

DIVERSITY AND IDENTIFICATION OF ARANEA (SPIDERS) IN DISTRICT HANGU, KHYBER PAKHTUNKHWA

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ABSTRACT

This research addresses a knowledge gap concerning the spider population in Southern Khyber Pakhtunkhwa, with a specific focus on the Hangu District in Pakistan. Spiders, renowned for their eight legs and their ability to produce silk, play a crucial role in ecosystems worldwide. They contribute to essential functions such as nutrient cycling, pest control, and soil fertility. The present study documents the diversity of spider fauna from District Hangu, Khyber Pakhtunkhwa (KPK), Pakistan. A total of 57 specimens were collected during surveys conducted across six sampling sites: Kahi, Togh Bala, Kach Banda, Kotki, Karbogha Sharif, and Zargari. Collected specimens were preserved and identified using standard taxonomic keys. The survey revealed representatives of 1 order, 11 families, 18 genera, and 23 species. The family Salticidae was the most diverse with eight species, and then Araneidae with four species, whereas several families had a single species each. Among the total, 11 species (47.8%) were common, while 12 species (52.2%) were uncommon in encounter rate. This research presents the first comprehensive baseline on spider

diversity from District Hangu, which reflects the ecological importance of these predators in local ecosystems. The results will be useful for future ecological monitoring, conservation planning, and faunistic evaluations of arachnids in Pakistan.

Keywords: Spider, Arachnida, Fauna, Diversity, Salticidae, Araneidae, Region, Hangu.

INTRODUCTION

Spiders are arachnids with eight legs having two body segments (cephalothorax and abdomen), ability to produce silk for webs and prey capture, found worldwide except Antarctica. (van Rij 2016). They are ecologically crucial by aiding in nutrient cycling, save crops by consuming insect populations, maintain soil fertility and ecosystem health (Nyffeler et al., 2017, Riechert et al., 1990). It plays role in food web by serving as a vital food source for various other animals. They make strong and light silk, which could be used for medical stitches and protective clothing (Blackledge et al., 2006, Cardoso, Erwin, et al., 2011). Spiders, face various threats to their populations i.e habitat destruction due to urbanization and deforestation, pesticide use and climate change affecting their ecosystems (Cardoso, Pekár, et al., 2011, Riechert et al., 1990, Cardoso, Erwin, et al., 2011, Cox et al., 2011). Spiders are highly adaptable, inhabiting diverse ecosystems, from mountains to caves, forests to deserts, and even aquatic environments, showing remarkable ecological diversity in tropical rainforests (Chen et al., 2011). They are distributed throughout the world inhabiting a wide range of Earth's environments, from cold tundra to tropical rainforests, deserts, ocean shores, ponds, and streams (Chen et al., 2011, Sharma et al., 2010). In Pakistan they can be found in all four province including Islamabad and Azad Kashmir, showing their presence in various ecological niches, including deserts, mountains, forests, and plains, contributes to a wide variety of spider species. Species checklist and fauna inventories of various areas of Pakistan are available (Platnick 2006, Mukhtar 2013, Khan et al., 2015, Hasan et al., 2006, Bukhari et al., 2012, Logunov et al., 2011, Marusik et al., 2014, Ahmad et al., 2015, Ghafoor et al., 2011, Perveen et al., 2015, Ghazanfar et al., 2016, Sajid et al., 2021) , but the study area have still not been explored. We therefore, conducted the present study to fill this gap and report the archnids fauna (spiders) of Khyber Pakhtunkhwa (District Hangu) for the first time to contribute to biodiversity conservation efforts, establish a species inventory, understand their ecological role, conduct taxonomic research, and assess humananimal interactions. This information is valuable for ecological studies, conservation planning, and promoting a better understanding of the spider fauna in the region. The present findings significantly enrich the baseline knowledge of arachnid fauna in Pakistan and provide a valuable reference that may facilitate the development of a comprehensive national species guide in the future.

