

## Results and Discussions

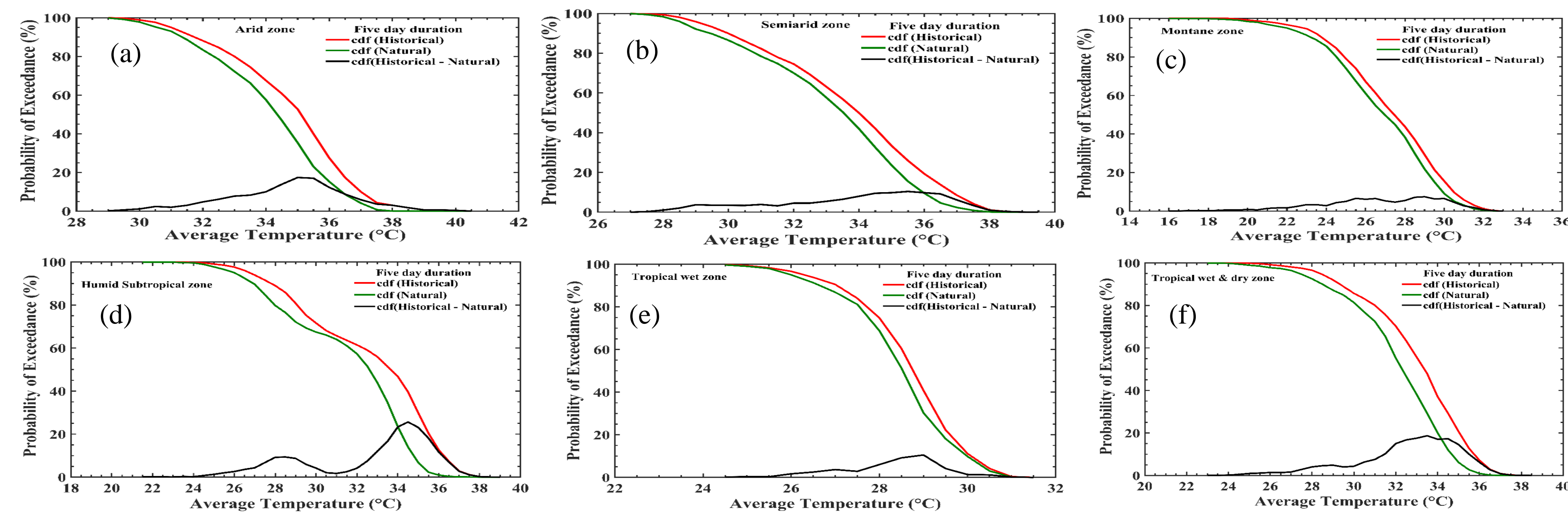


Figure 1: List of the cdf curve (Five-day duration) for (a) Arid zone, (b) Semi-arid zone, (c) Montane zone, (d) Humid subtropical zone, (e) Tropical wet zone, (f) Tropical wet & dry zone.

