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Prioritization of the WASH Facilities of Khyber Pakhtunkhwa with the Help of GIS

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Abstract — *There is a lack of assessment tool that causes suboptimal allocations and wastages of limited resources all over the world in general and particular in Pakistan. This research work aims to develop a framework for the prioritization of the Water, Sanitation and Hygiene (WASH) facilities. For this purpose, indices were developed for Water, Sanitation and Hygiene (WASH) facilities and their analyses and mapping were carried out in Excel and QGIS respectively. Their results show that although coverage provided by the PHE is good, but their maintenance is not satisfactory, because of the bad maintenance maximum of the Improved Water Points (IWPs) are not working properly. Moreover, the prioritization of districts to improve WASH facilities is also carried out.*

Keywords- *GIS, WASH, Prioritization, Resource Allocation, KP*

I. INTRODUCTION

In 2015, the 193 Member States of the United Nations General Assembly (UNGA) congruently ratified the 2030 agenda for Sustainable Development (SD). The agenda for SD recognized a total of 17 Sustainable Development Goals (SDGs) and 169 global targets for development to the year 2030. This aspiring and ubiquitous agenda for SDGs is applicable for all countries and places, emphasizing that gaps in services are identified and increasingly abolished. SDG-3 is related to Good Health and Wellbeing, SDG-4 is related to Quality Education, SDG-5 Gender Equality, SDG-6 Clean Water and Sanitation and SDG-7 are related to Affordable and Clean Energy [1] Around 25 million people in Pakistan are practicing open defecation. Due to poor WASH infrastructure in Pakistan around 53,000 children below five years die per annum from diarrhea and approximately 70 % of households are drinking water that is biologically contaminated. Diarrhea can affect the children very badly, due to periodic episodes of diarrhea the children are not attending schools, as a result, they are drop out from schools. Severe diarrhea can also cause stunting in the children, around 44 % of children are facing stunting [2].

Access to safe drinking water and sanitation is a basic human necessity and right, unsafe WASH facilities may cause diarrhea, typhoid and cholera. Improved drinking water is crucially important for both women and child health. In Khyber Pakhtunkhwa, 91.3 % of the population has access to improved drinking water in 2016-2017. Disparities exist between urban and rural areas, 96.8 % of the urban and 90.2% of the rural area have access to improved water services. Also, 74.4 % of the poor and 98.8% of the richest people have access to improved drinking water indicating a clear gap between rich and poor people. Moreover, disparities exist among different regions for example Peshawar division (central KP, Plane area) has the highest access (99.2 %) to improved drinking water while Hazara Division (Hilly area) has the lowest (81.9 %) access to improved drinking water. These situations become worse in the case of sanitation, 85% of the people have access to safe sanitation facilities. Disparities exist between rural and urban areas 95 % of the urban and 83 % of the rural have access to safe sanitation facilities. Moreover, disparities exist among different regions, wealth quintiles. Majority of the poor people in rural areas haven't access to improved sanitation facilities and are practicing open defecation.
Hand washing is the most important practice in preventing not only waterborne and sanitation-related diseases but it can prevent other diseases also like the coronavirus. In Khyber Pakhtunkhwa, only 69% of the population has access to water and soap facilities [3]

Garriga et. al. [4] carried out a research work, in which they collected data both from the households and water points, then for planning purposes a tool was developed: they took the water-related indices developed by Jiménez & Foguet [5], and introduced new indices as well, then the data were analyzed for the indicators such as access to water, seasoning of water sources, water quality, sanitation coverage, open defecation, latrine sanitation condition and handwashing knowledge. This study addresses the availability of credible data, stakeholders' access to the data and an opportunity for the decision-makers to use the data for the decision making process, such as which area of the policy required modification, identifying the neediest and the classification methodology to prioritize among the various group of the population, the proposed model is a little bit unpractical and it was proposed to enhance the decision making process and data updating mechanism

II. Study Area

The study area of our research work is Khyber-Pakhtunkhwa consisted of 25 districts in 2016-2017 as shown in Figure 1.