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MATERIALS AND METHODS

The study was conducted in District Hangu, Khyber Pakhtunkhwa Pakistan, from March 2024 to June 2025. We selected 6 sites for data collection representing six habitats: Gardens, Savanah, Sandy areas, Wetlands, Grasslands, and Caves.

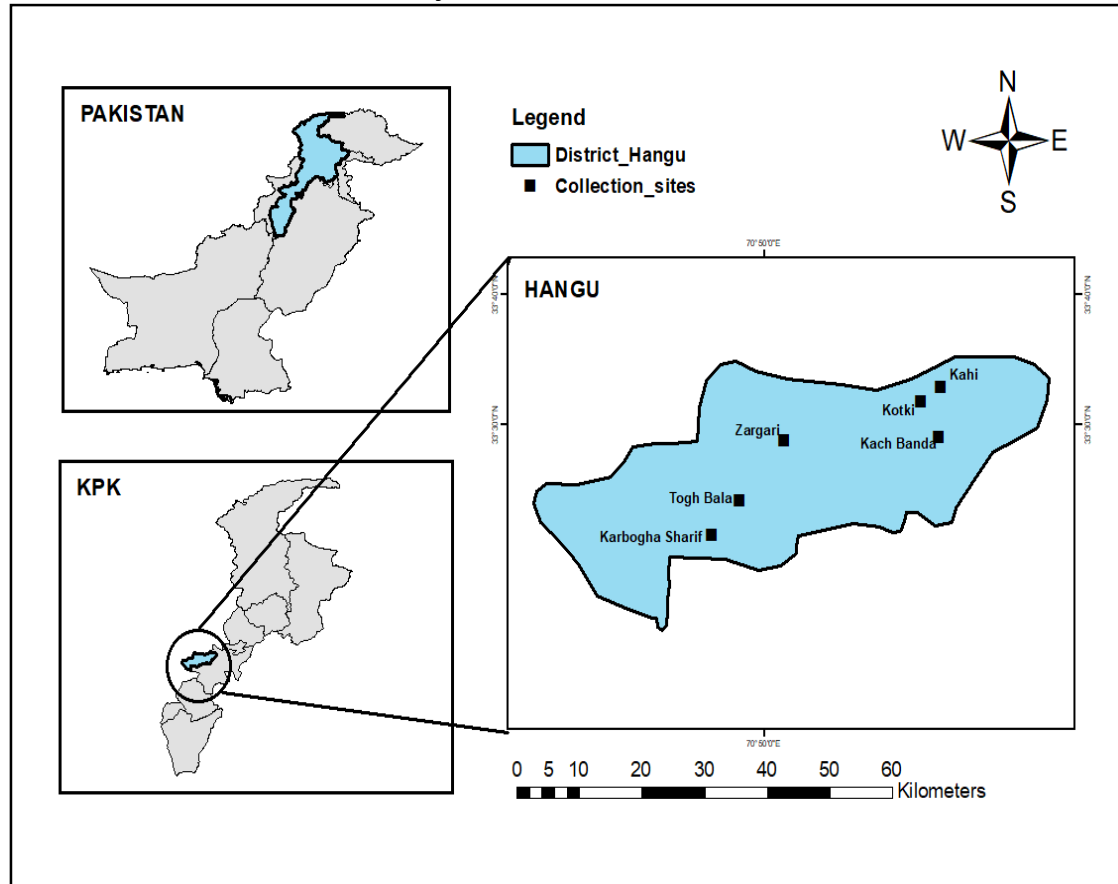


Figure 1. Map showing sampling sites selected in the areas Khyber Pakhtunkhwa in the district of Hangu