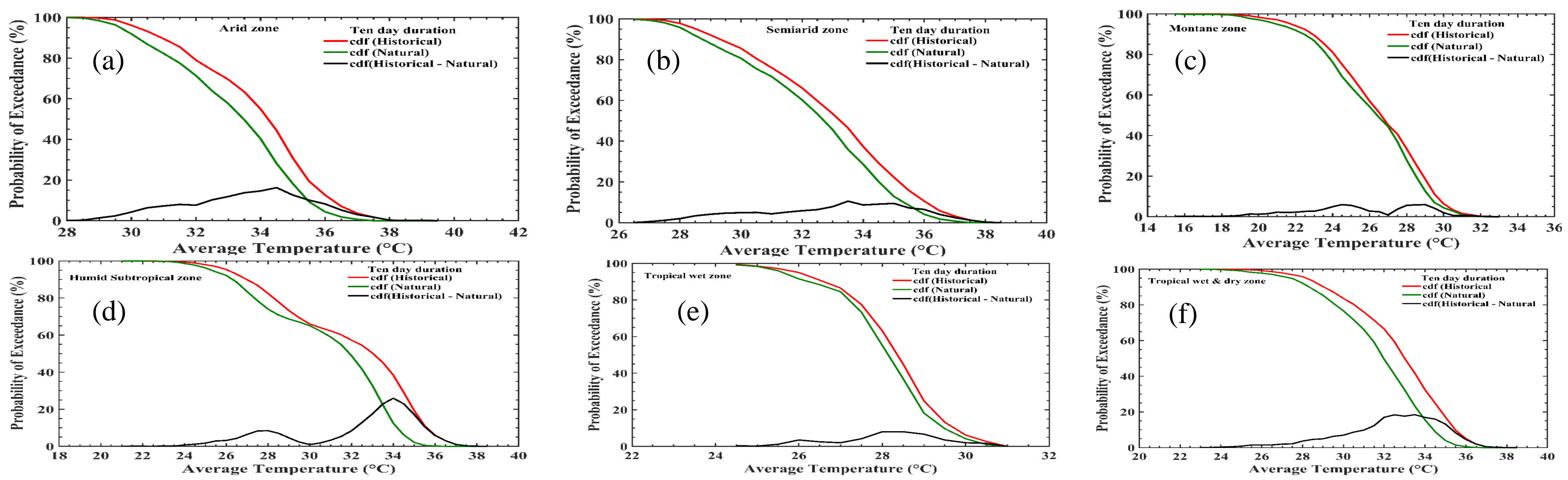


Figure 2: List of the cdf curve (Ten-day duration) for (a) Arid zone, (b) Semi-arid zone, (c) Montane zone, (d) Humid subtropical zone, (e) Tropical wet zone, (f) Tropical wet & dry zone.

Table 1: A list of the total entropy in each climatic zone for concentration of each pollutant during non-heat wave period.

Climatic zones of India	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>2</sub>	NH <sub>3</sub>	SO <sub>2</sub>	CO	O <sub>3</sub>	AQI
Arid	1.11	1.26	0.27	0	0.017	0.33	0.65	1.25
Semi-arid	1.37	1.36	0.58	0.01	0.12	0.78	0.63	1.42
Montane	1.01	0.69	0.008	0.01	0.22	0.24	0.6	1.02
Humid Subtropical	1.33	1.31	0.5	0.001	0.25	0.78	0.7	1.40
Tropical wet	1.11	0.83	0.28	0.023	0.28	0.86	0.25	1.14
Tropical wet and dry	1.03	0.85	0.36	0.0057	0.12	0.75	0.42	1.1

Table 2: A list of the total entropy in each climatic zone for concentration of each pollutant during heat wave period.

Climatic zones of India	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>2</sub>	NH <sub>3</sub>	SO <sub>2</sub>	CO	O <sub>3</sub>	AQI
Arid	0.87	1.22	0.57	0	0.056	0.35	0.66	1.10
Semi-arid	1.38	1.49	0.77	0.004	0.18	0.89	0.70	1.48
Montane	1.14	0.90	0.022	0.02	0.37	0.12	0.38	1.11
Humid subtropical	1.39	1.38	0.6	0.003	0.19	0.76	0.66	1.46
Tropical wet	1.12	0.75	0.11	0	0.285	0.74	0.18	1.11
Tropical wet and dry	1.07	0.96	0.34	0.008	0.15	0.78	0.46	1.15

Table 3: A list of the ranks decided for the worst polluted city in the summer season using the MCDM method.

City	Rank of worst polluted city
Delhi	1
Faridabad	2
Lucknow	3
Muzaffarpur	4
Kanpur	5
Ahmedabad	6
Jaipur	7
Patna	8
Gaya	9
Agra	10
Chennai	11
Howrah	12
Navi Mumbai	13
Kolkata	14
Mumbai	15
Hyderabad	16
Bengaluru	17
Guwahati	18
Thiruvananthapuram	19

