अत्यावश्यक

पत्रांक–01 / प्रा0आ0–20 / 2015 (खण्ड) / 810 / आ०प्र०

बिहार सरकार
आपदा प्रबंधन विभाग

प्रेषक,

डॉ० चन्द्रशेखर सिंह, भा०प्र०से०
सचिव।

सेवा में,

अपर मुख्य सचिव / प्रधान सचिव / सचिव,
शिक्षा विभाग / पर्यावरण, वन एवं जलवायु परिवर्तन विभाग /
ग्रामीण विकास विभाग / नगर विकास एवं आवास विभाग /
स्वास्थ्य विभाग / डेयरी, मत्स्य एवं पशु संसाधन विभाग /
समाज कल्याण विभाग / लोक स्वास्थ्य अभियंत्रण विभाग /
सूचना प्रौद्योगिकी विभाग / श्रम संसाधन एवं प्रवासी श्रमिक कल्याण विभाग /
ऊर्जा विभाग / पंचायती राज विभाग / परिवहन विभाग /
सूचना एवं जनसम्पर्क विभाग, बिहार, पटना
महानिदेशक, राज्य अग्निशमन निदेशालय, बिहार, पटना
निदेशक, भारत मौसम विज्ञान विभाग, फुलवारी शरीफ, पटना
निदेशक, बिहार मौसम सेवा केन्द्र, पटना।

पटना–23, दिनांक– 17-03-26

विषयः **भीषण गर्मी एवं लू (Heat wave) से बचने के उपाय से संबंधित कार्रवाई करने के संबंध में।**

महाशय,

उपर्युक्त विषय के संबंध में ध्यान आकृष्ट करते हुए कहना है कि राज्य में गर्मी के मौसम में भीषण गर्मी के साथ लू (Heat wave) चलती है, जिसके कारण जन–जीवन प्रभावित होता है एवं आम जनता को स्वास्थ्य एवं पेयजल संबंधी गंभीर परेशानियों का सामना करना पड़ता है। विशेषकर छोटे बच्चों, स्कूली बच्चों, गर्भवती एवं धातृ महिलाओं एवं काम के लिए घर से बाहर निकलने को बाध्य दिहाड़ी मजदूरों को काफी समस्याएँ आती हैं। साथ ही, पेयजल संकट की स्थिति भी उत्पन्न हो जाती है। ऐसे में यह आवश्यक है कि राज्य सरकार के संबंधित विभागों के द्वारा आमजनों को भीषण गर्मी एवं लू से बचाव हेतु कारगर उपाय के संबंध में यथोचित आवश्यक कार्रवाई की जाए तथा लू से बचाव हेतु जिला स्तर पर जागरूकता अभियान चलाया जाए व लू के दौरान 'क्या करें, क्या न करें' का प्रचार–प्रसार कराया जाए।

अतः भीषण गर्मी एवं लू से बचाव हेतु बिहार राज्य आपदा प्रबंधन प्राधिकरण के द्वारा तैयार Heat Wave Action Plan के आलोक में विभिन्न विभागों के स्तर से निम्न कार्रवाईयाँ अपेक्षित हैं :

1. नगर विकास एवं आवास विभाग

i. शहरी क्षेत्रों में सार्वजनिक जगहों पर स्थानीय निकायों द्वारा पियाऊ की व्यवस्था सुनिश्चित की जानी चाहिए। इन स्थानों पर गर्म हवाओं एवं लू से बचाव से संबंधित सूचनाओं एवं अलर्ट को कलर कोडिंग के साथ प्रदर्शित किया जाना चाहिए, ताकि आमजन इनसे भलीभाँति अवगत हो सकें।

ii. अपने क्षेत्राधिकार के अन्तर्गत खराब चापाकलों की मरम्मत युद्ध स्तर पर करायी जानी चाहिए।

iii. नगरीय क्षेत्र में अवस्थित आश्रय स्थलों में पेयजल तथा स्लम के निवासियों हेतु आकस्मिक दवाओं की व्यवस्था की जानी चाहिए।

2. स्वास्थ्य विभाग

i. सभी प्राथमिक स्वास्थ्य केन्द्रों/रेफरल अस्पतालों/सदर अस्पतालों/अनुमंडलीय अस्पतालों/मेडिकल कॉलेजों में लू से प्रभावितों के ईलाज हेतु विशेष व्यवस्था कर ली जाए। सभी स्वास्थ्य केन्द्रों एवं अस्पतालों में पर्याप्त मात्रा में ओ0आर0एस0 पैकेट, आई0 भी0 फ्लूड एवं जीवन रक्षक दवा इत्यादि की व्यवस्था कर ली जानी चाहिए।

ii. अत्यधिक गर्मी से पीड़ित व्यक्तियों के ईलाज हेतु आवश्यकतानुसार अस्पतालों में आईसोलेसन वार्ड की व्यवस्था कर ली जानी चाहिए एवं लू से पीड़ित बच्चों, वृद्धों, गर्भवती महिलाओं तथा गम्भीर रूप से बीमार व्यक्तियों का विशेष ध्यान रखा जाना चाहिए। आवश्यकतानुसार प्रभावित जगहों के लिए स्टैटिक/चलन्त चिकित्सा दल की भी व्यवस्था कर ली जाए।

iii. गर्म हवाएँ/लू से बचाव के उपाय से संबंधित IEC सामग्री स्थानीय स्तर पर मुद्रित कर पम्पलेट/पोस्टर के माध्यम से प्रचार–प्रसार कराया जाना चाहिए। साथ ही, स्थानीय प्रचार माध्यमों का भी उपयोग किया जा सकता है।

iv. सभी अस्पतालों में स्वच्छ पेयजल, शीतल छत समाधान और शीतल कक्ष (Cool Room) की उपलब्धता सुनिश्चित कर ली जाए। साथ ही, लू से पीड़ित व्यक्तियों के ईलाज के लिए शीतल कक्ष (Cool Room) में ही व्यवस्था की जाए।

3. लोक स्वास्थ्य अभियंत्रण विभाग

i. खराब चापाकलों की मरम्मत युद्ध स्तर पर की जानी चाहिए।

ii. जिन स्थानों पर नल का जल नहीं पहुँचता हो एवं चापाकलों में पानी की कमी हो गयी हो, वहाँ आपदा प्रबंधन विभाग द्वारा पेयजल संकट से निबटने हेतु निर्धारित मानक संचालन प्रक्रिया के अनुसार टैंकरों के माध्यम से पेयजल पहुँचाने की व्यवस्था सुनिश्चित करायी जानी चाहिए।

iii. भूगर्भ जल स्तर की लगातार समीक्षा की जाए एवं इस पर सतत् निगरानी रखी जानी चाहिए।

4. शिक्षा विभाग

i. स्कूली बच्चों को भीषण गर्मी से बचाने के लिए आवश्यक है कि विद्यालय या तो सुबह की पाली में ही संचालित हों अथवा गर्मी की छुटियाँ निर्धारित समय से पूर्व घोषित कर दी जाएँ। गर्मी की स्थिति को देखते हुए स्कूलों को अल्प अवधि के लिए बन्द किया जा सकता है। इस हेतु संबंधित जिला पदाधिकारी के द्वारा समीक्षा कर निर्णय लिया जाना चाहिए।

ii. सभी स्कूलों एवं परीक्षा केन्द्रों में पेयजल, ORS की व्यवस्था सुनिश्चित करायी जाए।

iii. गर्म हवाएं/लू से बचाव के उपाय से संबंधित IEC सामग्री स्थानीय स्तर पर मुद्रित कर पम्पलेट/पोस्टर के माध्यम से प्रचार–प्रसार कराया जाना चाहिए। साथ ही, स्थानीय प्रचार माध्यमों का भी उपयोग किया जा सकता है।

5. समाज कल्याण विभाग

i. सभी आँगनबाड़ी केन्द्रों पर पेयजल की समुचित व्यवस्था की जानी चाहिए एवं वहाँ पर गर्म हवाओं एवं लू से बचाव से संबंधित IEC (बच्चों को समझने हेतु) सामग्री प्रदर्शित कर जनता को जागरूक किया जाना चाहिए।

ii. स्वास्थ्य विभाग के सहयोग से आँगनबाड़ी केन्द्रों पर जीवन रक्षक घोल (ORS) की व्यवस्था करनी चाहिए।

iii. नवजात शिशु, बच्चों, धातृ एवं गर्भवती महिलाओं के लिए स्वास्थ्य विभाग के सहयोग से विशेष चिकित्सा सुविधा की व्यवस्था की जानी चाहिए।

6. डेयरी, मत्स्य एवं पशु संसाधन विभाग

i. सरकारी ट्यूबवेल के समीप अथवा अन्य सुविधायुक्त स्थानों पर गड्ढ़ा खुदवा कर पानी इक्कट्ठा किया जाए, ताकि पशु–पक्षियों को पानी मिल सके।

ii. पशुओं के बीमार पड़ने पर चिकित्सा दल की व्यवस्था की जाएगी।

7. ग्रामीण विकास विभाग

i. मनरेगा अन्तर्गत तालाबों/आहर इत्यादि की खुदाई की योजनाओं में तेजी लायी जाए, जिससे इनमें पानी इक्कठ्ठा कर पशु–पक्षियों को पानी उपलब्ध कराया जा सके।

ii. लू चलने पर मनरेगा की कार्य अवधि को सुबह 6:00 बजे से 11:00 बजे तक तथा अपराह्न 3:30 बजे से 6:30 बजे तक निर्धारित किया जा सकता है।

iii. कार्य स्थल पर पेयजल, विशेष आश्रयों की स्थापना एवं लू लगने पर प्राथमिक उपचार की व्यवस्था की जानी चाहिए।

8. पंचायती राज विभाग

i. विभाग के द्वारा पंचायतों में लू चलने के दौरान ''क्या करें क्या न करें'' का प्रचार प्रसार कराया जाना चाहिए।

ii. गाँवों में पेयजल की व्यवस्था हेतु पंचायतों को कार्य–योजना बनाने हेतु निदेशित किया जा सकता है तथा जल संरक्षण की योजनाओं पर कार्य किया जा सकता है।

9. श्रम संसाधन एवं प्रवासी श्रमिक कल्याण विभाग

i. लू से बचाव हेतु मजदूरों के कार्य अवधि को लचीला किया जा सकता है। लू चलने पर कार्य अवधि को सुबह 6:00 बजे से 11:00 बजे तक तथा अपराह्न 3:30 बजे से 6:30 बजे तक निर्धारित किया जा सकता है।

ii. कार्य स्थल पर पेयजल की व्यवस्था तथा लू से बचाव हेतु प्राथमिक उपचार की व्यवस्था की जानी चाहिए।

iii. खुले में काम करने वाले, भवन बनाने वाले तथा कल–कारखानों में काम करने वाले मजदूरों के लिए पेयजल, आईस पैड की व्यवस्था के साथ शेड की भी व्यवस्था करनी चाहिए।

iv. साथ ही, लू से बचाव हेतु औद्योगिक मजदूरों एवं अन्य मजदूरों के बीच जागरूकता कैम्प लगवाया जाए।

10. परिवहन विभाग

i. लू चलने की अवधि में जहाँ तक संभव हो, वाहनों का परिचालन कम से कम करना चाहिए तथा पूर्वाह्न 11:00 बजे से अपराह्न 3:30 बजे तक सार्वजनिक परिवहन की गाड़ियों के परिचालन को नियंत्रित किया जा सकता है।

ii. सार्वजनिक परिवहन की गाड़ियों में पेयजल तथा ओ०आर०एस० के साथ–साथ प्राथमिक उपचार की भी व्यवस्था की जाए।

11. ऊर्जा विभाग

i. प्रायः बिजली के तारों के ढ़ीला रहने के कारण वे हवा चलने पर आपस में टकराते रहते हैं, जिससे चिनगारी निकलने की संभावना रहती है। इन चिनगारियाँ के कारण भी अगलगी की घटनाएँ होती हैं। अतएव बिजली के ढ़ीले तारों को भी ठीक करवाने की व्यवस्था कर ली जाए।

ii. निर्बाध बिजली की आपूर्ति की व्यवस्था सुनिश्चित की जानी चाहिए।

12. पर्यावरण, वन एवं जलवायु परिवर्तन विभाग

i. गर्मी के दिनों में लू चलने से वन्य जीव भी प्रभावित होते हैं। अतः वन्यजीव उद्यानों तथा अभ्यारण्यों में पानी की व्यवस्था की जानी चाहिए।

ii. वन्यजीव उद्यानों में जानवरों के पिंजड़ों को ठंडा रखने की व्यवस्था की जानी चाहिए।

iii. अभ्यारण्यों में गड्ढ़े खोदकर वन्य जीवों के लिए जल की व्यवस्था की जानी चाहिए।

iv. पर्यटन स्थलों पर पेयजल की व्यवस्था की जाए। साथ ही, लू से बचाव हेतु पर्यटकों के लिए एडवाईजरी निर्गत किया जाए।

13. सूचना एवं जनसम्पर्क विभाग

गर्म हवाएँ/लू से बचाव के उपाय से संबंधित विज्ञापन का प्रचार–प्रसार प्रिंट मिडिया एवं इलेक्ट्रॉनिक मिडिया के माध्यम से कराया जाय। साथ ही, गर्म हवाएँ/लू से बचाव के उपाय से संबंधित जिंगल को भी राज्य के एफ एम एवं आकाशवाणी के रेडियो चैनलों के माध्यम से प्रचारित कराया जाय। इसे सोशल मिडिया यथा–Facebook, WhatsApp एवं Twitter आदि के माध्यम से भी प्रचारित कराया जाए।

14. सूचना प्रावैधिकी विभाग

गर्म हवाएँ/लू से बचाव हेतु राज्य एवं जिला स्तर पर मॉनिटरिंग के लिए डैशबोर्ड/इन्टरफेस बनाया जाय तथा इसके माध्यम से बल्क एस0एम0एस0 भेजने की व्यवस्था की जाए।

15. राज्य अग्निशमन निदेशालय

भीषण गर्मी के कारण अगलगी की घटनाओं में भी वृद्धि हो जाती है। अगलगी की घटनाओं से निबटने तथा उनके रोकथाम के लिए एतद विषयक विभागीय मानक संचालन प्रक्रियानुसार कार्रवाई सुनिश्चित करायी जाए।

16. सभी जिला पदाधिकारी, बिहार

गर्म हवाएँ/लू से बचाव हेतु "क्या करें, क्या न करें" को जिला स्तर पर जागरूकता कार्यक्रम आयोजित कर इसे जन–सामान्य के बीच प्रचारित किया जाय। साथ ही, संलग्न Heat Wave Action Plan के तहत संबंधित कार्यालयों/निकायों को Sunstroke से बचने हेतु आवश्यक कार्रवाई करने के लिए निदेशित किया जाय। समय–समय पर लू–जनित बिमारियों एवं उनकी गंभीरता से लोगो को अवगत कराने हेतु प्रेस कॉन्फ्रेंस किया जाय। सार्वजनिक जगहों पर पेयजल की व्यवस्था की जाय।

अतः अनुरोध है कि भीषण गर्मी एवं लू से बचने से संबंधित उपर्युक्त निदेशों के अतिरिक्त इस संबंध में गृह मंत्रालय, भारत सरकार एवं राज्य सरकारों के विभिन्न विभागों के द्वारा समय–समय पर दिये गये निदेशों का पूर्णतः अनुपालन किया जाए।

अनु०–Heat Wave Action Plan (PDF)।

विश्वासभाजन,

सचिव

ज्ञापांक–01 / प्रा0आ0–20 / 2015 (खण्ड) / 810 / आ०प्र० पटना–23, दिनांक– 17-03-26

प्रतिलिपिः मुख्य सचिव, बिहार के विशेष कार्य पदाधिकारी / विकास आयुक्त, बिहार के प्रधान आप्त सचिव को सूचनार्थ प्रेषित।

सचिव

ज्ञापांक–01 / प्रा0आ0–20 / 2015 (खण्ड) / 810 / आ०प्र० पटना–23, दिनांक– 17-03-26

प्रतिलिपिः माननीय मुख्यमंत्री, बिहार के प्रधान सचिव / माननीय मंत्री, आपदा प्रबंधन विभाग के आप्त सचिव को सूचनार्थ प्रेषित।

सचिव

ज्ञापांक–01 / प्रा0आ0–20 / 2015 (खण्ड) / 810 / आ०प्र० पटना–23, दिनांक– 17-03-26

प्रतिलिपिः अपर मुख्य सचिव, वित्त विभाग, बिहार, पटना / पुलिस महानिदेशक–सह–असैनिक सुरक्षा आयुक्त, नागरिक सुरक्षा महानिदेशालय, बिहार, पटना को सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित।

सचिव

ज्ञापांक–01 / प्रा0आ0–20 / 2015 (खण्ड) / 810 / आ०प्र० पटना–23, दिनांक– 17-03-26

प्रतिलिपिः सभी प्रमंडलीय आयुक्त / सभी जिला पदाधिकारी, बिहार / सचिव, बिहार राज्य आपदा प्रबंधन प्राधिकरण (BSDMA) को सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित।

सभी जिला पदाधिकारी, बिहार से अनुरोध है कि संलग्न प्रपत्र (A, B, C) में दैनिक प्रतिवेदन राज्य आपातकालीन संचालन केन्द्र के ईमेल–seoc-dmd-bihar@bihar.gov.in पर भेजने की कृपा की जाय।

अनु०–यथोक्त।

सचिव

ज्ञापांक–01 / प्रा0आ0–20 / 2015 (खण्ड) / 810 / आ०प्र० पटना–23, दिनांक– 17-03-26

प्रतिलिपिः निदेशक, भारत मौसम विज्ञान विभाग, पटना / निदेशक, बिहार मौसम सेवा केन्द्र, पटना को इस अनुरोध के साथ प्रेषित की दैनिक न्यूनतम एवं अधिकतम तापमान प्रतिदिन अपराह्न 4:00 बजे विभाग के राज्य आपातकालीन संचालन केन्द्र को ईमेल–seoc-dmd-bihar@bihar.gov.in पर भेजने की कृपा की जाय।

सचिव

ज्ञापांक–01 / प्रा0आ0–20 / 2015 (खण्ड) / ....810..... / आ०प्र० पटना–23, दिनांक–17-03-2026

प्रतिलिपिः सचिव के वरीय प्रधान आप्त सचिव / प्रभारी, राज्य आपातकालीन संचालन केन्द्र (SEOC) / आई०टी० मैनेजर, आपदा प्रबंधन विभाग, बिहार, पटना को आवश्यक कार्रवाई हेतु प्रेषित।

16/3/26
सचिव

Govt. of Bihar Department of Disaster Management Heat Wave Report (Dated on .....)

S.No.	Block Name	Number of Deaths due to Heat Wave (Today)	Number of Deaths due to Heat Wave (Cumulative)	Number of deceased person for whom ex-gratia payment done (Today)	Number of deceased person for whom ex-gratia payment done (Cumulative)	Number of persons hospitalized (Today)	Number of persons hospitalized (Cumulative)	Number of hospitalized person for whom payment done (Today)	Number of hospitalized person for whom payment done (Cumulative)	Remarks

Letter No.:

Date:

Copy:

Signature of District Officers/

Additional District Magistrate(ADM)(Disaster Management)/

Officer in Charge(District Disaster Management)/

[DISTRICT]

BIHAR HEAT WAVE ACTION PLAN 2024-25

Table of Contents

Abbreviations

ADM	Additional District Magistrate
ANM	Auxiliary nurse midwife
ASHA	Accredited Social Health Activist
ASP	Assistant Superintendent of Police
AWCs	Anganwadi Centres
BMSK	Bihar Mausam Seva Kendra
BSDMA	Bihar State Disaster Management Authority
CHC	Community Health Centre
CMG	Crisis Management Group
CSR	Corporate Social Responsibility
DDMA	District Disaster Management Authorities
DEOC	District Emergency Operation Centre
DM	District Magistrate
DMD	Disaster Management Department
EWE	Extreme Weather Events
HAP	Heat Action Plan
HRI	Heat-Related Illnesses
HVI	Heat Vulnerability Index
IDSP	Integrated Disease Surveillance Programme
IEC	Information, Education and Communication
IMD	India Meteorological Department
IV	Intravenous
LED	Light-emitting diode
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MoEs	Ministry of Earth Sciences
MoHFW	Ministry of Family Health and Welfare
NCRB	National Crime Records Bureau
NDMA	National Disaster Management Authority
NFHS	National Family Health Survey
NGOs	Non-governmental organizations
ORS	Oral Rehydration Solution
PCA	Principal Components Analysis
PHC	Primary Health Centre
PHED	Public Health Engineering Department
SC	Scheduled Cast
SDM	Sub Divisional Magistrate
SEOC	State Emergency Operation Centre
SMS	Short Message Service

SOP	Standard Operating Procedure
SP	Superintendent of Police
ST	Scheduled Tribe
TMax	Maximum Temperature
UHC	Urban Health Centres
ULBs	Urban Local Bodies
UNEP	United Nations Environment Programme
UNICEF	United Nations Children's Fund
UTs	Union Territories
WHO	World Health Organization
WMO	World Meteorological Organization
WRD	Water Resources Division

Executive summary

Heat waves are a growing threat to India's climate. India Meteorological Department (IMD) data shows a trend of rising temperatures, with severe heat waves in summer leading to more casualties. Bihar, along with other states like Andhra Pradesh, Telangana, Punjab, Uttar Pradesh, and Odisha, faces severe impacts on human and livestock health. The World Meteorological Organization (WMO) predicts more intense and prolonged heat waves globally, affecting agriculture and rural economies. In 2016, Bihar experienced severe heatwave conditions, and in 2022, India recorded 2,227 deaths due to extreme weather events. The state's climate shows extreme temperatures, with maximum temperatures reaching up to 49.5°C. This leads to heat waves during the pre-monsoon season, affecting livelihoods and health. Heat waves have had a severe impact on Bihar, leading to adverse health effects, reduced crop yields, and water scarcity. The future scenario predicts a consistent upward trend in temperatures, with significant impacts on agriculture, water resources, and human health.

