



The Influence of Late Neolithic Yangshao Cultural Stove Site on the Development of Folk Stove

Wei Pan ¹, Ling Xu ^{2*}

¹ Assistant Professor, School of Textile Garment and Design, Changshu Institute of Technology, Suzhou, China

² Lecturer, Department of Public Experimental Teaching, Nanjing University of Aeronautics and Astronautics, Nanjing, China

* Corresponding Author: xuling1018@126.com

Citation: Pan, W., & Xu, L. (2024). The Influence of Late Neolithic Yangshao Cultural Stove Site on the Development of Folk Stove. *Mediterranean Archaeology and Archaeometry*, 24(2), 29–42. [10.5281/zenodo.10442271](https://doi.org/10.5281/zenodo.10442271)

ARTICLE INFO

Received: 10 Aug 2023

Accepted: 12 Nov 2023

ABSTRACT

The Yangshao cultural site is a representative site of the late Neolithic period, and many stone tools and cultural relics materials are unearthed. Among them, the folk cultural sites such as stoves, square foundations, and red clay pots have a considerable proportion, more than 80%, which is of far-reaching significance for exploring the evolution of folk stoves. Taking the ancient stove site of Yangshao culture as the research object, this paper carries out a comprehensive analysis of the stove unearthed at the site of the Yangshao cultural stove and successively studies its classification and evolution to facilitate the evolution of domestic folk stoves and provides reasonable historical and cultural support. Studies have shown that the Yangshao culture stove site has distinctive characteristics and is highly representative, and at the same time, it is also the prototype of the stove in the earliest period. Whether it is for the modern stove, it has a positive impact. It is found that there are more table stoves, followed by ground stoves and the least pit stoves in Yangshao culture stoves. In some stove sites, the ground stove was reformed based on a pit stove and gradually evolved into a platform stove. In the 1: 1 reduction experiment, the pit furnace has the slowest heating speed and higher heat dissipation rate, followed by the ground furnace, and last is the bench furnace. This shows that the residents in the Yangshao area in the late Neolithic Age mastered the design method of the stove and improved the stove with experience to improve the burning rate of wood and the oxygen supply rate of the stove pit. In addition, the appearance of Table-type stoves also changed the shape of cooking utensils at that time, expanded the range of cooking food, and even prolonged the life of residents in the Yangshao area. Therefore, the Yangshao cultural stove site is significant to the archaeological study of food culture and life span in the late Neolithic Age.

Keywords: Yangshao, Culture, Stove, Folk, Influence, Development.

INTRODUCTION

The evolution of folk stoves affects people's food culture and dietary health, diet is the basis of ancient human survival, and stoves are the basis to ensure the diet of ancient humans, which has long been explained in the "Shi Gong Room, Shi Name", "stove, manufacturing, the basic food". It can be seen that the ancients also agreed with this point. The stove is an essential appliance of human dietary security, but also an essential thing in the initial evolution of human beings. Human beings in the late Neolithic age relied on manual Labor to obtain food, so their diet had not yet formed a culture. In the initial period (6000~5000 BC) of the stove, in addition to the function of simple ripening food, there is no other symbol. However, when humans gradually evolved to a more civilized level, the stove gradually developed from simple to complex, enabling low-level to high-level evolution. Fire plays an essential role in promoting the development of human society, making human beings bid farewell to the lifestyle of eating and drinking blood and prolonging human life. In using fire, human beings are still exploring temperature, heating speed and other issues to expand the range of food intake. Cookware is an essential representative of the improvement of fire utilization rate, and its evolution mode not only promotes the development of human society but also marks the improvement of human production and living technology. Yangshao is the central area of human activities in the Neolithic Age, and its cultural stove site reflects the

utilization of fire by human beings at that time and indirectly reveals the development of stove culture. Because the stove is essential and indispensable for human beings, especially primitive people, the simple form of the stove is needed to ensure its primary function to protect their survival. Therefore, the stove site in the Yangshao cultural site has specific research value and research significance because it involves the lifestyle, diet and other aspects of primitive people (Bertolin & Cavazzani, 2022). Based on the above analysis, this paper studies the Yangshao cultural stove sites in the late Neolithic Age, compares and excavates the types, shapes and burning temperatures of different stove sites, aiming at finding out the stove culture of the residents in the late Neolithic Age in Yangshao area, revealing the social level, human development level and social structure at that time, and providing a reference for the archaeology of cultural stove sites. In the research process, based on the theory of previous research, this paper carries out quantitative, simulation and simulation analysis with the help of modern equipment, and explains the stove culture in Neolithic Age and the human social structure in the late Neolithic Age with quantitative indicators such as temperature rise, heat dissipation and airflow, which has certain novelty.