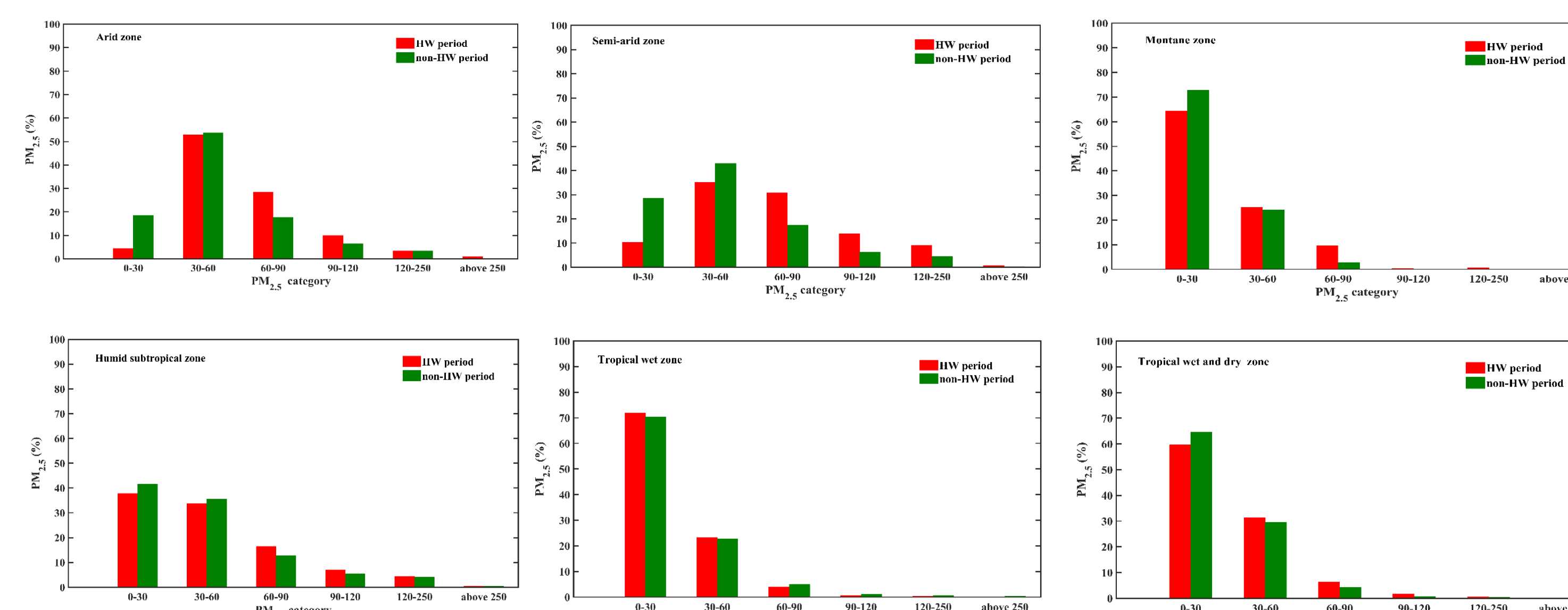


Figure 3: Daily average PM<sub>2.5</sub> concentration (in %) of different categories (good, satisfactory, moderately polluted, poor, very poor, and severe) during heat wave and non-heat wave periods for six climatic zones of India.