Bihar's Heat Action Plan (HAP) aims to protect the community by integrating adaptation and mitigation strategies for extreme temperatures. Efforts include increasing green coverage, protecting livestock, early warning systems, and public education. The state also focuses on long-term measures, such as the Jal-Jeevan-Hariyali Mission, to combat climate change and enhance water conservation. To address these challenges, Bihar's government collaborates with various stakeholders, including the IMD, and focuses on early warning systems, public awareness, and infrastructure improvements. These efforts aim to build a more resilient system against the impacts of extreme temperatures.

The Bihar HAP 2024 focuses on preparing and protecting the population from the potential harm of heat waves. The objectives and key strategies for 2024 build upon those outlined in the HAP 2019, with a continued emphasis on comprehensive assessment, enhanced preparedness, and innovative initiatives. The HAP 2024 also aims to refine the identification of critical temperature and humidity thresholds specific to Bihar's local climatic conditions, engage diverse agencies and stakeholders, suggest innovative initiatives, and strengthen mechanisms for review and evaluation. The HAP 2024 includes five components: the heat wave in the context, hazard and vulnerability, state strategy and plan, mitigation and preparedness and department-wise action plan.

The plan involves vulnerability mapping conducted by IIPH Gandhinagar categorized Bihar's districts based on their Heat Vulnerability Index (HVI), indicating varying degrees of vulnerability. The plan also involves identifying colour signals for cold alerts and implementing preparedness and response strategies. Further, a list of Do’s and Don'ts in the form of IEC has been provided for various vulnerable communities to raise awareness about quick measures that can be taken at the community level to prepare for and address heat wave-related illnesses.

Overall, the Bihar Heat Wave Action Plan is a thorough strategy designed to tackle the challenges presented by heat waves. It emphasizes early warning systems, coordination among agencies, and community engagement to minimize the impact on vulnerable groups and improve overall resilience.

CHAPTER 1

Introduction to Heat Wave in Bihar

1.1 Introduction

In recent years, heat waves have emerged as a major severe weather hazard in India. Floods and cyclones contribute to maximum human deaths in India from extreme weather events (EWEs), but deaths due to heatwaves and lightning need urgent attention too. An analysis of deaths from extreme weather events (EWE) in India in the past 50 years has revealed that An analysis of deaths from extreme weather events (EWE) in India in the past 50 years has revealed that floods and tropical cyclones contribute almost 75 percent to the total mortalities per year due to EWEs. But heatwaves and lightning are gaining importance, according to the analysis by scientists at India's Ministry of Earth Sciences (MoES).[1]

The Indian Meteorological Department (IMD) reported 2016 as the hottest year in a century and 2023 ended as the second warmest year, a trend that has continued, with severe heat waves during summer leading to an increase in human casualties. States like Andhra Pradesh, Telangana, Punjab, Uttar Pradesh, Odisha, and Bihar are particularly affected, experiencing adverse impacts on both human and livestock health. The World Meteorological Organization (WMO) highlights the global temperature rise, projecting more intense and prolonged heat-wave conditions across most land areas in the 21st century, disrupting communities, agriculture, and the agro-rural economy through altered temperature and rainfall patterns. Heat waves develop gradually but exert significant physiological stress, resulting in fatalities and disruption of community infrastructure. With the effects of climate change manifesting in higher daily peak temperatures and more frequent intense heat waves, especially in Bihar, IMD is enhancing its early warning systems for timely alerts to improve preparedness and response, underscoring the urgent need for comprehensive action plans to mitigate these impacts.

In 2016, severe heat wave conditions affected Bihar, Jharkhand, Gangetic West Bengal, Odisha, Punjab, Haryana, Chandigarh & Delhi, Rajasthan, Maharashtra, West Madhya Pradesh and Gujarat.[2] India recorded 2,227 deaths in 2022, the fifth warmest year on record since 1901, due to extreme weather events, according to the India Meteorological Department's report.

1.2 Heat Wave in Context to Bihar

Bihar state in India is highly susceptible to hydro-meteorological natural disasters, with north (flood-prone) and south (drought-prone) being most vulnerable due to high exposure,

[1] https://www.preventionweb.net/news/floods-cyclones-caused-maximum-deaths-extreme-weather-events-past-50-years

[2] WHO, https://www.who.int/india/heat-waves). On 314 out of 365 days India experienced extreme weather events. They were spread across 34 states/UTs (Disaster Management Division, India Meteorological Department and media reports, https://cdn.downtoearth.org.in/library/0.73942600_1673957560_extreme-weather-events-india-2022--factsheet.pdf

sensitivity, and low adaptive capacity. Weather-related extremes affect over 45% of the state, attributed to its growing population and density, making it the second most populous state in India. In Bihar, the phenomenon of heat waves is not just a meteorological event but a public health and economic issue, with the state accounting for a significant portion of heat wave-related mortalities in India.[3]

According to the report "Climate of Bihar" which is the eighteenth issue in the series of 'State Climatological Summaries' published by the India Meteorological Department, In Bihar, the climate exhibits extreme temperatures with the highest maximum temperatures ever recorded reaching up to 49.5°C. This region faces severe heat, particularly during the pre-monsoon season, contributing to the occurrence of heat waves that significantly affect the livelihood and health of its population. The state, characterized by its varying topography and significant river systems, such as the Ganga, experiences a substantial impact on its climate due to these geographic features. Particularly during the hot weather season from March to June, temperatures can soar, leading to heatwaves that not only stress the human population but also affect agriculture, water supply, and overall environmental balance. The following climate data highlights the crucial need for effective heatwave management and adaptive strategies to mitigate the impact of extreme temperatures on the state's diverse socio-economic fabric.

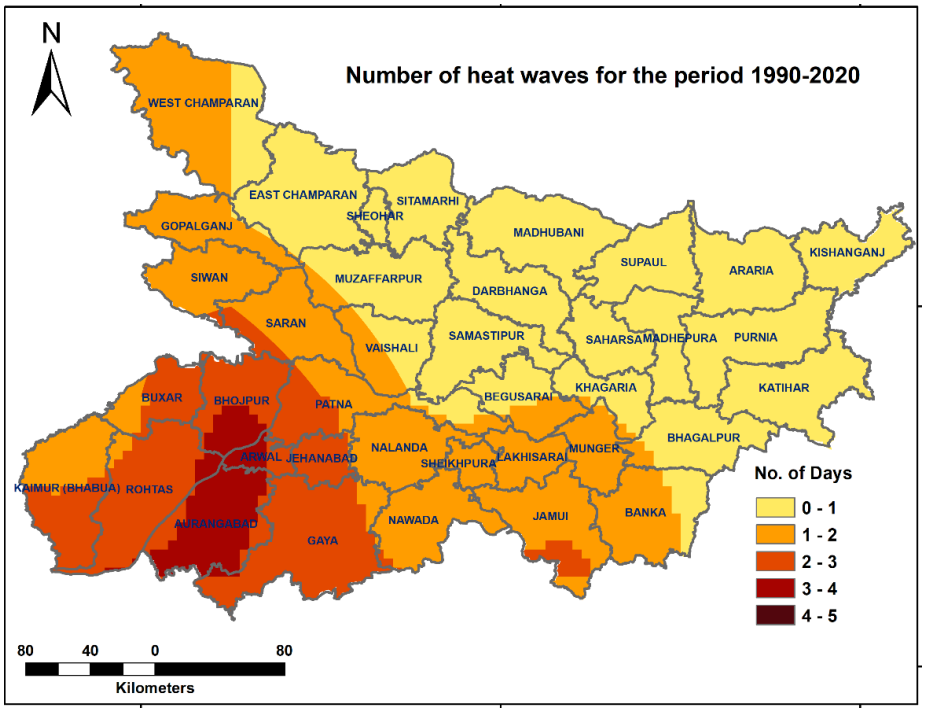


Figure 1.1: Number of heat waves for the period 1990-2020

Source: Bihar Mausam Sewa Kendra (BMSK)

[3] Mahdi, S. S., & Dhekale, B. S. (2016). Long term climatology and trends of heat and cold waves over southern Bihar, India. *Journal of Earth System Science*, *125*, 1557-1567.

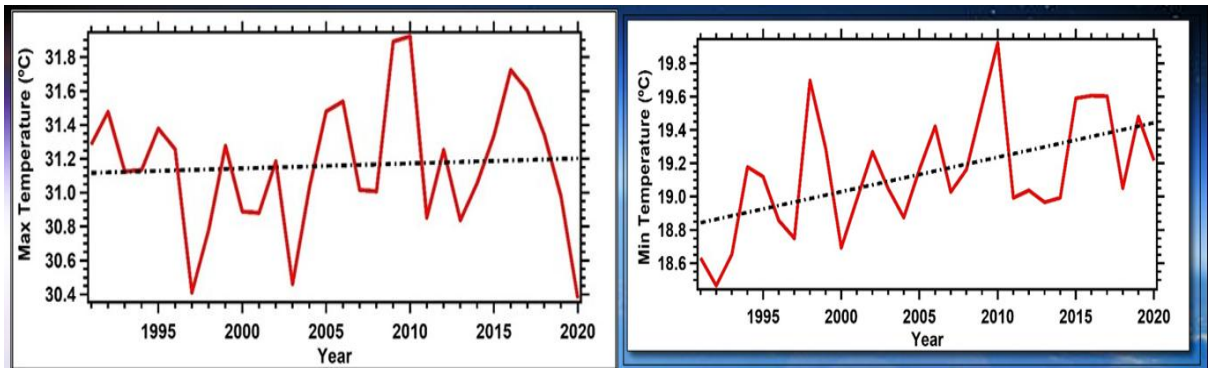


Figure 1.2: Temperature Analysis between the period 1995-2020

Source: Bihar Mausam Sewa Kendra (BMSK)

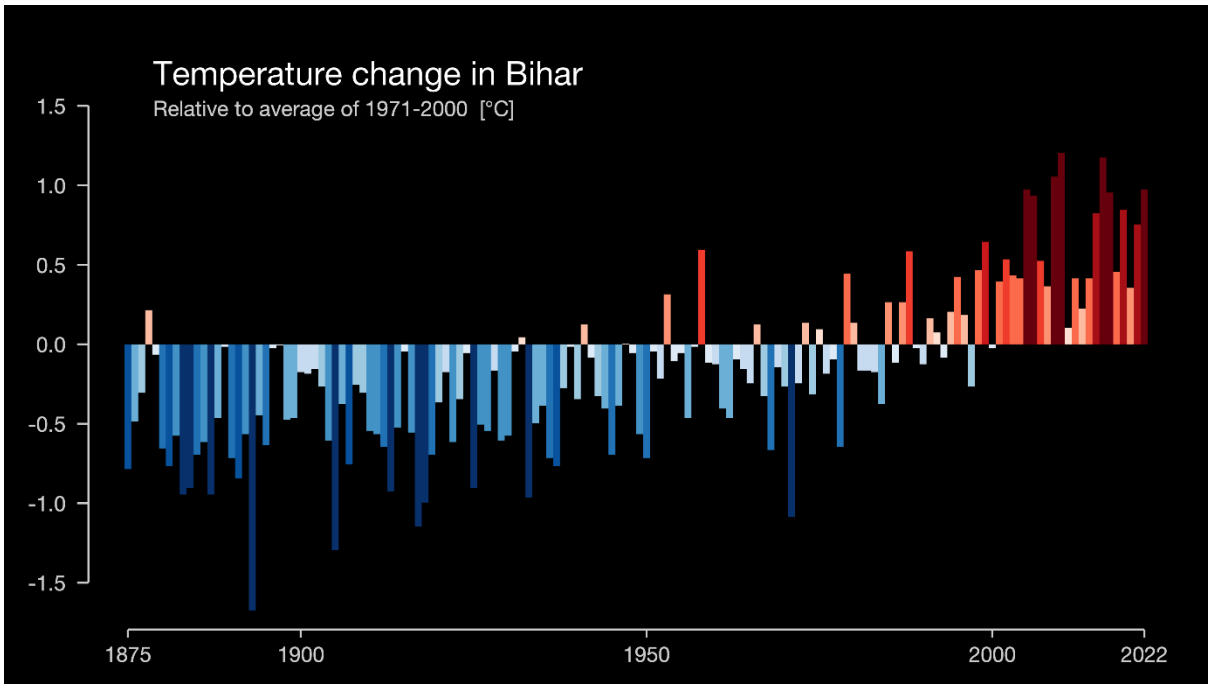


Figure 1.2: Relative Temperature Change between the period 1971-2000

Source: Bihar Mausam Sewa Kendra

1.3 Definition & Criteria of Occurrence

IMD classifies heat waves as a condition when temperature is 4.5-6.4° C above normal. For areas in the plains, heat wave conditions are said to exist when the maximum temperature is consistently more than 40° C. A temperature above 42° C is equivalent to having 102° F fever, which where the body's temperature starts breaking, making human life most vulnerable.[1]

The criteria adopted by IMD to define Heat Wave	Heat wave is considered if maximum temperature of a station reaches at least 40°C or more for Plains. a) Based on Departure from Normal • Heat Wave: Departure from normal is 4.5° C to 6.4° C • Severe Heat Wave: Departure from normal is >6.4°C b) Based on Actual Maximum Temperature (For plain stations only) • Heat Wave: When maximum temperature ≥45°C • Severe heat Wave: When minimum temperature ≥47°C (If above criteria met at least in 2 stations in a Meteorological sub-division for at least two consecutive days and it declared on the second day)

1.4 Necessity and Government of Bihar Efforts for Heatwave Mitigation:

The Heat Action Plan for Bihar is a state-level strategy to tackle extreme heat events, incorporating block and panchayat-level details into district-level data. This approach ensures the plan is tailored to local needs and vulnerabilities, allowing authorities to prioritize interventions and allocate resources more effectively. This HAP aims to protect residents from heat-related hazards by integrating adaptation and mitigation strategies into the state's planning processes. Emphasizing collaboration, early warning systems, and public education, the plan outlines preventive actions and long-term adaptation measures. Its success relies on the coordinated efforts of various governmental and non-governmental entities, especially with the Indian Meteorological Department (IMD) predicting extreme heat conditions. This initiative marks a significant step towards building a resilient Bihar against the challenges of extreme temperatures.

To build heat resilience, the state is working to increase its green coverage, which can reduce the urban heat island effect. For example, new road projects must plant and maintain trees. Protecting livestock is one of the key focuses of the Bihar HAP. The Bihar HAP has 16 key stakeholders and starts annual preparation in January. The Chief Minister monitors the HAP. BSDMA focuses on protecting the heat-vulnerable and has an early warning system. Through spatial analysis, Bihar is attempting to identify heat wave prone districts. The state has worked to develop a mass text messaging system on heat advisories; the early warning system can reach a million people at once. Bihar has a disaster awareness program for children that includes heat waves.

Previously planned efforts by the state during heat season include information dissemination on heat waves using various forms of media; close coordination with IMD officials in affected regions; holding orientation and training programs, with the health department, for stakeholders such as hospital staff and district disaster management authority officials;

implementing timed office closings by changing working hours for laborers under government schemes, closing markets in the afternoon, and constructing permanent roof structures in markets; adding sprinklers for cool mist on railway platforms, having ice bags available at health centers, and possibly making rainwater harvesting compulsory; using light colors in government buildings, schools, offices, and housing societies; and increasing drinking water and public shelter spots.

The state has also focused on long-term measures to address climate change, and with the support of the UN Environment Program (UNEP), has pursued a climate resilient and low-carbon development pathway. This increases the capacity of Bihar's government departments to deal with climate-related issues. The state's ongoing **Jal-Jeevan-Hariyali Mission** aims to combat climate change, increase conservation, and preserve water resources. One more important initiative of the state is **Akira Miyawaki's afforestation method** aims to restore degraded lands, enhance biodiversity, and mitigate climate change by planting native trees in clusters, providing socio-economic benefits to local communities.

CHAPTER 2

Hazard & Vulnerability

The state of Bihar faces a significant hazard in the form of heat waves, as indicated by the Statement of Climate for the State of Bihar 2022 by IMD. Over the period from 1901 to 2022, there has been a notable upward trend in maximum temperatures, increasing by +0.54°C/100 years. This trend is exemplified by the occurrence of the five warmest years on record in Bihar: 1958 (with an anomaly of +1.224°C), 1941 (+0.832°C), 1947 (+0.797°C), 1966 (+0.772°C), and 1979 (+0.757°C), all compared to the base period of 1981-2010. These temperature anomalies have been particularly pronounced during the months of March, April, July, and August, highlighting the high risk of heat waves during these periods.

2.1 Vulnerability mapping

Vulnerability mapping for Bihar involves a comprehensive assessment of hazard, vulnerability and risk, which was undertaken through a study conducted by IIPH Gandhinagar, Gujarat. This study employed a structured process consisting of three crucial steps: hazard analysis, vulnerability analysis, and risk assessment. During the hazard analysis phase, potential risks were meticulously identified, drawing upon historical data, recollections from elderly residents, and in some cases, hazard simulations. This involved a thorough examination of the intensity and return periods of various hazards prevalent in the region.

Subsequently, vulnerability analysis was conducted to delve into the susceptibility of diverse population groups, buildings, and economic activities to these identified hazards. This phase provided valuable insights into the underlying factors contributing to vulnerability within Bihar. The culmination of these analyses resulted in a comprehensive risk assessment, which quantified the combined impact of both hazard and vulnerability. The risks were then categorized into 3 classes as High, Medium and Low providing a structured framework for understanding and addressing the varying degrees of risk across different regions of Bihar. **(Refer Annexure 1 for detailed approach, methodology and outcomes)**

The HVI is designed based on data availability and standard protocols followed by the NDMA. A community-centric approach is also employed, particularly in creating vulnerability analysis. Notably, districts in Bihar are color-coded based on their Heat Vulnerability Index (HVI), designating high vulnerability in red, moderate in yellow, and low in green. HVI scores are the final cumulative weighted scores categorised into three equal tertile as per the Principal Component Analysis score. The region's vulnerability indexes indicate 12 districts with low vulnerability, 13 with medium vulnerability and 13 with high vulnerability. The HVI categories are defined by specific ranges of values and described below.

- Low Vulnerability (Low HVI) districts: The first 1/3rd score holders (score >1.5) are categorised as Low Vulnerability. Districts, including Madhubani, Gopalganj, Vaishali,

Patna, Aurangabad, Saran, Munger, Muzaffarpur, Bhojpur, Siwan, Buxar, Rohtas, are classified under this category.

- Moderate Vulnerability (Medium HVI) districts: The second 1/3rd score holders (which ranged from -1.5 to 1.5) are categorised as Moderate Vulnerability. Districts like Saharsa, Sitamarhi, East Champaran, Darbhanga, Bhagalpur, Jehanabad, Begusarai, Kaimur (Bhabua), Kishanganj, Nalanda, Nawada, West Champaran, Arwal fall into this category.
- High Vulnerability (High HVI) districts: The last 1/3rd score holders (score <-1.5) are categorised as High Vulnerability. This category includes districts such as Katihar, Khagaria, Samastipur, Araria, Supaul, Sheikhpura, Jamui, Madhepura, Lakhisarai, Purnea, Sheohar, Banka, Gaya. As per the current HVI calculation, these districts are highly vulnerable, probably for two prime reasons: the average high temperature and the higher population density. The neighbourhoods in these areas are more at risk for dying during and immediately following extreme heat. It uses a statistical model to summarize the most important social and environmental factors that contribute to neighbourhood heat risk.

These categorizations provide insights into the varying degrees of vulnerability to heat waves across different districts in Bihar, aiding in the development of targeted mitigation and adaptation strategies.

Table 2.1: Heat Vulnerability Index (HVI) for Bihar state.