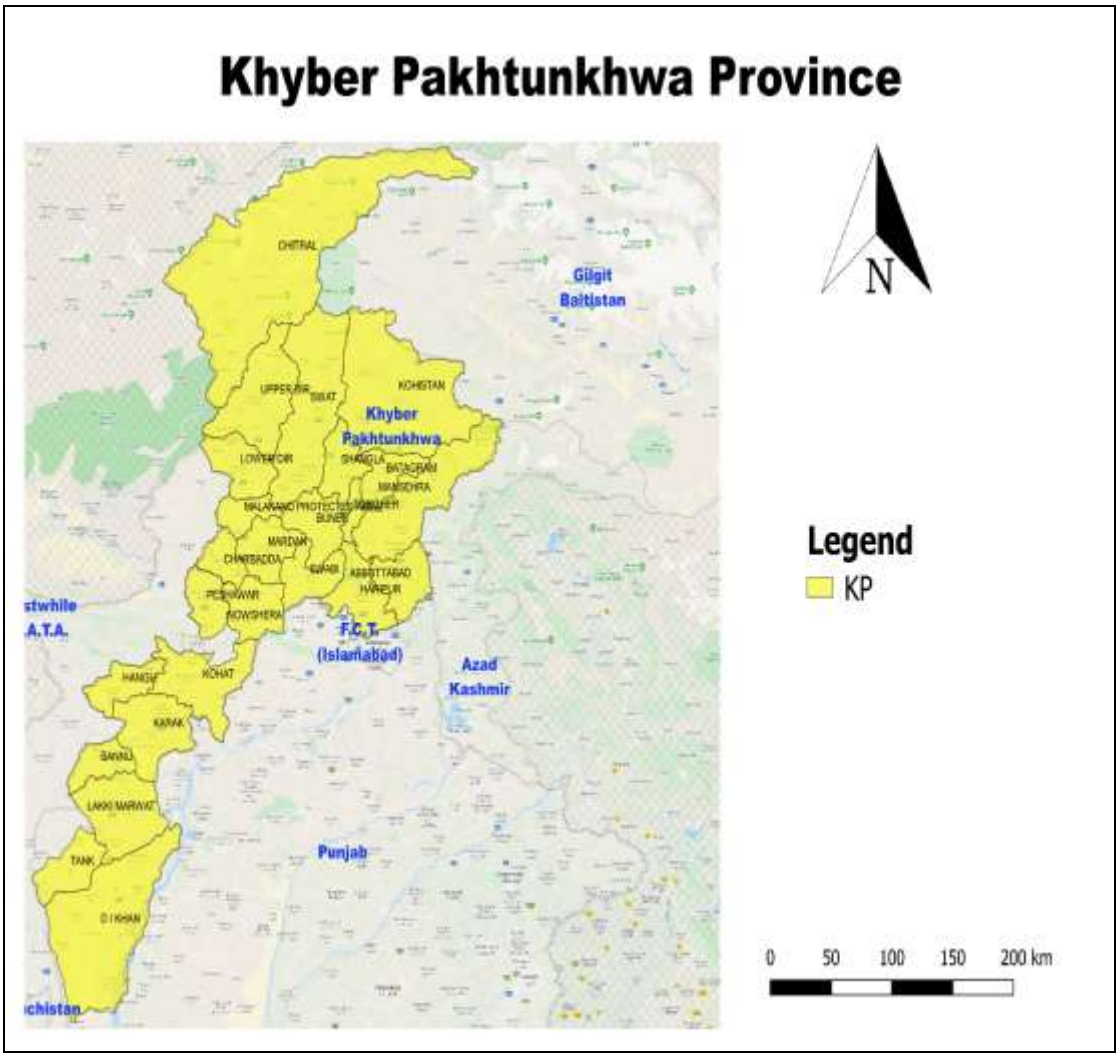

Figure 1: Study area of the research work

III. Data Collection

The data of all types of water sources like protected springs and tube wells are taken from the Public Health Engineering Department, the data contains comprehensive information about water sources:

1. How many Improved Water Points are operational in each district?
2. How many Improved Water Points are properly maintained?

Moreover, the Public Engineering department has no online database management system. The data from the MICS5 KP is also taken regarding sanitation and handwashing.

IV. Methodology

For the prioritization of the WASH services first of all, indices were developed, and based on that indices prioritization is carried out, the indices of the WASH facilities are given in Table 1.