CLASSIFICATION AND EVOLUTION OF YANGSHAO CULTURAL STOVES

About 10,000 years ago, the hunting life of human beings in the late Neolithic age gradually shifted to agricultural cultivation and began to use stoves. In the 4000~3500 BC period, primitive people began to use stoves to complete food cooking, so stoves were an essential living and eating facility for ancient people. Later, with the gradual deepening of the habitation changes of primitive people, the stove also moved from the ground to the ground and began to experience a long period of evolution during the 5000~2500 BC period (Califano, Baiesi, & Bertolin, 2022). the stove also gradually evolved from the bonfire to the pot table type, and in the long evolution, the cooking utensils with it also changed in different forms. Until the Shang Dynasty, the form of the stove was basically fixed, forming a stove commonly used by the people, and by the Later Han Dynasty (Liritzis et al., 2020), the folk stove had stable shape characteristics and also became the critical facility of the kitchen, closely related to human life. The Yangshao culture is a representative site of the Neolithic period, which contains many different types of sites, and the stove site is one of them. In the Yangshao culture stove site, the stove site is often different depending on the region. In the current archaeological data, there are still relatively few studies on the Yangshao culture stove site, and it is not easy to explore its complete picture for now (Gutierrez & Munoz-Cadena, 2023). Therefore, the excavated stove site in the Weishui River Basin was selected as the research object, and the influence of the Yangshao culture stove site on the evolution of folk stove was explored based on this to facilitate the research of the stove culture, lifestyle, dietary characteristics and other aspects of primitive humans in the 4000~3000 BC period, to enrich the relevant data.

Classification of Stoves in the Yangshao Culture Stove Site

Among the Yangshao cultural stove sites, the stove sites unearthed in the Weishui River Basin are more representative, such as Banpo and Zerokou Village in Xi'an, Shaanxi, Lijiagou in Tongchuan, Xiameng Village in Bin County, Quanhui Village in Hua County, Baoji North Chief, Longxian Yuanzitou, Dadiwan Area in Qin'an, Gansu and Zhao Village in Tianshui Division. In the Yangshao culture stove site, the shape is diverse, and according to the form (Halford et al., 2022), it is divided into pit stove, ground stove and table-type top stove. According to the morphology and structure of the stove site, it can be divided into many subcategories, as follows.

The pit-type stove is the main content of the Yangshao cultural stove site. According to the pit's depth, it is also divided into shallow cave stoves and deep cave stoves.

Shallow Cave Stove

Shallow cave stoves are found in several sites and are characterized by their often straightforward structure. However, the surrounding area of the stove pit is slightly higher than the living surface, and the stove circle forms a simple, shallow cave-type stove. Moreover, there will be a small pit inside, buried with fire and clay pots, and the whole is in the shape of a digging bag (Kikhney & Temirshina, 2022) to better maintain the temperature in the stove. It can be seen that primitive people have mastered holding the stove fire. In shallow cave stoves, there are many different shapes, such as some round, some oval, some scoop-shaped, or rounded squares (Marijan & Kudelic, 2022). After archaeological findings, although the shallow cave stove is different in shape and the sites found are also different, the shallowness is the same, and the size is similar, and their respective conditions are shown in [Table 1](#).

Table 1. Details of the Different Shapes of Shallow Cavern Stoves and the Fire Retention Facilities