Vulnerability Level	Districts
Low (Score: >1.5)	Gopalganj, Munger, Saran, Siwan, Rohtas, Madhubani, Bhojpur, Patna, Muzaffarpur, Buxar, Aurangabad, Vaishali
Moderate (Score: -1.5 to 1.5)	Samastipur, West Champaran, Sheohar, Jehanabad, Nawada, East Champaran, Kaimur (Bhabua), Kishanganj, Nalanda, Bhagalpur, Arwal, Darbhanga, Begusarai
High (Score: <-1.5)	Saharsa, Sitamarhi, Khagaria, Gaya, Banka, Sheikhpura, Lakhisarai, Purnea, Supaul, Katihar, Madhepura, Jamui, Araria

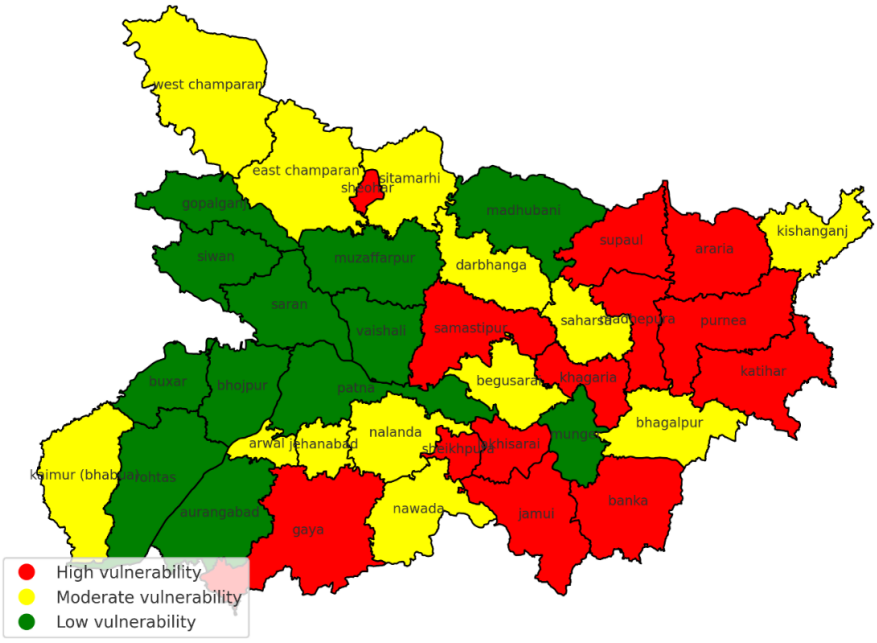


Figure 2.1: Heat Vulnerability Index (HVI) for Bihar

Low Vulnerability: Populations with low vulnerability are those at the lowest risk of experiencing adverse health effects from heat exposure. This includes individuals who are healthy, have access to air conditioning, and can take measures to protect themselves from extreme heat. Research has shown that access to air conditioning can significantly reduce the risk of heat-related illnesses and mortality, particularly among vulnerable populations (Hajat et al., 2010; Semenza et al., 2008).

Moderate Vulnerability: Populations with medium vulnerability are moderately susceptible to heat-related health impacts. This may include individuals who are relatively healthy but may still be at risk due to factors such as age, occupation, or lack of access to cooling facilities. Some studies have identified occupational factors, such as outdoor work or lack of access to air conditioning, as increasing the risk of heat-related illnesses among working-age adults (Hansen et al., 2008; Kjellstrom et al., 2016).

High Vulnerability: Populations with high vulnerability are those at the greatest risk of experiencing adverse health effects from heat exposure. This includes groups such as the elderly, children, pregnant women, and individuals with pre-existing health conditions. Studies have shown that the elderly are particularly vulnerable to heat-related illnesses and mortality due to factors such as decreased thermoregulatory capacity and chronic health conditions (Hondula et al., 2015; Oudin Åström et al., 2013). Children are also at increased risk due to their higher metabolic rates and greater susceptibility to dehydration (Basu, 2009).

2.2 Losses & Overall Impact

The National Crime Records Bureau (NCRB) gathers information regarding accidental deaths categorized by states/union territories (UTs), gender, and age groups attributed to various natural causes, including avalanche, cold and exposure, cyclone/tornado, starvation/thirst, earthquake, epidemic, flood, heat stroke, landslide, lightning, torrential rains, and other natural causes. The demographic breakdown of fatalities due to heat stroke in Bihar between 2012 and 2021 is outlined in the subsequent table.

Year	No. of Deaths in India	No. of Deaths in Bihar
2012	1247	166
2013	1216	85
2014	1248	131
2015	1908	86
2016	1338	85
2017	1127	84
2018	890	64
2019	1274	117
2020	530	53
2021	374	57

Table 2.2: Death caused by heat stroke in Bihar from 2012 to 2021

Source: National Crime Records Bureau

Heat waves in Bihar have become a significant concern, casting a wide-reaching impact on the region's health, agriculture, and overall socioeconomic status. These extreme weather events have not only caused a direct threat to human life through heat-related illnesses but also challenge the agricultural backbone of the state, leading to reduced crop yields and heightened water scarcity. The compounding effects of these challenges are felt across the spectrum of society, from rural farmers to urban dwellers, as they grapple with the realities of a changing climate.

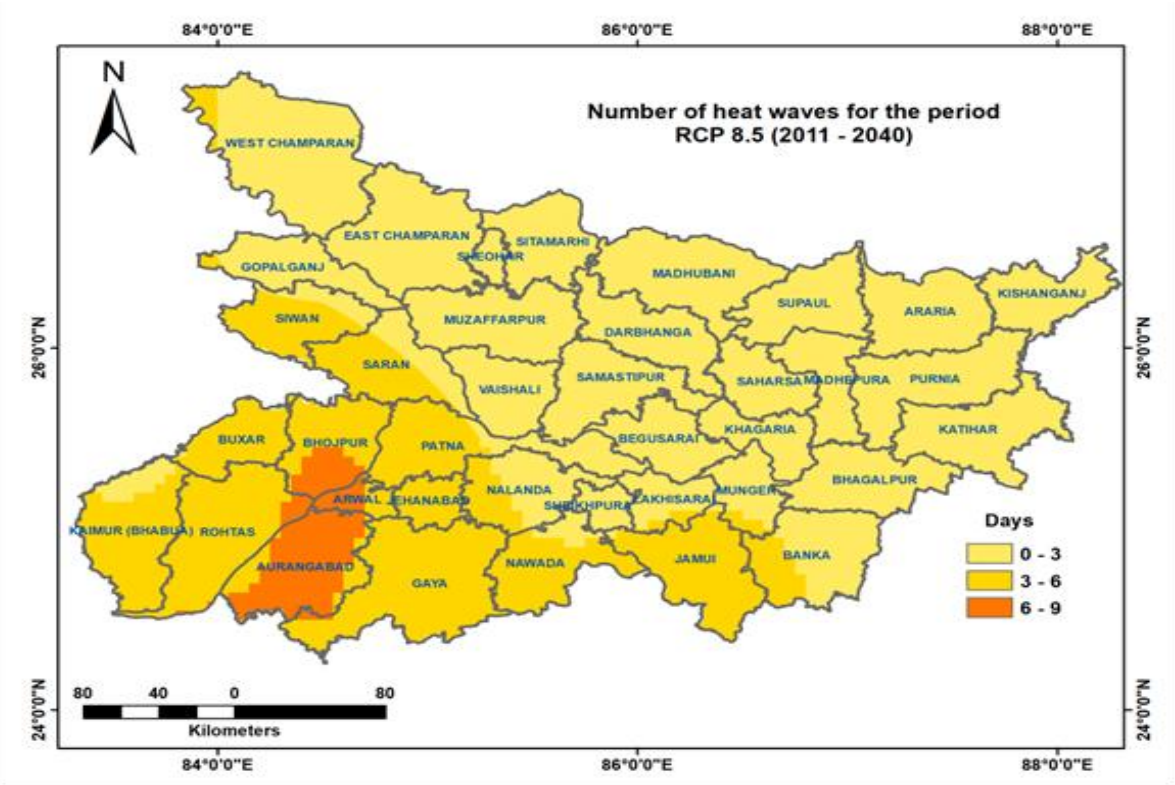
Sector	Impact of Heat Wave
Agriculture	Reduced crop yields due to heat stress and evapotranspiration; increased pest activity.
Water Resources	Diminished water supplies due to increased evaporation rates; potential for drought conditions.
Health	Increased incidences of heat-related illnesses and conditions, such as heatstroke, dehydration, and exhaustion. ***(Refer Annexure 2)***
Energy and Power Supply	Higher electricity demand for cooling, leading to potential strain on power grids and increased outages.

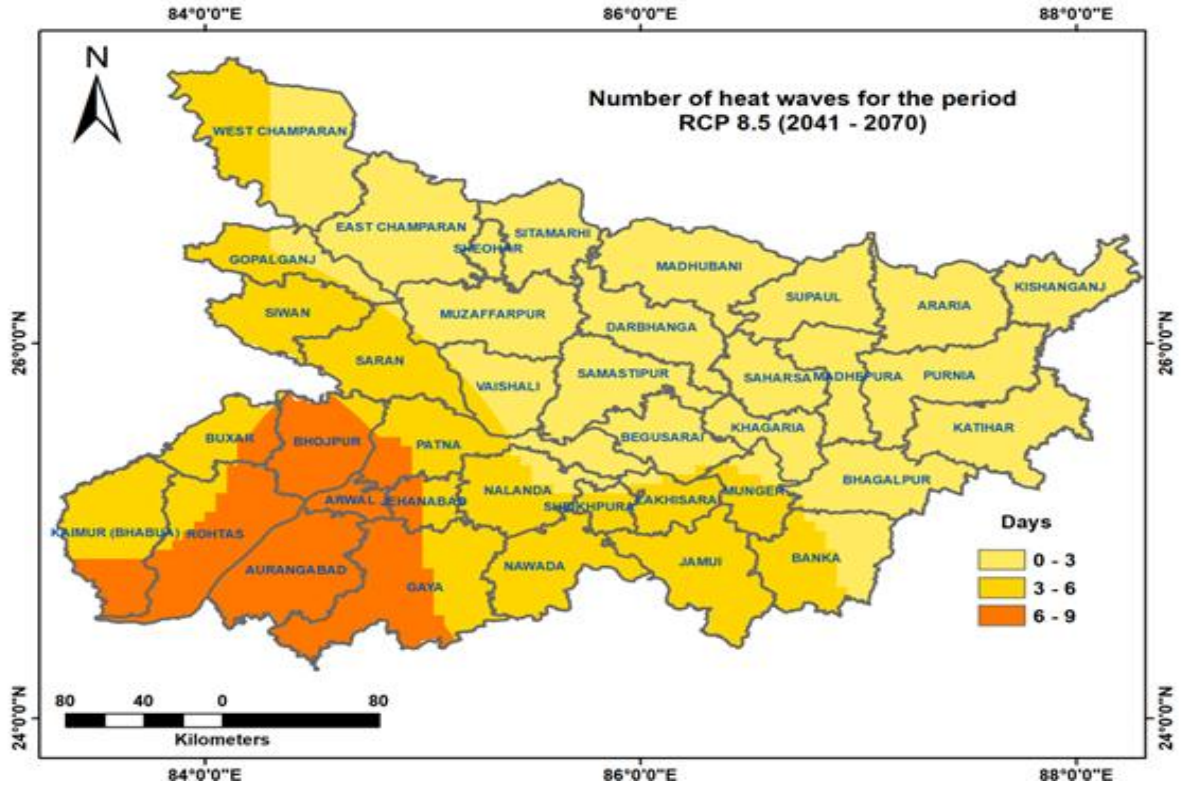
Infrastructure and Construction	Accelerated wear and tear on road surfaces and other infrastructure; disrupted construction schedules.
Livelihoods	Threatened livelihoods, especially for outdoor workers and those in heat-exposed industries.
Education	Possible disruptions to school schedules due to extreme heat conditions, affecting learning and exams.
Transportation	Potential for increased road surface damage and tire blowouts, affecting transportation efficiency.

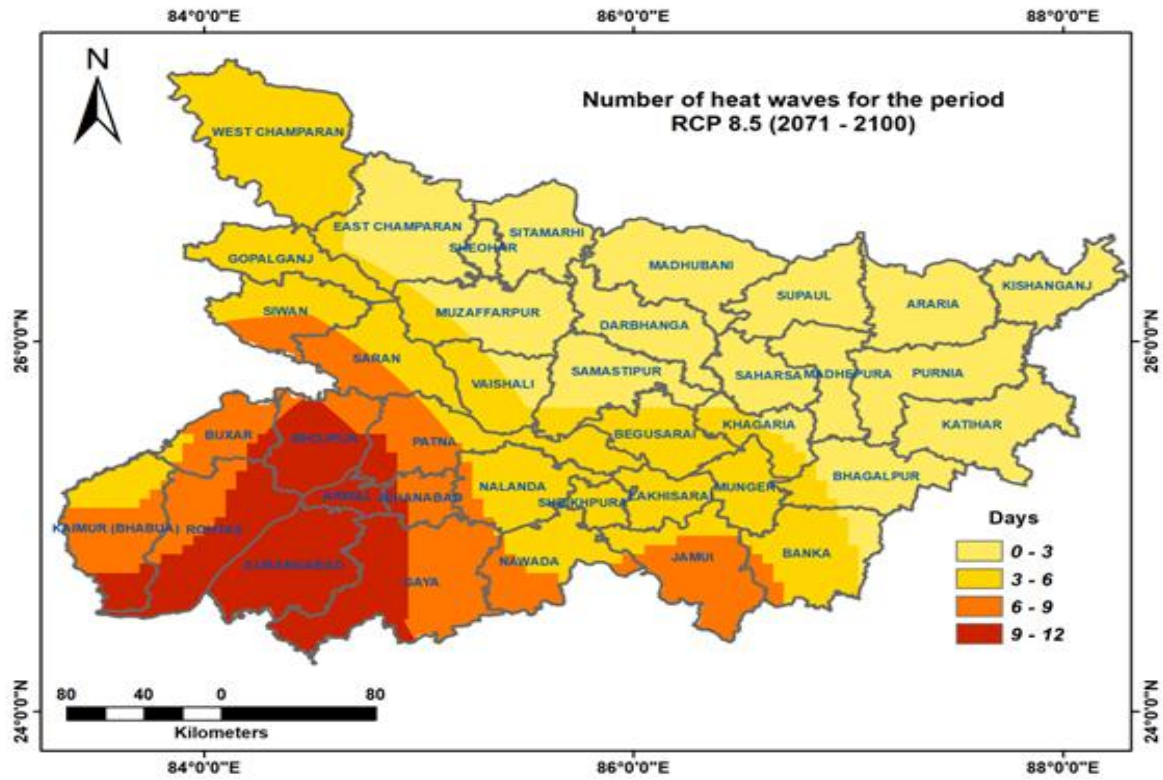
2.3 Futuristic Scenario

As per IMD Patna and Bihar Mausam Seva Kendra (BMSK) reports, Bihar is anticipated to face significant challenges due to rising temperatures in the coming decades. As per the report of Climate Resilient & Low Carbon Development Pathway for Bihar 2024[4], the projections indicate a consistent upward trend in both maximum and minimum temperatures across the state, which will have profound impacts on agriculture, water resources, human health, and overall socio-economic development. Bihar is facing significant changes in its climate, with temperatures expected to rise noticeably in the coming years. By the 2040s, the state's average yearly temperature is projected to go up by about 0.7 °C to 1°C. This upward trend is likely to continue, with an increase of 1°C to 1.3°C expected in the 2050s and then reaching an increase of 1.4°C to 1.9°C by the 2070s. The increase in temperatures won't be the same everywhere in the state. The south-western districts, in particular, are expected to see a sharper rise in temperatures ranging from 1-1.5℃ and 1.5-2℃ during the 2030s and 2050s when compared to past records. By the 2070s, almost the entire state, except for some north-eastern districts like Madhubani, Supaul, Madhepura, Saharsa, Bhagalpur, Katihar, Purnia, Araria, and Kishanganj, is predicted to experience an even more significant increase in maximum summer temperatures, going up by more than 2℃ from what has been usual. This expected rise in temperature is set to make it uncomfortably hotter for people and animals, increase the likelihood of heat-related health risks, boost the demand for water, and negatively impact farming, posing a challenge to the state's future planning and readiness for climate change.

[4]Climate Resilient & Low Carbon Development Pathway for Bihar 2024


Number of heat waves for the period
RCP 8.5 (2011 - 2040)
N
84°0'0"E
86°0'0"E
88°0'0"E
26°0'0"N
24°0'0"N
WEST CHAMPARAN
EAST CHAMPARAN
SITAMARHI
SHEOHAR
GOPALGANJ
MADHUBANI
SUPAUL
ARARIA
KISHANGANJ
SIWAN
MUZAFFARPUR
DARBHANGA
SARAN
VAISHALI
SAMASTIPUR
SAHARSA
MADHEPURA
PURNIA
BUXAR
BHOJPUR
PATNA
BEGUSARAI
KHAGARIA
KATIHAR
NALANDA
MUNGER
BHAGALPUR
ARWAL
JEHANABAD
SHEIKHPURA
LAKHISARAI
KAIMUR (BHABUA)
ROHTAS
AURANGABAD
GAYA
NAWADA
JAMUI
BANKA
Days
0 - 3
3 - 6
6 - 9
80 40 0 80
Kilometers


Number of heat waves for the period
RCP 8.5 (2041 - 2070)
N
84°0'0"E
86°0'0"E
88°0'0"E
26°0'0"N
24°0'0"N
WEST CHAMPARAN
EAST CHAMPARAN
SITAMARHI
SHEOHAR
GOPALGANJ
MADHUBANI
SUPAUL
ARARIA
KISHANGANJ
SIWAN
MUZAFFARPUR
DARBHANGA
SARAN
VAISHALI
SAMASTIPUR
SAHARSA
MADHEPURA
PURNIA
BUXAR
BHOJPUR
PATNA
BEGUSARAI
KHAGARIA
KATIHAR
NALANDA
MUNGER
BHAGALPUR
ARWAL
JEHANABAD
SHEIKHPURA
LAKHISARAI
KAIMUR (BHABUA)
ROHTAS
AURANGABAD
GAYA
NAWADA
JAMUI
BANKA
Days
0 - 3
3 - 6
6 - 9
80 40 0 80
Kilometers

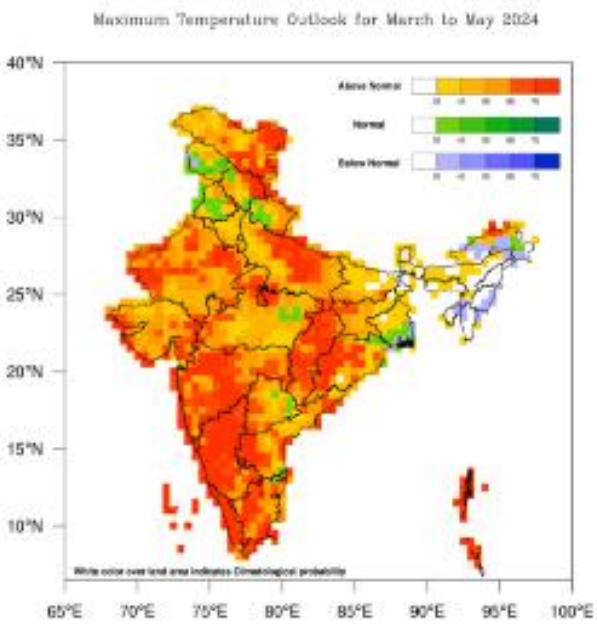


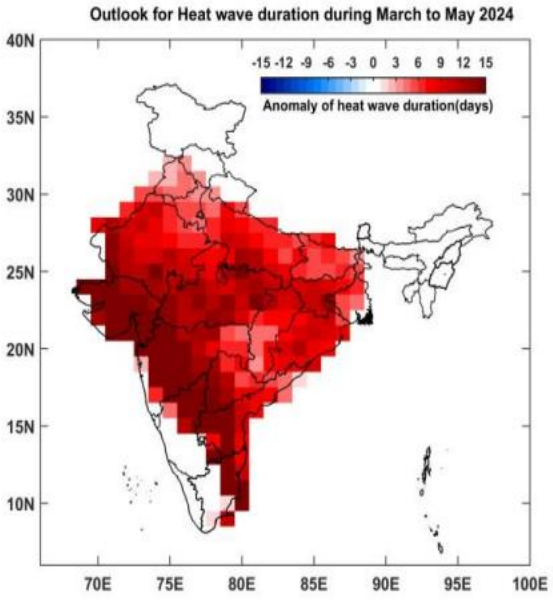
The above projection maps show the increase in the number of days with extreme temperature predicted to about 6-9 days during the period 2041-70 and 9-12 days during 2071-2100 over South-western part of the state . Source: Bihar Mausam Sewa Kendra (BMSK)

2.3.1 Forecast for 2024

For Bihar, during the hot weather season from March to May 2024, the India Meteorological Department forecasts above-normal maximum temperatures across most parts of the country. This includes Bihar, where higher than usual maximum temperatures can be expected. In terms of minimum temperatures, above-normal readings are also anticipated throughout most regions, indicating warmer nights during this period. Additionally, the season may see an above-normal number of heatwave days, highlighting an increased likelihood of prolonged periods of excessive heat. This forecast underscores the need for preparedness for higher temperatures and potential heatwaves in Bihar during the upcoming hot weather season. For instance, as per IMD Patna as of April 6, 2024, the heat forecast for the upcoming five days, April 6 to April 10 is normal. It shows the likelihood of occurrence of thunderstorms in Jamui, Rohtas, Kaimur, Aurangabad, Gaya, Nawada and Banka[5].