Table 1:Indices of the WASH Facilities for Prioritization

S. No.	Index	Unit	Formula
1	Coverage Index	%	$\frac{(Number\ of\ IWP * 1000) * 100}{Population}$
2	Functionality Index	%	$\frac{(Number\ of\ FIWP) * 100}{Total\ IWP}$
5	Sanitation Index	%	$\frac{(Number\ of\ HH\ with\ ISF) * 100}{Total\ HHs}$
7	Handwashing Facilities Index	%	$\frac{(Number\ of\ HH\ access\ to\ HW\ Facilities) * 100}{Total\ HHs}$

After the development of the indices, the plotting of the indices is carried out with the help of GIS. It is elaborated From the GIS maps as shown in Figure 2, that almost every district has 100 % water coverage. Kohistan, Shangla, Mardan and Charsadda have coverage index of between 80-90%. Mardan, Charsadda, Kohistan, and Shangla need high priority 42, 28, 17, and 16 Improved water points need to be constructed in each district respectively.

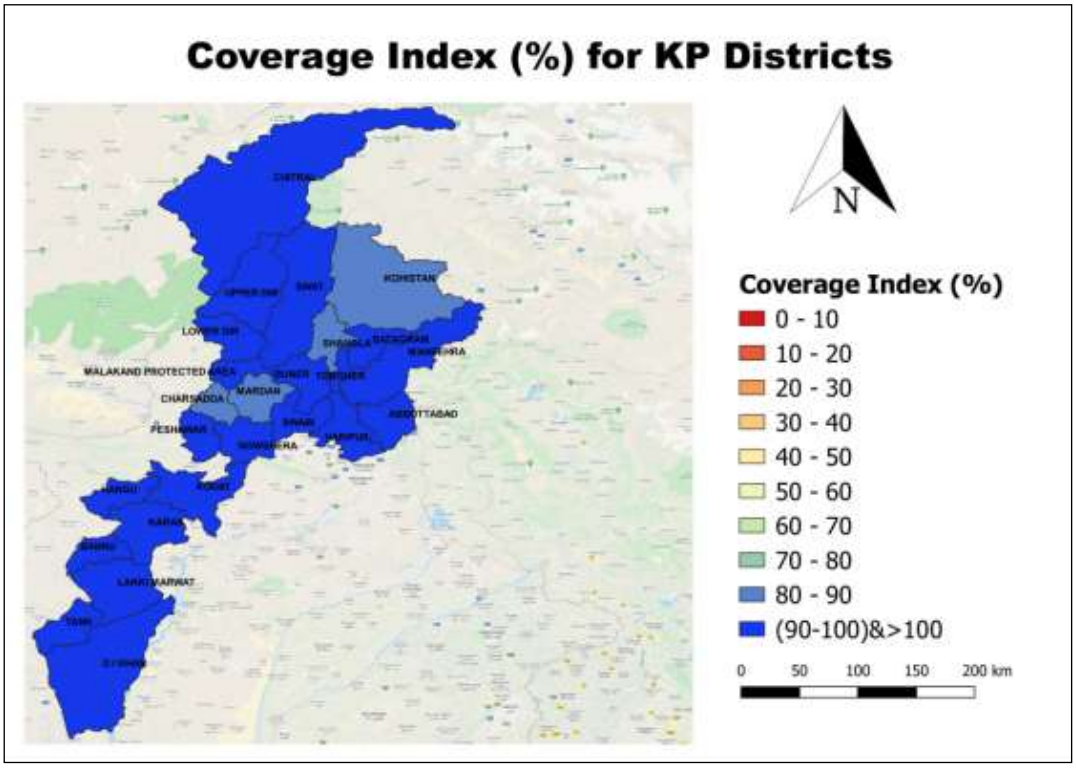

Figure 2: Water Coverage Index for KP

The maximum improved water points are non-functional in Charsadda district, and almost 100% of the water points are functional in Peshawar, Upper Dir, Shangla and Abbottabad as shown in Figure 3. Mardan and Charsadda need high priority, followed by Swabi and Kohistan. Moreover, maintenance of the improved water is very limited in KP.

