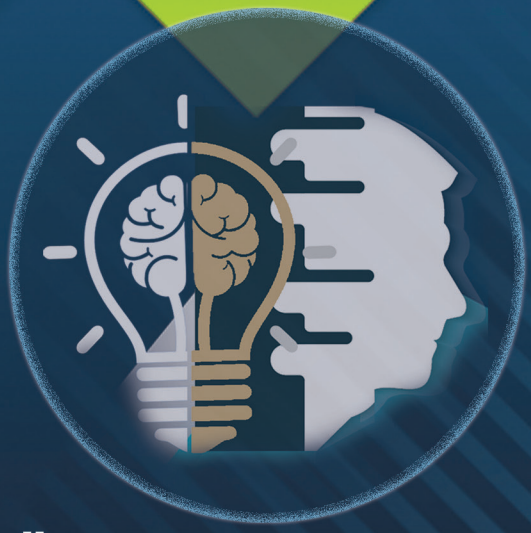
مجلة العلوم الإنسانية
بجامعة حائل

جامعة حائل
University of Ha'il

# مجلة العلوم الإنسانية

## دورية علمية محكمة تصدر عن جامعة حائل



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# مجلة العلوم الإنسانية

دورية علمية محكمة تصدر عن جامعة حائل

للتواصل:

مركز النشر العلمي والترجمة

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## نبذة عن المجلة

**تعريف بالمجلة**

مجلة العلوم الإنسانية، مجلة دورية علمية محكمة، تصدر عن وكالة الجامعة للدراسات العليا والبحث العلمي بجامعة حائل كل ثلاثة أشهر بصفة دورية، حث تصدر أربة أعداد في كل سنة، وبحسب اكتمال البحوث المجازة للنشر.

وقد نجحت مجلة العلوم الإنسانية في تحقيق معايير اعتماد معامل التأثير والاستشهادات المرجعية للمجلات العلمية العربية معامل " آرسيف Arcif " المتوافقة مع المعايير العالمية، والتي يبلغ عددها (32) معياراً، وقد أطلق ذلك خلال التقرير السنوي الثامن للمجلات للعام 2023.

**رؤية المجلة**

التميز في النشر العلمي في العلوم الإنسانية وفقاً لمعايير مهنية عالمية.

**رسالة المجلة**

نشر البحوث العلمية في التخصصات الإنسانية؛ لخدمة البحث العلمي والمجتمع المحلي والدولي.

**أهداف المجلة**

تهدف المجلة إلى إيجاد منافذ رصينة؛ لنشر المعرفة العلمية المتخصصة في المجال الإنساني، وتمكن الباحثين –من مختلف بلدان العالم– من نشر أبحاثهم ودراساتهم وإنتاجهم الفكري لمعالجة واقع المشكلات الحياتية، وتأسيس الأطر النظرية والتطبيقية للمعارف الإنسانية في المجالات المتنوعة، وفق ضوابط وشروط ومواصفات علمية دقيقة، تحقيقا للجودة والريادة في نشر البحث العلمي.

## قواعد النشر

### لغة النشر

1- تقبل المجلة البحوث المكتوبة باللغتين العربية والإنجليزية.
2- يُكتب عنوان البحث وملخصه باللغة العربية للبحوث المكتوبة باللغة الإنجليزية.
3- يُكتب عنوان البحث وملخصه ومراجعه باللغة الإنجليزية للبحوث المكتوبة باللغة العربية، على أن تكون ترجمة الملخص إلى اللغة الإنجليزية صحيحة ومتخصصة.

### مجالات النشر في المجلة

تهتم مجلة العلوم الإنسانية بجامعة حائل بنشر إسهامات الباحثين في مختلف القضايا الإنسانية الاجتماعية والأدبية، إضافة إلى نشر الدراسات والمقالات التي تتوفر فيها الأصول والمعايير العلمية المتعارف عليها دوليًّا، وتقبل الأبحاث المكتوبة باللغة العربية والإنجليزية في مجال اختصاصها، حيث تعنى المجلة بالتخصصات الآتية:

- علم النفس وعلم الاجتماع والخدمة الاجتماعية والفلسفة الفكرية العلمية الدقيقة.
- المناهج وطرق التدريس والعلوم التربوية المختلفة.
- الدراسات الإسلامية والشريعة والقانون.
- الآداب: التاريخ والجغرافيا والفنون واللغة العربية، واللغة الإنجليزية، والسياحة والآثار.
- الإدارة والإعلام والاتصال وعلوم الرياضة والحركة.

## أوعية نشر المجلة

تصـــدر المجلة ورقيًّا حســـب القواعد والأنظمة المعمول بها في المجلات العلمية المحكمة، كما تُنشـــر البحوث المقبولة بعد تحكيمها إلكترونيًّا لتعم المعرفة العلمية بشكل أوسع في جميع المؤسسات العلمية داخل المملكة العربية السعودية وخارجها.

# ضوابط النشر في مجلة العلوم الإنسانية وإجراءاته

## أولاً: شروط النشر

### أولاً: شروط النشر

1. أن يتّسم بالأصالة والجدّة والابتكار والإضافة المعرفية في التخصص.
2. لم يسبق للباحث نشر بحثه.
3. ألا يكون مستلّاً من رسالة علمية (ماجستير / دكتوراة) أو بحوث سبق نشرها للباحث.
4. أن يلتزم الباحث بالأمانة العلمية.
5. أن تراعى فيه منهجية البحث العلمي وقواعده.
6. عدم مخالفة البحث للضوابط والأحكام والآداب العامة في المملكة العربية السعودية.
7. مراعاة الأمانة العلمية وضوابط التوثيق في النقل والاقتباس.
8. السلامة اللغوية ووضوح الصور والرسومات والجداول إن وجدت، وللمجلة حقها في مراجعة التحرير والتدقيق النحوي.

## ثانيًا: قواعد النشر

1. أن يشتمل البحث على: صفحة عنوان البحث، ومستخلص باللغتين العربية والإنجليزية، ومقدمة، وصلب البحث، وخاتمة تتضمن النتائج والتوصيات، وثبت المصادر والمراجع باللغتين العربيّة والإنجليزيّة، والملاحق اللازمة (إن وجدت).
2. فـــي حال (نشر البحث) يُزوَّد الباحث بنسخة إلكترونية من عدد المجلة الذي تم نشر بحثه فيه، ومستلاًّ لبحثه .
3. فـــي حال اعتماد نشر البحث تؤول حقوق نشره كافة للمجلة، ولها أن تعيد نشره ورقيّاً أو إلكترونيّاً، ويحقّ لها إدراجه في قواعد البيانات المحلّيّة والعالمية – بمقابل أو بدون مقابل– وذلك دون حاجة لإذن الباحث.
4. لا يحقّ للباحث إعادة نشر بحثه المقبول للنشر في المجلة إلا بعد إذن كتابي من رئيس هيئة تحرير المجلة.
5. الآراء الواردة فـــي البحوث المنشورة تعبر عن وجهة نظر الباحثين، ولا تعبر عن رأي مجلة العلوم الإنسانية.
6. النشر في المجلة يتطلب رسوما مالية قدرها ( 1000 ريال) يتم إيداعها في حساب المجلة، وذلك بعد إشعار الباحث بالقبول الأولي وهي غير مستردة سواء أجيز البحث للنشر أم تم رفضه من قبل المحكمين.

## ثالثًا: توثيق البحث

أسلوب التوثيق المعتمد فـــي المجلة هو نظام جمعية علم النفس الأمريكية (APA7)

## رابعا: خطوات وإجراءات التقديم

1. يقدم الباحث الرئيس طلبًا للنشر (من خلال منصة الباحثين بعد التسجيل فيها) يتعهد فيه بأن بحثه يتفق مع شروط المجلة، وذلك على النحو الآتي:

أ. البحث الذي تقدمت به لم يسبق نشرة (ورقيا أو إلكترونيا)، وأنه غير مقدم للنشر، ولن يقدم للنشر في وجهة أخرى حتى تنتهي إجراءات تحكيمه، ونشرة في المجلة، أو الاعتذار للباحث لعدم قبول البحث.

ب. البحث الذي تقدمت به ليس مستلا من بحوث أو كتب سبق نشرها أو قدمت للنشر، وليس مستلاً من الرسائل العلمية للماجستير أو الدكتوراة.

ج. الالتزام بالأمانة العلمية وأخلاقيات البحث العلمي.

د. مراعاة منهج البحث العلمي وقواعده.

هـ. الالتزام بالضوابط الفنية ومعايير كتابة البحث في مجلة العلوم الإنسانية بجامعة حائل كما هو في دليل المؤلفين لكتابة البحوث المقدمة للنشر في مجلة العلوم الإنسانية بجامعة حائل وفق نظام APA7

2. إرفاق سيرة ذاتية مختصرة في صفحة واحدة حسب النموذج المعتمد للمجلة (نموذج السيرة الذاتية).
3. إرفاق نموذج المراجعة والتدقيق الأولي بعد تعبئته من قبل الباحث.
4. يرسل الباحث أربع نسخ من بحثه إلى المجلة إلكترونيّاً بصيغة (word) نسختين و (PDF) نسختين تكون إحداهما بالصيغتين خالية مما يدل على شخصية الباحث.
5. يتم التقديم إلكترونياً من خلال منصة تقديم الطلب الموجودة على موقع المجلة (منصة الباحثين) بعد التسجيل فيها مع إرفاق كافة المرفقات الواردة في خطوات وإجراءات التقديم أعلاه.
6. تقوم هيئة تحرير المجلة بالفحص الأولي للبحث، وتقرير أهليته للتحكيم، أو الاعتذار عن قبوله أولياً أو بناء على تقارير المحكمين دون إبداء الأسباب وإخطار الباحث بذلك
7. تملك المجلة حق رفض البحث الأولي ما دام غير مكتمل أو غير ملتزم بالضوابط الفنية ومعايير كتابة البحث في مجلة حائل للعلوم الإنسانية.
8. في حال تقرر أهلية البحث للتحكيم يخطر الباحث بذلك، وعليه دفع الرسوم المالية المقررة للمجلة (1000) ريال غير مستردة من خلال الإيداع على حساب المجلة ورفع الإيصال من خلال منصة التقديم المتاحة على موقع المجلة، وذلك خلال مدة خمس أيام عمل منذ إخطار الباحث بقبول بحثه أوليًا وفي حالة عدم السداد خلال المدة المذكورة يعتبر القبول الأولي ملغي.
9. بعد دفع الرسوم المطلوبة من قبل الباحث خلال المدة المقررة للدفع ورفع سند الإيصال من خلال منصة التقديم، يرسل البحث لمحكّمين اثنين؛ على الأقل.
10. في حال اكتمال تقارير المحكّمين عن البحث؛ يتم إرسال خطاب للباحث يتضمّن إحدى الحالات التّالية:

أ. قبول البحث للنشر مباشرة.

ب. قبول البحث للنّشر؛ بعد التّعديل.

ج. تعديل البحث، ثمّ إعادة تحكيمه.

د. الاعتذار عن قبول البحث ونشره.

11. إذا تطلب الأمر من الباحث القيام ببعض التعديلات على بحثه، فإنه يجب أن يتم ذلك في غضون (أسبوعين من تاريخ الخطاب) من الطلب. فإذا تأخر الباحث عن إجراء التعديلات خلال المدة المحددة، يعتبر ذلك عدولا منه عن النشر، ما لم يقدم عذرا تقبله هيئة تحرير المجلة.
12. في حالة رفض أحد المحكمين للبحث، وقبول المحكم الآخر له وكانت درجته أقل من 70%؛ فإنّه يحق للمجلة الاعتذار عن قبول البحث ونشره دون الحاجة إلى تحويله إلى محكم مرجح، وتكون الرسوم غير مستردة.