[5] https://mausam.imd.gov.in/imd_latest/contents/districtwise-warning_mc.php?id=11


Maximum Temperature Outlook for March to May 2024
Above Normal
Normal
Below Normal
40°N
35°N
30°N
25°N
20°N
15°N
10°N
65°E
70°E
75°E
80°E
85°E
90°E
95°E
100°E


Outlook for Heat wave duration during March to May 2024
-15 -12 -9 -6 -3 0 3 6 9 12 15
Anomaly of heat wave duration(days)
40N
35N
30N
25N
20N
15N
10N
70E
75E
80E
85E
90E
95E
100E

CHAPTER 3

State Strategy and Plan

3.1 Objective & Key Strategy

For the HAP 2024 report, the focus remains on preparing and protecting the people of Bihar from the potential harm of heat waves. Building upon the objectives and key strategies outlined in the HAP 2019, the following are the objectives and key strategies for 2024.

- The HAP continues to address the heat wave situation by conducting a comprehensive assessment of the magnitude and impact of heat wave-related morbidity and mortality. It delved deeper into analyzing patterns and trends to better understand the evolving nature of heat-related issues.
- To enhance preparedness, the HAP refined the identification of critical thresholds of temperature and humidity specific to Bihar's local climatic conditions. This involved ongoing research by Bihar Mausam Sewa Kendra and collaboration with meteorological experts to accurately pinpoint thresholds that triggered heat-related mortalities and morbidities.
- Building on previous efforts, the HAP further engaged diverse agencies and departments within the Government of Bihar, as well as other stakeholders including non-governmental organizations, community groups, and the private sector. This expanded collaboration aimed to ensure a coordinated and holistic approach to heat wave preparedness and response.
- The HAP 2024 continues to suggest innovative initiatives and measures to be undertaken by all stakeholders, including the government, to effectively mitigate the adverse impacts of extreme heat. This included the implementation of new technologies, community-based interventions, and awareness campaigns tailored to the specific needs of different demographics within Bihar.
- To ensure accountability and effectiveness, the HAP 2024 will strengthen mechanisms for the ongoing review and evaluation of its implementation. This involved regular monitoring of progress, gathering feedback from stakeholders, and making necessary adjustments to strategies and activities based on lessons learned.

Overall, the HAP 2024 aims to build upon the foundation laid out in previous years, striving for continuous improvement and adaptation to better protect the population of Bihar from the risks associated with extreme heat.

3.2. Institutional Structure

Entity	Role/Function
India Meteorological Department (IMD)	- Provides current and forecast weather information, including warnings for all weather-related hazards
	- Issues alerts for severe weather conditions, including heatwaves

Entity	Role/Function
	- Provides real-time data and forecasts for maximum temperatures and heat alerts for vulnerable areas
	- Offers a multi-hazard early warning system, issuing updated warnings four times a day on its website
	- Issues exclusive heat-related warnings valid for the next four days daily
	- Provides climate forecasts and seasonal temperature outlooks to support decision-making
Bihar Mausam Seva Kendra (BMSK)	- Consolidates, analyzes, data from Automatic Weather Stations at Block level and Automatic Rain Gauges at Panchayat level and generates high-resolution weather forecasts for Bihar
	- Disseminates customized weather information, forecasts, and advisories to the concerned Departments through weather Bulletins and to the public through "Mausam Bihar" Mobile App
	- Monitors weather conditions to issue area specific early warnings about extreme weather events
	- Provides long-term climate predictions to support various sectors, including agriculture and water resource management
Nodal Department: Disaster Management Department	- Serves as the nodal department for the implementation of the State Heat Action Plan (HAP)
Crisis Management Group (CMG)	- Coordinates and monitors disaster management activities at the state level
	- Oversees the implementation of the HAP
	- Coordinates responses to drinking water and fire incidents crises
Bihar State Disaster Management Authority (BSDMA)	- Provides technical support to the CMG and state government departments for effective implementation of the HAP
	- Operates a mass messaging system to disseminate precautionary measures based on IMD warnings and heat forecasts to vulnerable districts
District Disaster Management Authorities (DDMAs)	- Coordinate with concerned line departments at the district level to implement the HAP and SOP for fire and drinking water crises during summer season

Entity	Role/Function
	- Periodically review and monitor heatwave conditions and departmental responses in alignment with the HAP
	- Conduct review meetings, especially during intense heatwave conditions, with relevant district-level functionaries

The above table outlines the roles and functions of each entity involved in disaster management and weather forecasting in Bihar, highlighting their contributions to mitigating the impact of heat waves.

3.3 Early Warning & Alert Systems

3.3.1 Early warning and forecast Alert by IMD and Mausam Seva Kendra (BMSK)

The India Meteorological Department (IMD) serves as the primary agency for weather forecasting, issuing alerts for various hazards, including heatwaves. It provides real-time data, heat wave warnings, and forecasts for vulnerable areas, updating them four times a day on its website. Exclusive heat-related warnings are issued daily, valid for the next four days. Additionally, the IMD offers climate forecasts and seasonal temperature outlooks for informed decision-making.

Established in 2020, the Bihar Mausam Seva Kendra (BMSK) consolidates and analyzes data from Automatic Weather Stations and Rain Gauges. It disseminates customized weather information, forecasts, and advisories, issuing warnings for severe events through Weather Bulletin and Heatwave Bulletin daily. Weather information and forecast is also disseminated through dynamic and interactive weather dashboard https://mausamsewa.bihar.gov.in/WeatherDashboard/ and bilingual Mobile App "Mausam Bihar". BMSK also provides long-term climate predictions, supporting sectors like agriculture and water resource management.

Furthermore, the Bihar State Disaster Management Authority (BSDMA) provides technical support to Crisis Management Groups (CMG) and state departments, facilitating effective implementation of heat action plans. Utilizing a mass messaging system, BSDMA sends alerts based on IMD warnings and heat forecasts to vulnerable districts, ensuring timely precautionary measures.

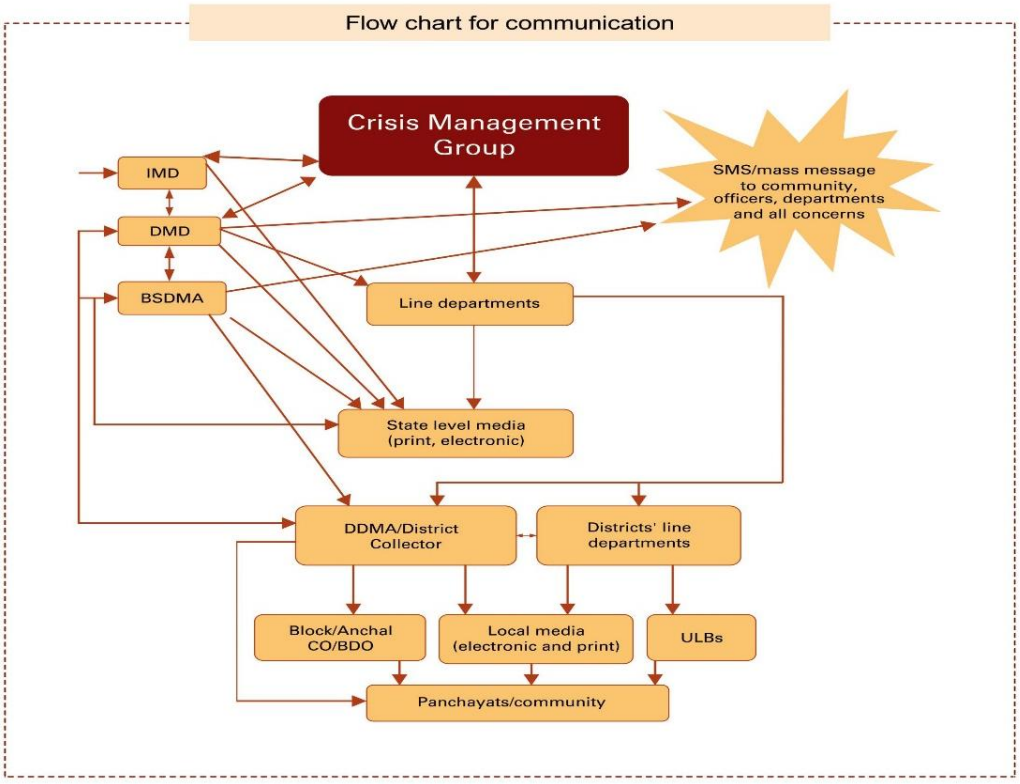
3.3.2 Identification of Colour Signals for Heat Alert

IMD currently follows a single system of issuing warnings for the entire country through a colour code system as given below. This system advises on the severity of an expected Heat hazard.

Colour signals for heat alert		
Colour code	**Heat wave condition**	**Temperature**
Red alert (severe condition)	**Extreme heat alert for the day**	**Normal maximum temperature increase 6°C to more**
Orange alert (moderate condition)	Heat alert day	Normal maximum temperature increase 4°C to 5°C
Yellow alert (Heat-wave warning)	Hot day	Nearby normal maximum temperature
White (normal)	Normal day	Below normal maximum temperature

3.4 Communication Plan for Heat Wave & Proposed Early warning receipt and dissemination mechanism for Bihar

The following is the communication plan and proposed Early warning receipt and dissemination mechanism for Bihar:



1. **India Meteorological Department (IMD) and Bihar Mausam Sewa Kendra (BMSK) Heat Wave Alert**: The process begins when the IMD identifies a potential heat wave situation and issues an alert. IMD also release warning forecasts to the local print and electronic media including all radio stations and Doordarshan for public broadcasting of the same.

2. **State Level Dissemination System**:

- **State Emergency Operation Centre (SEOC) of DMD**: This center receives the heat wave alert from the IMD and is responsible for coordinating the response at the state

level. Early warning system can enhance the preparedness and response of responsible line departments. Based on IMD warning and heat wave predictions, State Emergency Operation Centre (SEOC) of DMD will issue heat wave alerts to District Emergency Operation Centres (DEOCs), disseminating it to vulnerable districts and all relevant line departments to trigger the response actions. DEOCs would be responsible for sending early warning messages to the vulnerable populations through block office/ Gram Panchayats/ municipalities/ULBs. The detailed advisory is attached as **Annexure 3**.

- **Bihar State Disaster Management Authority (BSDMA)**: The Bihar State Disaster Management Authority (BSDMA) has developed a mass messaging system under which SMS and WhatsApp messages can be sent to specified mobile numbers in any village/city of the state. Based on IMD warning and heat wave forecast, a mass messaging system would be activated, and messages to the vulnerable population would be flashed across vulnerable districts
- **Line Departments Nodal Officer**: From the DMD/SEOC, the alert is further disseminated to the nodal officers of various line departments. These departments are part of the government and include sectors like health, public works, water supply, and others that have a role in disaster preparedness, response and management.
- **Media**: The information is also disseminated in the media, which plays a critical role in spreading the alert and related information to the public. Do's and Don'ts for heat wave alerts and advisories are published in various district level as well local Hindi/ English Daily newspapers and other electronic social media.

3. **District Level Dissemination System**:

- **District Disaster Management Authority (DDMA)**: Simultaneously, the SEOC communicates the alert directly to the DDMA. The DDMA is the district-level authority responsible for planning, coordinating, and implementing disaster management and takes action based on the state-level directives. Heat wave forecast is transmitted to the District Emergency Operation Centre (DEOC) through email by District Disaster Management Authority (DDMA)
- **District Emergency Operation Centre (DEOC)**: The DDMA then informs the DEOC, which acts at the district level to coordinate the responses to the heat wave alert and issues directives to the block, village, and community level. The heat wave warning is sent to District Emergency Operation Centre which is further transmitted to Block/Gram Panchayat, village and to the DM, SP, ADC/ADM, ASP, SDMs and filed officials, all the officers of the line departments, and community members through mass text and image message in the WhatsApp group to all.
- **Block/Gram Panchayat/Village**: The DEOC sends the information down to the local levels, which include administrative blocks, gram panchayats (village councils), and

individual villages. They're responsible for implementing the directives and ensuring that the communities are prepared and aware of the heat wave conditions.

- **Field Officials, Officers of Line Departments, Community Members**: At the local level, field officials, officers from various line departments, and community members play a vital role in ensuring the dissemination of the alert and in preparing the community to deal with the heat wave. This may include activities like setting up cooling centers, distributing water, and educating people on how to avoid heat stroke. Public alerts are disseminated through media outlets, official websites, SMS, and mobile apps

The flow of information is primarily top-down, from national to state to district to local authorities. This structured approach ensures that all levels of government are informed and can work in coordination to mitigate the impact of heat waves. It also emphasizes the role of the media and community members in spreading awareness and taking appropriate action.

CHAPTER 4

MITIGATION & PREPAREDNESS

As the frequency and severity of heat waves continue to rise, particularly in regions like Bihar, proactive mitigation and preparedness measures are imperative to safeguard public health and livelihoods. This chapter outlines a strategic approach to managing heat-related illnesses, enhancing interdepartmental cooperation, and instituting comprehensive preventive measures.

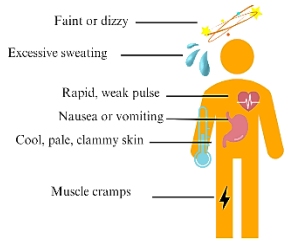
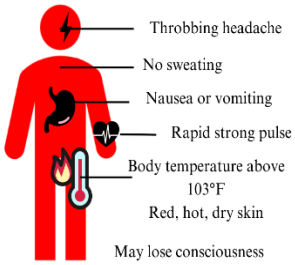
4.1 Heat Related Illnesses

The World Health Organization (WHO) defines Heat-Related Illnesses (HRI) as a spectrum of conditions resulting from the body's inability to cope with heat. These conditions range from mild heat cramps and heat exhaustion to more severe forms like heat stroke, which can be life-threatening if not promptly addressed. According to WHO, the increase in morbidity and mortality during heat waves can be significantly mitigated through effective prevention strategies, timely medical response, and public education on the risks of extreme heat. The onset of heat waves brings a spike in heat-related illnesses, necessitating immediate and effective medical responses. ***(Refer to Annexure 2 for case definition of various HRIs)***.

The following table describes the symptoms and first aid for various heat disorder;

Table 4.1: Symptoms and First Aid for various Heat Disorders

Heat Disorder	Symptoms	First Aid
Heat rash	Skin redness and pain, possible swelling, blisters, fever, headaches.	Take a shower using soap to remove oils that may block pores preventing the body from cooling naturally. If blisters occur, apply dry, sterile dressings and seek medical attention.
Heat Cramps	Painful spasms usually in leg and abdominal muscles or extremities. Heavy sweating	Move to cool or shaded place. Apply firm pressure on cramping muscles or gently massage to relieve spasm. Give sips of water. If nausea occurs, discontinue.
Heat Exhaustion	Heavy sweating, weakness, Skincold, pale, headache and clammy extremities. Weak pulse. Normal	Get victim to lie down in a cool place. Loosen clothing. Apply cool, wet cloth. Fan or move victim to air-conditioned place. Give sips of water slowly and if nausea occurs, discontinue. If vomiting occurs, seek

Heat Disorder	Symptoms	First Aid
	temperature possible. Fainting, vomiting.	immediate medical attention, call 108 and 102 for ambulance.
Heat Stroke (Sun Stroke) 	High body temperature. Hot, dry skin. Rapid, strong pulse. Possible unconsciousness or altered mental status. Victim will likely not sweat.	Heat stroke is a severe medical emergency. Call 108 and 102 for ambulance for emergency medical services or take the victim to a hospital immediately. Delay can be fatal. Move victim to a cooler environment. Try a cool bath or sponging to reduce body temperature. Use extreme caution. **DO NOT GIVE FLUIDS ORALLY** if the person is not conscious

Refer Annexure 4 for signs and symptoms in vulnerable population especially children and pregnant women.

4.2. Hospital Preparedness for Managing HRIs

In Bihar, where the impact of heatwaves is increasingly severe due to climatic changes, hospital preparedness for managing Heat-Related Illnesses (HRIs) in anticipation of the 2024 heatwave season is crucial. The state's healthcare infrastructure is focusing on a multi-faceted approach to combat the heightened risk. This involves the development and implementation of localized heatwave preparedness plans, which are essential for timely and effective response mechanisms. Hospitals and healthcare facilities across Bihar are enhancing their capacity through the training of medical staff in the identification and treatment of HRIs, ensuring the availability of critical supplies such as intravenous fluids, and upgrading their cooling systems to provide safe havens for those affected.

Moreover, the integration of early warning systems in collaboration with meteorological departments enables healthcare facilities to be on high alert during peak heat periods, allowing them to manage resources and staff allocations more efficiently. Public awareness campaigns are also a critical component of the preparedness strategy, educating communities on the risks of heatwaves and promoting preventive measures such as hydration and staying indoors during the hottest parts of the day.

Partnerships between the government, non-governmental organizations (NGOs), and international health bodies are being strengthened to support Bihar's healthcare system in managing the anticipated surge in HRIs. These collaborations aim to improve infrastructure resilience, facilitate knowledge exchange on best practices, and provide additional resources

and support where needed. With these comprehensive preparedness measures, Bihar aims to significantly reduce the health impact of heatwaves on its population in 2024 and beyond, demonstrating a proactive approach to heat-related health challenges. To elevate the readiness of the healthcare system, a detailed operational plan has been outlined, featuring several key initiatives ***(Refer Annexure 5 for Treatment Protocol of Heat Illness);***

- A detailed action plan to tackle heat-related illnesses well in advance of hotter months.
- Operational framework – preparing specific health adaption plan, development of guidelines and response plan to tackle all levels of heat-related illnesses. Capacity building measures for doctors, nurses and others staff should be undertaken.
- Cases with suspected heat stroke should be rapidly assessed using standard Treatment Protocols.
- Identify surge capacities and mark the beds dedicated to treat heat stroke victims and enhance emergency department preparedness to handle more patients.
- Identify RRT (Rapid Response Teams) to respond to any exigency call outside the hospitals.
- Ensure adequate arrangements of Staff, Beds, IV fluids, ORS, essential medicines and equipment to cater to management of volume depletion and electrolyte imbalance.
- Health centres should establish accessible outreach clinics and conduct awareness campaigns for neighbourhood communities to reduce cases and reduce the number of affected cases.
- Primary health centres must refer the patients to the higher facility only after ensuring adequate stabilization and basic definitive care (cooling and hydration).
- Hospitals must ensure proper networking with nearby facilities and medical centres to share the patient load which exceeds their surge capacities.
- All cases of heat-related illnesses should be reported to IDSP (Integrated Disease Surveillance Programme) unit of the district.

As per the Ministry of Family Health and Welfare (MOFHEW), the National Centre for Disease Control (NCDC) has developed standard guidelines and directed the states to implement them, with a special focus on notification. Based on this the Bihar Health Society has released advisory and standard reporting format as per the national gudilines (Refer to **Annexure 6 for Heat-related Illness notification).** Additionally, the current capacity of the hospitals also needs to be reported in the prescribed format, which will not only be helpful to analyse the strength but also will provide an insight to design or re-design the human resource allocation for managing the heat-related illnesses. However, priority should be given to enhancing capacity building for the Integrated Health Information Platform (IHIP), formerly known as the Integrated Disease Surveillance Programme (IDSP), to detect heat-related illness and improve case notification reporting.

4.3 Role of other departments in mitigation and preparedness

In managing, mitigating, and preventing heat waves in Bihar, the role of departments beyond health and hospitals is crucial. The following are proposed mitigation measures for the key departments.

