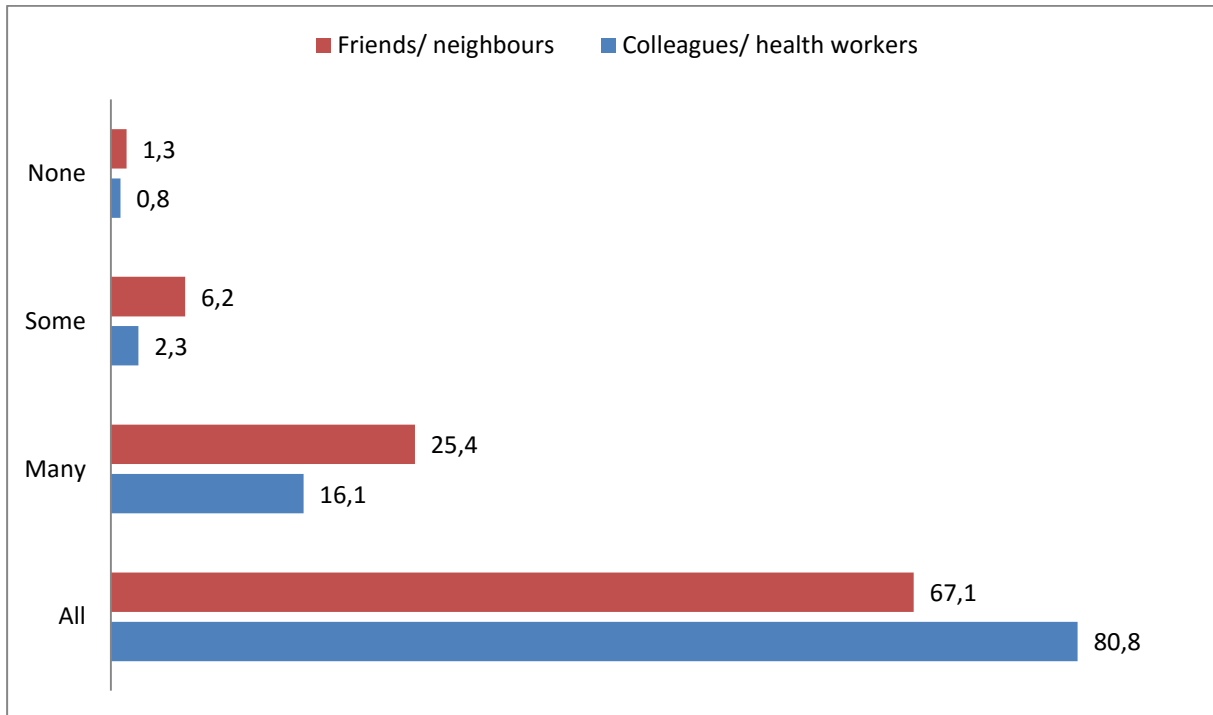


Figure 16: Comparison in the distribution of health workers with regard to vaccination of children (0 – 5 years) of their colleagues and friends/ neighbours

4.2.8 Distribution of health workers with knowledge about people who refused polio vaccination for their children

The distribution of health workers with knowledge about people who refused polio vaccination for their children is shown in Figure 17. The majority of the health workers (64%) had no knowledge about anyone who had refused polio vaccination of their children while 29% had knowledge about a few individuals who had refused. A further 7% of the health workers had knowledge about many individuals who had refused vaccination of their children against poliomyelitis.

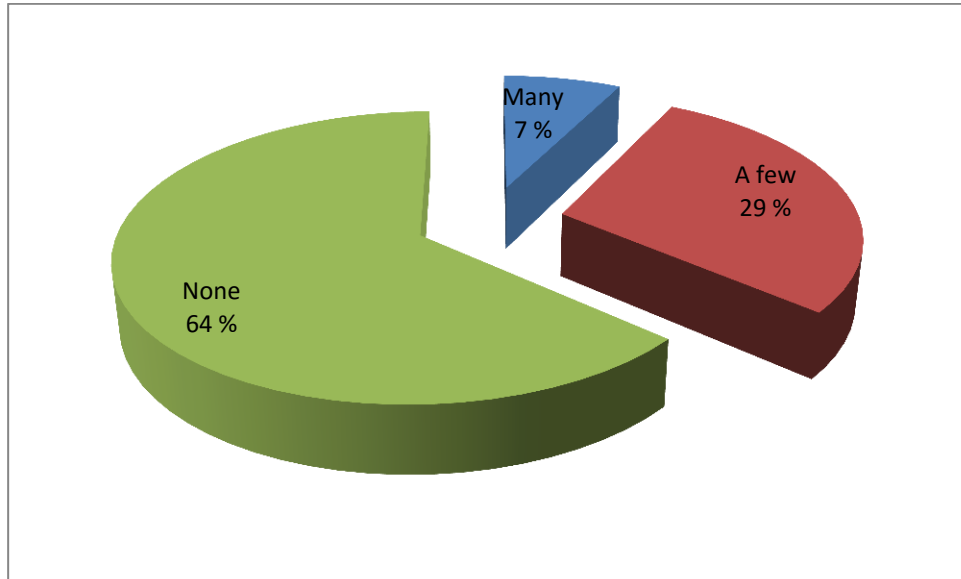


Figure 17: Distribution of health workers with knowledge about people who refused polio vaccination for their children

4.2.9 Reasons for refusal of polio vaccination

Table 10 shows the distribution of the reasons for refusal of polio vaccination by their importance. Lack of awareness was the most important reason for refusal according to 61.9% of the health workers. 39.1% of the health workers thought that the refusals were due to believing that the vaccination was harmful whereas 35.5% thought that the head of family/ elders not giving their permission was the most important reason for refusal.