Shape	There are Tinder reservation facilities	No Tinder retention facilities	Main distribution points
Round shallow acupunctur e foci	For example, Jiangzhai F63 is a typical circular subcave stove with fire protection facilities. Its inner diameter and depth are 80 cm 10 cm, the visible depth is very shallow, and the surrounding is arranged with a ridge-like stove ring. A fire outlet at the east end of the stove circle is convenient for smoke dispersion and safety assurance. The placement point of the tinder is located on the inside south of the stove.	For example, the Lijiagou F8's caliber and bottom diameter are nearly 100 cm. The depth is 12 cm and a convex ridge-like stove around it.	Dadi Bay, Zerokou Village, Jiangzhai, Shizhao Village, Lijiagou, etc.
Scoop-shaped shallow acupunctur e foci	For example, Beishouling F17 has a stove pit in the middle of the southern position of the room, with a length of about 155 cm, a width of about 107 cm, and a depth of 30 cm, and a tinder jar is buried at the north end of the stove, and the mouth of the tank is close to the doorway. The walls of the stove are coated with slurry and stone slurry.	For example, Banpo F3's stove pit is also set in the middle of the room, with a length, width and depth of 106, 70 and 30 (unit: cm). The surrounding position is equipped with a convex ridge-like stove ring, and the wall and bottom of the stove are coated with fine mud.	Beishouling, Dadi Bay, Atomtou, Xiamengcun, Banpo, etc.
Oval shallow acupunctur e foci	For example, the length of the Beishouling F36, shortness and depth of the stove pit are 103, 80 and 22 (unit: cm). The tinder protection facility is located at the southern end of the stove, which is a tinder tank that is buried diagonally.	For example, Fort F11, specifically located in the east of the room, has a stove pit, and the length, short, and depth of the stove pit are 50, 35, and 15 (unit: cm).	Jiangzhai, Zerokou Village, Dadi Bay, Fulin Fort, Quanhu Village, Beishouling, etc.
Rounded square shallow cave foci	For example, in Jiangzhai K4, the length of north-south and east-west directions is 64 cm and 60 cm, respectively, and the depth is only about 4 cm. The tinder tank is located in the southwest part of the stove pit and is set diagonally.	For example, in Banpo F22, the stove pit is set in the middle of the room, the length and depth of the stove pit are 180, 110, and 5 (unit: cm), and the wall and bottom of the stove are made of grass mud.	Jiangzhai, Dadiwan, Zerokou Village, Banpo, Yangju, etc.

The shape of the stove in Table 1 is shown in Figure 1.



Circular Shallow Acupoint Focus



Ladle-shaped Shallow Acupoint Stove



Oval Shallow Acupoint Focus



Round, Square, Shallow Hole Stove

Figure 1. Different Shapes of Stoves in the Yangshao Culture Stove Site

Stove deep cave stove pit is also found in most of the Yangshao cultural sites of the Wei River. It is characterized by the fact that the plane is generally round, the diameter is generally 70-158 cm, and the depth is generally 30-148 cm (Miglioranza, Scanu, Simionato, Sinigaglia, & Califano, 2022); The structure is often a shaft-like structure, and the bottom of the mouth is often the same size, the pit wall is vertical, and the bottom plane of the stove is very flat, or a little concave. Most deep-cavern stoves contain pillar holes, tinder tanks, doorways, partition walls, vents, and fire retention facilities. The deep cave structure also has a certain classification, mainly divided into 2 types: a single stove and a combination stove. Among them, single stoves are divided into vents and fire retention facilities (Millard, Hale, & Burnham, 2022) no vents and fire retention facilities. Table 2 for information on monofocal.

Table 2. Parameter Table of a Deep Cave-Type Single Stove

Scope	Numbering	Specification of Stove (cm ³)	Aperture (cm ³)
Lake West Village	F1	81*72*56	31*12*62
	F2	83*71*54	31*13*66
	F3	85*70*52	31*10*63
	F4	86*72*53	31*11*69
	F5	82*74*52	111*54*22
Jiang Zhai	F1	74*73*14	91*62*26
	F2	72*71*15	41*22*76
	F3	75*72*13	91*42*36
	F4	72*73*12	89*45*22
	F5	78*73*10	90*52*81

Among them, the combined stove pit is also called a "connected stove," its essential feature is composed of more than two deep cave stove pits because the ancients did not have such exaggerated needs in 5000~3000 BC, so this combination stove is generally 2 to 3 groups as one. Some fire passages through the holes will be connected in each pit, and only a few stove pits are not equipped with fire retention facilities. It is divided according to the difference in the plane shape of the combined stove pit, among which there are four types: oval and round, boat-shaped and scoop-shaped (Mutiso et al., 2023). The different combinations are divided into four types: circular pit-boat-shaped pit combination, three oval pit combination, scoop-shaped pit-circular pit combination, and 2 circular pit combination. Regardless of the combination of forms, there are connected acupuncture channels inside the combined stove pit, and most of them are not much different in length, width, and depth, and the most common is the setting of 100 cm deep (Okereke et al., 2023).