13. يقدم الباحث الرئيس (حسب نموذج الرد على المحكمين) تقرير عن تعديل البحث وفقاً للملاحظات الواردة في تقارير المحكمين الإجمالية أو التفصيلية في متن البحث
14. للمجلة الحق في الحذف أو التعديل في الصياغة اللغوية للدراسة بما يتفق مع قواعد النشر، كما يحق للمحررين إجراء بعض التعديلات من أجل التصحيح اللغوي والفني. وإلغاء التكرار، وإيضاح ما يلزم. وكذلك لها الحق في رفض البحث دون إبداء الأسباب.
15. في حالة رفض البحث من قبل المحكمين فإن الرسوم غير مستردة.
16. إذا رفض البحث، ورغب المؤلف في الحصول على ملاحظات المحكمين، فإنه يمكن تزويده بهم، مع الحفاظ على سرية المحكمين. ولا يحق للباحث التقدم من جديد بالبحث نفسه إلى المجلة ولو أجريت عليه جميع التعديلات المطلوبة.
17. لا ترّد البحوث المقدمة إلى أصحابها سواء نشرت أم لم تنشر، ويخطر المؤلف في حالة عدم الموافقة على النشر
18. يحق للمجلة أن ترسل للباحث المقبول بحثه نسخة معتمدة للطباعة للمراجعة والتدقيق، وعليه إنجاز هذه العملية خلال 36 ساعة.
19. لهيئة تحرير المجلة الحق فـــي تحديد أولويات نشر البحوث، وترتيبها فنّياً.

## الهيئة الاستشارية

## فهرس الأبحاث

# «Exploring the Potential for sustainable Curative Tourism Development in Hail, Saudi Arabia: Opportunities and Challenges»

# استكشاف إمكانات تطوير السياحة العلاجية المستدامة في حائل، المملكة العربية السعودية: الفرص والتحديات

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**Abstract**

Curative tourism has recently become one of the promising development sectors in arid regions, yet its potential still remains under-investigated in the Hail region of Saudi Arabia, despite its unique combination of climatic and natural therapeutic resources. The prevailing literature misses an integral assessment that combines both climatic comfort indices and the spatial distribution of natural curative assets. This paper tends to assess the suitability of Hail for curative tourism by considering climatic comfort through the Tourism Climate Index, in addition to the analysis of the therapeutic value of local natural resources represented by mineral-rich soils, hot springs, and geomorphological features. A mixed-methods approach was adopted, combining quantitative climatic data (1990-2023) with qualitative insights from local stakeholders and secondary reports. Accordingly, results reflect that Hail enjoys high levels of climatic comfort during extensive periods of the year, mainly during winter and spring, suitable for various types of curative and health tourism activities. Results also highlighted a number of promising therapeutic assets that are still underutilized due to the limited infrastructure and weak strategic planning. Ultimately, the study concludes with policy-oriented recommendations to enhance curative tourism development in Hail through focusing on spatial planning, environmental management, and destination branding in alignment with Saudi Vision 2030.

**Keywords:** Curative tourism, spas, hot and mineral springs, Hail, KSA.

**المستخلص**

أصبحت السياحة العلاجية مؤخرًا أحد قطاعات التنمية الواعدة في المناطق القاحلة، إلا أن إمكاناتها لا تزال غير مستكشفة جيدًا في منطقة حائل بالمملكة العربية السعودية، على الرغم من مزيجها الفريد من الموارد المناخية والعلاجية الطبيعية. تفتقر الأدبيات السائدة إلى تقييم متكامل يجمع بين مؤشرات الراحة المناخية والتوزيع المكاني للأصول العلاجية الطبيعية. تميل هذه الورقة إلى تقييم مدى ملاءمة حائل للسياحة العلاجية من خلال مراعاة الراحة المناخية من خلال مؤشر مناخ السياحة، بالإضافة إلى تحليل القيمة العلاجية للموارد الطبيعية المحلية المتمثلة في التربة الغنية بالمعادن والينابيع الساخنة والسمات الجيومورفولوجية. تم اعتماد نهج مختلط الأساليب، يجمع بين البيانات المناخية الكمية (1990-2023) مع رؤى نوعية من أصحاب المصلحة المحليين والتقارير الثانوية. وبناءً على ذلك، تعكس النتائج أن حائل تتمتع بمستويات عالية من الراحة المناخية خلال فترات طويلة من العام، وخاصة خلال فصلي الشتاء والربيع، وهي مناسبة لأنواع مختلفة من أنشطة السياحة العلاجية والصحية. كما سلّطت النتائج الضوء على عدد من المرافق العلاجية الواعدة التي لا تزال غير مستغلة بالكامل بسبب محدودية البنية التحتية وضعف التخطيط الاستراتيجي. وفي نهاية المطاف، تُقدّم الدراسة توصياتٍ سياساتيةً لتعزيز تنمية السياحة العلاجية في حائل من خلال التركيز على التخطيط المكاني، والإدارة البيئية، وتعزيز الهوية السياحية، بما يتماشى مع رؤية السعودية 2030.

**الكلمات المفتاحية:** السياحة العلاجية، المنتجعات الصحية، الينابيع الحارة والمعدنية، حائل، المملكة العربية السعودية.

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**التمويل:** لا يوجد تمويل لهذا البحث

## 1.Introduction:

There is a lengthy history of health-related travel overseas. Patients have often traveled overseas for care due to limited access to healthcare in their native nations. However, it was not until the early twenty-first century that medical tourism made a significant breakthrough, emerging as a separate business, and the phrase "medical tourism" became widely used. Since then, there has been a clear trend at work in which patients from rich nations move to underdeveloped ones (Skowron and Skowron, 2014).

Curative or therapeutic tourism relies on the use of natural environmental resources such as mineral and sulfur springs, sand, air, and sun for the medically and scientifically controlled treatment of diseases. A few of the types of natural therapy include treatment using mineral waters (Grenotherapy), steam treatment (Grottotherapy), drinking of mineral water (Hydrotherapy), and climatic treatment (Climatotherapy), which is founded on temperature, humidity, air pressure, and light. It also includes heliotherapy or sun exposure, mud or sand treatment (Peliotherapy) with mineral-laden sands containing iodine, bromide, chloride, and carbonates, and thalassotherapy or seawater and sea air bathing and exposure. (Al-Jallad, 2002, pp. 114–115; gaba,2024).

Tourism is the Kingdom of Saudi Arabia's second greatest source of revenue after oil, producing roughly US$ 13.8 billion each year, and the third largest source of employment. International travel and tourism are expected to generate $63.7 billion in revenue for the Kingdom of Saudi Arabia by 2019. Religious tourism is central to all forms of tourism in the Kingdom of Saudi Arabia. It is the region's largest economy, with a national budget of US$144 billion and a surplus of US$20.4 billion. Currently, the Kingdom of Saudi Arabia is spending heavily on its health system, with the majority of the funding coming from government entities, putting a constant burden on the government. According to WHO (NHA indicators, 2013).

As part of the Saudi Vision 2030, which includes the ambitious Saudi Arabia Health Sector Transformation Program, the country's authorities undertook many efforts to reinforce the basis of the Kingdom's medical tourism industry.

### 1.2 Research Problem.

Despite the various types of natural healing resources and favorable climatic conditions over substantial periods of the year, the potential for curative tourism in the Hail region remains largely underdeveloped. Previous studies in Saudi Arabia tend to relate to coastal or mountainous areas, with the arid inland regions, like Hail, not being well-represented. Furthermore, integrated assessments that link a set of climatic comfort indicators to the spatial attributes of natural healing resources remain lacking. This limits the capacity of the region to establish an evidence-based approach towards curative tourism. The problem of this research, thus, lies in the absence of a comprehensive evaluation regarding the climatic suitability and therapeutic potential of Hail as a competitive destination for curative tourism.

### 1.3 Research Objectives.

#### Main Objective

Assess the Hail region's climatic suitability for curative tourism development based on Oliver's Climate Index. Evaluate the natural therapeutic resources in the region.

#### Specific Objectives.

To calculate the climatic comfort level with Oliver's Climate Index and analyze its variation for different seasons in the Hail region.

Identifying and evaluating natural therapeutic resources-thermal mineral soils, geomorphological features, and other curative environmental elements-of the region.

The paper aims to evaluate the spatial suitability of some selected sites in the Hail region for curative tourism, using climatic and environmental factors.

To investigate stakeholder perceptions related to curative tourism development opportunities and challenges within Hail.

The study aims to present strategic suggestions to develop curative tourism in Hail in line with the sustainable aspects of Saudi Vision 2030.

### 1.4 Research Questions.

- What are the levels of climatic comfort in the Hail region throughout the year according to Oliver's Climate Index?
- What natural therapeutic resources exist in the Hail region, and how suitable are they for curative tourism development?
- How do spatial and environmental characteristics influence the suitability of sites for curative tourism?
- What are the perceptions of stakeholders about developing curative tourism in the Hail region? In view of climatic and environmental analyses, which strategies can be recommended to develop curative tourism in Hail?

### 1.5 Importance of Research

The importance of this research is underlined by the current global trend of shifting toward curative and health-oriented tourism, especially in those regions that possess certain unique natural and climatic features and yet have not been exploited as part of a national tourism strategy. While the potential therapeutic resources of the Hail region include mineral-rich soils, specific geomorphological formations, and favorable seasonal climatic comfort, there is an evident lack of scientific investigations that would position it within a comprehensive curative tourism context. This is particularly significant, given that the majority of the research on health and curative tourism in Saudi Arabia has been conducted along its coastlines or in mountainous areas, leaving inland arid regions largely unresearched.

At the national level, the importance of the study is justified in its alignment with Saudi Vision 2030, emphasizing tourism diversification, rural development, and sustainable utilization of natural assets. Identifying the therapeutic and climatic advantages of Hail provides critical evidence that can assist the development of targeted initiatives aimed at policymakers, investors, and local authorities in terms of curative tourism.

Scientifically, this study fulfills a recognized knowledge gap by combining the climatic comfort assessment using the TCI with the analysis of natural therapeutic resources, an approach rarely applied in arid regions. This combined assessment offers a new analytical perspective that can guide future spatial planning, environmental management, and destination development strategies.

Despite the growing global and regional interest in curative and therapeutic tourism, the existing literature related to Saudi Arabia remains heavily concentrated on coastal and mountainous environments such as the Red Sea, Taif, and Al-Baha. In contrast, inland arid regions—particularly Hail—have received limited scientific attention, despite their diverse climatic, geological, and therapeutic assets. Moreover, previous research has rarely integrated climatic comfort indices—especially Oliver's Temperature–Humidity Index (THI)—with spatial assessments of natural therapeutic resources such as mineral soils, sulfuric springs, geomorphological formations, and medicinal plants. Additionally, there is a clear lack of studies that combine quantitative climatic analysis with qualitative stakeholder perspectives to understand development challenges and opportunities. This gap highlights the need for a comprehensive, multi-dimensional assessment that links climatic suitability, natural curative resources, spatial distribution, and stakeholder insights to evaluate the potential for sustainable curative tourism development in the Hail region.

## 2. LITERATURE REVIEW

### 2.1 Concepts and Definitions of Health Tourism.

There are numerous definitions used in this field, with commentators referring to health tourism, wellness tourism, medical tourism, and spa tourism as the most commonly used descriptors, where 'improved health on holiday... has become the central theme of tourism in an active rather than a passive sense.' (Connell, 2006a, p. 1094).

According to Mueller and Kaufmann (2001), health tourism is "the sum of all the relationships and phenomena resulting from a change in location and residence by people in order to promote, stabilize, and, as appropriate, restore physical, mental, and social well-being while using health services and for whom the place where they are staying is neither their principal nor permanent place of residence or work" (Kaspar 1996).