Table 10: Reasons for refusal of polio vaccination

Reasons	Importance of the reasons against vaccination			
	Very important	Important	Not important	Do not know
Believing it is harmful	151 (39.1)	183 (47.4)	30 (7.8)	21 (5.4)
Head of family/ elders not giving their permission	137 (35.5)	162 (42.0)	55 (14.2)	30 (7.8)
Not being visited by vaccination workers	117 (30.3)	146 (37.8)	87 (22.59)	35 (9.1)
Believing it is unnecessary	148 (38.3)	175 (45.3)	38 (9.8)	24 (6.2)
Lack of awareness	239 (61.9)	128 (33.2)	11 (2.8)	7 (1.8)
Other	5 (1.3)	4 (1.0)	1 (0.3)	2 (0.5)

Chapter 5 Discussion

5 Discussion

5.1 Main Objective

The main objective of this study was to identify obstacles to optimal function of the polio eradication program in 33 high risk districts in Pakistan.

While the specific objective was:

Health workers' views and experiences relevant to function of the immunization program and polio immunization in particular.

5.2 The strengths of the study

A large sample size was available for analysis due to the many questionnaires that were completed. The data represents health workers coming from all the different tribes, districts and communities in the northwest of Pakistan, along the Pakistan-Afghanistan border and in the capital. Most of the respondents belong to the areas worst affected by poliomyelitis. A majority of them was ethnically Pashtun. This is important because a majority of the children with polio are of Pashtun origin. The questionnaires mostly represent health workers who both belong to and work among the worst affected ethnic group. It also represents those who work in the main government teaching hospitals with the largest numbers of patients of the lowest socio-economic backgrounds (refugees and internally displaced people). These are the patients worst affected by poliomyelitis.

The questionnaires were distributed by colleagues who made them feel safe. Many of them said that if a big international aid agency had come into their hospital surrounded by security personnel they might have felt compelled to answer a certain way.

5.3 Weaknesses of the study

The questionnaire had several similarly formulated questions. The researcher experienced that several of the respondents grew impatient while completing the questionnaire, because they were in busy hospital wards. Distributing 400 questionnaires produced a large quantitative of data. Reading, controlling and recording data from 386 questionnaires took many weeks. The researcher should have had an assistant. Using exponential non-discriminative sampling method also meant that the researcher has little control over the sampling method. The subjects obtained relied mainly on the previous subjects that were interviewed.

Representativeness of the sample is not guaranteed. Initial subjects tend to nominate people that they know well. The subjects share the same traits and characteristics, thus, it is possible that the sample that the researcher obtains is only a small subgroup of the entire population.

5.4 Discussion of the results

57,5 % of the health personnel, majority of Pashtun origin, thought that gastroenteritis was the most important health challenge. Only 1.6% of the health workers thought that poliomyelitis was the most important health challenge. This is a surprising result when thinking about the intensive campaigning both targeting the health workers and the population in general. This does however fit the statistical data from international agencies which shows that the major health challenges are infectious diseases. (53-55) While interviewing one of the district manager (of GPEI) in Khyber-Pukhtoonkhwa said that they had a policy of follow-up visits in homes where parents refused vaccinating their children. He said that during one of his home visits in a remote village in a mountainous region the father of the child was very surprised to see him. The father told him that when the children were ill earlier and he had taken them to the hospital no health personnel had time to see them, but when he refused vaccinating them against polio a doctor came to his home to talk to him. The father said that this made him even more suspicious about the true contents of the vaccine.

77.5% of the health workers said that BCG was the most important vaccine compared to 4.4% who said that OPV for polio was the most important as shown in Table 7. One possible explanation for this is that BCG is the one of the most established vaccines in the world and therefore it is easy to nominate as most important. Another explanation is that it is a poorly formulated question and therefore the respondents were unclear about how to answer.

Eighty-six (22.3%) of the 386 health workers were either working or had worked for the campaign to eradicate polio. When asked whether the campaign was running effectively, 49.7% of the health workers said yes. When asked further to rate the eradication campaign, 47.4% were satisfied and 2.6% thought that the campaign was excellent. However, 40.4% and 8.8% thought that the campaign was either deficient or poor respectively. One of the reasons below 50% were satisfied with the effectiveness of the campaign might be that they still hear about new cases of poliomyelitis.

The reasons why the polio campaign was viewed as weak by the health workers, who thought the campaign was poor or deficient, are presented in Table 9 Over 50% of the health workers thought that safety and security issues were making the polio campaign weak compared to 2.6% who thought that the safety and security issues were not a deterrent since safety and security issues were excellent. Figure 13 shows the distribution of health workers who thought that issues such as planning and safety and security issues are making the polio campaign poor. Safety and security issues tops the reasons for the campaign being poor while supportive follow-up and supervision are second and third respectively.