Ground-Mounted Stovetop

Ground-type stoves, also known as "stove surfaces," have been found in the Yangshao cultural stove sites of the Weihe River, such as Fulin Fort and Dadiwan, Zerokou Village, Jiangzhai, Lijiagou and other sites. Specifically, the shape of the ground-type stove is often straightforward. Generally, the scope is directly delimited on the living surface, and the fire begins to burn within the delimited range (Phillip et al., 2023). If a specific range is not delineated, the fire will be burned in a fixed position on the residential surface. Floor stoves can be divided into two types according to the flat shape, namely round floor stoves and oval floor stoves. There is no difference in the other parts of the two stoves except in plane shape (Ravillard et al., 2023).

Table Type Top Stove

Countertop-type stoves have been found in multiple sites, such as Jiangzhai and Yang Arc, and certain quantities exist. The general shape of the benchtop stove is a round earthen table, the height is slightly higher than the living surface, and at the top of the earthen table, there is generally a sintered hard surface brought by the fire, and the table body is made of a multi-layer structure. According to the size, it can be divided into large and small. Among them, large table-type stoves such as F405 in Dadi Bay, the stove is set in the front of the room in the middle (Ruiz-Serrano, H. Serrano-Barquín, C. Serrano-Barquín, & Zarza-Delgado, 2022), the appearance is oval, divided into two parts, the upper part is about 40 cm, the lower height is about 20 cm, and the height is about 60 cm. In the lower part, a base is also set to form a mud circle with a simple thickness of grass and soil, which is oval and not fixed in size. When lighting a fire, it should be completed in the center of the mud circle, and the specification of the inner diameter is generally about 100 cm, and the longest will not exceed 150 cm. The middle is slightly below the top position, about 40 cm lower. There is also a coating layer on the surface of the stove site, which is coated with clay. In addition, small benchtop stoves are mainly distributed in the Jiangzhai site, and their countertops are generally round, with a top diameter, bottom diameter, and height of 110, 130, 15, and 15 cm.

Measurement of Furnace Heating Time, Temperature Change Rate and Fuel Utilization Rate of Different Stoves

Methods and Techniques

According to the ratio of 1:1, the 3 stoves in the Yangshao culture stove site were copied, and the data were analyzed by HZ-300 handheld infrared thermal imager (Guangdong: Youlide Technology Co., Ltd.), BC-4H pump gas detector (Guangdong: Baoshian Electronic Technology Co., Ltd.) and Mintab software. Among them, the thermal imager mainly tests the temperature around the furnace and the pump gas detector mainly monitors the content of carbon monoxide. Combustion rate = 100-carbon monoxide content. In order to improve the test results, the average value of 10 tests is taken as the final result.

Furnace Heating Time

Comparing the heat duration of different cooktops, the results are shown in Figure 2.