Different researchers distinguish between medical tourism, curative (therapeutic) tourism, and preventive (wellness) tourism, based on travel motive and extent of medical supervision during traveling. Medical tourism is traveling, typically abroad, primarily for surgical or clinical treatment, where post-operative treatment can occur in spas or wellness facilities, but the underlying motive still is medical treatment (Quintela, Costa, & Correia, 2016; Lui et al., 2021). Therapeutic or curative tourism is traveling to cure a diagnosed condition or undergo convalescence in the supervision of a doctor, using natural curing resources such as thermal-mineral springs, saltwater lakes, therapeutic mud, climatotherapy, or radioactive sand. The purpose is therapeutic recuperation, not recreation (Han et al., 2023). Wellness or preventive tourism, however, refers to voluntary tourism for rest, recreation, stress avoidance, and overall wellness enhancement, typically without medical supervision, with an emphasis on health maintenance and avoidance of stress (Quintela et al., 2016; Han et al., 2023).

### 2.2 Spa Tourism

#### 2.2.1 Spa Tourism Concept and Definitions

Before the definition of different types of spas can be made, it is important to lay down the etymology of the word "spa" as well as its conceptual definition. The word "spa" is a short form of the Latin term "salus per aquam", literally meaning "health through water" (Lund, 2000). Thus, the term itself suggests

seeking health or wellness through the therapeutic use of water. The term "Spa" also is believed to have originated in the Belgian spa town of Spa, where in 1326 a local ironmaster, Collin le Loup, visited a spring named Espa near Liège, in southern Belgium close to the German border, to cure an illness (Jallad, 2000; Lund, 2000). In Walloon, "espa" means "fountain."

De Vierville (as cited by Lund, 2000) defined the word spa from three perspectives:

"The spa is the social use of water therapeutically."

"The spa is a natural place and environment with a view regarding time."

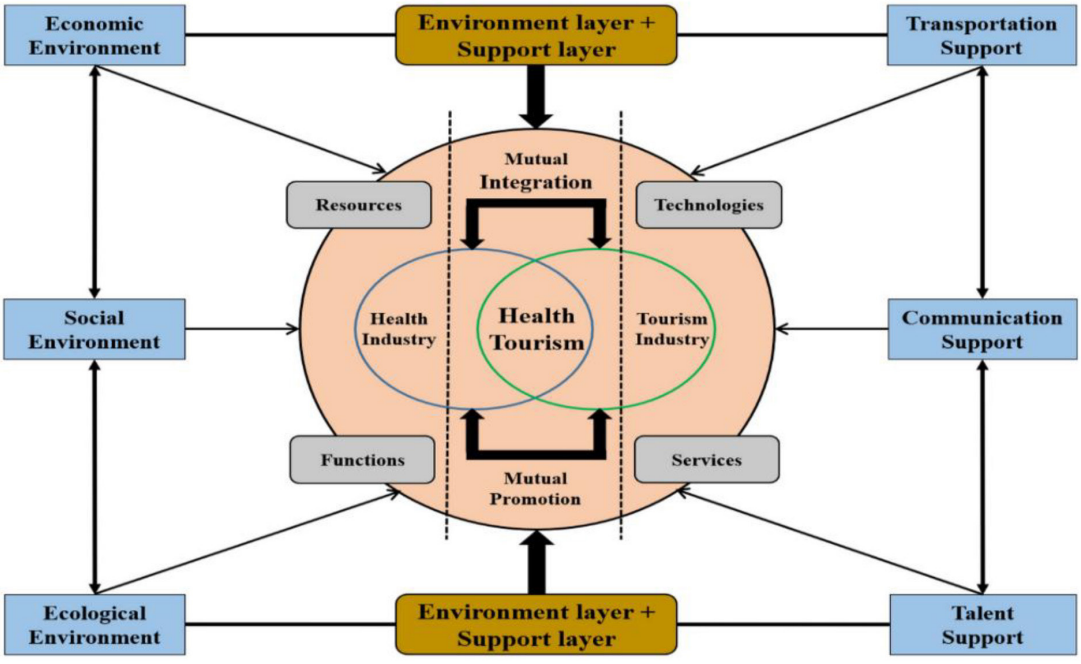
"A spa is a space with intention—by plan, by purpose, for a span of time."

"A location where guests may get therapeutic services like herbal baths, mud wraps, cosmetic treatments, and nourishing meals in addition to water therapy (thermo-mineral, salty, or fresh waters).".

Components of health tourism and hospitalization in the Kingdom:

- Local and foreign medical competencies from all medical specialties.
- Distinctive hospitals with a high level of technical equipment in all cities of the Kingdom.
- Specialized hospitals with a regional reputation for treating a number of chronic diseases.
- Geographical diversity and availability of natural resources such as mountains, seas, etc.
- The presence of the Two Holy Mosques and the spiritual importance it represents for Muslims.
- Arabic and English are widely spoken in hospitals in the Kingdom.
- Acceptable cost compared to Western countries.

**Figure 1**
***Conceptual framework for assessing health tourism development.***




*Source (Wang, Huadi, et al. 2023).*

## Element & potential curative tourism development in hail region.

### Geography and location

The Hael Region is located in the Kingdom of Saudi Arabia's northern center. The area of the region is 118,232 square kilometers. Hael is the region's sole large city, located in the middle. It is well-connected to major regional hubs and is around 600 kilometers from Riyadh, 450 kilometers from Madinah, and 650 kilometers from Tabuk.

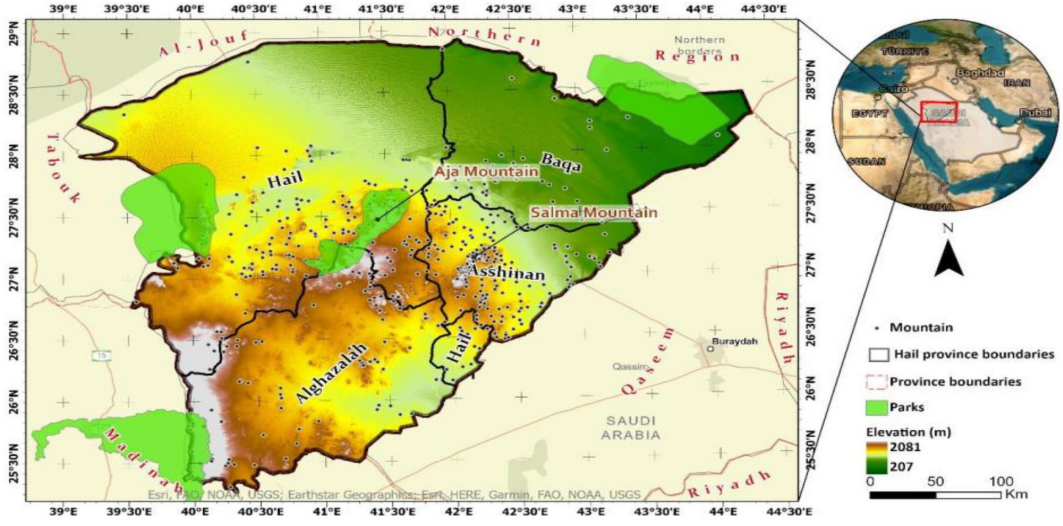
Hail is situated at an altitude of about 915 meters above sea level, thus a mostly moderate and pleasant climate for most of the year. It is bordered on its west and southeast sides by two major mountain ranges: the Aja Mountains and the Salma Mountains respectively. The Aja Mountains are about 100

kilometers long and 25–30 kilometers wide, with a height of nearly 1,350 meters. The Salma Mountains are about 60 kilometers long and 13 kilometers wide, with a maximum altitude of nearly 1,200 meters above sea level. This unique geographical setting provides Hail with beautiful natural scenery that includes mountainous regions, desert flats, and a temperate climate, making it both aesthetically and climatically pleasing.

The 2010 census stated that the Hail Region contained an approximate population of 670,000 people, making up 2.18% of the total population within Saudi Arabia. Non-Saudi nationals made up 19.5% of the total population. In the different localities within the region, Governorate of Hail contains the largest population group, who account for 69.2% of the total, followed by Al-Ghazalah for 17.1%, and Al-Shanan for 7%, with Baq'a for 6.7%. This distribution of the population demonstrates a conspicuous population and resource focus on the main urban area, whereas the rural areas are less densely populated.)Ministry of Municipal and Rural Affairs, Riyadh, 2019, p. 20.)

The Hail area is defined by its richness in natural tourism assets including mountains, valleys, sandy landscapes, native flora species, and a tourist-friendly climate, which means such unique features are readily available for a large part of the year. The findings also suggest that while such natural assets help preserve the area's unique identity for coming generations and provide the local people with benefits, they require prudent administration and care from tourism developers to ensure their sustainability. (Al Salah, S. 2023, p. 362).

**Figure 2**
***location study area***




## Origins of Climatotheraphy.

Hippocrates, the founder of modern medicine, pioneered climatotherapy about 500 BC, when it was used to treat a variety of chronic inflammatory skin conditions.(Hristakieva E, 2005).

For a long time, scientists have examined how climate affects both healthy and sick people. Hungary's main medical director, Generisch Andor, inaugurated the first 300-bed lung clinic on June 15, 1932. The clinic, formally known as the Hungarian Mátra (Royal) Miklós Horthy Hospital, was founded to treat respiratory disorders. The head of the institute described climatology as the study of all the consequences of larger climatic elements on biological creatures. Based on his empirical findings, Andor discovered that TB improved and recovered quicker in various climates (2006).

High-altitude climate therapy, as per researchers, is a widely applied treatment that improves the clinical presentation of asthma. The therapy reduces inflammation of the airway and adjusts lymphocyte function, inhibiting the immune system (Karagiannidis C. et al., 2006) and gaining international acclaim.

Climatological information of Hail by the Saudi Ministry of Defense and Aviation shows an arid to extremely arid tendency. Rainfall approaches 110 mm with two

rains highest at March and November. Mean annual temperature is 23˚C. Temperature during summer is even up to over 40˚C at times. Wind blows only from two principal directions: the north during summer and the south during the rest of the year with an average wind speed of 6 knots. The

relative average humidity annually is 33% as Hail is located away from the prominent water bodies of the country; i.e. the Red Sea and the Arabian Gulf. Relative humidity goes down to as low as 17% in summer and up to 54% in January. Evaporation rates annually at the center of Saudi Arabia, which includes Hail, go up to 3480 mm(Edgell, 2006; Hereher, Al-Shammari, & Abd Allah, 2012).

**Table1**

***Average temperature in hail region(C) (2018-2022)***

| ANNUAL | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | 12 | 14 | 19 | 23 | 29 | 33 | 35 | 34 | 32 | 26 | 20 | 14 |

***Source (General Authority for Meteorology and Environmental Protection, Saudi Arabia,,2018–2022).***

**Table 2**

***Average relative Humidity in hail region (2018-2022)***

| ANNUAL | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | 51 | 43 | 32 | 32 | 22 | 16 | 16 | 18 | 18 | 26 | 56 | 58 |

***Source (General Authority for Meteorology and Environmental Protection, Saudi Arabia.,2018–2022).***

## Curative, mineral, sulf water

As stated by the International Society of Medical Hydrology, the International Association for Spas, Health Resorts and Balneology and the German Health Resorts Association (quoted in Salameh & Rimawi, 1997, p. 9), water is therapeutic only if it has particular physicochemical qualities. These are:

- Iron-bearing water with a minimum of 20 mg/L Fe.
- Iodide-containing water of a minimum of 1 mg/L I.
- Water containing hydrogen sulphide at 1 mg/L of $H_2S$.
- Radon water of at least 18 nCi/L.
- Calculation of Carbon Dioxide (acid) Water with 1000 mg/L.
- Fluoridated water of at least 1 mg/L of F.

Furthermore, the exiting water temperature must be above the average environmental temperature at least by 5 °C.

Salameh and Rimawi (1997, p. 9) further note that the therapeutic effect of water depends on a variety of factors:

- Presence of both anions and cations both of which sum to a total of over 20% of the total ionic load.
- Presence of active elements like iron, sulfur, fluoride, or radon.
- Water temperature.