Department	Proposed Mitigation Measures

Urban Development & Housing Department	• Implement urban planning strategies, such as increasing green spaces, improving ventilation etc. • Promote and construct "Heat Resistant Buildings" as a mitigating measure in the long run. • Promote cool roofs initiative /white coloured roofs (albedo paint), green roofs and walls, and plantation in neighbourhoods to keep them cool.
Education Department	• Paint the rooftop of schools with white/ Albedo painting to reduce heat built-up and ensure cooler classrooms. • Encourage planting of trees in the vicinity of schools (as a long term plan).
Water Resource Department	• Promote construction of rain water harvesting structures
Agriculture Department	• Promote efficient irrigation techniques such as drip irrigation • Promote Crop Insurance • Promote drought resistant crops
Animal Husbandry & Fisheries Department	• Construct water trough for animals at strategic locations
Public Health Engineering Department	• Monitor the level of ground water on regular basis
Rural Development Department	• Ensure excavation/deepening of Pynes/Ahars so as to ensure storage of water under MGNREGA
Panchayati Raj Department	• Prepare village level action plan to ensure the installation of sufficient drinking water points • Execute the water conservation schemes/projects
Information Technology Department	• Develop Dashboard for the monitoring of heat wave condition and cases at the ground level

Lastly, collaboration with the Department of Energy can facilitate the provision of uninterrupted power supply, essential for running cooling systems during heat waves. By

leveraging the expertise and resources of these departments, a comprehensive approach to heat wave management can be established, ensuring the well-being of Bihar's residents during extreme heat events. ***(Detailed action points are given in Chapter 5)***

4.4 Preventive Measures Dos & Don'ts

Addressing the escalating threat of heatwaves in Bihar necessitates a comprehensive public health strategy. The Bihar Heatwave Action Plan 2024 advocates for an integrated approach, focusing on the 'B.E.A.T. the Heat' risk communication framework - **B.E.A.T. the Heat - BE AWARE of heat stress and protect yourself; EASILY IDENTIFY the symptoms; ACT IMMEDIATELY to protect; TAKE to a health facility**. This framework emphasizes coordinated prevention, prompt response, accurate diagnosis, and effective care strategies, involving front-line workers such as community health representatives and educators. Additionally, preventive measures like hydration, avoiding peak heat hours, and appropriate clothing are essential, alongside community-level interventions such as establishing cooling centers and distributing hydration kits. Mitigating heat wave threats requires interdepartmental collaboration, public awareness, and education, including integrating heat wave management into school curriculums and healthcare professional training.

In light of the rising temperatures and the increasing incidence of heat-related illnesses, it is paramount to adhere to specific health advisories for the effective prevention and management of heat stress. These guidelines, tailored for everyone, employers, and workers alike, offer a comprehensive approach to safeguarding oneself and others during the hotter months. From staying hydrated with sufficient water and appropriate beverages to wearing suitable clothing and scheduling work to cooler times of the day, these measures are designed to mitigate the risks associated with heat exposure. Additionally, the advice extends to maintaining a cool living environment, recognizing the signs of heat-induced health issues, and understanding what to avoid during peak heat times to ensure the well-being of all individuals and animals under one's care. The table below summarizes these vital precautions and recommendations, serving as a quick reference to promote health and safety during the summer season.

Category	Advice
Dos for Everyone	- Listen to Radio, watch TV, read Newspaper for local weather news.
	- Drink sufficient water - even if not thirsty.
	- Use ORS, homemade drinks like lassi, torani, lemon water, buttermilk, etc.
	- Wear lightweight, light-colored, loose, and porous cotton clothes.
	- Cover your head with a cloth, hat, or umbrella.
Employers and Workers	- Provide cool drinking water near the workplace.
	- Caution workers to avoid direct sunlight.
	- Schedule strenuous jobs to cooler times of the day.

	- Increase the frequency and length of rest breaks for outdoor activities.
	- Give additional attention to pregnant workers and those with a medical scondition.
Other Precautions	- Stay indoors as much as possible.
	- Keep your home cool, use curtains, shutters, or sunshade, and open windows at night.
	- Try to remain on lower floors.
	- Use fans, damp clothing, and take baths in cold water frequently.
	- If you feel faint or ill, see a doctor immediately.
	- Keep animals in shade and give them plenty of water to drink.
Don'ts	- Avoid going out in the sun, especially between 12.00 noon and 3.00 p.m.
	- Avoid wearing dark, heavy, or tight clothing.
	- Do not go out barefoot.
	- Avoid cooking during peak hours. Open doors and windows to ventilate the cooking area adequately.
	- Avoid alcohol, tea, coffee, and carbonated soft drinks, which dehydrate the body.
	- Avoid high-protein food and do not eat stale food.
	- Do not leave children or pets in parked vehicles, as they may get affected by Heat Wave.

This table summarizes the essential guidelines for managing and preventing heat stress, making it easier to understand and follow the provided advice.

Information, Education, and Communication (IEC) campaigns are crucial for raising awareness among vulnerable populations, encouraging safer practices, and fostering community engagement to address heat stress. The following materials are part of BSDMA's efforts for heat wave preparedness and mitigation.

गर्म हवाएं/लू से बचाव

साधारण सावधानियों से अपने आपको सुरक्षित रखें

जहाँ तक संभव हो कड़ी धूप में बाहर न निकलें।
जितनी बार हो सके पानी पीयें, प्यास न भी लगे तो भी पानी पीयें। सफर में अपने साथ पीने का पानी हमेशा रखें।
जब भी बाहर धूप में जायें हल्के रंग के ढीले-ढाले सूती कपड़े धूप के चश्में इस्तेमाल करें। गमछे या टोपी से अपने सिर को ढकें और खाली पांव धूप में न चलें।
अधिक तापमान में कठिन काम न करें।
हल्का भोजन करें। अधिक पानी की मात्रा वाले फल जैसे-तरबूज, खीरा, नींबू, संतरा आदि का सेवन करें तथा ज्यादा प्रोटीन वाले भोजन का सेवन न करें, जैसे-मांस व मेवे, जो शारीरिक ताप को बढ़ाते हैं।
घर में बना पेय पदार्थ जैसे कि लस्सी, नमक चीनी का घोल, छाँछ, नींबू-पानी, आम का पन्ना इत्यादि का नियमित सेवन करें।
बच्चों एवं पालतू जानवर को बंद वाहनों में अकेला न छोड़ें।
जानवरों को छांव में रखें और उन्हें खूब पानी पीने को दें।
लू लगने की स्थिति में जैसे कि बेहोशी या चक्कर लगना, उल्टी, सिरदर्द, अत्यधिक प्यास लगना, दिल की धड़कन तेज होना इत्यादि होने पर तुरंत चिकित्सक के पास जावें।
स्थानीय मौसम के पूर्वानुमान और आगामी तापमान में परिवर्तन के बारे में सतर्क रहें।
अगर आपकी तबीयत ठीक न लगे या चक्कर आए तो तुरंत डाक्टर से संपर्क करें।

लू लगने पर क्या करें

लू लगे व्यक्ति को छांव में लिटा दें।
अगर तंग कपड़े हों तो उन्हें ढीला कर दें अथवा हटा दें।
ठंडे गीले कपड़े से शरीर पोछें या ठंडे पानी से नहलायें।
व्यक्ति को ओ0 आर0 एस0/नींबू/पानी/नमक-चीनी का घोल पीने को दें जो शरीर में जल की मात्रा को बढ़ा सके।
यदि व्यक्ति पानी की उल्टियाँ करे या बेहोश हो, तो उसे कुछ भी खाने व पीने को न दें।
लू लगे व्यक्ति की हालत में एक घंटे तक सुधार न हो तो उसे तुरंत नजदीकी स्वास्थ्य केन्द्र में ले जाएं।

बिहार राज्य आपदा प्रबंधन प्राधिकरण

(आपदा प्रबंधन विभाग, बिहार सरकार)

द्वितीय तल, पंत भवन, नहरू मार्ग, पटना-01 फोन-+91 (0612) 2547232, Visit us:www.bsdma.org : e-mail:info@bsdma.org

राज्य आपातकालीन संचालन केन्द्र (SEOC)- 0612-2294202/206

बिहार सरकार

बिहार सरकार
समाज कल्याण विभाग

समेकित बाल विकास सेवाएँ (ICDS) निदेशालय

गर्म हवाओं एवं लू से बचने के उपाय

बचाव के उपाय

गर्भवती व धात्री महिलाएं दोपहर में बाहर जाने से बचें।
घर मे प्रत्यक्ष रूप से आने वाले सूर्य के प्रकाश को अवरूद्ध करें।
जितनी बार हो सके पानी पीएं, प्यास ना भी लगे तो भी पानी पीएं।
अधिक तापमान में कठिन काम न करें।

खानपान मे सावधानी

तरल पदार्थ जैसे, सत्तू का घोल, नींबू पानी, आम का सरबत, छांछ एवं लस्सी आदि का सेवन करें।
नवजात से छः माह तक के बच्चे को केवल माँ का दूध पिलाएँ और कुछ न दें।
चाय, कॉफी तथा अन्य गरम पदार्थों का सेवन ना करें।

धूप मे निकलने पर

धूप मे निकलने से पहले शरीर को पूरी तरह से सूती कपड़े से ढ़क लें।
धूप का चश्मा इस्तेमाल करें। संभव हो तो तौलिया/गमछा रखे।
जूता या चप्पल पहन कर ही बाहर निकले।

लू से बच्चे, बूढ़े, गर्भवती महिला, मजदूर व्यक्ति, अत्यधिक प्रभावित होते हैं।

लू लगने पर क्या करें

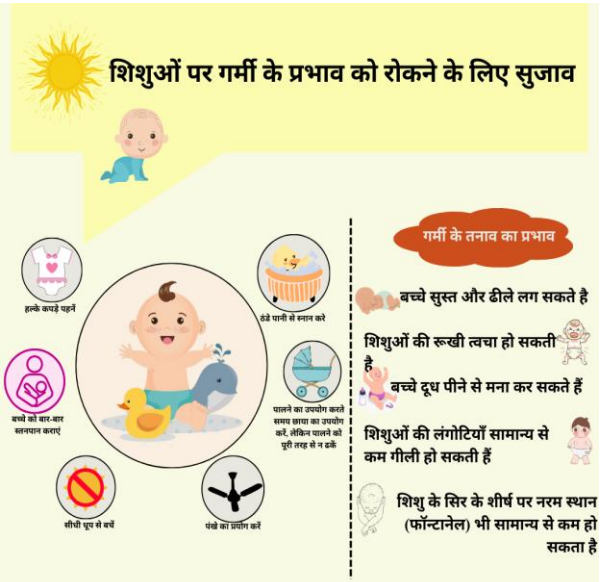
लू लगे व्यक्ति को छाँव में पैर को ऊंचा कर लेटा दें, कपड़े को ढीला कर दें।
शरीर के तापमान को कम करने के लिए कूलर, पंखे इत्यादि से हवा दें।
ठंडे गीले कपड़े से शरीर को पोंछे या ठंडे पानी से नहलायें। रोगी को ORS का घोल / नींबू पानी / सादा पानी / नमक चीनी का घोल पीने को दें।
यदि रोगी पानी की उल्टियाँ करे या बेहोश हो तो नजदीकी स्वास्थ्य केंद्र ले जाएँ।

समेकित बाल विकास सेवाएँ (ICDS) निदेशालय, बिहार, पटना द्वारा जनहित में जारी

अधिक जानकारी के लिए हेल्प लाइन - 104 पर संपर्क करें।

आई.सी.डी.एस. निदेशालय, इंदिरा भवन, राम चरित्र सिंह पथ, पटना - 800001 | वेबसाइट: icdsbih.gov.in


गर्भवती महिलाओं पर गर्मी के तनाव का प्रभाव
अल्पकालिक प्रभाव
सरदर्द होना
चक्कर आना
थकान होना
जी मिचलाना
ठंड लगना
पैर मे सूजन आना
लंबे समय तक का प्रभाव
जन्म के समय कम वजन वाला बच्चा
गर्भपात की दर में वृद्धि होना
समय से पहले जन्म होना
मृत शिशु का जन्म होना
क्या करना चाहिए
तरल पदार्थ का खूब सेवन करें
बहुत सारे फल खाएं
ठंडी जगह पर आराम करें
हल्के रंग और सूती कपड़े पहनें
बाहर जाते समय टोपी/छाता/ स्कार्फ का प्रयोग करें
क्या नहीं करना चाहिए
मीठे पेय पदार्थों को टाले
अधिक शारीरिक गतिविधि को प्रतिबंधित करें
कसे हुए कपड़ों को टाले
गर्मियों की दोपहर में बाहर जाने का टाले
शराब और धूम्रपान को टाले


शिशुओं पर गर्मी के प्रभाव को रोकने के लिए सुजाव
हल्के कपड़े पहनें
ठंडे पानी से स्नान करे
बच्चो को बार-बार स्तनपान कराएं
पालने का उपयोग करते समय ज्ञात का उपयोग करें, लेकिन पालने को पूरी तरह से न ढकें
सीधी धूप से बचें
पंखे का प्रयोग करें
गर्मी के तनाव का प्रभाव
बच्चे सुस्त और ढीले लग सकते है
शिशुओं की रूखी त्वचा हो सकती है
बच्चे दूध पीने से मना कर सकते हैं
शिशुओं की लंगोटियाँ सामान्य से कम गीली हो सकती हैं
शिशु के सिर के शीर्ष पर नरम स्थान (फॉन्टानेल) भी सामान्य से कम हो सकता है


बुजुर्गों पर गर्मी का प्रभाव
स्वाभाविक रूप से होने वाले जैविक परिवर्तन
उम्र से सबंधित बीमारियों की उच्च दर
दवाओं का अधिक उपयोग गर्मी के प्रति शरीर की प्रतिक्रिया को बदल देता है
तरल पदार्थ का खूब सेवन करें
धूप में बाहर जाने का टाले
चाय, कॉफी और कार्बोनेटेडपेय को टाले
ठंडे पानी से नहाएं
हल्के रंग के सूतीकपड़े पहनें


कार्यस्थल मे गर्मी से बचाव करें
कार्यस्थल के अंदर और बाहर की गर्मी खतरनाक होती है
निर्माण/औद्योगिक श्रमिक
गर्मी के तनाव का प्रभाव
गर्मी के तनाव को दूर करने के उपाय
गर्मी के तनाव का तत्काल प्रभाव
मांसपेशियों में ऐंठन
चक्कर आना
भारी पसीना आना
तीव्र प्यास लगना
थकान होना
सरदर्द होना
धुंधली दृष्टि होना
गर्मी के तनाव का लंबे समय तक का प्रभाव
व्यावसायिक दुर्घटनाओं की बढ़ती घटनाएं
ठंडा पानी पिएं
हल्के रंग के सूती कपड़े पहनें
काम करते वक्त थोड़े थोड़े समय पर विश्राम करे
दिन के ठंडे समय में भारी काम करे

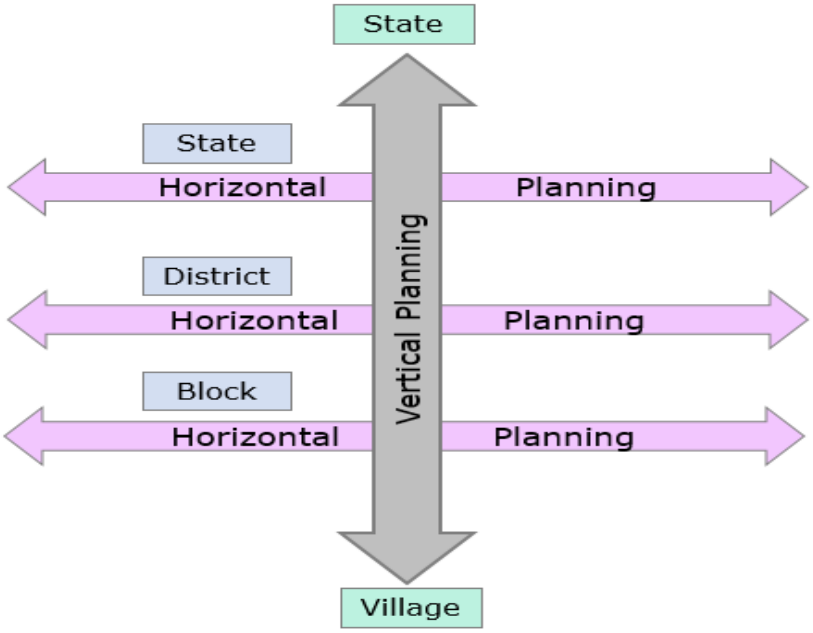
CHAPTER 5

DEPARTMENT WISE PREPAREDNESS & RESPONSE ACTIONS

The Heat Action Plan (HAP) is a state strategy for enhancing preparedness and addressing heatwave situations. Multiple line departments and non-governmental organisations, such as civil society organisations, citizen's groups, Gram Panchayats, Municipalities & Urban Local Bodies, and other stockholders, will implement the HAP in view of the potential effects that heat waves and extreme hot weather will have on various sectors, including health, education, social welfare, labour, energy, animal husbandry, and the community at large. The implementation of the HAP requires a coordinated effort from various stakeholders to ensure effective mitigation and response strategies are in place. Collaboration between these entities will enable a comprehensive approach that addresses the diverse challenges posed by heat waves and extreme heat weather conditions. Additionally, regular communication and collaboration among these stakeholders will facilitate the sharing of best practices and lessons learned, further enhancing the overall effectiveness of the HAP.

5.1. Heat wave Risk management planning

Action plans are being proposed for the heat wave risk management and risk planning at the state, district or block level. These action plans aim to mitigate the impact of heat waves on vulnerable populations and infrastructure. They involve measures such as early warning systems, public awareness campaigns, and the establishment of cooling centers in high-risk areas. The planning process involves identifying vulnerable populations and areas, developing early warning systems, implementing heat health action plans, and improving infrastructure



and urban planning to reduce heat exposure. By planning for heat waves, communities can protect public health, minimize economic losses, and build sustainable cities for the future (Figure 5.1).

- Horizontal and Vertical Planning with clear role & responsibilities
- Appropriate Prevention, Preparedness Mitigation and Response
- Develop monitoring mechanism
- Conduct weekly Reviews and update
- Appoint Nodal office at each level (by Post)
- Data Collection and Analysis
- Conducting regular risk assessments to identify vulnerable areas and populations
- Developing comprehensive contingency plans for effective response

5.2 Department-wise Action Plan

5.2.1 Health Department

Preparedness (January & February)		Response (March to July)	
S.N.	**Activities**	**S.N.**	**Activities**
1.	Health Department to ensure a well-defined plan with clear protocols for Heat Related Illness (HRI) identification, treatment, and communication	1.	• Ensure adequate quantities of life-saving medicines in all the PHCs, district hospitals, medical college hospitals, ASHA, and ANM kits to meet heat-related illnesses • Maintain sufficient supply of ORS sachets and ice packs at PHCs, Community Health Centers, Taluk/District/ private hospitals. Encourage opening of ORS booths in coordination with NGOs or as a CSR initiative.
2.	Hospitals to ensure the necessary resources to manage an influx of HRI patients such as dedicated beds, cooling equipment, medication stockpiles & ORS Sachets, and surge capacity planning	2.	Ensure spate beds and isolation wards (for heat related ailments) are established in PHCs, district hospitals, and medical colleges to treat hyperthermia, and heat stroke during the heat wave period.
3.	Health Department and Hospitals to educate communities about Health-Related Illnesses (HRI), preventive measures, and warning signs to empower individuals to take	3.	• Issue health advisories from time to time to make the public aware of precautions taken to safeguard against heat waves

	responsibility for their safety and well-being in hot weather		• Ensure that all medical facilities have access to enough drinking water.
4.	• Purchase and distribute drugs and other essential logistics in the block as well as in all sub-centers (outreach level), PHCs, CHCs and ambulances • Prepare clinical guidelines to improve heat wave impact on patient.	4.	Data management and collection of heat wave-impacted patients during the heat wave period from across government hospitals and shared with the concerned department.
5.	Incorporate heat-wave component in the service training module for ANM & ASHA and Jeevika Didis (round the year)	5.	Ensure uninterrupted power supply in the health centres/hospitals through solar power system.
6.	Private Clinics' Role in Bihar's Heat Action Plan	6.	• Provide medical care for heat-related illnesses. • Educate patients and community about heat-related illnesses. • Monitor vulnerable populations for signs of heat-related illnesses. • Referral to Higher-Level Care: Refer patients with severe heat-related illnesses to specialized medical facilities. • Collaboration with Public Health Authorities: Collaborate with public health authorities to share data and coordinate response activities.

5.2.2 Education Department

Preparedness (January & February)		Response (March to July)	
S.N.	**Activities**	**S.N.**	**Activities**
1.	Identify the most probable affected schools within spots/villages/slum and possible impacts of heat wave on the children with the help of school teachers.	1.	Schools and colleges may reschedule classes and exams during summer months, adjusting timings based on heat alerts and conditions, and potentially closing schools or pre-opening summer vacations.

2.	Dissemination of public messages on how to protect children against extreme heat through media outlets and orientation materials, such as pamphlets and advertisements on heat stress prevention. Use text messages, email, radio and social media, such as WhatsApp.	2.	Dissemination of public messages on how to protect children against extreme heat through media outlets and orientation materials, such as pamphlets and advertisements on heat stress prevention. Use text messages, email, radio and social media, such as WhatsApp.
		3.	• Ensure availability of sufficient cool drinking water, IV fluids and ORS in all the schools. • Introduce Water Bell sessions to facilitate the teachers and children to have water periodically. • Develop and execute school health program/campaign.

