

Climate Changes and Distribution of Vector Born Communicable Disease in the Eastern Region, Afghanistan.

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ABSTRACT

Vector-borne diseases are parasitic, viral, and bacterial diseases continue to contribute significantly to the global burden of disease, and cause epidemics that interrupt health services and cause wider socioeconomic impacts around the world. Aims of this study to describe and measure the epidemiological burden and sessional variation of current Vector- Borne Diseases (VBDs) in the eastern regions of Afghanistan. This was a Retrospective descriptive study in the eastern region of Afghanistan. Data obtained from (Malaria and Leishmaniasis Information System (MLIS) and Drought Early Warning Decision Support (DEWS) reports from January 2019 to Dec 2023 of Ministry of Public Health and includes from more than 260 health facilities covering particularly all parts of the east provinces' territory. In the result identified four known VBDs in the east four provinces, overall incidences of malaria were 20.28%, Leishmania 1.62%, Dengue 0.054% and Crimean- Congo hemorrhagic Fever (CCHF) 0.0063% with low prevalence's. Province base Laghman had high incidence (27.82%) then Konar (21.36%) and Nooristan (20.28%) but Nangarhar was relatively in lower incidence (15.8%). Dengue fever firstly coming VBD which two cases were diagnosed in December 2022 and up to 30 December 2023 diagnosed 1526 cases all over district of Nangarhar province. In conclusion, four VBDs incidences have been identified in the eastern region of Afghanistan, and their cases has been clearly increasing in recent years. Their incidences mostly occurring in summer and autumn sessions, Dengue is a newly coming VBD to the Nangarhar province, its spreading is fast, therefore, will distribute more parts of the country rapidly.

Keywords: Vector-borne diseases, Climate changes, Sessional variation, Communicable diseases, Incidence

INTRODUCTION

VBDs are parasitic, viral, and bacterial diseases that are transmitted to humans by vectors. Vectors are organisms capable of transmitting infectious diseases between humans or between humans and animals (Chan et al., 2020), and it is evaluated as climate-sensitive communicable diseases at the international level with the aim of shedding view on possible future trends. The effects of climate change on VBDs are becoming an undeniable reality and are creating new challenges for public health (Githeko et al., 2000).

Climate change, which has been affecting the world for the past century, has led to an overall increase in temperatures between 1906-2005 (Change, 2013), and they have created serious threats to life and health. Currently, about 30% of the world's population is exposed to extreme weather that exceeds the human thermoregulatory capacity for at least 20 days a year (Mora et al., 2017). According to the ND-GAIN Country Index, South Asian countries are considered most vulnerable to climate change in the 2021 ranking of Afghanistan (175), Bangladesh (164), Pakistan (146), Nepal (126), India (111), Maldives (106), Sri Lanka (104) and Bhutan (94) (Initiative, 2021).

Three groups of diseases in VBDs are rodent-borne diseases (plague, hemorrhagic fever, hemorrhagic fever with renal syndrome, leptospirosis, cutaneous leishmaniasis, and Puumala hantavirus), mosquito-borne diseases (malaria, dengue, Zika, chikungunya, West Nile virus, Ross River virus, and Japanese encephalitis), tick-borne diseases (tick-borne encephalitis, Lyme disease, etc), and other arthropod-borne diseases (Kilpatrick & Randolph, 2012; Wilder-Smith et al., 2017). More than 700,000 people die from VBDs each year, and more than 80% of the world's population lives in areas at high risk of VBDs that are threatened by one or more types of VBDs (Ma et al., 2022). 86% of the world's 250 countries (218 countries) are suitable for the survival and reproduction of arboviral diseases (Ma et al., 2022). About 3.83 billion people, or 53% of the world's population, live in dengue-prone areas, with the vast majority living in Asia, followed by Africa and the Americas. In 2080, 2.25 billion more people worldwide will be at risk of dengue than in 2015 (Messina et al., 2019). Malaria and

dengue are present in all South Asian countries except Sri Lanka and the Maldives (Bhattarai, 2023). According to the World Malaria 2021 report, 2% of the global malaria burden was in Southeast Asia with the highest share being India (82.5% of estimated cases and 82% of malaria deaths) (Singhal et al., 2022). . Climate change is predicted to increase dengue, malaria and dysentery deaths in South Asia (Hundessa et al., 2018).The proposed descriptive study attempts to measure the epidemiological burden of current VBDs in the eastern regions of Afghanistan.

MATERIALS AND METHODS

Study Area

This was a cross-sectional descriptive study conducted in the eastern region provincial base (Nangarhar, Kunar, Laghman, Nooristan) of Afghanistan.

Samples Collection

The data regarding VBDs were provided by the ministry of Public Health in Afghanistan, based on the MLIS and DEWS reports from January 2019 to Dec 2023. The data includes reports from more than 260 health facilities covering particularly all parts of the east provinces' territory. All cases were included, regardless of whether sourced from public or private health facilities. Incident VBDs cases diagnosed at designated health facilities are reported at monthly interval to the national database (DHIS2) under the supervision of health management information system, department of Ministry of Public Health. In this study VBDs cases were aggregated to the provincial level indicating in last 5 years. Every data point in the study represents the total number of cases per year for a selected province. Updated annual provincial population base data obtained from the Afghanistan central Statistics Office (cso.org.af).