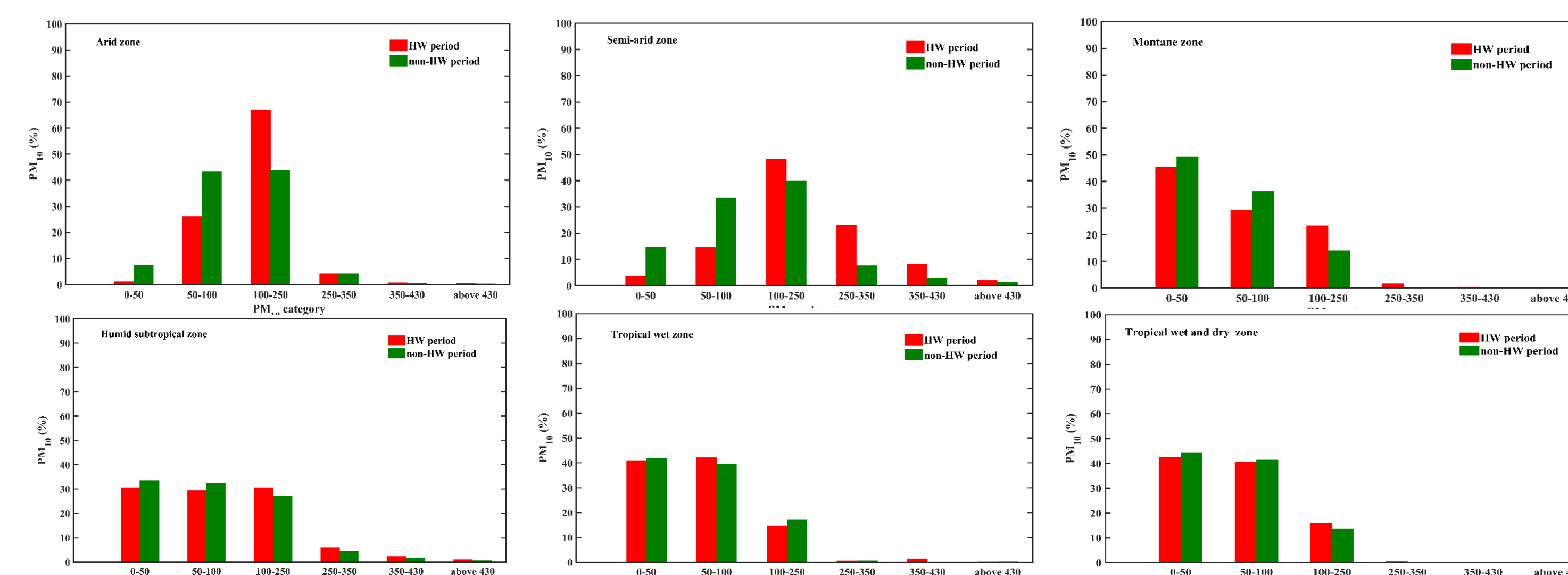


Figure 4: Daily average PM<sub>10</sub> concentration (in %) of different categories (good, satisfactory, moderately polluted, poor, very poor, and severe) during heat wave and non-heat wave periods for six climatic zones of India.

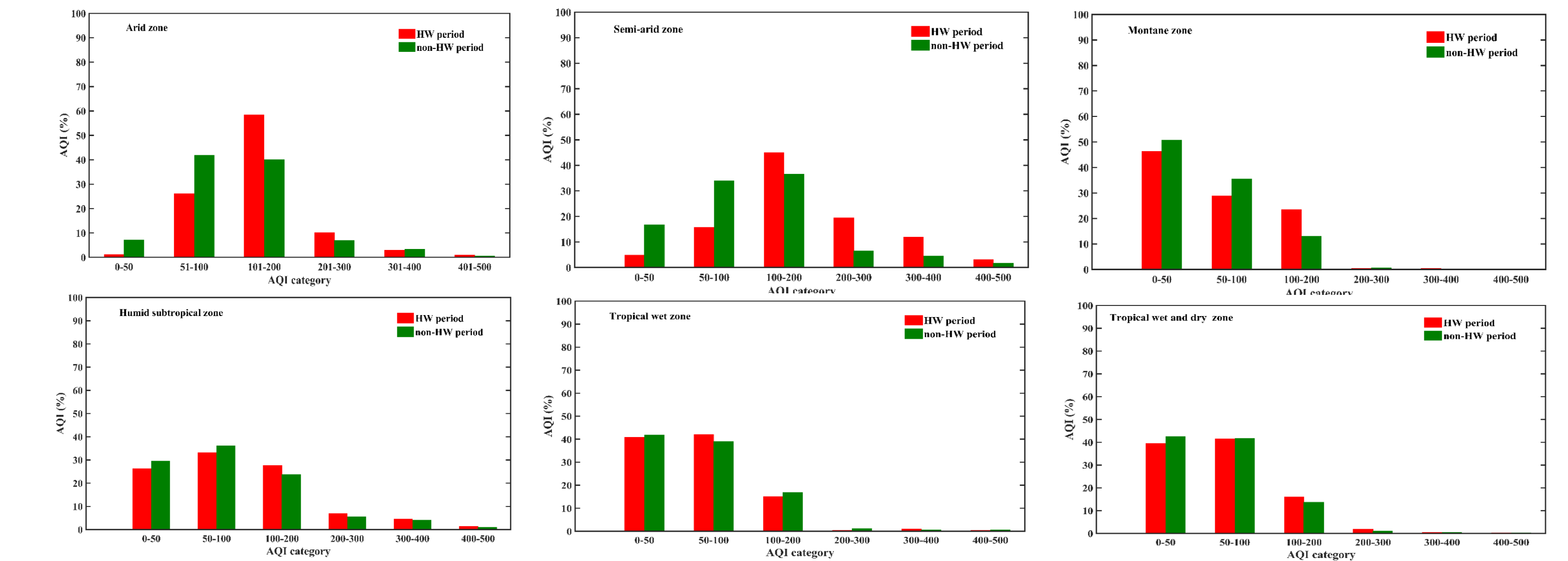


Figure 5: Daily average AQI (in %) of different categories (good, satisfactory, moderately polluted, poor, very poor, and severe) during heat wave and non-heat wave periods for six climatic zones of India.