Hangu District spans about 1,097 square kilometers and is situated roughly between latitudes $33^{\circ}15'$ to $33^{\circ}35'$ north and longitudes $70^{\circ}29'$ to $71^{\circ}14'$ east in Khyber Pakhtunkhwa, Pakistan. The climate is classified as steppe, characterized by hot summers average high temperatures in June often reaching 40°C and cold winters, with January lows frequently near 6°C . Annual rainfall is moderate, approximately 550 mm per year. The main crops of districts are Wheat, Gram, Maize, Sugarcane, Rice, Fruits, Barley, and Tobacco (Farooq et al., 2007)). These environmental and agricultural features, along with the area's elevation gradient and climatic variation, provide suitable habitats that support a wide range of arthropod fauna, including spiders. We carried out a total of 10 field surveys from March 2024 to June 2025. We followed the active searching method. We observed and collected specimens using a hand picking, jarring, net picking, plastic bags. We handled the specimen using gloves. The geographical coordinates and habitat characteristics of each collection site

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were recorded using a handheld GPS device (Offline Maps, Travel Guides, and Navigation). Collected spider specimens were carefully transferred into airtight collection vials to avoid damage during transport. For euthanization, specimens were initially immobilized and preserved in 70%–80% ethanol, a standard practice for maintaining morphological integrity. Collected specimens were identified using keys given by (Levi et al., 1975, Biswas et al., 1992, Patil et al., 2013, Namkung et al., 2002).

RESULTS

In the present investigation, the spider fauna of District Hangu, Khyber Pakhtunkhwa (KPK), Pakistan was systematically explored. A total of 57 specimens were collected, carefully preserved, and identified through standard taxonomic keys. Six sampling sites were selected for the present survey which were: Kahi, Togh Bala, Kach Banda, Kotki, Karbogha Sharif, and Zargari. The specimens collected and identified belongs to One order, 11 families, 18 genera, and 23 species.

Pholcus phalangioides, *Pholcus manuli*, *Neoscona arabesca*, *Araneus ventricocus*, *Neoscona crucifera*, *Araneus nordmanni*, *Selenops actophilus*, *Heteropoda venatoria*, *Rabidosa rabida*, *Phidippus arizonensis*, *Lyssomanes viridis*, *Plexippus paykulli*, *Oxyopes salticus*, *Plexippus petersi*, *Platycryptus undatus*, *Hasarius adansoni*, *Pelegrina proterva*, *Dolomedes triton*, *Dolomedes scriptus*, *Zora nemoralis*, *Scytodes globula*, *Kukulcania hibernalis*, *Cheiracanthium inclusum*.



A) *Pholcus phalangioides* (B) *holcus manuli* (C) *Cyrtophora citricola* (D) *Araneus diadematus* (E) *Neoscona crucifera* (F) *Araneus nordmanni*

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G) *Selenops actophilus* (H) *Heteropoda venatoria* (I) *Rabidosa rabida* (J) *Hogna radiata* (K) *Thyene imperialis* (L) *Lyssomanes viridis*



M) *Plexippus paykulli* (N) *Oxyopes salticus* (O) *Plexippus petersi* (P) *Platycryptus undatus* (Q) *Hasarius adansoni* (R) *Dolomedes triton*

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S) *Dolomedes scriptus* (T) *Zora nemoralis* (U) *Scytodes globula* (V) *Kukulcania hibernalis* (W) *Cheiracanthium inclusum*