Therapy with curative waters involves a series of factors, including the treatment medium itself (the water), environmental conditions of the treating place, mental factors including calm and relaxation, and physical exercises including training, walking, or swimming.

Curative waters possess various physical and chemical properties. Physical parameters include temperature, acidity, salinity, and radioactivity, while the chemical properties are made up of dissolved substances (such as sodium, potassium, magnesium, ammonium, chloride, and sulphates), haloids (like fluoride, bromide, and iodide), trace and heavy metals (like iron, manganese, cadmium, zinc, copper, lead, and strontium), and also carbon dioxide and radon-222 and hydrogen sulphide. Consequently, the therapeutic applications of curative waters rely on unique components.In Saudi Arabia. According to surveys and studies, the majority of international patients coming in Saudi Arabia have a spiritual life and value both their spiritual and physical health equally. Furthermore, those with illnesses may have stronger spiritual requirements. Many studies have found that religious or spiritual practice can have an influence on both physical and mental health. Most studies have found that religious and spiritual activity is associated with better health outcomes, such as speedier healing, increased longevity, improved coping abilities, optimism and hope, and less despair and anxiety.

In Hail, there are several sulfuric therapeutic wells that are known for their healing properties. These wells are popular for their mineral-rich waters, which are believed to have therapeutic benefits, particularly for skin conditions, respiratory ailments, and joint pain. The distinct composition of each well's water contributes to its unique healing potential, attracting both locals and visitors seeking natural treatment options.

The table shows the sulfate (SO4) concentration, pH, conductivity (Cond), and total dissolved solids (TDS) in mineral water from wells located in the Hail area. Wells Bier Al-Rafdi, Bier Al-Suhwah, and Bier Qafaar are included:

eyewitness

- Bier Al-Rafdi has the lowest sulfate content (11 mg/L) with pH 6.8, conductivity 2970, and TDS of 2585.5 mg/L.

- Bier Al-Suhwah has moderate sulfate levels (854 mg/L), 6.77 pH, conductivity of 3930, and TDS of 2554.5 mg/L.
- Bier Qafaar is most concentrated in sulfate (854 mg/L), pH 8.1, conductivity of 213, and TDS of 138.45 mg/L.

The information indicates variations of mineral composition and water quality between the wells, with different potential applications for therapeutic or consumption reasons.

**Table3**

***for sulfuric water wells in Hail.***

| Well | SO4 Sulfates (mg/L) | PH | Conductivity (Cond) | Total Dissolved Solids (TDS) (mg/L) |
|---|---|---|---|---|
| Bier Al-Rafdi | 883 | 6.78 | 3970 | 2585.5 |
| Bier Al-Suhwah | 11 | 8.1 | 213 | 138,45 |
| Bier Qafaar | 854 | 6.77 | 3930 | 2554.5 |

***Source (King Abdulaziz City for Science and Technology (KACST) & (Al-Qazi, 2018).***

## Radioactive sand and black sand.

### Sand bath (therapy)

Sand is rich in food for thought. Some of the literature has highlighted its importance in the technical, ecological, social, symbolic and aesthetic lives of different human groups (Boulay and Gélard, 2013; Roccella and Varichon, 2006), while other studies have explored specifically sand-dependent tourist resort activities in the way that money is invested in beaches by contemporary urban societies (particularly Corbin, 1988; Lageiste, 2008). Increasingly, studies have shown the complexity of the scientific, socio-economic and environmental concerns created by sand as a natural resource (Welland, 2009). Sand baths are an ancient form of treatment in every culture, and they come in various forms around the world. In Saudi Arabia, Hail, where the climate is hot and arid, sand baths could be particularly suitable due to the natural environment of the area.

In Hail, the hot desert environment makes it a natural setting for such practices. Traditional therapies like sand baths often utilize local resources and environmental conditions to provide health benefits. If you're considering trying a sand bath, it might be worth seeking out local wellness centers or practitioners who specialize in this form of therapy.

## Hot Stone Massage Therapy and Hot Sand Therapy

### Hot Stone Massage Therapy

Radziejowski and Radziejowski (2018), in their study titled "Hot Stone Massage Therapy - Mechanisms of the Influence on the Human Organism of Selected Methods of Use," devote a detailed study to stone massage therapy. They affirm that stones from geologically active volcanoes—the likes of Hawaii, Bali, Peru, and Chile—are believed to retain volcanic energy, and this can be transferred to the human body in the process of a massage simultaneously drawing in negative energy. The stones are typically mined from the sea floor in unpolluted, pristine environments and vary in size and form, with special sets being reserved for different types of massage practices. Prior to use, the stones are warmed to the desired temperature. Hot stone massage is primarily utilized to alleviate ailments such as hypertension, attack of anxiety, and muscle fatigue, and it is recommended for people of different body types who are suffering from various inner discomvements. This therapy has a long history and worldwide usage, being placed on record among Native Americans, the Chinese, and Indians, thus highlighting its universal recognition and application.

### Hot Sand Therapy

Low discusses the health benefits of hot sand therapy in her 2019 article titled "Hot Sand Therapy: 4 Things to Expect from Psammotherapy, the Holistic Massage That Can Boost Your Health and Wellbeing." Hot sand therapy, or psammotherapy, is a type of therapy whereby a person is immersed in hot sand and is also known to be able to calm and lower the amount of anxiety. Ancient Greeks are recorded to have utilized similar forms of therapy with sun-heated sand to help relieve symptoms of arthritis, rheumatism, and bronchial diseases.

For areas like Hail, Saudi Arabia, the use of psammotherapy capitalizes on the native desert sand's heat, especially during the hot season, and therefore allows for special therapeutic value. The hot sand allows for the alleviation of muscular and joint pain, assists in blood flow, and facilitates detoxification via perspiration. The desert environments around Hail, and in particular the prominent Nafud Desert, are well suited for this old healing method.

### Mud

Mud is an essential natural component that includes minerals that promote health. Mud may absorb toxins from the body, making it beneficial at preventing a variety of ailments. Mud treatment cools and relaxes the body by maintaining the moisture on the skin for an extended period of time.(Nadim Z. and Gandomkar A., 2016).

The volcano mud in Hail is a unique geological

feature and a potential tourist attraction. It's located in the picturesque Salma Mountains and offers a peaceful environment. Developing the area for tourism could contribute to the local economy and showcase Saudi Arabia's natural wonders.

The volcanic clay found in the White Mountain offers a variety of therapeutic benefits, making it a valuable natural resource. Rich in minerals, this clay is renowned for its ability to detoxify the skin, drawing out impurities and promoting a clearer complexion. Its soothing properties make it effective in treating skin conditions such as acne, eczema, and psoriasis, providing relief from irritation and inflammation. Additionally, volcanic clay is known for its excellent absorption qualities, allowing it to retain moisture while keeping the skin hydrated. The clay's thermal properties can also help with muscle relaxation and pain relief when used in baths or wraps. Furthermore, the minerals in volcanic clay, such as silica and magnesium, contribute to overall skin health by promoting cell regeneration and improving elasticity. This unique clay, found in the White Mountain, thus serves as a natural remedy for various skin ailments and a means to enhance general well-being. The volcanic clay found in the White Mountain continues to be the focus of ongoing research and scientific studies. Researchers are investigating its unique properties and potential applications in dermatology and wellness. These studies aim to understand the mineral composition of the clay and its interactions with the skin, validating traditional uses and uncovering new therapeutic benefits. As interest in natural treatments grows, the volcanic clay may offer valuable insights into sustainable health solutions and innovations in skincare products.

**Figure**.3.
***White Mountain, Hail, KSA.***

## Herbal and Medicinal Plants

Medicinal plants have grown in popularity across the world, with implications for global health. Herbal medicine has played an important part in maintaining the global healthcare system (Akerele, 1988). The increased use of medicinal plants in illness treatment is owing to the fact that plants or their derivatives are regarded safe and effective medications, have less side effects, and are inexpensive (Odhav et al., 2013).

Herbal treatments are widely used throughout the Arab world, including Saudi Arabia. Anecdotally, herbal products are supposed to be popular because there is a common notion that they are natural and hence safe. Another prominent trend in Saudi Arabia is the rising popularity of self-medication, which is combined with the use of both herbal and conventional pharmaceuticals. (Al Braik et al. 2008). The medicinal flora of the kingdom of Saudi Arabia has been well-covered within the detailed two-volume work known as Medicinal Plants of Saudi Arabia (Mossa et al., 1987; 2000). In addition, recent work evaluated the ethnomedicinal use of native plants and identified a total of 471 species across 309 genera from 89 plant families to be used in indigenous medicine (Aati et al., 2019). The flora of the kingdom of Saudi Arabia is known to be amongst the most diverse on the Arabian Peninsula and provides important genetic material for both agricultural and medicinal use. Aside from its high number of endemic species, this flora also exhibits biogeographical features with a trace to Asia, Africa, and the Med Region (Collenette, 1998, p. 78).According to Al-Yahya (Al-Yahya M.A. Kuwait, 1984), herbal medications originated on the Arabian peninsula, and folk medicine has been used there from time immemorial. According to Mossa et al. (Mossa JS, Al-Yahya MA, Al-Meshal IA., 1987), the Kingdom of Saudi Arabia has a diverse flora, including

several therapeutic plants, shrubs, and trees. However, it is predicted that Saudi Arabia's flora has a high medicinal species diversity, with over 1200 (more than 50%) of the 2250 species. Indigenous knowledge (IK) of how to use Saudi Arabian plants to treat a variety of diseases is old and still present among tribal and local people, as well as medical practitioners. These IK and cultural experiences are fading as development and modernization accelerate. As a result, there is an urgent need to document these huge stocks of knowledge through ethnobotanical surveys across the Kingdom before they perish from the society (M. Atiqur Rahman et al., 2004).

Natural vegetation forms an integral part of the tourism industry and is a major contributor to visitor attraction, particularly for the Hail area. The inherent aesthetic beauty, cultural values, and suitability for an array of recreational and tourism activities make the landscapes extremely unique, marked by open spaces and unbroken natural tracts. The uniqueness of the area to tourists is also augmented through special and aesthetic vegetation patterns. The dominant vegetation types of Hail include both perennial and seasonal varieties, thus increasing the ecological and recreational value of the area.. (Al Salah, S. (2023).

### Healthy Environment

The clean environment in Hail significantly enhances the health and well-being of its residents. Low pollution levels contribute to better air quality, reducing respiratory issues and promoting overall lung health. The natural landscape encourages outdoor activities, supporting physical fitness and mental well-being. Access to clean water helps prevent waterborne diseases, while a serene atmosphere reduces stress levels. Additionally, community engagement in environmental initiatives fosters social cohesion and encourages healthier lifestyle choices, all of which contribute to improved physical and mental health in the region.

### Human element of curative tourism.

### Population.

731,000 people were living there in 2019. Five municipalities make up the municipality of Hail: Hail, Baqa, Asshinan, Alghazalah, and Hail ‹.The Hail city (Great Sand Dune Desert) is near the Nefud Al-Kebir and the Aja Mountains. These unsurmountable mountains have long shielded hail from outside encroachment. And the just as well-known desert. Hail is an irrigated agricultural oasis that yields fruit, grains, and dates. Gardens in the Hail Province provide a significant portion of the wheat produced in the Kingdom. Hail has varied terrain with unique features including mountains, plains, caves, and volcanoes, with tremendous potential for sports and adventure activities to enhance already-existing events like the Hail Rally & Season of Hail. (Al Salah, S. 2023)

### Accommodation facilities.

The formation of favorable attitudes toward change is a critical aspect for the future development of new and creative types of housing facilities (Dragicevic, 2016) [38]. Provision of a unique customized service, which will give visitors with a specific experience, and a high degree of satisfaction will almost certainly assure the return of tourists to the tourism location and the accommodation facility.. (NADIA PAVIA, TAMARA FLORIČIĆ, 2017, p4)

### Healthcare Infrastructure:

Hospitals and Clinics: Developing state-of-the-art medical facilities and integrating them with traditional and alternative medicine practices could enhance the region's attractiveness as a health tourism destination.