5.2.3 Urban Development and Housing Department

Preparedness (January & February)		Response (March to July)	
S.N.	**Activities**	**S.N.**	**Activities**
1.	Identify the most probable affected spots/cities/town/slums and understand the possible impacts of heat wave in the urban areas	1.	Set up water kiosks at market places and other strategic locations in coordination with NGOs or as a CSR activity.
2.	Identify shed (like temple, mosque, bus stand, railway stations etc.) and make appropriate arrangements	2.	Run temporary day & night shelters/Ren Baseras for those without access to shelter, water and /electricity during summers.
3.	Designate public places such as schools (during vacations), public parks, etc. for resting during peak heat period.	3.	• Disseminate heat alerts received from SEOC and SDMA to all stakeholders and general public. • Set up electronic scrolling boards to display temperature and forecasts at junctions and other public places. • Ensure access to Ren Baseras with facilities such as cool drinking water, maintenance of room temperature (cool room) for homeless.
4.	Repair and maintenance of non-functional hand pumps/water supply system to ensure uninterrupted	4.	• Expand access to public places such as public parks for outdoor workers, slum

	drinking water supply during summer. This is to be done with support of PHE Department.		communities, and other vulnerable sections of population. • Maintain longer evening park hours. • Ensure adequate stock and distribution of ORS, IV fluids and other medicines in cooperation with hospitals.

5.2.4 Social Welfare Department

Preparedness (January & February)		Response (March to July)	
S.N.	**Activities**	**S.N.**	**Activities**
1.	• Targeted dissemination of IEC material through public awareness campaigns with a special focus on infants, children below five years, pregnant and lactating mothers and geriatric population. • Create awareness regarding importance of hydration.	1.	Anganwadi timings should be rescheduled to avoid peak heat.
		2.	Ensure availability of cool drinking water and ORS with ice packs in each AWC along with age-appropriate IEC materials.
2.	Train Anganwadi workers to identify heat-related health risks and its management.	3	Ensure adequate stock and distribution of ORS at all AWCs with support of Health Department
		4	Ensure arrangements of special treatment facilities at the AWCs for infants, children below five years, pregnant and lactating mothers.
		5	Buttermilk/curd should be served in anganwadi instead of milk, if needed.
		6	Anganwadis should be opened for the general public as a resting place during vacations.

5.2.5 Fire Services Department (Home dept.)

S.N.	Preparedness -Activities	S.N.	Response -Activities

1.	Preparedness to respond fires. Give priorities to high-risk areas.	1.	Guarantee a prompt and efficient response in case of fire outbreaks.
2.	Identification of fire hot spots.	2.	Mock drills in rural/urban locations.
3.	Educational campaign in rural and urban areas to prevent fire accidents. Additionally, raise awareness about fire safety measures.	3.	Awareness generation at identified black spots.
4.	Perform a fire safety inspection of all public and private structures.	4.	Ensure coordination with stakeholders.

5.2.6 Rural Development Department

S.N.	Preparedness -Activities	S.N.	Response -Activities
1.	Renovation and deepening of water bodies through MGNREGA.	1.	Arrangements of resting shades/cool drinking water and emergency medicines for the workers of MGNREGA at all working sites.
2.	Prioritizing tree planting and implementing water recharge schemes, like water harvesting structures.	2.	Rescheduling of working timing at MGNREGA work sites during summer season and heat wave conditions: no work between 11:30 am to 3:30 pm. Work may start early in the morning and continue till completion of the total prescribed working hours.
3.	Preparation of resting shades/cold drinking water for the workers of MGNREGA at the work sites (as per the MGNREGA ACT).	3.	• Ensure availability of ORS at all MGNREGA sites. • Issue instruction for workers to keep their body covered with long sleeved shirts, caps & clothes for protection of ears and necks

5.2.7 Micro Water Resource Department

S.N.	Preparedness -Activities	S.N.	Response -Activities
1.	Digging and deepening Pynes/Ahars to increase water storage, providing a source of drinking water for animals and birds.	1.	Ensure deepening and encroachment-free Pynes/Ahars.
2.	Repairing and rectifying mechanical or electrical faults in tube wells should be	2.	Ensure hassle free functioning of tube wells.

	prioritized to ensure water storage in ponds and for irrigation channels, including those used for fodder crops.		
3.	Periodically evaluate the availability of water in Reservoirs, rivers, ponds and lakes.	3.	Ensure availability of water in ponds and other local water bodies and in state-constructed tube well for animals.

5.2.8 Public Health Engineering Department

Preparedness (January & February)		Response (March to July)	
S.N.	**Activities**	**S.N.**	**Activities**
1.	Excavation/deepening of Pynes/Ahars so as to ensure storage of water; for animals and birds to drink from.	1.	• Ensure deepening and encroachment-free Pynes/Ahars. • Ensure hassle free functioning of tube wells
2.	Repairing/rectification of mechanical/ electrical electric faults of tube wells should be on priority basis to ensure water storage in pond and for irrigation channels (including for fodder crop).	2.	Ensure availability of water in ponds and other local water bodies and in state-constructed tube well for animals

5.2.9 Information & Public Relations Department

Preparedness (January & February)		Response (March to July)	
S.N.	**Activities**	**S.N.**	**Activities**
1.	• Secure commercial airtime slots for public service announcements • Identify areas to post warnings and information during heat season • Activate mobile heat hotline messages • Begin placing temperature forecasts in Newspapers • Increase installed LED screens with scrolling temperature data.	1.	• Issue heat warnings on electronic media • Contact local FM radio and TV stations for announcements • Use SMS, text and WhatsApp mobile messaging and centralized mobile databases to send warnings. • To send SMS alert messages directly to private practitioners in addition to the medical professionals at PHCs and UHCs • Contact Local and state transport department to place warnings on buses.

5.2.10 Animal Husbandry & Fisheries Department

Preparedness (January & February)		Response (March to July)	
S.N.	**Activities**	**S.N.**	**Activities**
1.	• The initiative promotes awareness among animal owners and farmers about the significance of shade and water for animals, particularly during the onset of heat waves. • Awareness generation about the health-related issues of animals in the wake of heat waves	1.	Coordinate with WRD and PHED for arranging water for animals near the tube wells.
2.	• Preparation of Posters & pamphlets with tips to take care of cattle and poultry during heat waves • Update surveillance programme and protocol including track daily heat is related to livestock	2.	Monitoring of animal health and make adequate arrangements for treatment of heat-related diseases affecting livestock.
3.	Capacity building programmes at veterinary hospitals/centres especially for farmers	3	• Adopt heat related illness and prevention protocol • Deploy all animal husbandry staff on duty during heat wave • Monitor water borne diseases
4.	Updating contingency plans regarding provision of water to animals as per SOP on Drinking Water Crisis.	4.	Provide referral/follow-up services through the local veterinary clinics.
5.	Strengthen the disease surveillance system and maintain online inventory of animal epidemics.		
6.	Ensure adequate stock of medicines in all veterinary hospitals. Arrange mobile hospital ready at vulnerable village		

5.2.11 Labour& Employment Department

Preparedness (January & February)	Response (March to July)

S.N.	Activities	S.N.	Activities
1.	Organize training for employers, outdoor labourers and workers on health impacts of extreme heat and protective measures to be taken during high temperature periods.	1.	Encourage employers to shift outdoor workers schedules away from peak afternoon hours (12 – 4pm) during a heat alert.
2.	Utilize maps of construction sites and outdoor work spots preferably overlaying with irradiation map from IMD or heat island map to identify more high-risk outdoor workers and to conduct publicity campaigns during high-risk days.	2.	• Conduct publicity campaigns during high-risk days in identified high-risk areas. • Communicate directly about heat season with non-factory workers. • Provision of Cool drinking water/Butter milk etc. at factory facilities.
3.	Preparing a list of factory medical officers, contractors and house side non-factory workers to include in heat alert and action communication	3.	Ensure to provide emergency ice packs and heat-illness prevention materials to construction workers.
4.	Heat illness orientation planning for factory medical officers	4.	Ensure provision of shelters/ cooling areas, water and supply of emergency medicines like ORS, IV fluids etc. at work sites by employers.

5.2.12 Energy Department

S.N.	Preparedness -Activities	S.N.	Response -Activities
1.	Perform repair and maintenance tasks to ensure a continuous power supply.	1.	Power distribution companies should strive to maintain uninterrupted power supply during peak hours.
2.	Execute repair and maintenance work for loose or hanging electric wires.	2.	Adequate arrangements should be established to promptly address reports of power supply faults from any location within the state.
-----	----------	3.	Prompt action in response to snapped wires.

5.2.13 Agriculture Department (In line with Krishi Road Map: 2023-2028)

Preparedness (January & February)		Response (March to July)	
S.N.	**Activities**	**S.N.**	**Activities**
1.	Identify the areas to be affected and study the probable impact of heat waves on agriculture.	1.	Conduct sessions on crop safety, crop diversification techniques with farmers.
2.	• Develop specific Dos and Don'ts related to crops for heat wave and disseminate the same based on the above study. • Prepare advisories on crop diversification techniques and organize sessions with farmers.	2.	Conduct sessions on Dos and Don'ts on heat wave with farmers.
3.	• Promote and distribute hot-weather sustainable seeds and plants • Ensure enough stock of seeds and plants and other relevant material in the warehouses		

5.2.14 Environment, Forest & Climate Change Department

Preparedness (January & February)		Response (March to July)	
S.N.	**Activities**	**S.N.**	**Activities**
1.	Ensure cooling facilities around animal enclosure in zoos and captive wild animal facilities.	1.	Ensure drinking water points in zoo and wild animals' yard
2.	Mass awareness among wildlife and forest personnel about heat wave.	2.	• Arrangements for promptly attending to the health issues of zoo animals caused by heat waves. • Arrangements for cooling system in zoos during extreme heat.
3.	Forest fire prevention and control measures in forests and wildlife sanctuaries.	3	Establishment of emergency operation and control centre

4.	Maintenance of water holes/bodies in forest and wildlife sanctuaries.		
6.	Plantation of shelter trees/wind breakers near habitation.		

5.2.15 India Meteorological Department

Preparedness (January & February)		Response (March to July)	
S.N.	**Activities**	**S.N.**	**Activities**
1.	Monitoring and forecasting of weather conditions and early warning systems for alerting the public and relevant authorities.	1.	Identify "heat wave prone areas" in the state through appropriate tracking and modelling of meteorological data and promote the timely development
2.	Release warning and forecast to the local print & electronic media, including radio stations, Doordarshan for the public before the onset of the heat wave.	2.	Coordinate with DMD and BSDMA for release advisory and mass massaging on heat wave.

5.2.16 Bihar Mausam Seva Kendra (BMSK) Action Plan

Preparedness (January & February)		Response (March to July)	
S.N.	**Activities**	**S.N.**	**Activities**
1.	Develop an app through which early warning for heat wave conditions (based on colour code signals) will be provided to the citizens. Information regarding this will also be provided to the people through the call center of the BMSK (throughout the year with special focus between March to July).	1.	Electronic media, including radio stations, Doordarshan for the public before the onset of the heat wave (on daily basis)
2.	Release warning and forecast to the local print & electronic media, including radio stations, Doordarshan for the public before the onset of the heat wave.	---	----------

5.2.17 Disaster Management Department Action Plan

S.N.	Preparedness -Activities	S.N.	Response -Activities
1.	Organize awareness generation program to take protective measure against heat wave.	1.	Coordinate with IMD to get specific alerts about heat wave situations and issue alerts to the DEOCs and general public.
2.	Coordinate with line departments and District Collectors for implementation of Heat Action Plan.	2.	Organize meetings with CMG to review the implementation of Heat Action Plan.
-----	----------	3.	Ensure prompt payment of ex-gratia in cases of deaths caused by heat waves.

5.2.18 District Disaster Management Authorities (DDMAs) Action Plan

Preparedness (January & February)		Response (March to July)	
S.N.	**Activities**	**S.N.**	**Activities**
1.	Prepare Resource Plan of the vulnerable areas/ blocks/ Gram Panchayats based on the vulnerability mapping prepared by DMD.	1.	DDMAs to update heat wave situation in the districts through DEOC Multi Hazard Portal (http/eoc.bih.nic.in) and submit authorized copy to SEOC at email: seoc-dmd-bihar@bihar.gov.in
2.	Organise heat wave preparedness review meeting with line departments (follow the preparedness checklist and conduct the review). Atleast 4 meetings to be conducted from January to March.	2.	Organize review meetings on response done (every week from March to July)
		3.	Ensure prompt payment of ex-gratia in cases of deaths caused by heat waves
		4.	DM to ensure and monitor shelter/Drinking water arrangements

5.2.19 Bihar State Disaster Management Authority Action Plan

S.N.	Preparedness -Activities	S.N.	Response -Activities
1.	Organize sensitization and awareness generation program for Panchayat/ULB representatives for protection against the adverse impact	1.	Coordinate with IMD/BMSK to get specific alerts for mass messaging on the adverse impact of heat waves.

	of heat wave and prepare the checklist for preparedness.		
2.	Capacity building program for staff of medical colleges, hospitals, and PHCs in addressing heat-related illness and prepare the checklist for preparedness.	2.	Monitoring of heat wave action plan through line departments and DMD
3.	Capacity building program for staff of veterinary colleges & hospitals in addressing heat-related illnesses of animals	-----	----------
4.	Integrating the HAP with Mukhya Mantri School safety program to build the capacity of school children against the adverse effects of heat waves and prepare the checklist for preparedness	-----	----------
5.	Provide technical support to DMD and DDMAs to prepare the resource plan of the most vulnerable areas	-----	----------
6.	Provide technical support to DMD and Line departments to prepare the vulnerability mapping of the heat wave	-----	----------

Annexure -1

Detailed Methods of Heat Vulnerability Index

Based on prior literature addressing temperature-related vulnerability, fourteen indicators were meticulously selected for the vulnerability assessment analysis pertinent to the Bihar context. Our analysis, aiming for enhanced comprehensiveness, incorporates an array of indicators, including both socioeconomic/sociodemographic and biophysical metrics. The following list enumerates the 14 indicators integrated into our vulnerability assessment:

1. Percentage of children under six years (Census) (+)
2. Sex ratio (NFHS 5) (-)
3. Percentage of Scheduled Tribes (STs) (NFHS 5) (+)
4. Percentage of Scheduled Castes (SCs) (NFHS 5) (+)
5. Literacy rate (Census 2011) (-)
6. Percentage of households in the lowest wealth quintiles (NFHS-5) (+)
7. Percentage of households with access to drinking water within the premises (NFHS-5) (-)
8. Household ownership of television (NFHS-4) (-)
9. Household ownership of a mobile phone (NFHS-4) (-)
10. Household ownership of a radio (NFHS-4) (-)
11. Percentage of fully immunized children (NFHS-5) (-)
12. Proportion of households with health insurance coverage (NFHS-5) (-)
13. Population density (persons per square kilometer) (Census 2011) (+)
14. Maximum Temperature (TMax) (BSDMA data) (+)

*A positive sign (+) indicates an increase in vulnerability with a higher indicator value. In contrast, a negative sign (-) denotes a decrease in vulnerability as the value of the indicator increases.

Given the diverse measurement units of the indicators, a standardization procedure was imperative. We transformed the data into a specified range using z-score normalization, which adjusts all indicators to a common scale with a mean of zero and a standard deviation of one. The equation represents this transformation: Z = (score - mean) / standard deviation. Such normalization methods have precedent in vulnerability assessments. 1 , 6 Five variables underwent reverse scoring (multiplying z-scores by -1) to ensure uniform directionality, indicating lower vulnerability with higher indicator values.

Subsequently, we conducted a principal components analysis (PCA), a statistical method to extract significant linear combinations from a large variable set.1 We employed the commonly

[6] Zahran, S., Brody, S. D., Peacock, W. G., Vedlitz, A., & Grover, H. (2008). Social vulnerability and the natural and built environment: A model of flood casualties in Texas. *Disasters*, *32*(4). https://doi.org/10.1111/j.1467-7717.2008.01054.x

used "eigenvalue-greater-than-one" rule7, a staple in PCA-based vulnerability studies, to determine the number of reliable components. This rule posits that components with eigenvalues (Eigenvalues represent the total amount of variance that can be explained by a given principal component) greater than one are considered reliable, with those close to one having minimal explained variance excluded. Post-PCA, we applied Varimax or orthogonal rotation, and the component scores were summed to formulate the Heat-Vulnerability Index (HVI). This method aligns with previous vulnerability assessment approaches in India (G. Azhar et al., 2017).1 The vulnerability index created was then categorized into tertiles (Low, Moderate, and high vulnerability).

District-wise HVI classification

District	Population	Generated HVI score	HVI (Tertile method)*
Gopalganj	2558037	7.3781114	Low vulnerability
Munger	1359054	5.0132804	Low vulnerability
Saran	3943098	4.8389025	Low vulnerability
Siwan	3318176	4.8302751	Low vulnerability
Rohtas	2962593	4.53791	Low vulnerability
Madhubani	4476044	3.9080524	Low vulnerability
Bhojpur	2720155	3.369179	Low vulnerability
Patna	5772804	3.2847905	Low vulnerability
Muzaffarpur	4778610	2.63925	Low vulnerability
Buxar	1707643	2.6233184	Low vulnerability
Aurangabad	2511243	2.4737241	Low vulnerability
Vaishali	3495249	2.4424143	Low vulnerability
Samastipur	4254782	-1.4479295	Moderate vulnerability
West Champaran	3922780	-1.1281413	Moderate vulnerability
Sheohar	656916	-1.1210203	Moderate vulnerability
Jehanabad	1124176	-1.0727302	Moderate vulnerability
Nawada	2216653	-0.87380964	Moderate vulnerability
East Champaran	5082868	-0.82670331	Moderate vulnerability
Kaimur (Bhabua)	1626900	-0.62413311	Moderate vulnerability
Kishanganj	1690948	-0.24403337	Moderate vulnerability
Nalanda	2872523	-0.0007149	Moderate vulnerability
Bhagalpur	3032226	0.46466896	Moderate vulnerability
Arwal	699563	0.52638197	Moderate vulnerability
Darbhanga	3921971	0.7803238	Moderate vulnerability

[7] Kaiser, H. F. (1960). The Application of Electronic Computers to Factor Analysis. *Educational and Psychological Measurement*, *20*(1). https://doi.org/10.1177/001316446002000116

Begusarai	2954367	1.0292335	Moderate vulnerability
Saharsa	1897102	-1.8748007	High vulnerability
Sitamarhi	3419622	-2.0185788	High vulnerability
Khagaria	1657599	-2.0666661	High vulnerability
Gaya	4379383	-2.4669108	High vulnerability
Banka	2029339	-2.6021919	High vulnerability
Sheikhpura	634927	-2.7536297	High vulnerability
Lakhisarai	1000717	-2.7630243	High vulnerability
Purnea	3273127	-3.0242615	High vulnerability
Supaul	2228397	-3.435425	High vulnerability
Katihar	3068149	-3.9025946	High vulnerability
Madhepura	1994618	-4.3472199	High vulnerability
Jamui	1756078	-5.3875241	High vulnerability
Araria	2806200	-5.7477736	High vulnerability

Low Vulnerability: (Score: > 1.5)
Moderate Vulnerability: (Score: -1.5 to 1.5)
High Vulnerability: (Score: < -1.5)

**Tertile method is a statistical way to rank all the districts into three equal parts and categorise them into high, moderate, low for ease of interpretation.*

Discussion on HVI outcomes

The Heat Vulnerability Index (HVI) and Principal Component Analysis (PCA) are valuable tools for assessing a system's vulnerability to heat-related impacts. The HVI analysis identifies key variables, while PCA integrates multiple variables into a smaller set, simplifying the analysis. PCA reduces the dimensionality of the dataset, focusing on essential components. It helps identify vulnerable subpopulations and provides a holistic risk assessment, considering factors like healthcare infrastructure, socioeconomic status, and preparedness measures. The results can inform policymakers about the most influential factors contributing to that vulnerability, guiding the development of targeted policies and adaptation strategies. PCA also helps identify temporal and spatial trends in heat vulnerability, aiding in adaptive strategies. This study uses a variance weighted approach to calculate vulnerability values, maps them at a fine spatial scale, and assesses the degree to which high heat vulnerability coincides with potential high heat wave events. This analysis suggest that future public health adaptation strategies should account for heterogeneity and implement more tailored interventions to mitigate heat-related health impacts. The study analyzed the effects of various factors on the performance of a group of individuals with different levels of stunting. The results showed that the group with stunting had lower performance in various aspects, such as radio, TV, mobile, pucca house, sex ratio, literacy, and overall, they had lower performance in various areas. Local adaptation strategies, including public messaging, automated phone calls, yellow, red- alerts, and traditional practices like staying indoors during noon hours, wearing cotton light coloured clothes, and use of ORS, homemade drinks like lassi, torani (rice water), lemon water, buttermilk, etc. which helps to re-hydrate the body., should be considered.