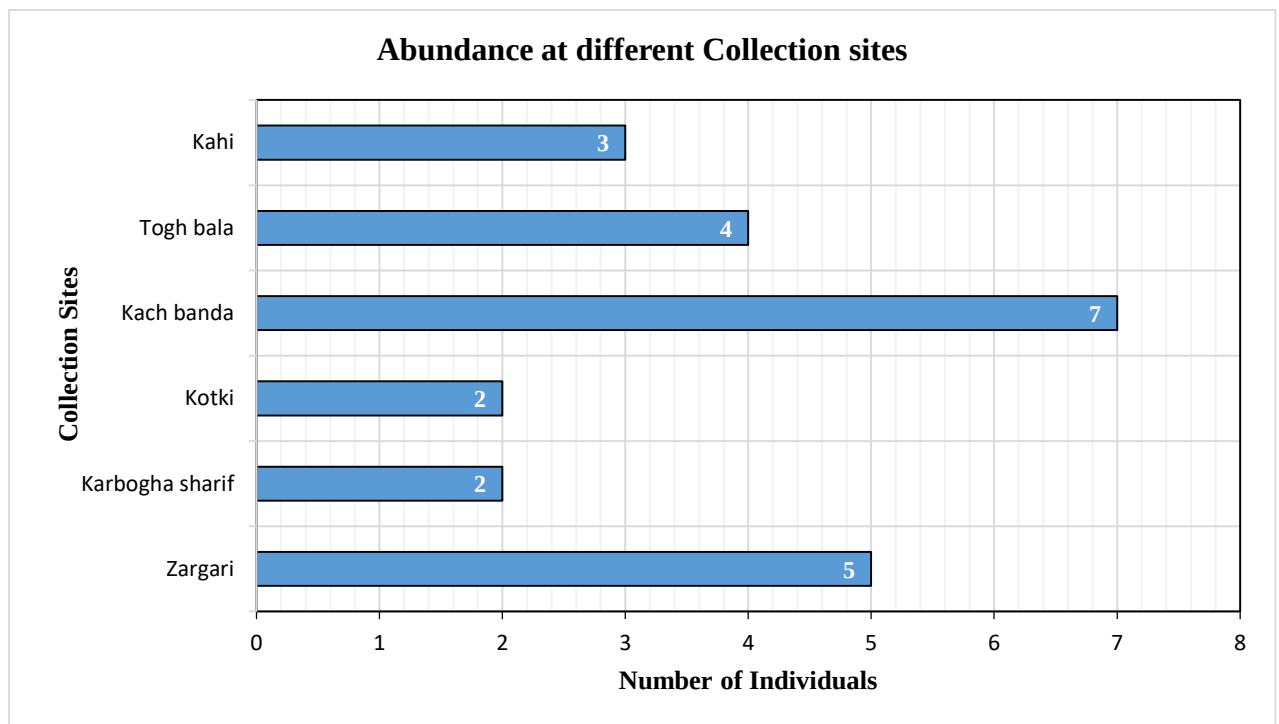


Figure 2. Abundance of spider individuals recorded from six collection sites in District Hangu