**Table4**

***Hospitals and beds in health sector by hail health region, by 2023G.***

| Health region | Total | | Private sector | | Other governmental sector | | MOH | |
|---|---|---|---|---|---|---|---|---|
| | beds | Hospitals | beds | Hospitals | beds | Hospitals | beds | **Hospitals** |
| Hail | 2,211 | 17 | 271 | 3 | o | 0 | 1,940 | **14** |

***Source (General Authority for statistics, The small& medium enterprises general Authority,2023)***

### Tourist labor.

### Labor market statistics issued by the Authority indicate.

The General Bureau of Statistics stated that the number of workers subject to social insurance regulations and regulations in accommodation and food services activities exceeded, at the end of the third quarter, by 4.8% of the year 2023, 390 thousand workers out of the total number of workers in all economic sectors in the Kingdom. It is one of the activities that most preoccupies Saudis, as it goes beyond the education sector, but It comes in third place after administrative services activities in first place and human health and social service activities in second place.(the small& medium enterprises general Authority,2023)

**Table5**

***Selected Indicators of Available Resources at MoH, Hospitals Health Region by 2023G.***

| Health region | Nurses\ physicians | Nurses\100 beds | No .of nurses including midwives | Physicians\100beds | No.of physicians | No.of beds |
|---|---|---|---|---|---|---|
| Hail | 194 | 158 | 3,073 | 83 | 1,607 | 1,940 |

***Source (General Authority for statistics, The small& medium enterprises general Authority,2023)***

### Cultural Heritage and Relaxation.

The region's historical sites, archaeological ruins, and traditional villages can provide a peaceful and relaxing environment for visitors. Engaging in cultural activities can contribute to overall well-being.

### Government Support.

The government in the Kingdom of Saudi Arabia places most of its focus on revitalizing the tourism sector in general. The recent decision to cancel the visa for those coming to the Kingdom from about 50 countries was noteworthy, as it can be obtained through the electronic platform or upon arrival. The duration of the visa is 90 days, and it can be obtained from the visa platform on the Ministry of Foreign Affairs website, or the self-service machine in the arrival halls of the Kingdom's international airports, or through the passport office at the airport.

Through this step, Saudi Arabia will succeed in attracting tourists from other categories, and medical tourism will certainly have a large share. Reviving the tourism sector also forms part of Saudi Vision 2030, which was launched about three years ago and seeks to reduce dependence on oil and diversify sources of income.

- Vision 2030 Initiatives: The Saudi government's Vision 2030 plan emphasizes diversifying the economy and promoting tourism, including medical tourism. This support can drive investment in curative facilities and enhance infrastructure.
- Promotion of Medical Tourism: Establishing partnerships with international hospitals and wellness centers to attract foreign patients could be beneficial

### Services.

Khadaroo and Seetanah (2007) and Masson and Petiot (2009) also depict the pivotal role of transport and road infrastructure in stimulating the growth of the tourism sector. Not just does this transport and road infrastructure open up tourist destinations to tourists, but it also injects life back into commercial activities and consequently improves the standard of life for resident populations. Moreover, scholars are of the opinion that well-developed transport networks strengthen existing tourism activities and open up spaces for the creation of new tourist destinations (Currie & Falconer, 2014; Musa & Ndawayo, 2011; Virkar & Mallya, 2018). Current studies indicate that well-developed transport and road systems are capable of attracting tourists and also stimulating the promotion of tourism destinations (Virkar & Mallya, 2018). Empirical findings ever and anon depict a positive correlation between transport infrastructure and transport activities for tourism and consequently stimulate the expansion of the tourism sector (Khadaroo & Seetanah, 2007; Liu & Shi, 2017). (Kanwal, Pitafi, Pitafi, et al., 2019; Nazneen, Xu, & Din, 2019).

Hail have highways linking four main regions of the kingdom of soudi arabia , with atotal lemgth of 4.311KM.and by train it include 4areas(Riyad,Al Majmaah,AlQassim,Al Jouf and Hail)through amodern connected railways.and Hail international airport capacity 500thousand passenger.(hail tourism development council ,discover hail).

### Aviation Transport

Hael Regional Airport is the region's only airport, hosting passenger and cargo activities and linking Hael to a series of cities and regions in the Kingdom of Saudi Arabia. In 2012, it served almost 465,000 passengers. In its cargo activities, it served almost 1,261,000 tons in 2011 and 1,157,000 tons in 2012, respectively representing about 0.27% and 0.22% of the domestic air cargo. The airport significantly contributes to the long-term development of the region (Ministry of Municipal and Rural Affairs, 2019, p. 21).

### Railway transport

Hael forms a key hub for the newly built railway connection to link Riyadh and Al Haditha, close to the border with Jordan. The railway enables the transport of both people and commodities and links Hael to markets outside its immediate environs. Infrasturcture of this kind holds the promise of expanded agricultural development and allows for efficient distribution of produce across broader regions. The planned expansion of numerous branch rail lines promises to enhance connectivity to areas closer to Hael to solidify its position as a major economic and developmental hub for the northern part of the Kingdom (Ministry of Municipal and Rural Affairs, 2019, p. 21).

## 3. Methodology

This study employed a mixed-methods approach that integrates quantitative and qualitative analyses to examine the potential for developing curative tourism in the Hail Region of Saudi Arabia. The methodology was designed to assess both the availability of natural and human resources relevant to curative tourism and the climatic suitability of the region using Oliver's Temperature–Humidity Index (THI).

The study focused on the Hail Region, located in northern Saudi Arabia, which is characterized by a semi-arid desert climate and a distinctive natural and cultural environment. The region contains several natural therapeutic resources, including hot springs, mineral-rich waters, and geological formations with potential applications in balneotherapy and climatotherapy. In addition, the region's cultural heritage, geographical setting, and existing tourism and healthcare infrastructure were considered, particularly in relation

to their role in supporting health and wellness tourism services.

Data were collected from multiple sources to ensure a comprehensive assessment of curative tourism potential. Information on natural therapeutic resources, such as hot springs, mineral waters, and geological characteristics, was obtained from governmental reports, geological surveys, and relevant official documents. These data were analyzed to evaluate the therapeutic value of the resources and their suitability for curative tourism activities. Human resource data related to healthcare infrastructure, availability of qualified medical and wellness professionals, wellness centers, and tourism services were collected through interviews with local stakeholders, tourism officials, and healthcare providers. These qualitative insights helped assess the region's capacity to deliver specialized curative tourism services. Climatic data, including monthly average air temperature and relative humidity, were obtained from reliable meteorological sources, such as the Saudi Arabian Meteorological Department and internationally recognized climate databases.

The THI model According to Mora et al. (2017) (Lin, Zhu, Li, & Liu, 2022), because temperature and relative humidity both have a direct impact on body heat exchange, the combination of these two parameters can better predict when climatic conditions will have a fatal impact on the human body. The THI is a classic measure that describes the human body's overall experience with ambient temperature and humidity, and it is an essential indication for assessing the appropriateness of the area climate. Therefore, we used THI, which is constituted of temperature and relative humidity, to analyze the climatic adaptability of the human settlements in Hail.

Oliver's **THI** was applied to assess the **thermal comfort** of Hail's climate for tourists. The formula used was:

$$THI=Td-(0.55-0.55\times R.H)\times(Td-58) \quad (1)$$

Where:

- *T is the average air temperature in Fahrenheit (°F), t is the average air temperature in Celsius (°C), and RH is the average relative air humidity.*

**Table.6.**
***Classification of THI***

| THI(F) | Extent of feeling of climatic comfort |
|---|---|
| Less than60 | Most members feel discomfort due to the cold |
| 60-65 | Feeling comfortable for all members of society |
| 65-80 | Almost half of society feels comfortable (Moderate Comfort Levels) |
| More than 80 | Most members feel discomfort due to the hot |

***Source (Oliver, J,E, 1981, P.189-191).***

$$T(°F)=T(°C)\times 1.8+32 \quad (2)$$

Where:

- *F (Fahrenheit): Represents temperature in the Fahrenheit scale.*
- *C (Celsius): Represents temperature in the Celsius scale. .[3]*
- *1.8: Represents the difference between the boiling point of water (100 degrees Celsius) and its freezing point (0 degrees Celsius) in both systems.*
- *32: Represents the freezing point of water in the Fahrenheit scale (32 degrees F).*

Monthly climate data were used to calculate THI values for each month, providing insight into the level of comfort tourists may experience while engaging in outdoor activities. The results were compared to comfort categories from existing literature to determine the best and worst months for tourism in terms of climate.

The analytical framework combined several complementary methods. Oliver's THI was used to identify climatically suitable periods for curative tourism development, while seasonal analysis was applied to aggregate monthly values and determine optimal tourism seasons. Geographic Information System (GIS) techniques were used to spatially analyze and map the distribution of natural therapeutic resources and integrate them with climatic suitability patterns. In addition, descriptive statistical analysis, correlation analysis, and regression analysis were employed to explore relationships between climatic variables and curative tourism potential. This integrated methodological approach ensured a robust assessment of both environmental and human factors influencing the development of curative tourism in the Hail Region.

## 4. Results and discussion

In this section, the findings from Oliver's Temperature-Humidity Index (THI) calculations, climate analysis, and stakeholder feedback are presented. These results provide insight into the thermal comfort for tourists in the Hail region, as well as the region's potential for developing curative tourism.

### 1. Oliver's Temperature-Humidity Index (THI) Calculations

The THI was calculated for each month using the available temperature and humidity data for Hail. The index indicates the level of comfort that tourists would experience when visiting the region, with a focus on outdoor activities and curative tourism opportunities. Below is a summary of the THI values:

**Table.7.**
***result of Oliver's Temperature-Humidity Index in Hail (2018-2022).***

| Month | Dry Temp (°F) | Relative Humidity (%) | Oliver's Formula Result | Tourist Comfort Result | (Tourist comfort rate) |
|---|---|---|---|---|---|
| January | 52 | 51 | 54 | Discomfortable Conditions Due to Cold | 10-20 |
| **February** | 58 | 43 | 58 | Discomfortable Conditions Due to Cold | 40-30 |
| March | 65 | 31 | 62 | Comfortable Conditions for All Tourists.(Complete comfort) | 100% |
| April | 73 | 32 | 67 | Moderate Comfort Levels Almost half of society feels comfortable (relative comfort) | 90% |
| May | 84 | 21 | 72 | Moderate Comfort Levels Almost half of society feels comfortable(relative comfort) | 65% |
| June | 91 | 16 | 75 | Moderate Comfort Levels Almost half of society feels comfortable(relative comfort) | 50% |
| July. | 94 | 17 | 77 | Discomfort Due to Heat | 30% |
| August | 92 | 18 | 76 | Discomfort Due to Heat | 40% |
| September | 89 | 18 | 75 | Moderate Comfort Levels Almost half of society feels comfortable(relative comfort) | 50% |
| October | 78 | 26 | 69 | Moderate Comfort Levels Almost half of society feels comfortable(relative comfort) | 80% |
| November | 67 | 55 | 64 | Comfortable Conditions for All Tourists (Complete comfort) | 100% |
| December | 57 | 58 | 56 | Discomfortable Conditions Due to Cold | 30-20 |