Eighty-eight percent (88%) of the health workers said that the oral polio vaccine via SIA must be continued compared to 6% who opinioned for its cessation. This shows that a majority of health workers support SIA. The analysis also showed that 85% of the health workers supported the establishment of permanent vaccination centres as a way of eradicating polio compared to 5% who were not in support as shown in Figure 15. Health workers strongly support both the SIA and establishment of permanent vaccination centres.

80.8% of the health workers were aware that all of their colleagues vaccinated their children against polio compared to 67.1% who were aware that all of their friends/ neighbours vaccinate their children against polio. However, only 0.8% and 1.3% of the health workers were not aware about the vaccination of children of their colleagues or their friends/ neighbours. The majority of the health workers (64%) had no knowledge about anyone who had refused polio vaccination of their children while 29% had knowledge about a few individuals who had refused. A further 7% of the health workers had knowledge about many individuals who had refused vaccination of their children against poliomyelitis. This shows that a majority of people in the health professionals sphere vaccinate their children. An explanation for this might be that Pakistan's population is divided into socio-economic classes which means that one hardly socialize with people outside ones class. However, a minority do know someone who did not vaccinate their children. On the other hand, my respondents work at the biggest public hospitals in the worst affected areas. Their experiences are therefore relevant. In one of my interviews a female medical doctor told me that her private driver had not vaccinated any of his children against poliomyelitis. He had told her that he was suspicious of the ingredients in the vaccine and was scared sterilize his children. He believed that the vaccine was a biological weapon to decrease the amount of Muslims in the world. There were many such stories given by the health professionals. This lack of trust might have several causes. One of the reasons might be the mistrustfulness which already exists towards Pakistani national campaigns and international campaigns due to historical events in the Pashtun history (please, read the ethnographic chapter). There is also a lack of trust in the public health care sector (please, read the chapter on health care in Pakistan). Last but not least, the combination of regular drone attacks in FATA and the false vaccination campaign which lead to the capture of Osama bin Laden has also made people suspicious (34, 37, 100-102)

Lack of awareness was the most important reason for refusal of polio vaccination according to 61.9% of the health workers. 39.1% of the health workers thought that the refusals were due to believing that the vaccination was harmful whereas 35.5% thought that the head of family/ elders not giving their permission was the most important reason for refusal. Refusal may reflect a lack in trust in vaccinators. Reports from the worst affected areas show that

caregivers trust in vaccinators was half of the Pakistan average of 61%. The Independent Monitoring Board for the Polio Eradication Initiative is viewing the number of persistently missed children during vaccination rounds of the greatest concern. They want to use the numbers of missed children as a key metric of performance. Reasons for missed children fall into four broad categories: 1. The vaccination team did not turn up on schedule. 2. Child unavailable during vaccination rounds 3. Parental refusal 4. The population was unavailable for vaccination. (1) Several of the health workers, who had worked for the Polio Eradication Initiative, told me that the vaccinators often only visited the houses in the main streets during their vaccination rounds. This led to the same children being vaccinated multiple times, sometimes 10-40 times, while those living in the back alleys never got a single dose of OPV. The reasons given were low salaries and lack of time.

Words from a 32 year old training medical officer in Peshawar who had worked with the Polio Eradication Campaign in Khyber-Pukhtoonkhwa for many years (as a supervisor):
“USA and NATO forces attack with drones and kill people and simultaneously give vaccines that are supposed to save people from disease and death, this makes people very suspicious.”
“The vaccinators are paid very little. They get 150 rupees / day = \$ 1,5 / day. The campaign lasts for three days. There is one campaign every 45 days. The workers are paid very little for a full campaign (4days x 150 rupees = approximately 5 dollars for a full campaign. Many places supervisors only pay the workers for three days and keep one day pay for themselves when they should be paid for four days.”

“Lady Health Workers (LHW) work is family planning, child / maternal health, nutrition and hygiene in the villages. Often LHWs are also used by the polio eradication campaign. It adds to their work load, but they are not compensated for this. The areas where LHWs are used are covered (children are vaccinated), but in the uncovered areas social workers are used. The social workers are the main problem. Many of these are untrained people.”

The statements above describe some of the main obstacles to the eradication of poliomyelitis.

Chapter 6 Conclusions and recommendations

6 Conclusions and recommendations

During the last six years several health workers associated with the polio eradication campaign has been injured and killed. The latest case occurred in January 2016 when a suicide bomber killed 15 people outside a polio eradication center in Quetta. The remaining endemic areas and those with outbreaks a couple of common denominators: Areas of insecurity and the disruption to infrastructure. The IMB therefore recommends a “Golden Rule” which states that in every security-compromised area where vaccination is to take place there should be a security plan in place. This security plan should be in agreement with the relevant district and local powers.

The numbers in 2015 are much better than the year before. In 2015 there were 54 confirmed cases of WPV. This is a decline of 82% compared to 2014 (306 cases). The number of infected districts was reduced from 40 (2014) to 21 (2015). However, children from Pashtu-speaking families were 3.4times (relative risk) more likely to be positive compared to non-Pashtu speakers. (1, 32)

The challenge for Pakistan’s program, which is much better coordinated in 2016 than in 2015, is to stop the transmission in Peshawar and the surrounding areas.