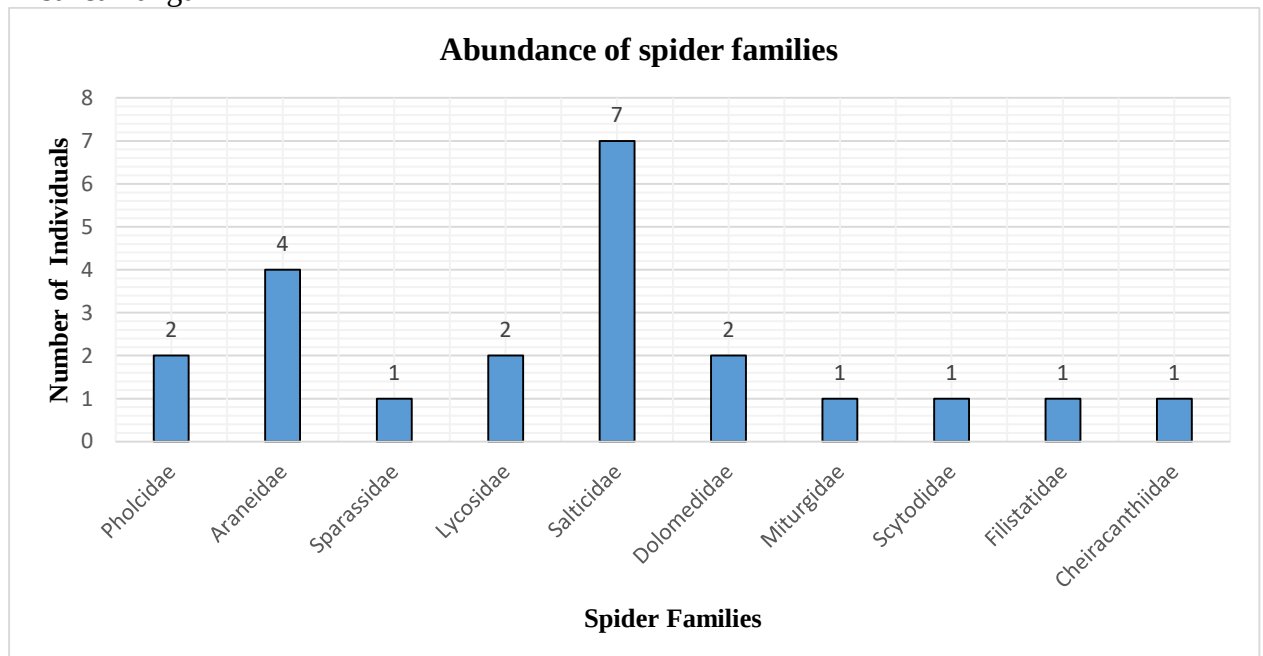


Figure 3. Number of different Spider species found in different families

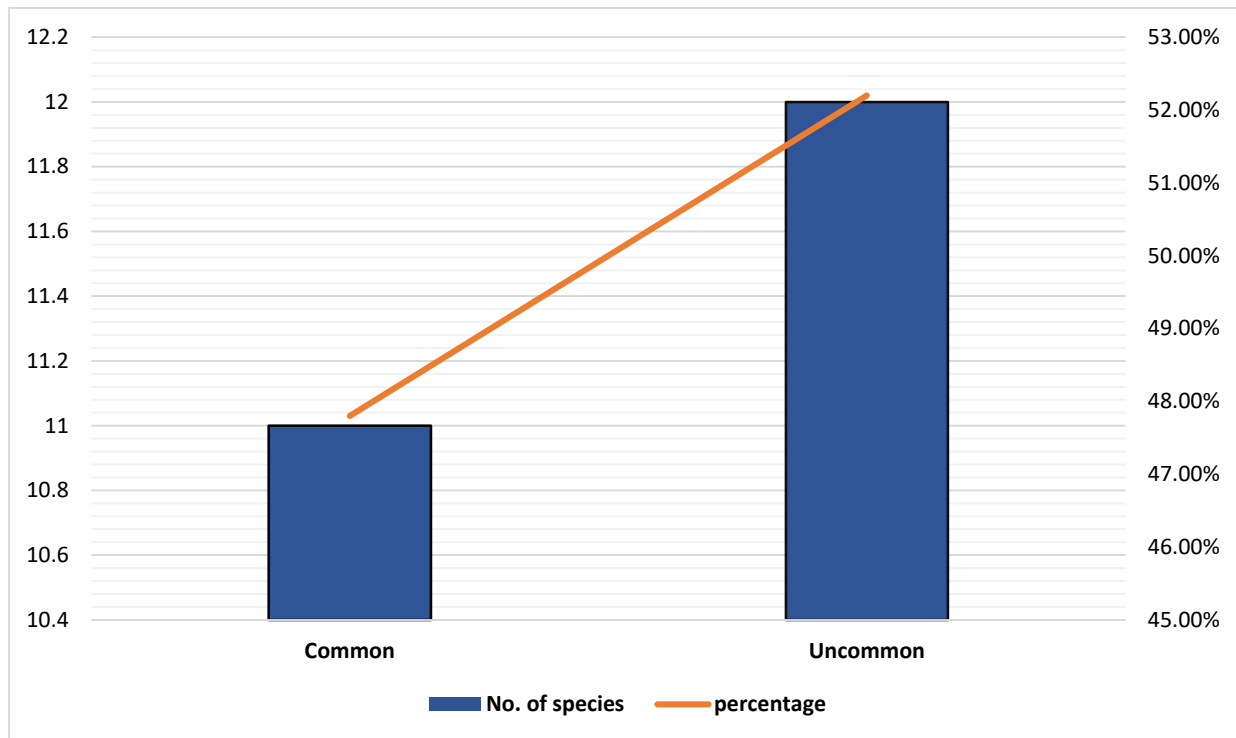


Figure 4. Comparison of Common and Uncommon Species by Number and Percentage

Spider Diversity in District Kohat

Table 1 documents a total of 24 spider species belonging to 12 different families recorded from District Kohat, Khyber Pakhtunkhwa, Pakistan. The recorded species exhibit varying encounter rates, with 9 species classified as common and 15 species categorized as uncommon. This indicates that approximately 37.5% of the recorded species are common, while 62.5% are uncommon, reflecting a dominance of less frequently encountered species in the study area. The diversity of families and species highlights the ecological heterogeneity of the region and the presence of both synanthropic and natural habitats.