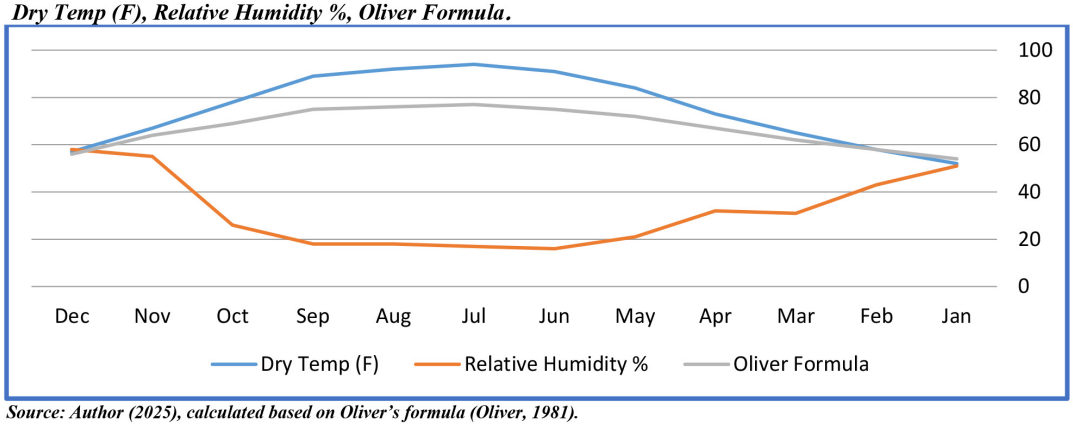
***Source: Author (2025), calculated based on Oliver's formula (Oliver, 1981).***

**Table 8**
***Dry Temp (F), Relative Humidity %, Oliver Formula***

| Month | Season | Dry Temp (F) | Relative Humidity % | Oliver Formula | **Oliver classification** |
|---|---|---|---|---|---|
| Jan | Winter | 52 | 51 | 54 | Discomfortable |
| Feb | Winter | 58 | 43 | 58 | Discomfortable |
| Mar | Spring | 65 | 31 | 62 | Complete comfort |
| Apr | Spring | 73 | 32 | 67 | relative comfort |
| May | Spring | 84 | 21 | 72 | relative comfort |
| Jun | Summer | 91 | 16 | 75 | relative comfort |
| Jul | Summer | 94 | 17 | 77 | relative comfort |
| Aug | Summer | 92 | 18 | 76 | relative comfort |
| Sep | Autumn | 89 | 18 | 75 | relative comfort |
| Oct | Autumn | 78 | 26 | 69 | relative comfort |
| Nov | Autumn | 67 | 55 | 64 | Complete comfort |
| Dec | Winter | 57 | 58 | 56 | Discomfortable |

***Source: Author (2025), calculated based on Oliver's formula (Oliver, 1981).***

**Figure 4**
***Dry Temp (F), Relative Humidity %, Oliver Formula.***




***Source: Author (2025), calculated based on Oliver's formula (Oliver, 1981).***

### Analysis of Climatic Comfort Levels

**1.\tDiscomfort table Conditions Due to Cold:**

- Months: January, February, December
- THI Results:
- January: 54
- February: 58
- December: 56
- Interpretation: These months have low temperatures, which cause discomfort among tourists. Outdoor activities might be restricted, and people would like to stay indoors in warm conditions.

**2.Comfortable Conditions for All Tourists:**

**Month: March, November**

- THI Results:
- March: 62
- November: 64

Interpretation: These months offer the best conditions for outdoor activities, and hence Hail is a preferred destination for tourists looking for good weather.

**3.Moderate Comfort Levels**

**Months: April, May, June, September, October**

- THI Results:
- April: 67
- May: 72
- June: 75
- September: 75
- October: 69

Interpretation: Tourists are comfortable in these months, though some experience less than ideal weather. Outdoor activities remain viable.

**Months: July, August**

- THI Results:
- July: 77
- August: 76

Interpretation: These are the summer months with hot weather and low humidity levels, which make most tourists uncomfortable. Outdoor activities tend to be avoided during peak hours due to the heat.

The analysis of climatic comfort level in Hail, based on Oliver's equation, shows a significant variation in the course of the year. It is observed that March and November are ideal for tourism, but July and August might deter tourists because of excessive heat. These are very important points for tourism development and planning strategies in Hail.2.Climatic Suitability for Curative Tourism in Hail.

The assessment of climatic suitability for curative tourism in Hail, Saudi Arabia, yielded several important insights based on the analysis of climatic data, including temperature, humidity, and overall comfort indices. The results are outlined below:

**1. Temperature Analysis**

**Seasonal Trends:**

**Spring (March-April):**

Average temperatures range from 65°F (18°C) in March to 73°F (23°C) in April.

These temperatures fall within the optimal range for outdoor activities and therapeutic tourism, providing ideal conditions for tourists.

**Summer (June-August):**

Temperatures peak, ranging from 91°F (33°C) in June to 94°F (34°C) in July, making summer the hottest season.

The high temperatures reduce overall comfort, especially for outdoor activities.

**Autumn (September-November):**

Temperatures moderate, ranging from 89°F (32°C) in September to 67°F (19°C) in November.

The cooling trend in November aligns with comfortable conditions for tourists.

**Winter (December-February):**

Temperatures drop, ranging from 52°F (11°C) in January to 58°F (14°C) in February.

Cold weather in winter leads to discomfortable conditions for most tourists.

**Implications:**

Spring and Autumn: Ideal seasons for outdoor and health-focused tourism due to mild and comfortable temperatures.

Summer and Winter: Extreme temperatures in both directions reduce comfort and limit outdoor tourism potential.

### 2. Humidity Levels

#### Seasonal Variations:

#### Spring (March-April):

Relative humidity averages between 31%-32%, offering a comfortable balance that enhances the experience for tourists.

#### Summer (June-August):

- Humidity levels drop to 16%-18%, which, despite the dryness, fails to mitigate the discomfort caused by the high temperatures.

#### Autumn (September-November):

- Humidity ranges from 18% (September) to 55% (November).
- Higher humidity in November complements cooler temperatures, creating optimal comfort conditions.

#### Winter (December-February):

- Humidity increases to 43%-58%, which, combined with low temperatures, leads to discomfortable conditions for tourists.

#### Implications:

- Spring and Autumn: Moderate humidity enhances comfort, making these seasons favorable for outdoor and therapeutic tourism.
- Summer: Extremely low humidity does not offset the discomfort caused by high temperatures.
- Winter: Higher humidity exacerbates the cold, further reducing comfort levels for tourists.
- Optimal Conditions: Spring (March-April) and Autumn (October-November) are the most favorable seasons for tourism, with balanced temperatures and humidity levels.
- Challenges: Winter's cold and summer's heat significantly limit tourist comfort, making them less suitable for outdoor activities and health-focused tourism.

### 3. Comfort Indices (Oliver's Equation Results)

**Tourist Comfort Levels:** The results from Oliver's equation indicated varying levels of comfort throughout the year:

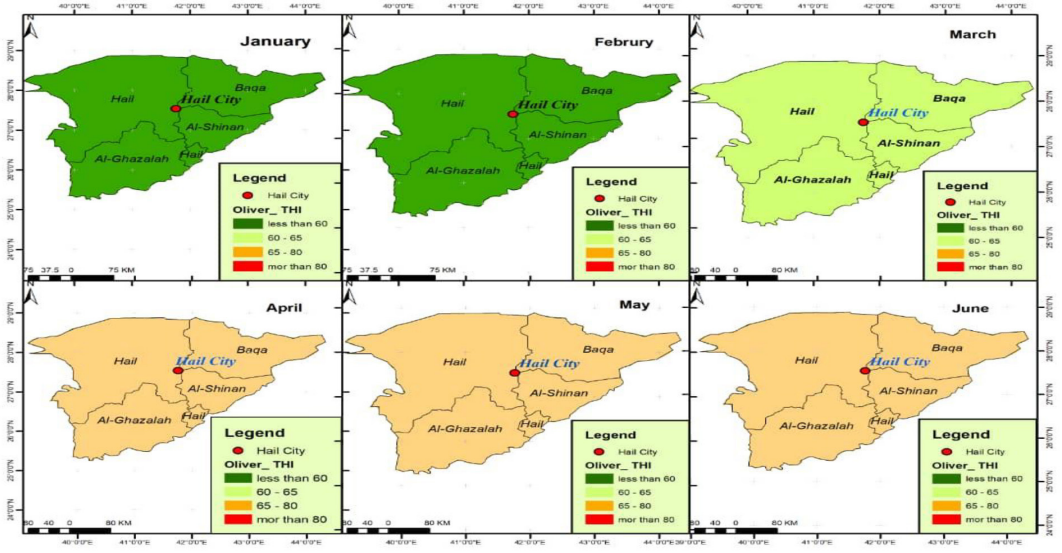
January: Comfort level at 54, indicating discomfortable conditions due to cold, with a tourist comfort rate of 10-20%.

- February: Comfort level at 58, still reflecting discomfortable conditions due to cold, with a slightly improved tourist comfort rate of 30-40%.
- March: Comfort level rises to 62, representing comfortable conditions for all tourists with a 100% comfort rate.
- April: Comfort level at 67, indicating moderate comfort levels, with 90% of tourists feeling comfortable.
- May: Comfort level drops to 72, maintaining moderate comfort levels, with 65% of tourists feeling comfortable, but conditions begin to lean toward discomfort due to rising temperatures.
- June: Comfort level at 75, signifying moderate comfort levels, where 50% of tourists feel comfortable, but the other half experiences discomfort due to heat.
- July: Comfort level peaks at 77, resulting in discomfort due to heat, with only 30% of tourists feeling comfortable.
- August: Comfort level remains high at 76, still causing discomfort due to heat, with a tourist comfort rate of 40%.
- September: Comfort level at 75, indicating moderate comfort levels, with 50% of tourists feeling comfortable.
- October: Comfort level at 69, representing moderate comfort levels, with 80% of tourists feeling comfortable.
- November: Comfort level drops slightly to 64, signifying a return to comfortable conditions for all tourists, with a 100% comfort rate.
- December: Comfort level at 56, indicating discomfortable conditions due to cold, with a tourist comfort rate of 20-30%.

**March and November:** Represent peak comfort months with 100% tourist comfort.

- June to August: Discomfort reaches its highest levels due to heat, with comfort rates dropping to 30-50%.
- January and February & December: Cold weather significantly impacts comfort, limiting comfort rates to 10-40%.
- April, May, September, and October: Fall into moderate comfort levels, where a substantial proportion of tourists (50-90%) feel relatively comfortable.

**Figure 5**
***"Monthly Spatial Distribution of the Oliver Thermal Humidity Index (THI) in Hail, Saudi Arabia (January–June)".***




***Source: Author (2025). Map of tourist climate comfort in Hail region based on Oliver's formula, created using GIS.***

### 1. January (Dark Green - THI < 60):

No Most of the area has very comfortable conditions due to cold weather. People may feel slight unease due to cold, otherwise the climate is ideal.

### 2. February (Dark Green - THI < 60):

Similar to January, the area is very comfortable due to cool weather, resulting in an ideal climate for outdoor activities.

### 3. March (Light Green - THI 60–65):

There is an increase in temperature, but minor, which transitions to a moderate level of comfort where everyone in society is comfortable. This is a transition from winter to spring.

### 4. April (Orange - THI 65–80):

The weather is warm, with conditions transiting to moderate levels of comfort. The population is evenly divided between comfort and mild discomfort.