Annexure- 2

Case Definitions

Annexure Table: Case definition of various Heat related illness[8]

Clinical Entity	Age Range	Setting	Cardinal Symptom	Cardinal Signs	Pertinent Negatives	Prognosis
Heat rash/ prickly heat/ Miliaria	All, But frequently children	Hot environment ; +/- insulating clothing or swaddling (wrap in tight clothes)	Itchy Rash with small red bumps at pores in the skin. Seen in setting of heat exposure; bumps can sometimes be filled with clear or white fluid	Diffused red colour skin or vesicular rash, itching of the skin without visible eruption	Not focally distributed like a contact dermatitis	Full recovery with elimination of exposure and supportive care
Heat Cramps	All	Hot environment typically with exertion; +/- insulating clothing	Painful spasms of large and frequently used muscle groups	Uncomfortable appearance may have difficulty fully extending affected limbs /joints	No contaminate wound/tetanus exposure; no seizure activity	Full recovery with elimination of exposure and supportive care
Heat Exhaustion	All	Hot environment ; +/- exertion; +/- insulating clothing or swaddling (wrap in tight clothes)	Feeling overheated, lightheadedness, exhausted and weak, unsteady, feeling of vomiting, sweaty and thirsty, inability to continue activities	Sweaty/diaphoretic; flushed skin; hot skin; normal core temperature; +/- dazed, +/- generalized weakness, slight disorientation	No coincidental signs and symptoms of infection; no focal weakness; no difficulty in swallowing food or speech; no overdose history	Full recovery With elimination of exposure and supportive care; progression to heat syncope / stroke if continued exposure

[8] Source: IIPH Gandhi Nagar, Gujarat.

Heat Syncope	Typically, adult	Hot environment; +/- exertion; +/- insulating clothing or swaddling (wrap in a tight clothes)	Feeling hot and weak; light-headedness followed by brief loss of consciousness	Brief generalized loss of consciousness in hot setting, short period of disorientation, if any	No seizure activity, no loss of bowel or bladder continence, no focal weakness, no difficulties in food swallowing or speech	Full recovery with elimination of exposure and supportive care; progression to heat stroke if continued exposure
Heat Stroke	All	Hot environment; +/- exertion; +/- insulating clothing or swaddling	Severe overheating; profound weakness; disorientation, not fully alert, convulsion, or other altered mental status	Flushed dry skin (not always), core temperature ≥ 40-degree C, altered mental status with disorientation, possibly delirium, coma, seizures, tachycardia, +/- hypotension	No coincidental signs and symptoms of infection; no focal weakness; no aphasia/dysarthria, no overdose history	25-50% mortality even with aggressive care, significant morbidity if survive

Annexure-3

Heatwave advisory from DMD

पत्रांक 1 प्रा0 आ0-20/2015...../आ0प्र0

बिहार सरकार
आपदा प्रबंधन विभाग

प्रेषक,

प्रत्यय अमृत
प्रधान सचिव।

सेवा में,

प्रधान सचिव,
पशु एवं मत्स्य संसाधन विभाग/ग्रामीण विकास विभाग/पंचायती राज विभाग/श्रम संसाधन विभाग/परिवहन विभाग/समाज कल्याण विभाग/ लोक स्वास्थ्य अभियंत्रण विभाग/नगर विकास एवं आवास विभाग/ शिक्षा विभाग/ स्वास्थ्य विभाग/लघु जल संसाधन विभाग/ ऊर्जा विभाग/ वन एवं पर्यावरण विभाग/ सूचना एवं जनसम्पर्क विभाग, बिहार, पटना
निदेशक, भारतीय मौसम विज्ञान विभाग

पटना–15, दिनांक–

विषय : भीषण गर्मी एवं लू से बचने के उपाय से संबंधित कार्रवाई करने के संबंध में।

महाशय,

उपर्युक्त विषय के संबंध में कहना है कि वर्त्तमान में राज्य के विभिन्न हिस्सों से भीषण गर्मी पड़ने एवं लू (Heat Waves) चलने की सूचनाएँ प्राप्त हो रही हैं। भारतीय मौसम विज्ञान विभाग के द्वारा भी अप्रैल माह से जून 2017 तक राज्य में भीषण गर्मी पड़ने की संभावना जतायी गयी है। अवगत है कि भीषण गर्मी के कारण जन–जीवन प्रभावित होता है एवं आम जनता को स्वास्थ्य एवं पेय जल संबंधी गंभीर परेशानियों का सामना करना पड़ता है। खास कर छोटे बच्चों, स्कूली बच्चों, गर्भवती एवं धात्री महिलाओं एव काम के लिए घर से बाहर निकलने को बाध्य दिहाड़ी मजदूरों को काफी समस्याएँ आती हैं। साथ ही पेय जल संकट की स्थिति भी उत्पन्न हो जाती है। पानी की भी कमी हो जाती है। ऐसे में यह आवश्यक है कि राज्य सरकार के विभागों के द्वारा आम जनों को भीषण गर्मी एवं लू से बचाव हेतु कारगर उपाय एवं कार्रवाई की जाय।

भारतीय मौसम विज्ञान विभाग के स्थानीय इकाई से लू की पूर्व चेतावनी एवं इसकी सूचना प्राप्त कर सभी प्रमुख Stakeholder तक पहुँचाने की व्यवस्था आपदा प्रबंधन विभाग द्वारा की जाएगी। साथ ही लू की पूर्व चेतावनी आम जनता को भी TV रेडियो, प्रिंट मिडिया, प्रेस विज्ञप्ति एवं Bulk SMS आदि के माध्यम से आपदा प्रबंधन विभाग द्वारा दी जाएगी।

अतएव भीषण गर्मी एवं लू से बचाव हेतु विभिन्न विभागों के स्तर से निम्न कारवाईयों अपेक्षित हैं :

1. **नगर विकास एवं आवास विभाग**
   i. शहरी क्षेत्रों में सार्वजनिक जगहों पर स्थानीय निकायों द्वारा पियाऊ की व्यवस्था सुनिश्चित की जानी चाहिए। इन स्थानों पर गर्म हवाओं एवं लू से बचाव से संबंधित सूचनाओं को भी प्रदर्शित किया जाना चाहिए ताकि आम जन इनसे भली भाँति अवगत हो सकें।
   ii. अपने क्षेत्राधिकार के अन्तर्गत खराब चापाकलों को मरम्मत युद्ध स्तर पर करायी जानी चाहिए।
   iii. नगरीय क्षेत्र में अवस्थित आश्रय स्थलों में पेय जल तथा आकस्मिक दवाओं की व्यवस्था स्लम के निवासियों हेतु की जानी चाहिए।

2. **स्वास्थ्य विभाग**
   i. सभी प्राथमिक स्वास्थ्य केन्द्रों/रेफरल अस्पतालों/सदर अस्पतालों/अनुमंडलीय अस्पतालों/मेडिकल

कॉलेजों/अस्पतालों में पर्याप्त मात्रा में लू से प्रभावितों के ईलाज हेतु विशेष व्यवस्था कर ली जाए। सभी स्वास्थ्य केन्द्रों एवं अस्पतालों में प्रर्याप्त मात्रा में ओ0आर0एस0 पैकेट, आई0भी0फ्लूड एवं जीवन रक्षक दवा इत्यादि की व्यवस्था कर ली जानी चाहिए।

ii. अत्यधिक गर्मी से पीड़ित व्यक्ति को ईलाज हेतु आवश्यकतानुसार अस्पतालों मं आईसोलेसन वार्ड की व्यवस्था कर ली जानी चाहिए एवं लू से पीड़ित बच्चों, बूढ़ों, गर्भवती महिलाओं तथा गम्भीर रूप से बीमार व्यक्तियों का विशेष ध्यान रखा जाना चाहिए। आवश्यकतानुसार प्रभावित जगह हेतु स्टैटिक/चलन्त चिकित्सा दल की भी व्यवस्था कर ली जाए।

iii. गर्म हवाएं/ लू से बचाव के उपाय से संबंधित IEC सामग्री, स्थानीय स्तर पर मुद्रित कर पम्पलेट/ पोस्टर के माध्यम से प्रचार–प्रसार कराया जाना चाहिए। साथ ही स्थानीय प्रचार माध्यमों का भी उपयोग किया जा सकता है।

3. लोक स्वास्थ्य अभियंत्रण विभाग

i. खराब चापाकलों को मरम्मत युद्ध स्तर पर किया जाना चाहिए।

ii. जिन स्थानों पर नल का जल नहीं पहुँचता हो एवं चापाकलों में पानी की कमी हो गयी हो, वहाँ आपदा प्रबंधन विभाग द्वारा पेयजल संकट से निबटने हेतु निर्धारित मानक संचालन प्रक्रिया के अनुसार टैंकरों के माध्यम से पेयजल पहुँचाने की व्यवस्था सुनिश्चित करायी जानी चाहिए।

iii. भूगर्भ जल स्तर की लगातार समीक्षा की जाए एवं इस पर सतत् निगरानी रखी जानी चाहिए।

4. शिक्षा विभाग

i. स्कूली बच्चों को भीषण गर्मी से बचाने के लिए आवश्यक है कि विद्यालय या तो सुबह की पाली में ही संचालित हो अथवा गर्मी की छूट्टियाँ निर्धारित समय से पूर्व घोषित कर दी जाय। गर्मी की स्थिति को देखते हुए स्कूलों को अल्प अवधि के लिए भी बन्द किया जा सकता है। इस हेतु संबंधित जिला पदाधिकारी के द्वारा समीक्षा कर निर्णय लिया जाना चाहिए।

ii. सभी स्कूलों में पेयजल की व्यवस्था सुनिश्चित करायी जाए।

iii. गर्म हवाएं/ लू से बचाव के उपाय से संबंधित IEC सामग्री, स्थानीय स्तर पर मुद्रित कर पम्पलेट/पोस्टर के माध्यम से प्रचार–प्रसार कराया जाना चाहिए। साथ ही स्थानीय प्रचार माध्यमों का भी उपयोग किया जा सकता है।

5. समाज कल्याण विभाग

i. सभी आंगनबाड़ी केन्द्रों पर पेयजल की समुचित व्यवस्था करायी जानी चाहिए एवं वहाँ पर गर्म हवाओं एवं लू से बचाव से संबंधित IEC (बच्चों को समझने हेतु) सामग्री प्रदर्शित कर जनता को जागरूक किया जाना चाहिए।

ii. स्वास्थ्य विभाग के सहयोग से आंगनबाड़ी केन्द्रों पर जीवन रक्षक घोल (ORS) की व्यवस्था करनी चाहिए।

iii. नवजात शिशु, बच्चों, धातृ एवं गर्भवती महिलाओं के लिए स्वास्थ्य विभाग के सहयोग से विशेष चिकित्सा सुविधा की व्यवस्था की जानी चाहिए।

6. पशु एवं मत्स्य संसाधन विभाग

i. सरकारी ट्यूबवेल के समीप अथवा अन्य सुविधायुक्त स्थानों पर गड्ढा खुदवा कर पानी इक्कट्ठा किया जाए, ताकि पशु–पक्षियों को पानी मिल सके।

ii. पशुओं के बीमार पड़ने पर चिकित्सा दल की व्यवस्था की जाएगी।

7. ग्रामीण विकास विभाग

i. मनरेगा अन्तर्गत तालाबों/ आहर इत्यादि की खुदाई की योजनाओं में तेजी लायी जाए, जिससे इनमें पानी इक्कट्ठा कर पशु–पक्षियों को पानी उपलब्ध कराया जा सके।

ii. लू चलने पर मनरेगा की कार्य अवधि को सुबह 6.00 बजे से 11.00 बजे तक तथा अपराह्न 3.30 बजे से 6.30 बजे तक निर्धारित किया जा सकता है।

iii. कार्य स्थल पर पेय जल तथा लू लगने पर प्राथमिक उपचार की व्यवस्था की जानी चाहिए।

8. पंचायती राज विभाग

i. विभाग के द्वारा पंचायतों में लू चलने के दौरान ''क्या करें क्या न करें'' का प्रचार प्रसार कराया जाना चाहिए।

ii. गाँवों मे पेय जल की व्यवस्था हेतु पंचायतों को कार्य योजना बनाने हेतु निदेशित किया जा सकता है तथा जल संरक्षण की योजनाओं पर कार्य किया जा सकता है।

9. श्रम संसाधन विभाग

i. लू से बचाव हेतु मजदूरों के कार्य अवधि को लचीला किया जा सकता है। लू चलने पर कार्य अवधि को सुबह 6.00 बजे से 11. 00 बजे तक तथा अपराह्न 3.30 बजे से 6.30 बजे तक निर्धारित किया जा सकता है।

ii. कार्य स्थल पर पेय जल की व्यवस्था तथा लू लगने पर प्राथमिक उपचार की व्यवस्था की जानी चाहिए।
iii. खुले में काम करने वाले, भवन बनाने वाले तथा कल–कारखानों में काम करने वाले मजदूरों के लिए पेय जल की व्यवस्था के साथ शेड की भी व्यवस्था करना चाहिए।

10. परिवहन विभाग

i. लू चलने की अवधि में जहाँ तक संभव हो वाहनों का परिचालन कम से कम करना चाहिए तथा पूर्वाह्न 11.00 बजे से अपराह्न 3.30 बजे तक सार्वजनिक परिवहन की गाड़ियों के परिचालन को नियंत्रित किया जा सकता है।
ii. सार्वजनिक परिवहन के गाड़ियों में पेय जल तथा ओ0आर0एस0 की व्यवस्था करने हेतु विभाग के द्वारा दिशा–निर्देश जारी किया जा सकता है।

11. ऊर्जा विभाग

i. प्रायः बिजली के तारों के ढीला रहने के कारण ये हवा चलने पर आपस में टकराते रहते हैं, जिससे चिनगारी निकलने की संभावना रहती है। इन चिनगारियों के कारण भी आगलगी की घटनाएँ होती है। अतएव बिजली के ढीले तारों को भी ठीक करवाने की व्यवस्था कर ली जाए।
ii. निर्बाध बिजली की आपूर्ति की व्यवस्था की जानी चाहिए।

12. वन एवं पर्यावरण विभाग

i. गर्मियों के दिनों में लू चलने से वन्य जीव भी प्रभावित होते हैं। अतः वन्य जीव उद्यानों तथा अभ्यारण्यों में पानी की व्यवस्था की जानी चाहिए।
ii. अन्य जीव उद्यानों में जानवारों के पिंजड़ों को ठंडा रखने की व्यवस्था की जानी चाहिए।
iii. अभ्यारण्यों में गड्ढे खोदकर वन्य जीवों के लिए जल की व्यवस्था की जानी चाहिए।

13. राज्य अग्निशमन निदेशालय

भीषण गर्मी के कारण आग लगी की घटनाओं में भी वृद्धि हो जाती है। आग लगी की घटनाओं से निबटने एवं उनके रोकथाम के लिए एतद् विषयक विभागीय मानक संचालन प्रक्रियानुसार कार्रवाई सुनिश्चित करायी जाए।

14. सूचना एवं जनसम्पर्क विभाग

गर्म हवाएं/लू से बचाव के उपाय से संबंधित विज्ञापन का प्रचार–प्रसार प्रिंट मिडिया एवं इलेक्ट्रॉनिक मिडिया माध्यम से कराया जाय। साथ ही गर्म हवाएं/लू से बचाव के उपाय से संबंधित जिंगल को भी राज्य के एफ एम एवं आकाशवाणी के रेडियो चैनलों के माध्यम से प्रचारित कराया जाय।

अनुरोध है कि उपरोक्त के आलोक में अपने विभाग के स्तर के आवश्यक कार्रवाई सुनिश्चित करने की कृपा की जाए।

विश्वासभाजन

ह0/–
प्रधान सचिव

ज्ञापांक ...../आ0प्र0 पटना–15, दिनांक–

प्रतिलिपि : सभी जिला पदाधिकारी, विभाग की सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित।

ह0/–
प्रधान सचिव

ज्ञापांक ...../आ0प्र0 पटना–15, दिनांक–

प्रतिलिपि : उपाध्यक्ष, बिहार राज्य आपदा प्रबंधन प्राधिकरण/मुख्य सचिव/ विकास आयुक्त/ माननीय मंत्री, आपदा प्रबंधन के आप्त सचिव/ माननीय मुख्य मंत्री के प्रधान सचिव को सूचनार्थ प्रेषित।

ह0/–
प्रधान सचिव

ज्ञापांक 1194/आ0प्र0 पटना–15, दिनांक– 29.04.2017

प्रतिलिपि : आई0टी0 मैनेजर आपदा प्रबंधन विभाग, बिहार सरकार, पटना को सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित।

ह0/–
प्रधान सचिव

Annexure-4

Signs And Symptoms In Vulnerable Population (Children & Pregnant Women[9])

Target Populations	Heat Stroke	Heat Exhaustion	Heat Syncope	Heat Cramps	Heat Edema	Heat Rashes	Dehydration**
All Populations 	• **Altered mental state (e.g., inappropriate behaviour, seizures, delirium, slurred speech, extreme lethargy, coma/loss of consciousness)** • Very high core body temperature (40°C/104°F) • Associated symptoms include: • Nausea • Rapid heartbeat/breathing • Hot and dry or damp skin • Sweating may or may not be present	• No altered mental state • High core body temperature (under 40°C/104°F) • Increased thirst • Heavy sweating • Headache • Cool and/or damp skin • Weakness and tiredness • Muscle cramps • Nausea or vomiting	• Brief loss of consciousness, usually in person standing for a prolonged period or rapidly changing positions in a warm environment	• Painful and involuntary contractions of skeletal muscle • Flushed and/or moist skin	• Swelling of hands, feet or other dependent areas	• Tiny bumps on skin, usually in chest or upper back • Could result in tiny blisters	• Dry mouth and tongue Sticky lips/mouth • Drowsy or sleepy • Little urine • Dark urin • Dizziness • Sunken eyes
Specific to Infants and Children under 4 years 	• Very irritable (unable to express specific symptoms) • May present symptoms of dehydration as well	• Very irritable (unable to express specific symptoms)		• Very irritable (unable to express specific symptoms) • Mild/slightly high core body temperature may be present (less than 39.5°C/102.5°F)		• Can occur in diapered area or if baby is overclothed/ overdressed	• Sunken soft spot (fontanelle) on baby's head and cheeks • No tears when crying • Decreased urine output or dark urine • Irritable (unable to express specific symptoms)
Specific to Older Children and Adolescents 	• May be associated with exertion, e.g., sports	• Muscle cramps (may be verbally expressed) • Nausea (may be verbally expressed)					
Specific to Pregnant Women 	• Very high core body temperature (above 39°C/102°F)* • Symptoms of severe dehydration such as labour contractions (Braxton Hicks) may present	• Increase in core body temperature (under 39°C/102°F)		• Involuntary contractions may affect calves, arms and stomach area (most common)	• Swelling most often seen around lower legs and feet	• Tiny bumps on the skin, in particular in the crease between and beneath the breasts, crease where bulge of lower abdomen rubs against the top of pubic area, on back, inner thighs, armpits, and other creasing areas	• Inadequate breastmilk production • False labour (Braxton-Hicks) contractions

Population	Milder symptoms (Treat at home)	Severe symptoms (Take to hospital immediately)
 General Population	• Dry lips, sticky mouth • Excessive thirst • Excessive sweating • Weakness, dizziness • Nausea, vomiting • Small blisters, rashes • Heat rashes • Mild, slightly high body temperature • Cramps, usually in arms and legs • Nosebleeds (common in hot and dry environments)	• **Confusion/not responding clearly, seizures, coma, very dull, not waking up (MOST SEVERE)** • Very high body temperature for longer than two hours **(40°C/104°F)** • Fainting • Dark urine • No urine in more than eight hours • Rapid heartbeat and breathing • No sweating (but skin may be wet and hot)
 Specific to Infants and Young Children (up to 4 years of age)	• Heat rashes in diapered area • Irritable and/or crying	• Crying without tears • Sunken eyes and/or forehead • Vomiting or diarrhoea • Extreme irritability • Fewer wet diapers
 Specific to Older Children and Adolescents (approximately 4–19 years of age)	• Expresses nausea • Expresses having headaches • Muscle cramps (especially after exercising outside, which is common for this age group)	• Deep or severe muscle pain (especially after exercising outside, which is common for this age group)
 Specific to Pregnant Women	• Heat rashes in body areas that rub against each other • Muscle cramping in stomach	• Very high body temperature • Extreme nausea • Early contractions • Swelling of body parts • Severe muscle cramping

[9] UNICEF Protecting-Children-Heat-Stress-Technical-Note2023

Annexure-5

Heat Illness- Treatment Protocol

Recognizing that treatment protocols may vary slightly according to the setting (EMS, health centre, clinic, hospital emergency department, etc.), the following should apply generally to any setting and to all patients with heat related illnesses:

1. Initial patient assessment – primary survey (airway, breathing, circulation, disability, exposure), vital signs, including temperature
2. Consider heat illness in differential diagnosis if:
   a) Presenting with suggestive symptoms and signs
   b) Patient has one or more of the following risk factors:
      i. Extremes of age (infants, elderly)
      ii. Debilitation/physical deconditioning, overweight or obese
      iii. Lack of acclimatization to environmental heat (recent arrival, early in summer season)
      iv. Any significant underlying chronic disease, including psychiatric, cardiovascular, neurologic, hematologic, obesity, pulmonary, renal, and respiratory disease
      v. Taking one or more of the following:
         - Sympathomimetic drugs
         - Anticholinergic drugs
         - Barbiturates
         - Diuretics
         - Alcohol
         - Beta blockers
3. Remove from environmental heat exposure and stop physical activity
4. Initiate passive cooling procedures
   a) Cool wet towels or ice packs to axillae, groin, and around neck; if patient is stable, may take a cool shower, but evaluate risk of such activity against gain and availability of other cooling measures
   b) Spray cool water or blot cool water onto skin
   c) Use fan to blow cool air onto moist skin
5. If temperature lower than 40°C, repeat assessment every 5 minutes; if improving, attempt to orally hydrate (clear liquids, ORS can be used but not necessary; cool liquids better than cold). If temperature is 40°C or above, initiate IV rehydration and immediately transport to emergency department for stabilization.