Family Pholcidae

The family Pholcidae is represented by two species, *Pholcus phalangioides* and *Phlocus manuli*. Both species were recorded as common, accounting for 100% common occurrence within this family. These spiders are typically associated with indoor and sheltered environments, which may explain their high encounter rate. The consistent presence of both species suggests that Pholcidae is a well established family within human inhabited areas of District Kohat.

Family Araneidae

The family Araneidae is represented by four species, making it one of the more species rich families recorded in the study. Among these, *Cyrtophora citricola* and

Araneus nordmanni were classified as common, while *Araneus diadematus* and *Neoscona crucifera* were recorded as uncommon. Thus, 50% of the species within this family were common, indicating moderate abundance. The presence of multiple orb weaving species suggests favorable environmental conditions for web building spiders, including sufficient vegetation and prey availability.

Family Selenopidae

The family Selenopidae is represented by a single species, *Selenops actophilus*, which was recorded as uncommon. This accounts for 100% uncommon representation within the family. The low encounter rate may be attributed to the cryptic behavior and specific microhabitat preferences of crescent eyed spiders, which often remain concealed during the day.

Family Sparassidae

The family Sparassidae is represented by one species, *Heteropoda venatoria*. This species was categorized as uncommon, indicating limited encounters during the study period. Despite its large size, its 100% uncommon status within the family suggests nocturnal activity patterns and habitat preferences that reduce visibility during routine sampling.

Family Lycosidae

The family Lycosidae includes two species, *Rabidosa rabida* and *Hogna radiata*, both of which were recorded as uncommon. Consequently, 100% of the species in this family were uncommon. Wolf spiders are ground dwelling hunters that do not rely on webs, and their lower detection rate may reflect their fast movement, camouflage, and preference for concealed habitats.

Family Salticidae

The family Salticidae is the most species rich family recorded in the study, represented by seven species, which constitutes approximately 29% of the total spider species documented. Of these, four species were classified as common, including *Plexippus petersi*, *Platycryptus undatus*, *Hasarius adansoni*, and *Oxyopes salticus*, while three species were uncommon. This results in approximately 57% common and 43% uncommon representation within the family. The relatively high abundance and diversity of jumping spiders indicate their ecological flexibility and ability to thrive in varied environments, including agricultural fields and human dwellings.

Family Dolomedidae

The family Dolomedidae is represented by two species, *Dolomedes triton* and *Dolomedes scriptus*. Both species were recorded as uncommon, resulting in 100% uncommon occurrence within the family. These spiders are typically associated with aquatic or semi aquatic habitats, and their low frequency may reflect the limited availability of suitable water bodies in the study area.

Family Miturgidae

The family Miturgidae is represented by one species, *Zora nemoralis*, which was categorized as uncommon. This family therefore shows 100% uncommon occurrence. The species is usually associated with forested habitats, suggesting that its distribution may be restricted to specific ecological niches within District Kohat.

Family Scytodidae

The family Scytodidae includes one species, *Scytodes globula*, commonly known as the spitting spider. This species was recorded as uncommon, representing 100% uncommon status within the family. Its secretive behavior and preference for dark, sheltered environments may contribute to its lower encounter rate.

Family Filistatidae

The family Filistatidae is represented by one species, *Kukulcania hibernalis*, which was recorded as uncommon. Despite being associated with human structures, this species accounted for 100% uncommon representation within the family, possibly due to its nocturnal and reclusive lifestyle.