Lack of awareness was the most important reason for refusal of polio vaccination according to my respondents. According to the National Emergency Action Plan for Polio Eradication 2015-2016 the government has rolled out a revamped communication strategy targeting vaccinators and promoting vaccination acceptance. The objective of this is to increase the chances of success for the vaccinator at the door-step of the unreached child. (32)

IMB estimates that at least 800 millio – 1 billion dollars are needed per year to interrupt polio transmission by 2016 (1)

The future of the polio eradication campaign looks brighter this year than ever, but there are political facets to this issue that is outside the sphere of control of the health authorities, NGOs and other health organizations. One can only hope that this improves in the foreseeable future.

6.1 Future research implications

This study shows that the health personnel, working at the public teaching hospitals and Polio campaign field supervisors or Area-In-Charges (AICs) in Khyber-Pukhtoonkhwa and Islamabad, are open and honest about the challenges facing the polio eradication campaign. The Independent Monitoring Board of the Polio Eradication Initiative recommends using qualitative research to pinpoint the reasons for children being consistently missed. (1) This shows that in spite of security issues it is possible to approach health personnel in the affected areas with a qualitative study.

The quantitative data from this cross-sectional study is especially suited to generate hypothesis that can be tested later.

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Appendices

6.2 Health worker questionnaire



UiO : **University of Oslo**

Questionnaire – Health research Pakistan 2013

This is a part of a M. Phil thesis in International Community Health at the Medical Faculty at University of Oslo, Norway.

Main objective of the research:

Identify obstacles to optimal function of the polio eradication program in 33 high risk districts in Pakistan.

Your views are highly appreciated.

By answering this questionnaire you are consenting to take part in this research project.

Your response is anonymous and the data will be kept strictly confidential.

Kind Regards,

Institute of Health and Society

Medical Faculty

University of Oslo

Norway

Encircle the best option that is relevant to the respective question

1. Profession:

Doctor:	Nurse:	Vaccinator:	Other
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Only answer question 2 and 3 if you are a medical doctor:

2. Role in the health service:

H.O.:	Training Medical Officer:	Consultant:	H.O.D.:	M.S.:	Other:
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3. Your specialization:

Ear Nose Throat

- Plastic Surgery
- Gyneacology
- Medicine
- Surgery

Paediatrics

Dermatology

Ophtalmology

Gastroenterology

Cardiology

Other

4. Place of work:

- Pakistan Institute of Medical Sciences (PIMS)
- Khyber Teaching Hospital (KTH)
- Naseer Teaching Hospital (NTH)
- Abbottabad
- Lady Reading Hospital (LRH)

5. Years of working in the health services:

Less than 2 years	2-4 years	5-7	7 or more years
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6. Years of higher education (after secondary school):

Less than 3 years	3-5 years	More than 5 years
-------------------	-----------	-------------------

7. Gender:

Male:	Female:
-------	---------

8. Age:

20-30:	31-40:	41-50:	More than 50 years
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9. Ethnicity:

Pashtun:	Punjabi:	Sindhi:	Balochi:	Kashmiri:
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Other:

10. Your place of birth (district):

11. Your place of residence (district):.....

12. Tribe.....

13. Regarding children's (between 0-5 years old) urgent health issues in Pakistan, please list, in your opinion the five most important health challenges. 1 being the least important and 5 being the most important.

5 most important health challenges for children between the ages of 0 and 5

Health challenges	Given priority from 1-5
<ol style="list-style-type: none"> 1. Respiratory Tract Infections 2. Gastroenteritis 3. Poliomyelitis 4. Tuberculosis 5. Measles 6. Urinary Tract Infections 7. Conjunctivitis 8. Skin rashes / infections 9. Allergy 10. Asthma 11. Hepatitis 12. Parasite infestation 13. Meningitis 	

14. Tetanus	
15. Other.....	

14. Regarding childhood vaccination (0-5 yrs old), IN YOUR OPINION, rate the importance of these vaccines (ranging from 1 -5, where 1 being least important and 5 is the most important).

Vaccine		Number of importance
BCG	Childhood TB (one dose)	
OPV	Poliomyelitis (four doses)	
Pentavalent vaccine (DPT+HepB+Hib)	Diphtheria, Tetanus, Pertussis, Hepatitis B, Hib pneumonia and meningitis (three doses)	
Measles	Measles (two doses)	
Pneumococcal conjugate vaccine (PCV 10)	Pneumonia and meningitis due Pneumococci (three doses)	

15. Are you currently working or have you previously worked with the polio vaccination campaign?

Yes:	No:
------	-----

16. Is the campaign running effectively?.....

If not, what is the reason?.....

17. What do you think of the Polio eradication campaign?

.....

18. Poor (answer question 19) Deficient (answer question 19)
 Satisfactory Excellent

If you answered **Poor** or **Deficient** on question 18 answer the question below.

**19. In your point of view, which of the options below makes the campaign weak?
 Rate according to the respective issues seperately**

Causes:	Excellent	Satisfactory	Deficient	Poor
Planning				
Management				
Supervision				
Recording /Reporting				

Safety and security issues				
Supportive follow-up				
Lack of vaccines/equipment in the clinic (logistics)				
Parental access to the health worker / vaccination sites				
Understandable information to the public				
Resistance to follow advice from health workers				

Other.....

20.

	Yes	No	Don't know
In your point of view, should the polio vaccination campaign continue distributing Oral Polio Vaccine via Supplementary Immunisation Activities (door-to-door campaign)?			

Lack of awareness				
Other				

Thank you for your time and thoughts!