Statistical Analysis

Data analyzed by SPSS 16 and Ms-Excell descriptively according to the annual, sessional and provincially with population base of eastern region of Afghanistan.

RESULTS

In the result identified four VBDs in the eastern region that malaria was in high incidence (20.28%), then Leishmania (1.62%), Dengue (0.054%) and CCHF (0.0063%) in lower incidence. In 2019 malaria incidence was high (5.5%), 2020 (2.8%) and 2021 (2.6%) decreased and 2022 (4%) and 2023 (5.4%) increased again. Province base Laghman was in high incidence area (27.82%) then Konar (21.36%) and Nooristan (20.28%) but Nangarhar was relatively in lower incidence (15.8%). Leishmania cases increased in the 2023 (0.5%) and the last four year were nearly same. CCHF incidence was low during last four years but increased in 2023 especially in Nangarhar and Nooristan Provinces. Dengue firstly coming VBD that two cases diagnosed in December 2022 than rapidly transmitted nearly all district of Nangarhar province and 1526 cases have diagnosed to 30 December 2023. Incidences of current VBDs of eastern region of Afghanistan are summarized in table 1.

Table 1. Summary of VBDs incidences in the Eastern Region Provincial base of Afghanistan

Diseases	Province	Year										Total	Inci (New cases/pop at risk x100)
		2019		2020		2021		2022		2023			
		Numb	Inci	Numb	Inci	Numb	Inci	Numb	Inci	Numb	Inci		
Confirmed Malaria New cases	Kunar	30345.	5.8	13603	2.6	14928	2.8	22571	4.3	30954	5.9	112401	21.36
	Laghman	39948.	7.7	20379	3.9	21131	4.1	29710	5.7	33484	6.4	144652	27.82
	Nangarhar	75415.	4.2	41894	2.3	36930	2.0	55213	3.1	75715	4.2	285167	15.8
	Nooristan	10455.	6.1	4011	2.3	2387	1.4	5947	3.7	13199	7.7	35999	20.87
Inci (New cases/pop at risk x100)	Total	156163	5.5	79887	2.8	75376	2.6	113441	4	153352	5.4	578219	20.28
Leishmania new conformed cases	Kunar	817.	0.2	680	0.1	1015.	0.2	1703.	0.3	2102.	0.4	6317	1.20
	Laghman	850.	0.2	1587	0.3	1768.	0.3	2328.	0.4	3298.	0.6	9831	1.89
	Nangarhar	8210.	0.5	4749	0.3	2930.	0.2	4941.	0.3	8695.	0.5	29525	1.64
	Nooristan	17.	0.01	27.	0.01	30.	0.02	91.	0.05	237.	0.1	402	0.23
Inci (New cases/pop at risk x100)	Total	9894.	0.3	7043.	0.2	5743.	0.2	9063.	0.3	14332.	0.5	46075	1.62
CCH	Kunar					1						1	0.0002
	Laghman					1				2		3	
	Nangarhar	19		1		18		25		75		138	0.0076
	Nooristan			1		1		31		6		39	0.023
	Total	19.		2.		21.		56.		83		181	0.0063
Dengue fever	Kunar	0		0		0		0		0		0	0
	Laghman	0		0		0		0		0		0	0
	Nangarhar							2		1524		1526	0.085
	Nooristan	0		0		0		0		0		0	0
	Total							2.		1524		1526	0.054

Note: Incidence = New cases/Population at risk*100

According to the variation of the session, overall VBDs infections occur more from winter to autumn, which have reported 50.50% in winter, (53.60%) in autumn, (96.90%) in summer and (99, 00%) in autumn. Malaria and dengue had a high peak in summer and autumn and decreased in winter and spring as shown in Figure 1. On the contrary, Leishmania peak was high in winter and spring which are 39.50% and 27.80% respectively and lower in summer and autumn.