Family Cheiracanthiidae

The family Cheiracanthiidae is represented by one species, *Cheiracanthium inclusum*, commonly known as the long legged sac spider. This species was recorded as uncommon, resulting in 100% uncommon occurrence for the family. Its wandering nature and temporary shelter construction may limit its detectability during surveys. The spider fauna of District Kohat comprises 24 species across 12 families, with a greater proportion of species recorded as uncommon (62.5%) compared to common species (37.5%). The family Salticidae emerged as the most diverse and relatively abundant group, while several families were represented by a single, rarely encountered species. These findings indicate a complex spider community structure influenced by habitat diversity, behavioral adaptations, and ecological specialization. The dominance of uncommon species underscores the importance of continued and long term surveys to better understand the true diversity and ecological roles of spiders in the region.

Table 1. Species of Spider recorded from district Kohat Khyber Pakhtunkhwa, Pakistan.

Scientific Name	Common Name	Encounter Rate
Family Pholcidae		
<i>Pholcus phalangioides</i>	Long bodied Cellar Spider	Common
<i>Phlocus manuli</i>	Daddy long legs spider	Common
Family Araneidae		
<i>Cyrtophora citricola</i>	Tropical Tent web Spider	Common
<i>Araneus diadematus</i>	European Garden Spider	Uncommon
<i>Neoscona crucifera</i>	Hentz Orb weaver	Uncommon
<i>Araneus nordmanni</i>	Orb weaver	Common

Family Selenopidae		
<i>Selenops actophilus</i>	Crescent eyed Spider	Uncommon
Family Sparassidae		
<i>Heteropoda venatoria</i>	Huntsman Spider	Uncommon
Family Lycosidae		
<i>Rabidosa rabida</i>	Rabid Wolf Spider	Uncommon
<i>Hogna radiata</i>	Wolf spider	Uncommon
Family Salticidae		
<i>Thyene imperialis</i>	Jumping Spider	Uncommon
<i>Lyssomanes viridis</i>	Magnolia Green Jumper	Uncommon
<i>Plexippus paykulli</i>	Pantropical Jumping Spider	Uncommon
<i>Oxyopes salticus</i>	Striped Lynx Spider	Common
<i>Plexippus petersi</i>	Common Housefly Catcher	Common
<i>Platycryptus undatus</i>	Tan Jumping Spider	Common
<i>Hasarius adansoni</i>	Adanson's House Jumper	Common
Family Dolomedidae		
<i>Dolomedes triton</i>	Six-spotted Fishing Spider	Uncommon
<i>Dolomedes scriptus</i>	Striped Fishing Spider	Uncommon
Family Miturgidae		
<i>Zora nemoralis</i>	Forest Dwelling Spider	Uncommon
Family Scytodidae		
<i>Scytodes globula</i>	Spitting Spider	Uncommon
Family Filistatidae		
<i>Kukulcania hibernalis</i>	Southern House Spider	Uncommon
Family Cheiracanthiidae		
<i>Cheiracanthium inclusum</i>	Long legged Sac Spider	Uncommon

DISCUSSION

The present study provides the first systematic account of spider fauna from District Hangu, Khyber Pakhtunkhwa, Pakistan. A total of 57 specimens were collected and identified into 23 species, 18 genera, and 11 families. Although the number of species recorded is moderate compared with other districts in the province, it contributes important baseline information for an area that has remained largely unexplored in terms of arachnid diversity.

Among the spiders recorded, *Pholcus phalangioides* and *Pholcus manuli* were collected in indoor habitats such as corners of buildings and cattle shelters. *Pholcus* species are commonly found in human dwellings and dark undisturbed areas, and their occurrence in Hangu aligns with observations from Pir Baba in District Buner (Khan & Zaman, 2015) and from Lahore in Punjab (Riaz et al., 2023). The presence of *Neoscona arabesca* and *Neoscona crucifera* reflects the typical dominance of orb weavers in outdoor habitats such as fields and shrubs. Comparable results were obtained by (Luqman et al., 2021) in Buner Valley and by (Nooreen, 2022) in Charsadda, where *Neoscona* species were abundant in agricultural and semi natural

habitats.