Annexure-6

Advisory of the Bihar State Health Society

राज्य स्वास्थ्य समिति, बिहार

पत्रांक—SHSB/GA/IDSP/2443/2017/6546

प्रेषक,

सुहर्ष भगत, भा.प्र.से
अपर कार्यपालक निदेशक,
राज्य स्वास्थ्य समिति, बिहार।

सेवा में,

निदेशक/प्राचार्य/ अधीक्षक, AIIMS, पटना, IGIMS पटना एवं सभी सरकारी मेडिकल कॉलेज एवं अस्पताल, बिहार।
सिविल सर्जन सह–सदस्य–सचिव सह–नोडल अधिकारी, NPCCHH, बिहार।
सभी जिला ऐपिडेमियोलॉजिस्ट सह–समन्वयक (NPCCHH), बिहार।

दिनांकः–15/03/24

विषयः– Heat Related Illness (HRI) के Preparedness से संबंधित Health Advisory.

महाशय/महाशया,

आप अवगत है, राष्ट्रीय स्वास्थ्य मिशन के अन्तर्गत राष्ट्रीय जलवायु परिवर्तन एवं मानव स्वास्थ्य कार्यक्रम (National Programme on Climate Change & Human Health/NPCCHH) राज्य में क्रियान्वित है। गर्मी से होनेवाली बीमारियों का सतत् निगरानी किया जाना महत्वपूर्ण है। Global Warming के कारण जलवायु परिवर्तन से प्रतिदिन हो रही तापमान में वृद्धि के कारण हमारे स्वास्थ्य पर मौसम का दुष्प्रभाव परिलक्षित हो रहा है। इस संबंध में National Programme on Climate Change & Human Health (NPCCHH), के द्वारा National Action Plan on Heat Related Illnesses, के ऊपर मार्गदर्शिका तैयार किया गया है जो इस पत्र के साथ संलग्न है (अनुः–1)।

अत्यंत गर्मी/लू से होनेवाले मानव स्वास्थ्य पर दुष्प्रभाव के प्रमुख लक्षणः–

- Dehydration, Headche, Heat Exhaustion, Heat Cramps, Brain Stroke इत्यादि।

उक्त के संदर्भ में HRI Preparedness एवं रोकथाम हेतु निदेशित किया जाता है किः–

1. सभी अस्पतालों द्वारा गर्मी का महीना प्रारम्भ होने के पूर्व गर्मी से प्रभावित मरीजों से निपटने की विस्तृत कार्य योजना तैयार कर लिया जाये।
2. Heat Related Illness से निपटने के Standard Operationg Procedure के संबंध में सभी चिकित्सक, पारा मेडिकल स्टॉफ का उन्मुखीकरण किया जाये (अनुः–1 के अनुसार)।
3. Suspected Heat Related Illnes के मरीज के Rapid Assessment हेतु इमरजेंसी विभाग में Standard Treatment Protocol का पालन सुनिश्चित किया जाये।
4. अस्पताल के क्षमता के अनुसार Heat Stroke के मरीजों के लिए Dedicated Bed की व्यवस्था की जाये।
5. जिला अस्पताल स्तर पर Heat Wave Shock Proof Room, earmark कर उसको rennovate किया जाये। इस हेतु राशि का वहन NPCCHH FMR Code-NCD.7,SL.NO 117, B (Infrastucutre/Civil Work से वाहन किया जायेगा। राशि का आवंटन वित्तीय वर्ष 2024–2025 के Financial Guidelines के साथ जल्द भेजा जायेगा।
6. Emergency Call के लिए Rapid Response Team का गठन जिला एवं प्रखण्ड स्तर पर किया जाये।
7. Para Medical Staff, Bed, IV Fluid, ORS, Essential Medicine एवं Equipment की पर्याप्त व्यवस्था जिला ब्लॉक एवं सामुदायिक स्वास्थ्य केन्द्र पर किया जाये।

जीवन्त बिहार... सपना हो साकार

स्वास्थ्य भवन, शेखपुरा, पटना – 800 014
दूरभाष : 0612–2290328, वेबसाइट : http://shs.bihar.gov.in

8. Vulnerable Population (5 वर्ष से कम आयुवर्ग वाले बच्चे, गर्भवती महिला, वरिष्ठ नागरिक) के लिए Out reach clinic की व्यवस्था की जाये।

9. बाह्य रोगी विभाग में आनेवाले सभी मरीजों जिसमे Heat wave से ग्रसित होने का लक्षण प्रतीत हो उनमे लू की लक्षण की जॉच अवश्य कराये। बाह्य रोगी कक्ष में बैठने का उचित प्रबंध के साथ ठंडे पेय जल की व्यवस्था सुनिश्चित किया जाये एवं शीतलता हेतु पंखा या कूलर की व्यवस्था अथवा अन्य उपाय किया जाय।

10. प्राथमिक उपचार कक्ष में ओ०आर०एस० कार्नर बनाया जाये।

11.प्रारंभिक सलाह के लिए 104 सेवा केन्द्र से निःशुल्क परामर्श की व्यवस्था की जाये।

12.स्वास्थ्य केन्द्रों द्वारा अपने आस–पास के समुदाय के लिए Awareness Campaign चलाया जाये, जिसमें गर्मी से बचाव की विधि के बारे मे चर्चा किया जाये।

13.जन–समुदाय को प्रचार–प्रसार के माध्यम से निम्नांकित (Do's and Dont's) सलाह दी जा सकती है (अनुः–2)।

- नशीले पदार्थ शराब, उच्च प्रोटीन युक्त खाद्य पदार्थ तथा कार्बोनेटेड शीतल पेय के सेवन से बचें।
- गर्म हवाओं की स्थिति जानने के लिए रोडियो, टी०वी० पर मौसम पूर्वानुमान की जानकारी लेते रहे।
- हल्के ढीले–ढाले सूती वस्त्र पहने तथा धूप में चश्मा, छाता, टोपी एवं जूता पहन कर घर से निकले। चक्कर आने, मितली आने पर छायादार स्थान पर आराम करें तथा शीतल पेय जल उपलब्ध हो तो फल का रस, लस्सी मट्ठा आदि का सेवन करें। उल्टी, सिर दर्द तेज बुखार की दशा में निकट के अस्पताल अथवा स्वास्थ्य केन्द्र में जरूरी सलाह लिया जाये।
- यात्रा के समय पानी का बोतल अवश्य रखें। गर्मी के दिनों में ओ०आर०एस० का घोल निम्बू पानी, कच्चे आम का रस एवं लस्सी का ज्यादा से ज्यादा उपयोग करें।

14. स्वास्थ्य केन्द्रो द्वारा Heat Related Illness से प्रभावित मरीजों का पर्याप्त प्राथमिक उपचार प्रदान किया जाये एवं आवश्यकता अनुसार जिला अस्पताल से रेफरल लिंक स्थापित कर गंभीर मरीजों को वहां रेफर किया जाये।

उपरोक्त निर्देशों के आलोक में HRI Preparedness का दैनिक प्रतिवेदन प्रपत्र इस पत्र के साथ संलग्न कर आवश्यक कार्रवाई हेतु हेजा जा रहा है (अनुः–3) जिसको SPCCHH कोषांग के Email-ssonewbihar@gmail.com पर प्रतिदिन भेजना सुनिश्चित किया जायें। साथ ही IMD द्वारा जारी Heat Wave Forecast/Bulletin को सभी संबंधित पदाधिकारी/कर्मी को प्रतिदिन अनिवार्य रूप से Circulate किया जाये।

भारत सरकार के IHIP (Integrated Health Information Platform) के NPCCHH Section पर प्रतिदिन सभी स्वास्थ्य संस्थानों (PHC and Above) के द्वारा Heat Related Illness से संबंधित डॉटा पूर्व में IDSP के अंतर्गत दिये गये Login Id एवं Password से प्रविष्टि सुनिश्चित किया जाये।

कृपया इसे सर्वोच्च प्राथमिकता दी जाये।

अनुः–यथोक्त।

विश्वासभाजन

ज्ञापांक–6546 दिनांक–15/03/24 (सुहर्ष भगत) 15/03/24

प्रतिलिपिः–

1. अपर मुख्य सचिव, स्वास्थ्य विभाग, बिहार को सादर सूचनार्थ ।

2. कार्यपालक निदेशक, राज्य स्वास्थ्य समिति, बिहार को सादर सूचनार्थ।
3. सभी जिला प्रदाधिकारी सह–अध्यक्ष, जिला स्वास्थ्य समिति, बिहार को सादर सूचनार्थ।
4. उपाध्यक्ष, बिहार राज्य आपदा प्रबंधन प्रधिकरण, पटना को सादर सूचनार्थ।
5. निदेशक, NCDC, दिल्ली, भारत सरकार स्वास्थ्य एवं परिवार कल्याण मंत्रालय, नई दिल्ली को सादर सूचनार्थ।
6. विभागाध्यक्ष, NPCCH, NCDC, दिल्ली, भारत सरकार को सादर सूचनार्थ।
7. अपर निदेशक सह–नोडल ऑफिसार आपदा, स्वास्थ्य विभाग बिहार को सूचनार्थ।
8. राज्य तथा जिला मौसम पूर्वानुमान पदाधिकारी बिहार को सूचनार्थ प्रेषित।
9. निदेशक, भारत मौसम विज्ञान विभाग (IMD) पटना को सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित।
10. राज्य कार्यक्रम प्रबंधक, (NHM & NUHM) राज्य स्वास्थ्य समिति पटना को सूचनार्थ।
11. प्रभारी, ड्रग सेल, राज्य स्वास्थ्य समिति, बिहार को सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषितं।
12. सभी जिला के अपर मुख्य चिकित्सा पदाधिकारी/जिला सर्विलेंस पदाधिकारी, कार्यक्रम प्रबंधक, लेखा प्रबंधक को सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित।
13. राज्य सलाहकार (State Consultant, Vital Strategies) को सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित।

15/03/24.

अपर कार्यपालक निदेशक

Heat-Illness Reporting format as per the Bihar State Health Society

राज्य स्वास्थ्य समिति, बिहार।

(जिला को नाम) जिला के स्वास्थ्य केन्द्र के द्वारा हीट वेव से बचाव हेतु कार्ययोजन संबंधित प्रतिवेदन दिनांक–

क्र0	स्वास्थ्य केंद्र का नाम	हीट वेव से बचाव हेतु बनाये गये वार्ड की संख्या	हीट वेव से बचाव हेतु बनाये गये वार्ड में लगाये गये बेड की संख्या	हीट वेव से बचाव हेतु बनाये गये वार्ड में एसी. /कूलर की संख्या	हीट वेव से बचाव हेतु बनाये गये वार्ड में चिकित्सीय प्रबंधन हेतु 24 घंटे चिकित्सक एवं पारा मेडिकल कर्मियों का ड्यूटी रोस्टर बनाया गया है अथवा नहीं	हीट वेव से बचाव हेतु बनाये गये वार्ड में चिकित्सक की संख्या	हीट वेव से बचाव हेतु बनाये गये वार्ड में पारा मेडिकल कर्मियों की संख्या	हीट वेव से ग्रसित मरीजों के उपचार हेतु आवश्यक दवा एवं कंजुमेवल पर्याप्त मात्रा में उपलबध है अथवा नहीं	स्वास्थ्य संस्थान में मरीजों के परिजनों हेतु बैठने की व्यवस्था एवं पेयजल की व्यवस्था है अथवा नहीं	कुल ओ०पी०डी० मरीजो की संख्या	हीट वेव से ग्रसित भर्ती मरीजों की संख्या	हीट वेव से ग्रसित अब तक कुल भर्ती मरीजों की संख्या	हीट वेव से ग्रसित कुल डिसचार्ज किये गये मरीजों की संख्या	हीट वेव से ग्रसित कुल कितने मरीजों की मृत्यु हुई है
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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2														
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State Health Society,Bihar

Facilities Wise Heat Wave Preparation Check List & Daily Report

Sr No.	Name Of Fascilities	No of Dedicated Ward for Heat Wave Stroke Patient	No of Bed in Dedicated Ward for Heat Wave Stroke Patient	No of AC/Coolle r in Dedicated Ward	24 Hr Duty Roster prepared of Medical Officer & Para Medical Staff for Heat Wave Ward (Yes or No)	No of Medical Officer deployed for Dedicated Heat Wave Ward	No of Para Medical Sfaff Deployed of Dedicated Heat Wave Ward	Essential Drugs & Consumable availiabe sufficent stock at Facility Level(Yes or No)	Drinking & Sitting arrangemnt availbele for Attendent (Yes or No)	Total OPD No as on Date	No of Patient Admitted for Heat Stroke Treatment as on Date	Total no of Patient Admitted for Heat Stroke Treatment as Till Date	Total No of Discharg e patient for Heat Wave	Total No of Death Due to Heat wave	Remarks
1															
2															
3															
4															
5															
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Additional Information

हीट वेव : क्या करें/ क्या न करें

हीट वेव की स्थिति शरीर की कार्य प्रणाली पर प्रभाव डालती है, जिससे मृत्यु भी हो सकती है। इसके प्रभाव को कम करने के लिए निम्न तथ्यों पर ध्यान देना चाहिए:

क्या करें

1. सावधान रहें

1.1 प्रचार माध्यमों से हीट वेव/ लू के सम्बन्ध में जारी की जा रही चेतावनी पर ध्यान दे।

1.2 हीट स्ट्रोक, हीट रैश,, हीट क्रैम्प के लक्षणों - जैसे कमजोरी, चक्कर आना, सरदर्द, उबकाई, पसीना आना, मूर्छा आदि - को पहचानें।

1.3 यदि मूर्छा या बीमारी अनुभव करते है तो तुरंत चिकित्सीस्य सलाह ले।

2. डाइड्रेटेड रहें (शरीर में जल की कमी से बचाव)

2.1 अधिक से अधिक पानी पीयें, यदि प्यास न लगी हो तब भी।

2.2 यात्रा करते समय पीने का पानी अपने साथ अवश्य लें।

2.3 ओ.आर.एस (ORS), घर में बनाये हुये पेय पदार्थ जैसे लस्सी, चावल का पानी (माड़), निम्बू पानी, छाछ, आदि का उपयोग करें, जिससे की शरीर में पानी की कमी की भरपाई हो सके।

2.4 जल की अधिक मात्रा वाले मौसमी फल एवं सब्जयों का प्रयोग करें तथा तरबूज, खरबूज, संतरे, अंगूर, अनानास, खीरा ककड़ी, सलाद पत्ता (लेट्यूस) आदि का सेवन करें ।

3. शरीर को ढक कर रखें

3.1 पसीना शोषित करने वाले हल्के रंग के वस्त्र पहने।

3.2 धूप के चश्मे, छाता, टोपी एवं चप्पल का प्रयोग करें।

3.3 अगर आप खुले धूप में कार्य करते हों तो सिर, चेहरा, हाथ, पैरों को कपडे से ढके रहें तथा छाते का प्रयोग करें।

4. यथा संभव अधिक से अधिक समय के लिए घर कार्यालय इत्यादि के अंदर रहें

4.1 उचित वायु संचरण वाले शीतल स्थानों पर रहें।

4.2 सूर्य की सीधी रोशनी तथा उष्ण हवा को रोकने के हेतु उचित प्रबंध करें, अपने घरों को ठंडा रखें। दिन में खिड़कियां, परदे तथा दरवाजे बंद रखें, विशेषकर घर तथा कार्यालय के उन क्षेत्रों में जहाँ सूरज की सीधी रोशनी पड़ती हो। शाम/ रात के समय घर तथा कमरों को ठंडा करने हेतु इन्हें खोल दें।

4.3 घर से बाहर होने की स्थिति में आराम करने की समयावधि तथा आवृति को बढ़ाएं।

5. उच्च जोखिम समूहों हेतु निर्देश: इन समूहों के बचाव पर अधिक ध्यान दिए जाने क लिए आवश्यकता है।

5.1 एक वर्ष से काम आयु के शिशु तथा अन्य छोटे बच्चे।

5.2 गर्भवती महिलायें ।

5.3 बाह्य वातावरण में (outdoor - आउटडोर) काम करने वाले व्यक्ति ।

5.4 बीमार व्यक्ति, खास कर उच्च रक्तचाप से ग्रस्त व्यक्ति ।

5.5 ऐसे व्यक्ति जो ठंडे क्षेत्रों से गर्म क्षेत्रों में जा रहे हों ।

6. अन्य सावधानियां

6.1 ऐसे बुजुर्ग तथा बीमार व्यक्ति जो अकेला रहते हैं, उनके स्वास्थ्य की नियमित रूप से देखभाल तथा समीक्षा की जानी चाहिए।

6.3 दिन के समय में अपने घर के निचले तल्ले पर रहने का का प्रयास करें।

6.4 शरीर के तापमान को कम रखने के लिए पंखे, गीले कपड़ें इत्यादि का प्रयोग करें।

क्या ना करें

1. अधिक गर्मी वाले समय में, विशेषकर दोपहर 12 से 03 बजे के मध्य धूप में जाने से बचें।
2. नंगे पैर बाहर ना निकले।
3. अधिक प्रोटीन वाले खाद्य पदार्थो के प्रयोग से यथासंभव बचें तथा बासी भोजन का प्रयोग ना करें।
4. बच्चों तथा पालतू जानवरों को खड़ी गाड़ियों में न छोड़।
5. गहरे रंग के भारी तथा तंग कपड़े न पहने।
6. जब बाहर का तापमान अधिक हो तब भारी श्रम वाले कार्य न करें।
7. अधिक गर्मी वाले समय में खाना बनाने से बचें ।
8. रसोई वाले स्थान के दरवाजे तथा खिड़कियाँ बंद न रखें।
9. शराब, चाय, कॉफी, कार्बोनेटेड सॉफ्ट ड्रिंक आदि के उपयोग करने से बचें, क्योंकि यह शरीर में निर्जलीकरण करता है।

<u>नियोक्ताओं तथा कर्मचारियों हेतु निर्देश</u>

1. कार्यस्थल पर शीतल पेय जल की व्यवस्था करें तथा कर्मियों को प्रत्येक 20 मिनट की अवधि पर जल का सेवन करने हेतु कहें, ताकि उनके शरीर में जल की कमी न हो।
2. कर्मियों को धूप में कार्य से बचने हेतु सावधान करें।
3. कर्मियों हेतु छायादार कार्यस्थल का प्रबनध करें। इस हेतु कार्य स्थल पर अस्थाई शेल्टर का निर्माण किया जा सकता है।
4. अधिक श्रम वाले तथा बाह्य वातावरण में (outdoor) किए जाने वाले कार्यों को दिन के ठंडे समय पर किए जाने हेतु प्रबंध करें - जैसे सुबह अथवा शाम के समय। बाह्य वातावरण में किए जाने वाले कार्य हेतु विश्राम की अवधि तथा आवृति को बढ़ाएं। प्रत्येक घंटे के श्रमसाध्य कार्य के उपरांत न्यूनतम 05 मिनट का विश्राम दें।
5. तापमान के अधिक होने पर कर्मियों की संख्या बढ़ाये अथवा कार्य की गति को धीमा करें।
6. अधिक तापमान के कारण उत्पन्न होने वाली स्वास्थ्य लक्षणों तथा अधिक तापमान से संबंधित रोगों के खतरों को बढ़ाने वाले कारकों को पहचानने हेतु कर्मियों को प्रशिक्षित करें।
7. कार्यस्थल पर प्रशिक्षित प्राथमिक सहांयता कर्मी (फर्स्ट ऐड वर्कर्स) उपलब्ध होने चाहिए तथा उष्णता सम्बन्धी बीमारियों की स्थिति से निबटने के लिए इमरजेंसी रेस्पॉन्स प्लान तैयार होना चाहिए।
8. गर्भवती महिलायों तथा पहले से बीमार व्यक्तियों को अधिक तापमान की स्थिति में कार्य करने के विषय में अपने चिकितसक से परामर्श करना चाहिए।
9. कर्मियों के सवेंदीकरण एवं उनमें जागरूकता उत्पन्न करने हेतु आवश्यक गतिविधियां सुनियोजित रूप से संपादित की जायें।
10. कार्यस्थल पर तापमान और पूर्वानुमान बताने वाले डिस्प्ले लगाए जाने चाहिए।
11. अत्याधिक तापमान से संबंधित प्रशिक्षण सत्र नियोक्ताओं एवं कर्मियों हेतु आयोजित किए जाने चाहिए।

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