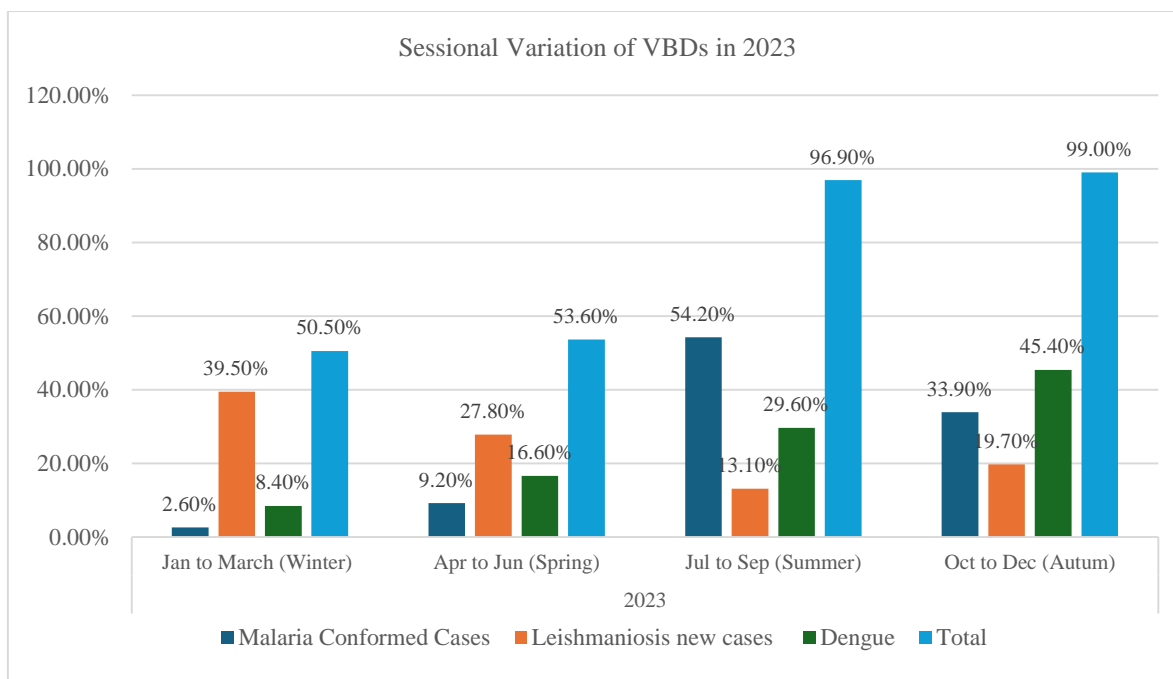


Figure 1: Sessional variation of malaria, leishmania and dengue fever incidences in 2023.

DISCUSSION

Our study identified that there are four VBDs in the eastern region of Afghanistan, three of them are already present, but dengue fever first time spread to Nangarhar province from the neighboring country of Pakistan in the last months of 2022. Malaria, which has been present throughout Afghanistan since before, is at its highest peak in the east, which was higher in 2019 compared to the previous five years, then relatively less in the next two years, and has been increasing again in recent 2022 and 2023 years. The highest incidence is reported first in Laghman, second in Kunar and third in Nuristan. Also, the incidence of Leishmania have increased in the last year, however, the new cases in Nooristan are less than in other provinces.

CCHF cases have been reported in four provinces, but most of the cases are in Nangarhar. CCHF cases are increased in 2023, and more of these reported in Nangarhar and Nuristan. Dengue cases were reported for the first time in the last months of 2022 only in Nangarhar. According to the seasonal change, malaria is clearly high in summer and autumn, its incidences are low in winter and spring, but unlike Leishmania, it is more in winter and spring sessions. Two VBDs Malaria and dengue are endemic in all South Asian countries except Sri Lanka and Maldives which declared malaria free (Bhattarai, 2023). In few systematic review and meta-analysis malaria spread was in India, Thailand, Afghanistan, China and Iran 8%, 35%, 0.15%, 63% and 9% respectively (Azizi et al., 2021; Commons et al., 2020; Kotepui et al., 2020; Wilairatana et al., 2021). Overall incidence in Pakistan was 23.3% (Khan et al., 2023) and Khyber-Pakhtunkhwa had 17.60% prevalence (Khan et al., 2018). According to the 2021 world malaria report, 2% of the global malaria burden was in South East Asia with the largest contribution from India (82.5% of estimated cases) (Chinar et al., 2022). Since 2010, epidemics of Dengue fever have occurred in Pakistan, India, Bangladesh, China, Sri Lanka, and Maldives; despite, highest incidences reported were almost in autumn session (Rafique et al. 2017; Rafique et al. 2018). In 2017 huge dengue outbreak (23541 cases) has been recorded and between January and September of 2023 totally 203406 people were infected, and 989 people died in Khyber-Pakhtunkhwa province (Khan et al., 2022). 3188 microscopically confirmed cases of Cutaneous leishmaniasis reported in Khyber Pakhtunkhwa province of Pakistan in 2021, incidence was increased gradually from October and reached a peak in February with following sharply decreasing in March, that mostly infections occurred in winter, while fewer infections were found in autumn (Ullah et al., 2023). CCHF is endemic diseases in tow province Baluchistan and Sindh of Pakistan, although, reported in all province. Pakistan has a share border with eastern region of Afghanistan (Umair et al., 2020), and classified as an endemic fourth country in Asia following Turkey, Russia, and Iran (Ince et al., 2014). CCHF has been reported from 2014 to 2020 in Baluchistan (38%), Punjab (23%), KPK (19%), Sindh (14%) and Islamabad (6%) of Pakistan (Ahmed et al., 2021).

CONCLUSION

Four VBDs have been identified in the eastern region of Afghanistan, and their incidence has been clearly increasing in recent years. Malaria is at a high level and most of its incidences occur in summer and autumn sessions, unlike leishmaniasis cases are more in winter and spring. The newly spreading disease is Dengue, the cases of which are present only in Nangarhar province, however, its spread is rapid and there is a possibility that it will spread to many parts of the country in the next future.

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