The genus *Araneus* was represented by *A. ventricocus* and *A. nordmanni*, both of which were observed in vegetated areas. These findings are consistent with regional reports where *Araneus* species frequently build orb webs in gardens, shrubs, and tall grasses to capture insects (Luqman et al., 2021). The presence of Sparassidae such as *Selenops actophilus* and *Heteropoda venatoria* in Hangu also reflects similar records from Khyber Pakhtunkhwa, where these large wandering spiders are often collected from shaded or indoor habitats (Ali et al., 2016).

Lycosids such as *Rabidosa rabida* were collected from open fields, where they actively hunt on the ground. Their presence in Hangu supports previous studies that reported Lycosidae as a dominant family in crop fields and grasslands of Pakistan (Shah et al., 2021). Salticids, including *Plexippus paykulli*, *P. petersi*, *Hasarius adansonii*, and *Phidippus arizonensis*, were particularly well represented in the present survey. This agrees with findings from Mardan (Younas et al., 2024) and Buner (Khan & Zaman, 2015), where Salticidae were the richest family, reflecting their wide ecological adaptability and synanthropic behavior. The cosmopolitan *Plexippus paykulli* is especially well documented in South Asia and has also been reported from Malakand and Karak (Ali et al., 2018), indicating its widespread distribution.

Other families, such as Oxyopidae, were represented by *Oxyopes salticus*, which was collected in grassy and crop field habitats. Similar habitat preferences were reported in rice fields in India and agricultural landscapes of Sindh, Pakistan (Soomro et al., 2025). Pisaurids such as *Dolomedes triton* and *D. scriptus* were found in moist or riparian habitats, which reflects the global ecology of this genus as fishing or nursery web spiders (Miliczky et al., 2005). Ground dwelling and crevice associated taxa, including *Zora nemoralis*, *Scytodes globula*, and *Cheiracanthium inclusum*, were also present in the collection, consistent with earlier reports from grasslands and agricultural habitats in Khyber Pakhtunkhwa (Shah et al., 2021).

In terms of overall species richness, the 23 species recorded in Hangu are fewer than those documented in Mardan, where (Younas et al., 2024) reported 29 species from 578 specimens, and in Charsadda, where (Nooreen 2022) identified 44 species from 2734 specimens. Likewise, surveys in Buner Valley yielded a higher diversity of orb weavers and jumping spiders (Luqman et al., 2021). The relatively low richness in Hangu may be attributed to limited sampling effort, smaller sample size, and habitat heterogeneity. Seasonal influence is also important, as most Pakistani studies report peaks in spider abundance during the warmer months when prey availability is high (Ali et al., 2016). Extending temporal coverage in Hangu could therefore reveal additional species.

Several species documented in the present survey, including *Pholcus manueli*, *Neoscona arabesca*, and *Scytodes globula*, represent rare or less frequently reported taxa in Khyber Pakhtunkhwa. This mirrors the findings of (Ali et al., 2016), who added new family records for the province. At the same time, the occurrence of cosmopolitan species such as *Plexippus paykulli*, *Pholcus phalangioides*, and *Oxyopes salticus* highlights the mixture of widespread and locally significant taxa in Hangu. Similar patterns have been noted in international studies, where synanthropic and generalist species co occur with habitat specialists across Asia, Africa, and Europe (Jiménez-Valverde et al., 2007; Franzini, 2013).

The current survey, despite its modest scope, emphasizes the ecological importance of spiders in the district. The presence of predatory families such as Lycosidae, Salticidae, and Araneidae indicates their potential role in biological control and ecosystem balance. This finding is consistent with broader literature highlighting spiders as effective natural pest regulators and bioindicators (Soomro et al., 2025). Future studies incorporating year round sampling and molecular identification methods could provide a more complete understanding of spider diversity in Hangu and its role in the regional ecosystem.

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