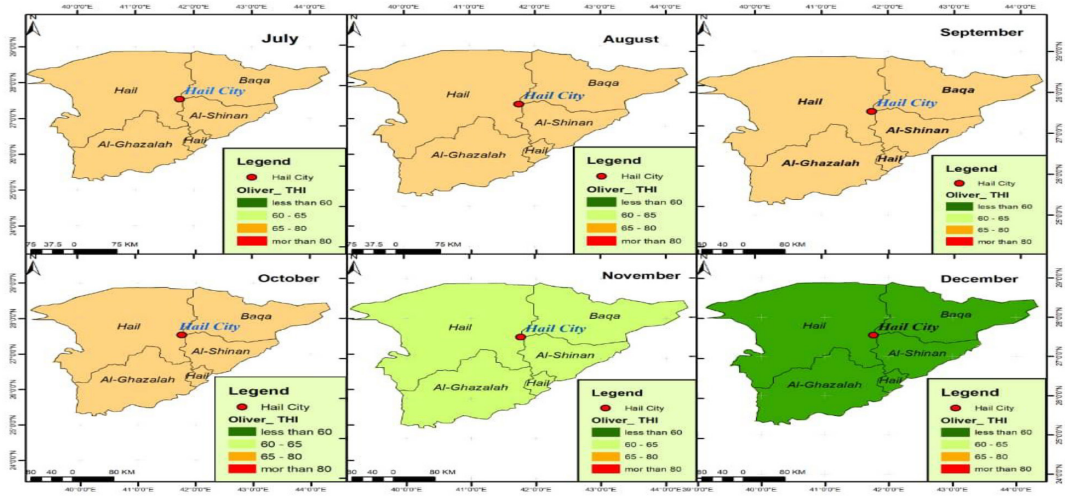
### 5. May (Orange - THI 65–80):

It gets hotter, and the majority of the region experiences moderate comfort. Although weather remains bearable, increasing heat reduces comfort for the majority.

### 6. June (Orange - THI 65–80):

Summer heat dominates, with the region experiencing predominantly moderate comfort levels. Out-of-doors activities can include adjustments to counter midday heat.

**Figure 6**
***"Monthly Spatial Distribution of the Oliver Thermal Humidity Index (THI) in Hail, Saudi Arabia (July–December)".***




***Source: Author (2025). Map of tourist climate comfort in Hail region based on Oliver's formula, created using GIS.***

### 1) July (Orange - THI 65–80):

The peak of summer produces warm to hot weather. Moderate comfort levels dominate, with increasing discomfort for some of the residents due to the high temperatures.

### 2) August (Orange - THI 65–80):

The scenario is more or less the same as that of July, with the high temperatures persisting. Moderate comfort levels dominate the region.

### 3) September (Orange - THI 65–80):

Temperatures decrease slightly, but the region continues to experience moderate comfort levels. The season is gradually transitioning to autumn.

### 4) October (Orange - THI 65–80) :

The region undergoes further cooling, but most of the region remains in the moderate comfort zone with more comfortable temperatures than during the peak summer months.

### 5) November (Light Green - THI 60–65):

Pleasant weather returns as temperatures decrease significantly. All members of society enjoy a climate that is favorable for outdoor and indoor activities.

### 6) December (Dark Green - THI < 60):

- Winter arrives with chilly temperatures and very pleasant conditions. It is one of the most pleasant months climatically in the region.
- THI above 80 (Red):
- Signifies that most people suffer from extreme heat discomfort.
- This color is not found on the maps, which means that the temperatures in Hail do not frequently rise above levels causing extreme heat discomfort.

### 4. Air Quality and Natural Resources

- Air Quality Assessment: Hail's dry climate aids in reducing the pollution rate, providing a healthier atmosphere and making it suitable for health-related activities.
- Natural Resources: The natural scenery in Hail, including the mountains and natural springs, adds to its appeal as a curative tourism region, enhancing its therapeutic capabilities.

### 5. Physiological and Psychological Benefits

- Sunshine Duration: Hail has high annual sunshine that positively impacts mental well-being and a stimulus for the tourism experience. This feature is essential for facilitating outdoor healing treatments and wellness tourism.
- Climatic assessment indicates that Hail possesses a potential for curative tourism, especially spring and autumn seasons with pleasant temperatures, moderate humidity, and overall health-conducive conditions for medically motivated tourists. While summer seasons are difficult due to heat, strategic promotion and development of tourism, targeting peak seasons can attract health-oriented tourists.
- Target Off-Peak Seasons: Promote Hail's therapeutic sites during spring and autumn seasons to attain high tourist comfort.
- Enhance Facilities: Invest in wellness centers and health retreats that leverage the region's natural resources.
- Sustainability: Develop tourism initiatives that prioritize environmental sustainability to maintain Hail's natural attractiveness for future visitors.6- Number of local tourists & tourist spending in hail.

**Table 9**

***Rank of Tourists Number and Tourists Spending in 2023.***

| Month | Season | Tourists Number | Tourists Spending | No. of Tourists Rank | Tourists Spending |
|---|---|---|---|---|---|
| Jan | Winter | 124398 | 203215462 | 10 | 7 |
| Feb | Winter | 127236 | 178383095 | 9 | 10 |
| Mar | Spring | 201187 | 243875163 | 3 | 5 |
| Apr | Spring | 163058 | 282337932 | 4 | 3 |
| May | Spring | 98837 | 158954443 | 12 | 12 |
| Jun | Summer | **241338** | **369684068** | **1** | **1** |
| Jul | Summer | 130601 | 201965980 | 8 | 8 |
| Aug | Summer | 134874 | 166100534 | 6 | 11 |
| Sep | Autumn | 141959 | 303571791 | 5 | 2 |
| Oct | Autumn | 124394 | 182639236 | 11 | 9 |
| Nov | Autumn | 216386 | 255884048 | 2 | 4 |
| Dec | Winter | 131549 | 233608853 | 7 | 6 |

***Source: Author , based on data from the Saudi Ministry of Tourism.,2023.***

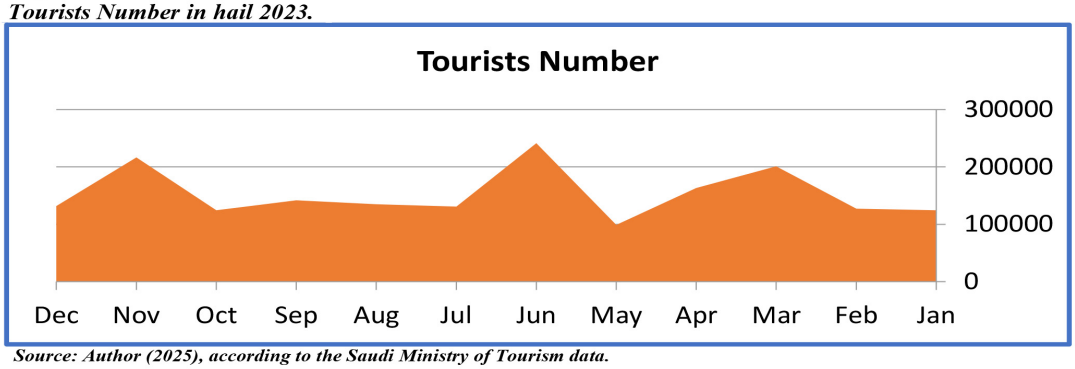
This table shows visitors' numbers and spending on a monthly basis, and each month's ranking in terms of visitor numbers and spending.

- The peak season (June) attracts the largest number of visitors and biggest spending, followed by fall (November) and spring (March).

There are the fewest number of tourists and lowest spending in May.

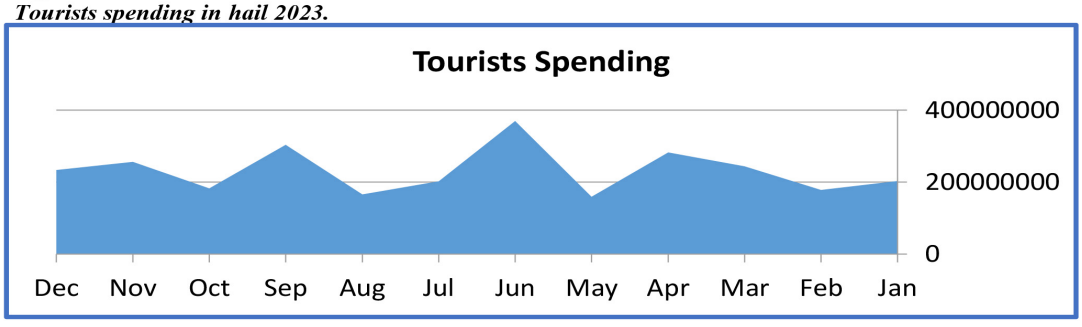
- Seasonal variations are reflected in tourist numbers and expenditure, which are highest during summer and autumn months.

**Figure 7**
***Tourists Number in hail 2023.***




***Source: Author (2025), according to the Saudi Ministry of Tourism data.***

**Figure 8**
***Tourists spending in hail 2023.***




***Source: Author (2025), according to the Saudi Ministry of Tourism data.***

**Table 10**
***Comparison between seasons in the average number of tourists, Tourists Spending, Dry Temp, Relative Humidity and Oliver Formula.***

| Variable | Season | Mean ± SD | P-value | Result |
|---|---|---|---|---|
| Tourists Number | Winter | 127727.7±3600.76 | 0.740 | NS |
| | Spring | 154360.7±51726.33 | | |
| | Summer | 168937.7±62736.92 | | |
| | Autumn | 160913±48837.21 | | |
| Tourists Spending | Winter | 205069136.7±27659504.14 | 0.873 | NS |
| | Spring | 228389179.3±63132662.76 | | |
| | Summer | 245916860.7±108675313.49 | | |
| | Autumn | 247365025±60914702.9 | | |
| Dry Temp (F) | Winter | 55.7±3.21 | 0.002 | S |
| | Spring | 74±9.54 | | |
| | Summer | 92.3±1.53 | | |
| | Autumn | 78±11 | | |
| Relative Humidity % | Winter | 50.7±7.51 | 0.031 | S |
| | Spring | 28±6.08 | | |
| | Summer | 17±1 | | |
| | Autumn | 33±19.47 | | |
| Oliver Formula | Winter | 56±2 | 0.002 | S |
| | Spring | 67±5 | | |
| | Summer | 76±1 | | |
| | Autumn | 69.3±5.51 | | |

***Source: Author (2025), based on the statistical analysis conducted by the researcher.***

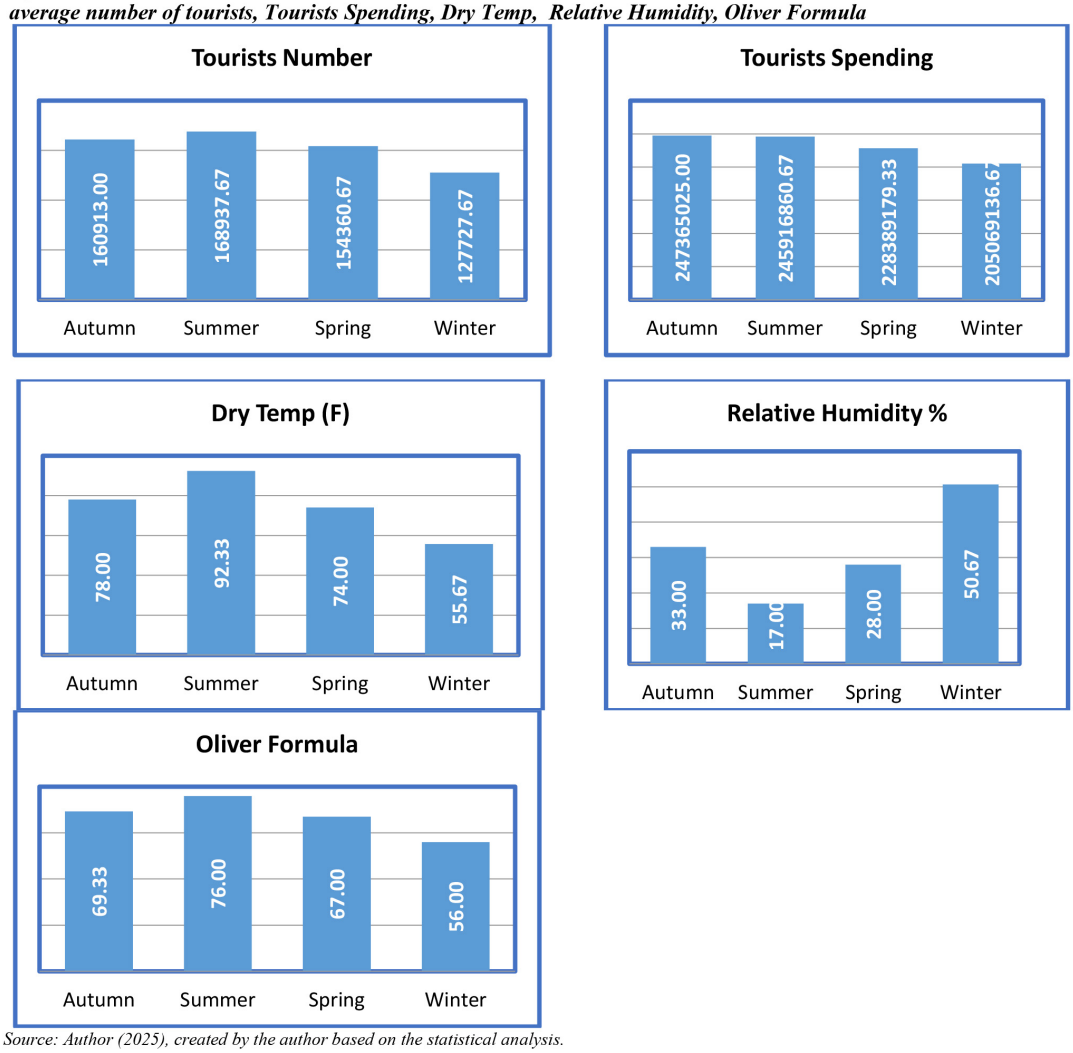
*F test (one way ANOVA) was use at 0.05 significant level, S = significant difference, NS = not significant difference*