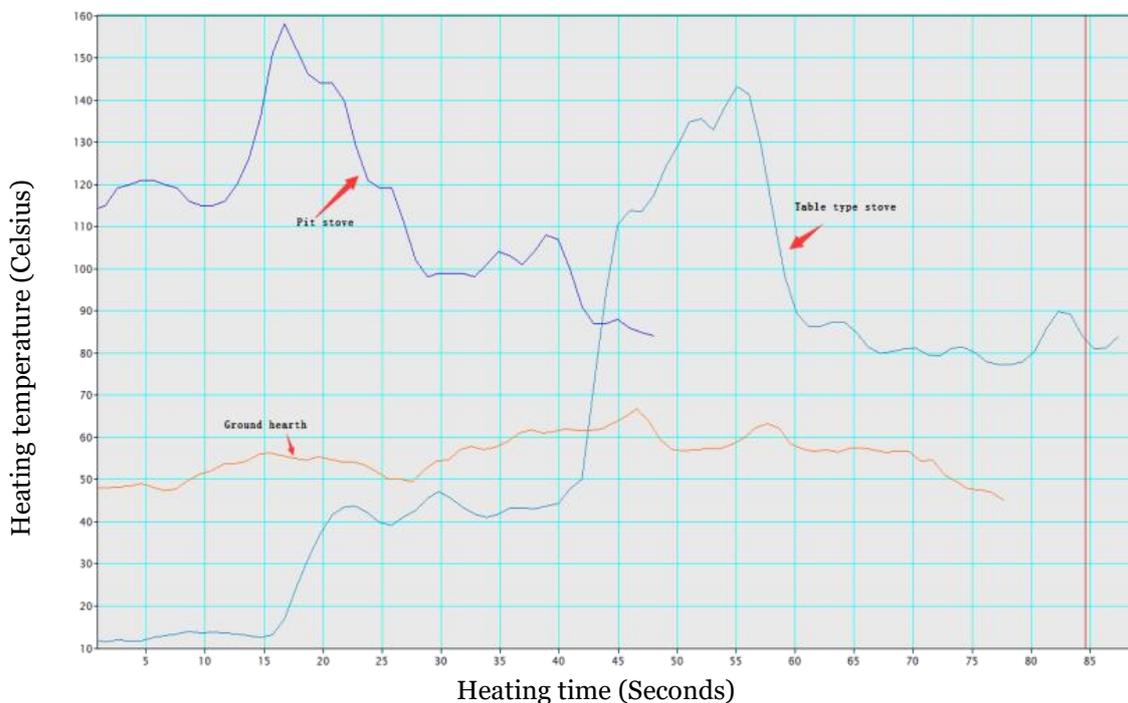


Figure 2. Duration of Heat for Different Stoves

It can be seen from Figure 2 that the heating time of the pit stove is the shortest, the heating time of the ground stove is moderate, and the heating time of the table-type top stove is the longest, mainly because the table-type top stove used the wind on the ground to supply oxygen, increase the combustion rate of charcoal, coal and other fuels, and increase the temperature of the stove.

Temperature Change Rate of Stove

The heat release process is the same for all three cooktops, as shown in Figure 3.