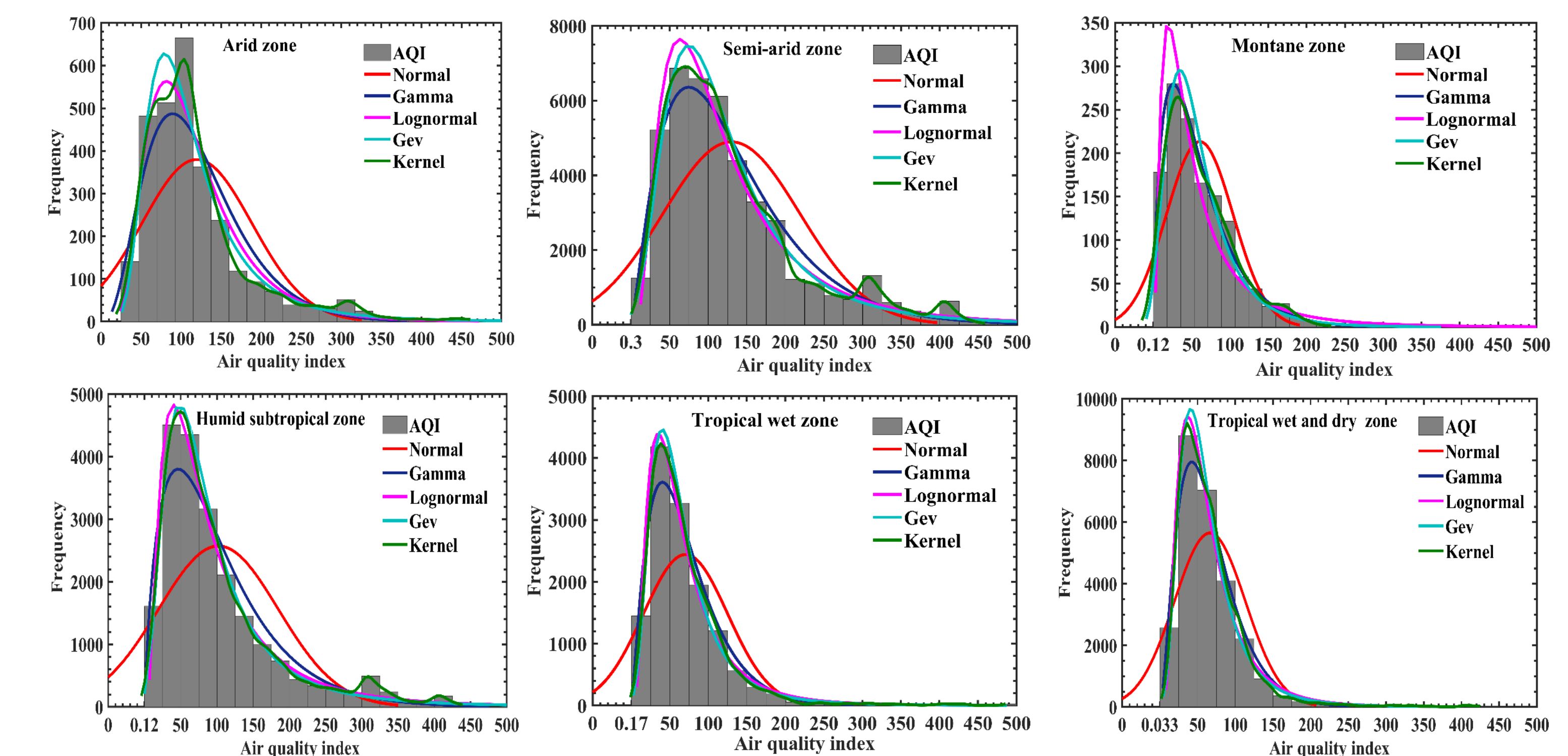


Figure 6: Probability distribution curve of AQI (in %) during summer for six climatic zones of India.

## Conclusions

- ✓ Particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>) has more influence on heat wave and non-heat wave periods for all climatic zones of India.
- ✓ Arid, Semi-arid, and Humid subtropical zones have highly polluted air quality during heat wave periods.
- ✓ NH<sub>3</sub> pollutant is approximately invariant or has lower variability, while the probability certainty of PM<sub>10</sub> and PM<sub>2.5</sub> is lower and uncertainty is higher.
- ✓ The worst polluted climatic zone and city are the semi-arid zone and Delhi, respectively, and the lowest polluted zone and city are the Montane zone and Thiruvananthapuram – Kerala, respectively.