6.3 Letters of ethical clearance



UNIVERSITY OF OSLO
FACULTY OF MEDICINE

Regional Committee for Medical Research Ethics
Southern Norway, Section D
Post.Box 1130 Blindern
NO-0318 Oslo

Telephone: 22 84 55 23

Date: 24th of October 2013
Your ref.:
Our ref.: 2013/1948

E-mail: post@helseforskning.etikkom.no
Homepage: <http://helseforskning.etikkom.no>

Dear Nadia Khan,

Re: Why are children in the 33 districts of Pakistan with high incidence of poliomyelitis not protected against polio?

I am writing in reference to your preliminary project application form received on the 10th of October 2013.

The aim of the study is to evaluate the vaccination program for polio in Pakistan. The data will be based on questionnaires answered by health workers in Islamabad.

This questionnaire can in no way be linked to the informant, and is thus anonymous. Also it seems that this project will not lead to new knowledge regarding health and disease, as understood in the Norwegian Health Research Act § 2 and § 4. It therefore falls outside the remit of REC.

REC has considered your preliminary application, and has concluded that a full application to REC is not necessary. The project can be done without the approval by the the Regional Committees for Medical Research Ethics of Norway.

Yours Sincerely

Finn Wisløff
Chair of the Regional Committee for
Medical Research Ethics of Southern Norway
(P.P.)
Section D

Emil Lahum
Higher Executive Officer

Region: REK sør-øst A
Saksbehandler: Jørgen Hardang
Telefon: 22845516

Vår dato: 29.04.2013
Vår referanse: 2013/689a
Deres dato: 8.4.2013
Deres referanse:

Nadia Khan
M.Phil in International Community Health
Institute of Health and Society, Faculty of Medicine
University of Oslo
Postbox 1130 Blindern
0318 Oslo

Re 2013/689a Why are children in the 33 districts of Pakistan with high incidence of poliomyelitis not protected against polio?

Project manager: Nadia Kahn

A description of the project was received on 8 April 2013 with the following enclosure: "Research protocolNYrec".

The project has been assessed in accordance with the Norwegian Research Ethics Act of 30 June 2006 and Act on Medical and Health Research (the Health Research Act) of 20 June 2008. The study does not include/contain any research questions concerning new methods of diagnosis or of treatment of disease.

This research project is considered to be outside the remit of the Act on Medical and Health Research and therefore can be implemented without the approval from the Regional Committee for Medical Research Ethics.

Yours faithfully


Jørgen Hardang
Committee Secretary

Besøksadresse:
Gullhaug torg 4A
0484 Oslo

Telefon: 22845511
E-post: post@helseforskning.etikkom.no
Web: <http://helseforskning.etikkom.no>

Vi ber om at alle henvendelser sendes inn via vår saksportal eller på e-post. Vennligst oppgi vårt referansenummer i korrespondansen.



**OFFICE OF THE
DIRECTOR
RESEARCH AND DEVELOPMENT CELL**
Khyber Medical College, Peshawar Pakistan.

No. _____/RD/Cell/KMC

Dated. _____/2013

Dear Dr. Nadia Khan

Re: Why are children in the 33 districts of Pakistan with high incidence of poliomyelitis is not protected against polio?

I am writing in reference to your preliminary project application form received on the 10th of October 2013.

The aim of the study is to evaluate the vaccination program for polio in Pakistan. The data will be based on questionnaires answered by health workers in Islamabad and Khyber-Pukhtoon khwa.

This questionnaire can in no way be linked to the informant, and is thus anonymous.

Also it seems that this project will not lead to new knowledge regarding health and disease, as understood in the KTH, Peshawar Bioethical Research Guidelines. It therefore falls outside the remit of the Ethical Committee.

We have considered your preliminary application and have concluded that a full application to the Ethical Committee is not necessary.

The project can be done without the approval by the Committee for Medical Research Ethics.

DIRECTOR
Research & Development Centre Cell
Professor Dr. Zafar Hayat
Khyber Teaching Hospital Peshawar

6.4 Letters of No Objection

To whom it may concern

Letter of introduction and recommendation of Dr. Med. Nadia Kahn

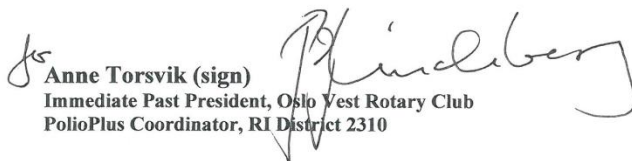
As Immediate Past President of Oslo Vest Rotary Club, Norway, and PolioPlus coordinator of Rotary International District 2310, I have the pleasure to recommend Dr. Nadia Kahn as a highly qualified medical doctor and researcher within the sector of public health studies at the University of Oslo.

We hope you, as fellow Rotarians in Islamabad, Peschawar and possibly other Pakistani locations, will be able to support her field efforts related to vaccination programs and other public health issues in your regions. Dr. Kahn is not in need of financial support for her field work, but would greatly appreciate appropriate introductions to relevant contacts within the local PolioPlus programs and other public health services.

Dr. Med. Nadia Kahn has her medical degree from Khyber Medical University and has been authorized as a medical doctor by the Norwegian authorities. She has excellent recommendations from her professors at the University of Oslo and the National Public Health Institute.