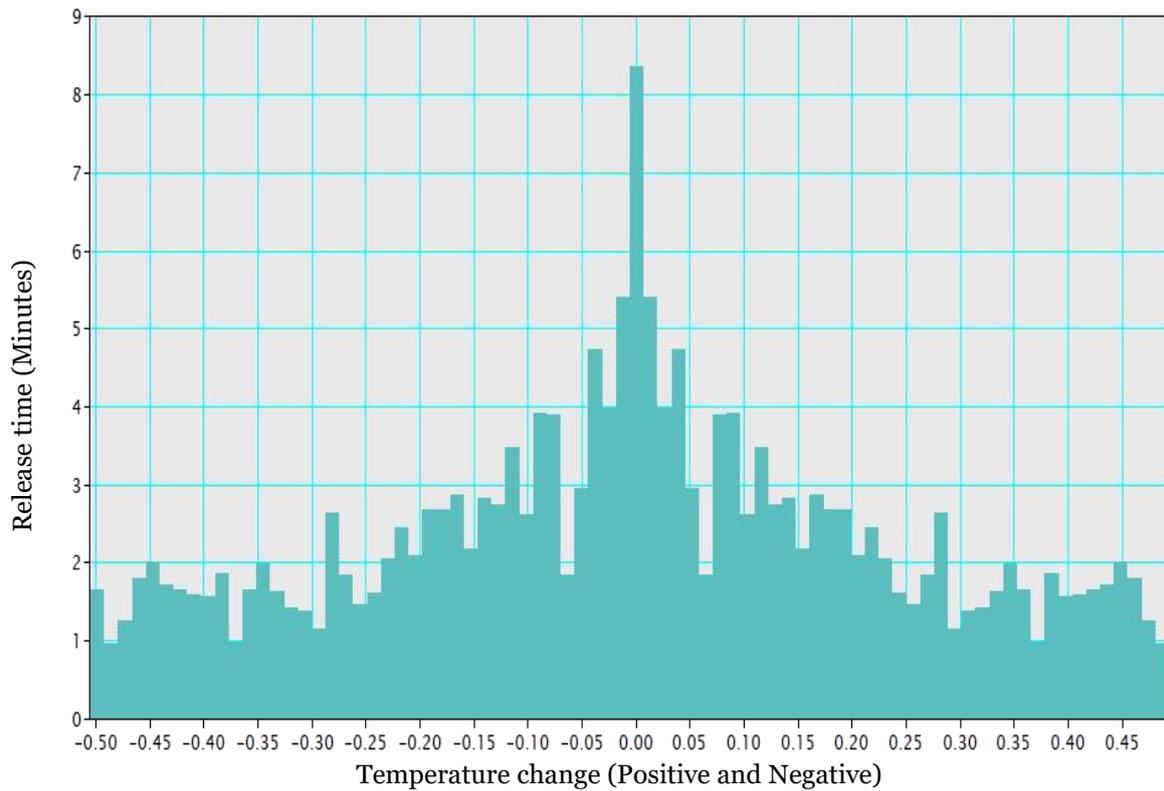


Figure 3. Heat Release Process of Different Stoves

As seen in Figure 3, the heat release process of the three stoves is an inverted U shape, indicating that the combustion process of the fuel is stable. It is not affected by uncertain factors, such as high winds. The results in Figure 3 prove that the pit stove, ground stove and table-type top stove do an excellent job of windproof work to ensure the smooth combustion of fuel.

Fuel utilization Rate of Stove

Compare the fuel combustion rate of the three stoves, as shown in Figure 4.

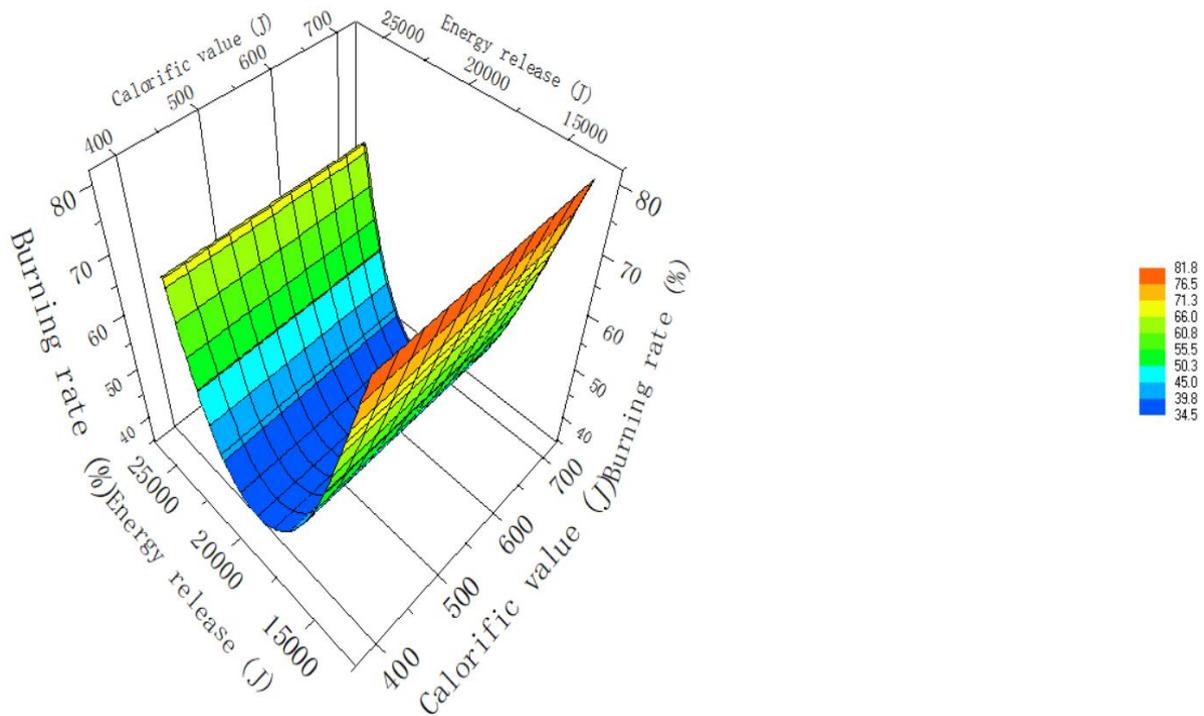


Figure 4. Fuel Combustion Rates of the Three Types of Stoves

Although there are differences in the total heat energy release of the three stoves, the combustion rate is high, all of which are greater than 80%, indicating that the design of the three stoves is reasonable, and it is gradually improved to improve the total heat energy release.