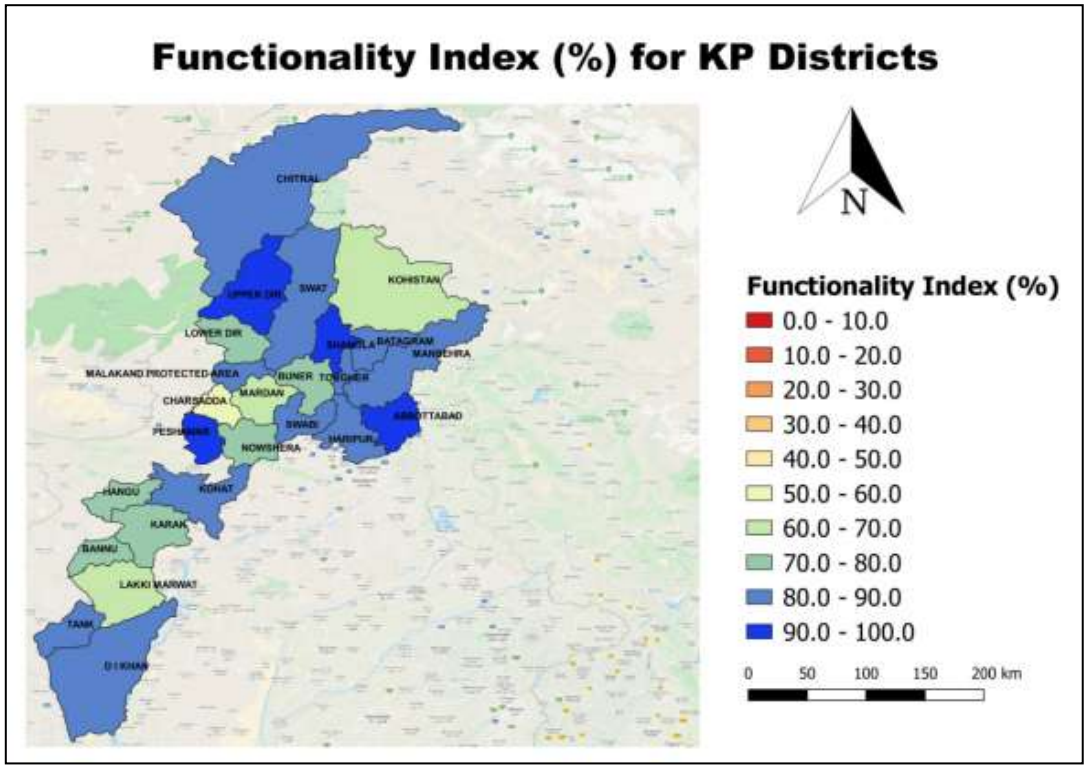

Figure 3: Functionality Index for KP

The situation of improved sanitation facilities is worst in Torgher as shown in Figure 4 and needs to be addressed. Moreover, the situation of improved sanitation facilities in Peshawar, Abbottabad and Chitral are quite good.