Dr. Kahn was born and raised in Norway by Pakistani parents of Pashtun background. Consequently, she speaks Pashtun, Urdu, English and Norwegian as well as some Hindi. This, as well as the fact that she is a woman medical doctor, gives her a unique advantage in her coming field work in Pakistan.

Sincerely yours,


Anne Torsvik (sign)
Immediate Past President, Oslo Vest Rotary Club
PolioPlus Coordinator, RI District 2310

Due to Anne Torsvik's current stay abroad, this document has been verified/stamped by the club secretary of Oslo Vest Rotary Club, Per Gustav Lindeberg..



Oslo Vest Rotary Klubb
Schafteløkken, Zahlkasserer Schafts Plass 1, N-0267 Oslo
Web: <http://oslovest.rotary.no/>, E-post: 2310.oslovest@rotary.no
Org.nr: 883 814 932

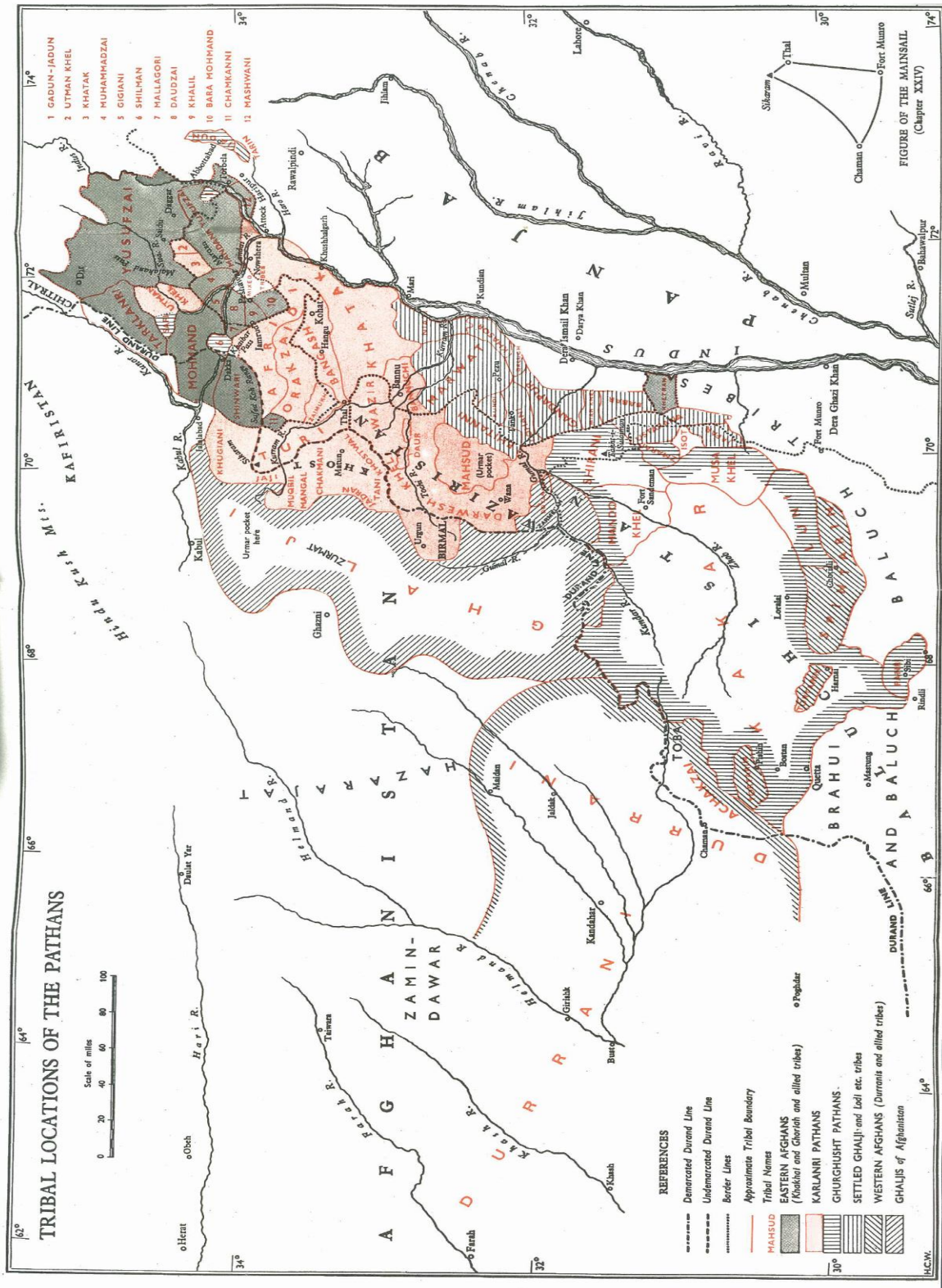
25 October 2013

To whom it may Concern

We confirm that Dr. Nadia Khan met with Per Engebak (Chief, Polio Pakistan) and Dr. Shamsheer Ali Khan (High Risk Co-Ordinator-Polio,) on the 21.October 2013. We have no objection to Dr Nadia Khan conducting her research in the concerned districts in Pakistan.