There is no significant difference between seasons in the average number of tourists and tourist spending (p-values are greater than 0.05

and equal 0.740, 0.873). However, there is a significant difference between seasons in the average dry temperature, relative humidity, and Oliver formula, with all p-values being less than 0.05 and equal to 0.002, 0.031, and 0.002 respectively.

**Figure 9**

***average number of tourists, Tourists Spending, Dry Temp, Relative Humidity, Oliver Formula***




*Source: Author (2025), created by the author based on the statistical analysis.*

## Correlation between number of tourists and Tourists Spending

**Table 11**

***Correlation between number of tourists and Tourists Spending***

**Correlations**

| | | Tourists Number | Tourists Spending |
|---|---|---|---|
| Tourists Number | Pearson Correlation | 1 | .770** |
| | Sig. (2-tailed) | | .003 |
| | N | 12 | 12 |
| Tourists Spending | Pearson Correlation | .770** | 1 |
| | Sig. (2-tailed) | .003 | |
| | N | 12 | 12 |

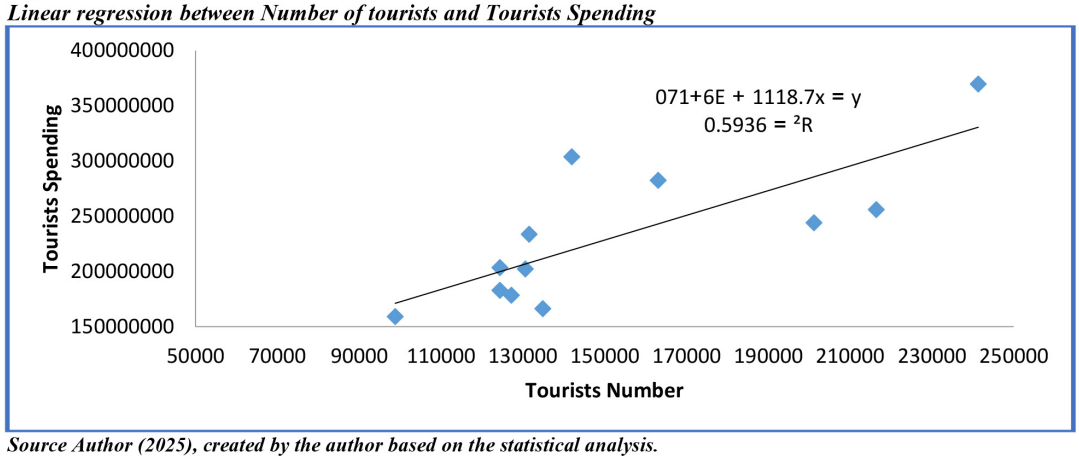
*Source: Author (2025), created by the author based on the statistical analysis.*

**. Correlation is significant at the 0.01 level (2-tailed).

There is a correlation between number of tourists and Tourists Spending (p-value is 0.003 less than 0.05).

**Figure 10**

***Linear regression between Number of tourists and Tourists Spending***




***Source Author (2025), created by the author based on the statistical analysis.***

**Table 12**

***Model summary***

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | 0.770442 | .0.593581 | **0.5529388** | 42309955.87 |

a. Predictors: (Constant), Tourists Number

*Source: Author (2025), created by the author based on the statistical analysis.*

Based on the results above, it is observed that 55.3% (Adjusted R Square is 0.553) of changes in Tourists Spending are attributed to the Number of tourists.

**Table 13**

***correlation matrix between number of tourists, Dry Temp, Relative Humidity and Oliver Formula.***

**Correlations**

| | | Relative Humidity % | Oliver Formula | Tourists Number |
|---|---|---|---|---|
| Dry Temp (F) | Pearson Correlation | -.904** | .996** | .059 |
| | Sig. (2-tailed) | .000 | .000 | .856 |
| | N | 12 | 12 | 12 |
| Relative Humidity % | Pearson Correlation | 1 | -.900** | .016 |
| | Sig. (2-tailed) | | .000 | .960 |
| | N | | 12 | 12 |
| Oliver Formula | Pearson Correlation | | 1 | .079 |
| | Sig. (2-tailed) | | | .807 |
| | N | | | 12 |

***Source: Author (2025), created by the author based on the statistical analysis.***

****. Correlation is significant at the 0.01 level (2-tailed).**

We have found a significant correlation between Relative Humidity % and Oliver Formula% (all p-values are less than 0.05). However, we did not find a significant correlation between Tourist number and other variables (all p-values in this case are greater than 0.05).

**Table 14**

***correlation coefficient values and categorizes them based on the strength and direction of the correlation.***

| Coefficient values | Correlation | Coefficient values | Correlation |
|---|---|---|---|
| 0.8 to 1.00 | Very strong positive | -1.00 to -0.80 | Very strong negative |
| 0.60 to 0.79 | strong positive | -0.79 to -0.60 | strong negative |
| 0.40 to 0.59 | Moderate positive | -0.59 to -0.40 | Moderate negative |
| 0.20 to 0.39 | Weak positive | -0.39 to -0.20 | Weak negative |
| 0.00 to 0.19 | Very weak positive | -0.19 to -0.01 | Very weak negative |

**Almost Perfect Direct (0.80 to 1.00):** Shows an almost perfect positive direct relationship. As one variable rises, the second variable increases very strongly.

**Strong Positive (0.60 to 0.79):** There is a strong direct relationship, but not as strong as very strong positive.

**Moderate Positive (0.40 to 0.59):** There is a moderate positive relationship; movement in one variable causes a moderate increase in another.

**Weak Positive (0.20 to 0.39):** Represents a weak positive relationship; there exists a weak relationship between variables.

**Very Weak Positive (0.00 to 0.19):** Represents a virtually negligible positive relationship.

**Very Strong Negative (-1.00 to -0.80):** A virtually perfect negative relationship; with increase in one variable, the other decreases considerably.

**Strong Negative (-0.79 to -0.60):** A strong reverse relationship but not very strong negative.

**Moderate Negative (-0.59 to -0.40):** There is a moderate negative correlation; when one variable increases, the other reduces moderately.

**Weak Negative (-0.39 to -0.20):** Weak negative correlation between variables.

**Very Weak Negative (-0.19 to -0.01):** There is very little negative relationship, with variation in one variable barely affecting another.

This classification enables the interpretation of the strength and type of association in data analysis, such as measurement of the impact of climatic variables on tourist expenditure or satisfaction.

## 5. Discussion and Interpretation

The findings of the present study reveal that climatic conditions notably affect curative tourism in Hail, Saudi Arabia. With the use of Oliver's formula, comfort levels were systematically followed, showing great seasonal variations in climatic suitability for tourism. The results imply that March and November are the two months that are most favorable for curative tourism, with optimal temperature and humidity levels that best facilitate tourists' comfort and well-being activities.

By contrast, the summer months are hot with low relative humidity and pose significant challenges to visitor comfort. These results were further supported by stakeholder consultations, which suggested strategic planning to minimize discomfort during these peak heat periods. According to stakeholders, there is a need for better facilities and wellness programs that suit the climatic nature of Hail, especially within the hottest months, to ensure a pleasant and safe experience for tourists.

Moreover, this study recognizes the opportunity to use Hail's natural climate as a therapeutic resource. The local specific climatic characteristics can be used as a starting point for providing special wellness programs, health retreats, and other tourism initiatives tailored in accordance with the comfort levels represented in this study. This approach not only strengthens Hail's position as a curative tourism destination but also contributes toward sustainable tourism development through the alignment of offerings with environmental and climatic realities.

## 6. Conclusion

This research reveals that the climate of Hail offers both great potentials and challenges for therapeutic tourism. In applying Oliver's formula, temperature and humidity data were examined systematically, thus allowing the identification of periods most suitable for tourist comfort. The results show that the most favorable time for climatic conditions is during the month of March and November; these months are considered to be the basis of planning, promoting, and operating health tourism initiatives.

Stakeholder consultations highlighted the practical implications of these results, particularly targeted infrastructure improvements and tailored wellness programs. Tourists' comfort requirements and the development of tourism offers based on Hail's climatic advantages will further increase the region's attractiveness for wellness tourism.

## 7.Policy and Strategy Recommendations:

**a)Tourism Infrastructure Development:** Establish climate-adaptive facilities, such as shaded recreation zones, air-conditioned wellness and health centers, and hydration stations, to avoid possible discomforts during hotter months.

**b) Program and Service Design:** Seasonal wellness programs, health retreats, and therapeutic packages should be designed to offer optimum climatic periods that will satisfy visitors, leading to repeat visits.

**c) Marketing and Promotion:** Campaigns promoting Hail's natural climate as a therapeutic asset should be launched, focusing on the best travel periods and health-focused experiences.

**d) Sustainable Planning:** Include climate data into tourism planning for long-term sustainability, considering the impact of climate change on curative tourism flows.

**e) Stakeholder Collaboration:** Foster partnerships among government authorities, tourism operators, and local communities to implement climate-responsive measures and develop overall tourist experiences.

This paper thus adds to the literature by presenting findings on how climate shapes curative tourism

and informs strategies for local authorities and tourism operators. Drawing on Hail's climatic comparative advantages while tackling environmental and comfort challenges paves the way for the region to position itself as a leader in the international tourism market targeting health and wellness. Future studies should be directed to developing projections on climate change and its implications for sustainable tourism development in the region.

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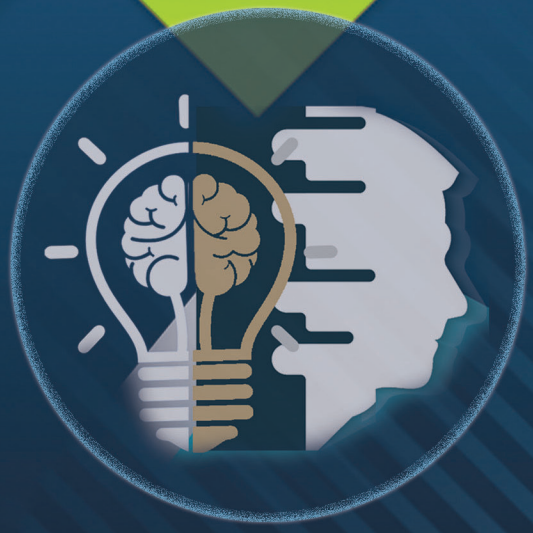

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