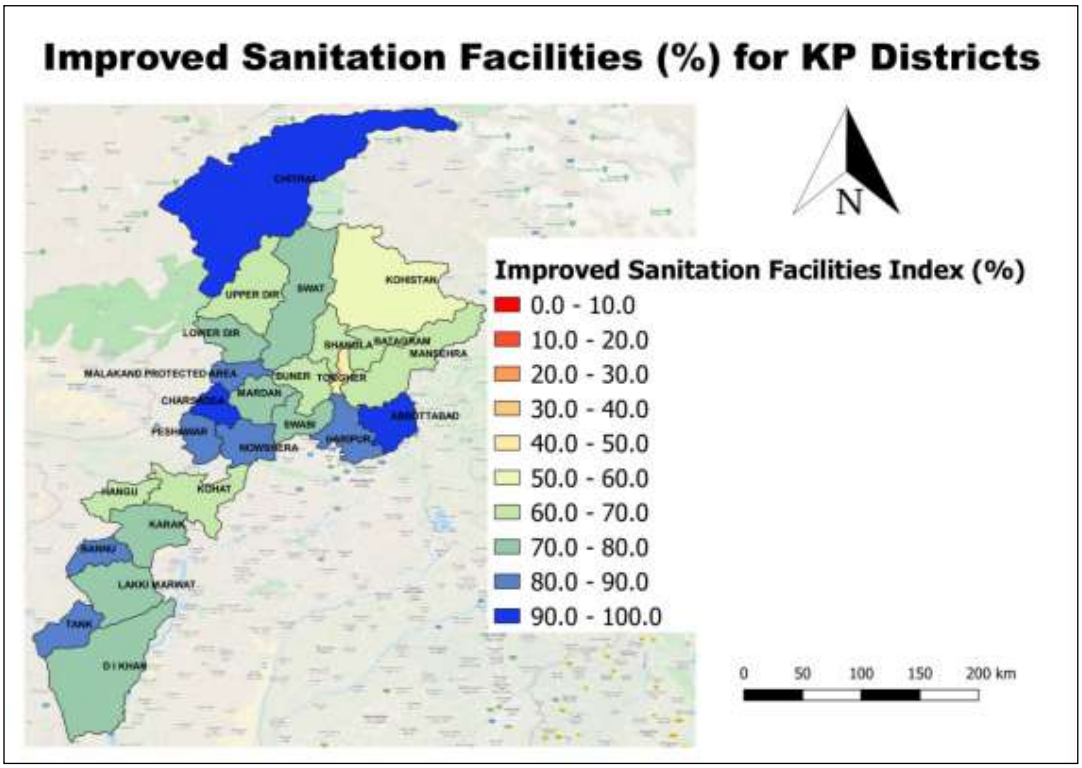

Figure 4: Improved Sanitation Facilities

Figure 5 clearly shows that District Karak has the lowest coverage of handwashing facilities and Nowshera has the highest coverage. Karak needs a high priority for the intervention to be made to improve the hygiene of the district. Torgher, Kohistan, Lakki Marwat are on the second priority to be intervened

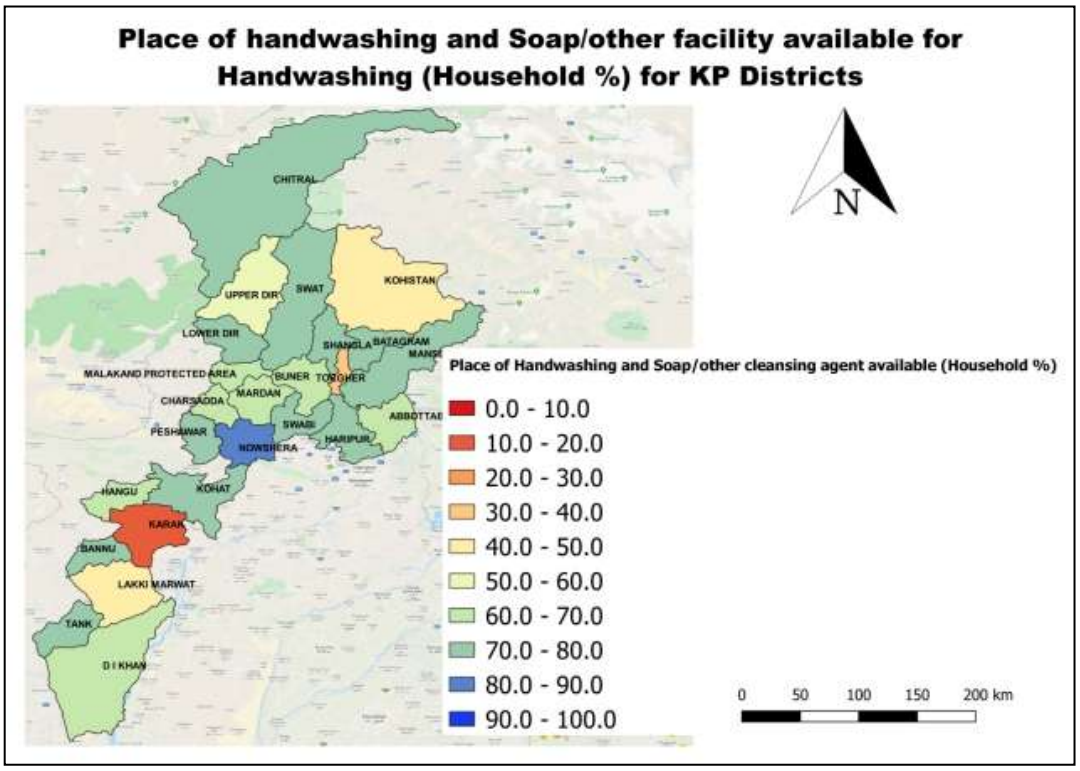

Figure 5: Handwashing Facilities of KP

V. Conclusions

Almost every district has full water coverage provided by the Public Health Engineering Department, the functionality of the water point has limited the coverage of water supply. Furthermore, maintenance of the Improved Water Points is not carried out, and many tube wells/Protected Springs are in the worst condition, because of the no maintenance of improved water points the coverage is reduced further. Because of the limited public water supply, people rely on the private water supply system.

VI. Recommendation

As the condition of the public WASH facilities is in worst conditions almost in every district of KP, intervention is necessary to improve the WASH facilities of the Public Health Engineering Department, that people may not opt for private WASH facilities, moreover, every citizen can't afford safely managed system, so public WASH facilities' improvement is indispensable.

VII. References

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