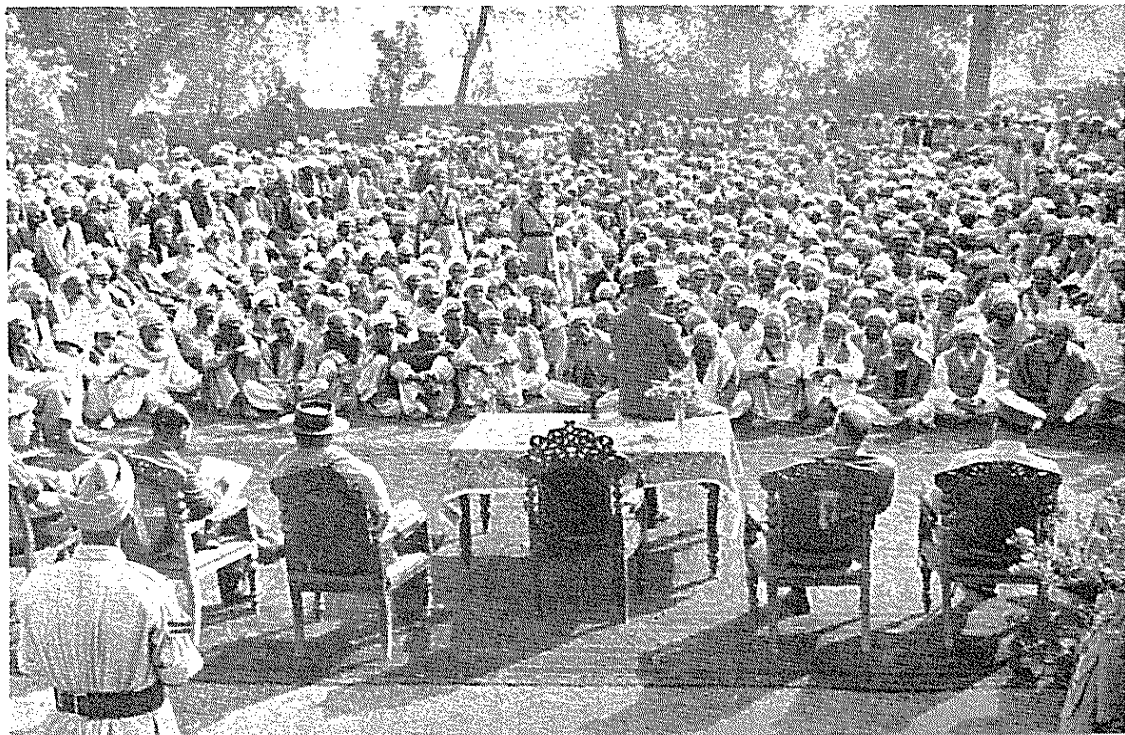
Per Engebak
Chief, Polio Pakistan



Source: Caroe, O.K. *The Pathans, 550 B.C.-A.D. 1957* (1983), Oxford University Press (48)

6.6 Historical illustrations

This depicts a jirga which is a traditional assembly of leaders that make decisions by consensus and according to the teachings of Islam. It predates modern-day written or fixed-laws and is conducted to settle disputes among the Pashtun. This shows Afridis (subclan among Pashtoons) in FATA.



'Life' photo.

AFRIDI JIRGA, ACCESSION TO PAKISTAN

DYNASTIC FRAMEWORK

NOTE: This Table shows dynasties which controlled Gandhara (Peshawar Valley) or, in later years, had Afghan and Pathan subjects. Only those rulers known to have themselves influenced the course of history in this area are mentioned.

The Umayyid and Abbasid Caliphates never reached east of the Helmand and are therefore excluded. For similar reasons I exclude the Afghan dynasties of Delhi — Khalji, Lodi and Sur — which never controlled west of the Indus. Both Muhammadzai Barakzai dynasties are included, although they never controlled Peshawar.

(L = local capital)

<i>Dynasty</i>	<i>Capital</i>	<i>Date-bracket</i>	<i>Rulers</i>	<i>Comment</i>
1. Achaemenian (Iranian).	Susa, Persepolis, L. Paskapuros (Peshawar) and Peucelaotis (Charsadda).	550-331 B.C.	1. Cyrus, 2. Darius the Great, 3. Xerxes, 4. Darius Codomannus.	Many of the Great Kings are omitted from this list.
2. Macedonian (Hellenic).	Pella, Babylon, Susa, L. Peucelaotis (Charsadda).	327-305 B.C.	Alexander the Great, Seleucus.	Seleucus lived till 280 B.C. but was expelled from Gandhara in 305. Asoka's date 264-227 B.C. Apostle of Buddhism.
3. Mauryan (Indian).	Pataliputra (Patna).	323-190 B.C.	Chandragupta, Asoka.	In Bactria dynasty founded 256 B.C. Gandhara conquered 185 B.C. Scythian nomads, akin to Parthians.
4. Graeco-Bactrian (Iranian with Greek veneer).	Taxila.	185-97 B.C.	Demetrius, Menander.	
5. Saka (Iranian).	Taxila.	97 B.C.- A.D. 5.	Maves, Azes I.	

