



## Effects of Seasonal Changes on the Patients Flux to Basic Health Units in Pakistan

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### Dear Editor-in-Chief

Immune response in humans, along with animals, is dependent on seasonal changes. Children's humoral and cell mediated immune response decreases in rainy season especially in tropical areas while in temperate zones decreased resistance against influenza is observed in winter (1). Immune response was more pronounced and more active during winter season. Melatonin, a key factor to enhance activity of immune system, is more in winter season. Length of the day triggers immune system activation (2). When the day light shortens it triggers glucocorticosteroid hormones especially adreno-corticosteroidal hormone. Consequently, boosting immunity in individuals. Lymphatic system changes can be observed by changed lymph organ sizes and structures which are high in the beginning of winter season or in late autumn. Human species in particular and all other species in general show these changes (3, 4). Result of environmental changes cause outbreak of disease in the region of the same latitude (5). Total 23 BHUs were present in Tehsil Ahmad Pur East, District Bahawalpur, Pakistan. Among these BHUs, BHU Balla Jhullan was selected as a model. Data from Jan 2009 to Dec 2017 was collected

from said Basic Health Unit. Descriptive epidemiological analysis was done through IBM SPSS 20 (Chicago, IL, USA) and MS Excel 2016 and R 3.5.1.

The year 2017 was the year when maximum number of patients were seen visiting the healthcare institution. In Fig. 1, month wise number of patients is shown. August was the month in which maximum patients got sick and visited BHU. Although June, July and Sep had more patient flux as compared to other months of a year. A regular increasing fashion was observed from the year 2009 to 2017 except a single anomaly in the year 2012. For determination of chronobiological circle, seasonality indexes were assessed and are shown in Table 1. Summer season was the time of maximum infection as compared to the winter season. Data from 2009-2017 indicated high burden of patients in specific months. Less patient rates during winter were observed but it continued to increase till the commencement of long days and peak of monsoon season. Studies have been conducted to examine variability in immunity in relation to seasonal changes.



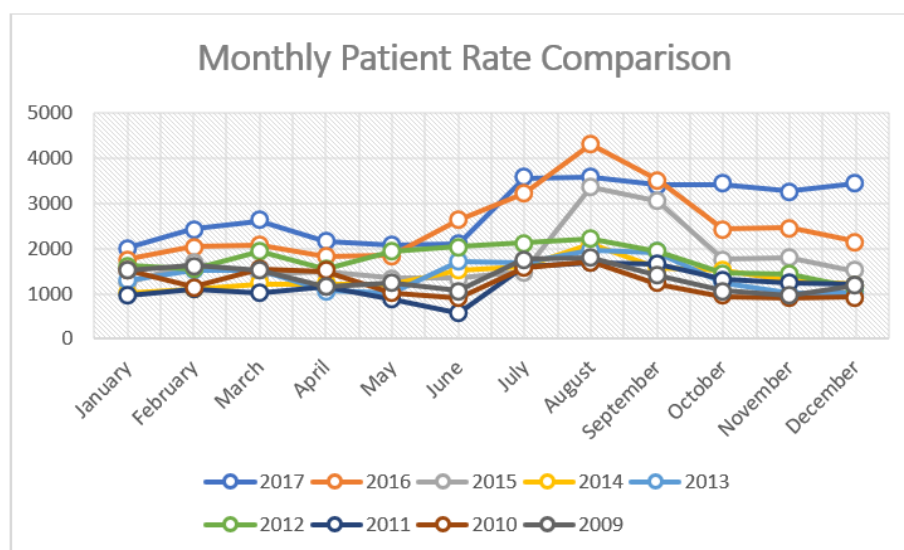


Fig. 1: Nine Years Month wise comparison between numbers of patients of BHU Balla Jhullan

Table 1: Seasonality Index 2009-2017

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Seasonality Index	0.069	0.076	0.079	0.070	0.067	0.07	0.100	0.122	0.105	0.081	0.077	0.074
	68	23	72	73	62	49	27	12	92	37	39	04

Studies on *Asian catfish Clarias batrachus* suggested that variation in immunity takes place as the season changes. (6). Seasonal variation not only affect immune level but also cause alteration in consumption of food especially utilization of specific food items in one season and others in different season (7). This utilization of specific food may be contributing factors in spread of diseases in a specific community.

As this Basic Health Unit is in river belt, summer season usually reaches to its extreme from June till the end of Sep every year. The time period of Monsoon season spans from July to Sep. Patients' ratio visiting BHU is at the highest during these months. Although various studies have been carried out on animal's models, there is dire need to channelize it to humans. In this way a clear picture of variation in immunity can be obtained.

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### Conflict of interest

Authors have no direct or indirect conflict of interest.

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