2

Dynasty	Capital	Date-bracket	Rulers	Comment
6. Indo-Parthian (Iranian).	Taxila.	A.D. 7-75	Gondophares.	Overflow from the great Arsacid dynasty of Persia, 249 B.C.-A.D. 225.
7. Kushan (Iranian, with Indian affinities in later years).	Purushapura (Peshawar).	A.D. 60-225.	Kadphises I and II, Kanishka, Vasishka, Huvishka, Vasudeva.	Kanishka, the second great apostle of Buddhism. In its closing years this dynasty embraced Brahminism.
8. Sassanian A. (Iranian).	Stakhr, L. Paskiboura (Peshawar).	A.D. 230-365.	Ardashir, Shapur (240-73).	This dynasty held Persia for over 400 years (226-642). Power extended to Indus during two separate periods — see 11.
9. Kidarite (Iranian?)	Uncertain.	A.D. 365-455.	Kidara.	Driven out of Bactria by 10.
10. White Hun <i>alias</i> Ephthalite or Haytal (Turkish).	Balkh L. Sakala (Sialkot).	A.D. 455-550.	Toramena, Mihiragula.	In Bactria lasted to 568, when defeated by Sassanians.
11. Sassanian B. (Iranian).	Stakhr, Ctesiphon, L. uncertain.	A.D. 568-644.	Khusrau I, Khusrau II, Yazdgard.	Defeated by Arabs at Nihawand in 642 (H. 21).
12. (a) Kabul Shahi. (b) Rutbil or Zunbil (Turco-Iranian).	(a) Kabul (b) Uncertain, but near Ghazni.	A.D. 650-870.	(a) Spalapati? (Kallar). (b) Rutbil, a title, name unknown	Probably of mixed Kushan and Haytal origin, with Indian affinities. Not Muslims.
13. Saffarid (Iranian and Muslim).	Zaranj (Sistan).	A.D. 861-900.	Yaqub-i-Lais, Amr-i-Lais.	Yaqub took Kabul from 12 (a) in 870 and founded Ghazni. He never controlled Gandhara.
14. Hindushahiya (as 12, but Indianized).	Ohind (Hund or Labor on Indus in Gandhara).	A.D. 870-1021	Samand, Kamalu, Bhim, Jaipal Anandpal.	Probably same dynasty as 12 (a). The last Hindu power in this region.

DYNASTIC FRAMEWORK

Dynasty	Capital	Date-bracket	Rulers	Comment
15. Ghaznawid (Turkish <i>manluk</i>).	Ghazni.	A.D. 960-1150.	Sabuktigin, Mahmud, Masud.	The first Muslims to rule in Gandhara.
16. Ghorid (possibly Tajik, viz. Iranian).	Firoz Koh, Ghazni and Delhi.	A.D. 1181-1206.	Alauddin Jahansoz, Muizzuddin Muhi-i-Sam.	Defeated 14. Scarcely extended rule to Peshawar except as passage-way.
17. Khwarezm Shahs (Seljuk Turk).	Urgench.	A.D. 1210-1220.	Muhammad, Jalaluddin.	Controlled Ghazni. Anarchy in Peshawar.
18. Chingizids (Mongol).	Almalik on Ili River.	A.D. 1220-1369.	Chingiz, d. 1227, Chaghatai, d. 1241. Successors of little importance.	Swept away by Chingiz Khan, No. 18. Period of anarchy in Peshawar and in most of Afghan country.
19. Timurids (Turco-Irano-Mongol).	Samarqand, L. Kabul, Kandahar, Herat.	A.D. 1380-1501.	Tamerlane, d. 1404. Shahrukh, Abu Said Ulugh Beg II (1469-1501), Husain Baiqara in Herat and Kandahar.	Delhi dynasties failed to control from their side. Period of dynastic strife and anarchy in Afghan and Pathan country.
20. Mughal (Turco-Iranian).	Delhi, Agra, L. Kabul, Peshawar.	A.D. 1526-1739.	Babur, Humayun, Akbar, Jahangir, Shah Jahan, Aurangzeb.	Ulugh Beg II ruler of Kabul. Derived title from 19, Ulugh Beg II having been Babur's uncle. Until 1581 Kabul and Peshawar held as fiefs by younger brothers.
21. Afshar (Tuckmen).	His throne his saddle	A.D. 1739-47.	Nadir Shah.	Nadir obtained cession of trans-Indus territory from 20
22. Durrani, Saddozai Popalzai (Afghan).	Kandahar, Kabul, L. Peshawar.	A.D. 1747-1818.	Ahmad Shah, Timur Shah, Shah Zaman, Shah Mahmud, Shah Shuja.	The first Afghan dynasty.

<i>Dynasty</i>	<i>Capital</i>	<i>Date-bracket</i>	<i>Rulers</i>	<i>Comment</i>
23. Sikhshahi (Panjabi).	Lahore.	A.D. 1823- 46.	Ranjit Singh, d. 1839.	Ranjit began ruling about 1800, but only took Peshawar in 1823.
24. Durrani, Muhammadzai, Barakzai I (Afghan).	Kabul.	A.D. 1826- 1928.	The Dost, Sher Ali, Abdurrahman, Habibullah, Amanullah, Nadir Shah, Zahir Shah.	These dyna- sties never held Pesh- war, but ruled over about half the Afghans and Pathans.
25. Barakzai II. (Afghan)	Kabul.	A.D. 1929-		
26. British.	Calcutta and Delhi, L. Peshawar.	A.D. 1846- 1947.	East India Co. to 1858, thereafter the Crown.	Took over from Sikhs after Sikh Wars.

27. Government of Pakistan from 15th August, 1947.



'AN EUSOFZYE'

Source: Sir Robert Warburton, *Eighteen years in the Khyber 1879-1898*, Oxford University Press (43)