Evolution of Yangshao Cultural Stove Sites

Based on the classification of stove sites, combined with the analysis of the stratigraphic relationship of units in the typical Weihe stove site of Yangshao culture and the comparison of the types of related artifacts of stoves at each stove site, this paper divides the evolution of the stove site in the Weihe River Basin of Yangshao culture into different stages, which are early, middle and late periods (Teslenko & Myronenko, 2022). At the same time, the characteristics and advantages of early, mid and late stove sites are discussed as follows:

In the early stage (5000~4000 BC), in the stove site at this stage, the more prominent feature is that the pit-type stove accounts for the vast majority and contains many different shapes, such as shallow cave stove and shaft-type deep cave stove, and connected stove with a large combination scale. In the evolution of this period, human floor stoves and table-type top stoves adopted a general, relatively simple and rough shape, so the overall look was fairly average. Among them, there are many stove pits where fire is retained. The general arrangement area is a particular stove side of the bottom (Zhou, 2022), obliquely distributed and buried, and the tinder pot is generally made of pottery. In addition, some stove pits are surrounded by apparent ridge-like stove rings higher than the *Ling* (xuling1018@126.com) with fire vents on one side, which can be used to output the burned ash. Because the evolution of the early Yangshao culture stove site was minimal, the number of shallow cave stoves was relatively large, and only a few houses were built with connecting stoves. With the gradual deepening of the evolution of the stoves in the early Weihe River Basin, at the end of the early evolution, some sites began to appear a little deeper circular shallow cave stoves, and the number was gradually increasing, but at the same time, some large connecting stoves were slowly disappearing. At this time, the stove site is often in the middle of the house, not far from the doorway, which may be done to facilitate ventilation and smoke exhaust. Later, round, shaft-type deep cavern stoves began to appear, so some houses in the doorway, probably on the side not far from the stove pit, began to have a ventilation pit set, and there were also connected holes between it and the stove pit, the purpose of this is probably to allow air to circulate better, thereby helping to deepen the degree of combustion in the stove, and this can also help the smoke during combustion to be discharged outward early, which can be conducive to safety.

Medium term (4000~3500 BC). In the middle of evolution, the stove site is still basically a pit stove, of which only a small part belongs to shallow cave stoves, and the rest of the stoves are deep cave stoves in the form of circles, shafts, and it is obvious that its shape has changed to a certain extent, and the way of construction has

been very mature.

In addition to shallow cave stoves, deep cave stoves also exist in many stove sites, such as it is found in Earth Bay and atomic head stove sites. The shape of the deep cavern stove is unchanged, and all are equipped with ordinary ventilation holes and ventilation pit facilities. Compared with the early deep cave stoves, their ancillary facilities have become more prosperous, such as the new fire gate and clay platform, which shows that the Yangshao culture stove site in the 3000~2500 BC period has evolved and is more in line with human requirements for daily cooking. Compared to earlier evolutions, the connecting stoves in those large houses have disappeared, while fire retention facilities are still ubiquitous. Another noticeable change in the stove sites of the 4200~3800 BC period is that many stove sites are found in the center of the house, which is different from the earlier stove sites because the early stove sites are often located near the doorway. It is unclear why people do this, but it has been speculated that it may be related to smoke emissions.

Late stage (3500~2500 BC). Late sites have undergone many changes in shape, one of which is that circular-shaft deep cave stoves have become unpopular, the number of shallow cave stoves has increased significantly, and the depth of shallow cave stoves has also changed significantly, contrary to what was expected, their depth has not become deeper, but shallower, some of which have become level with the ground. Moreover, in the late stove sites, it was also found that the number of ground-type stoves also increased significantly, especially the way they were built, which became very standardized. It is worth mentioning that the number of table-type top stoves is also increasing greatly. For example, in the Dadi Bay site, people have found many stoves in the house, large table-type top stoves. The characteristics of the table-type top stove are a larger structure and a more complex structure. According to the analysis, the table-type top stove was raised in the later evolution of the Yangshao culture stove site, and its rise has greater significance, which at least shows that the previous fire retention facilities are gradually disappearing, and other auxiliary facilities (such as ventilation holes) equipped with deep cave stoves have gradually disappeared because they have lost their application value. It can be seen that about 10,000 years ago, people's requirements for stoves became higher and higher, and they began to form a relatively fixed table-type stove. Until the Shang Dynasty, people used the stove was fixed, generally ceramic table-type stove, the specific development process is shown in Figure 5.

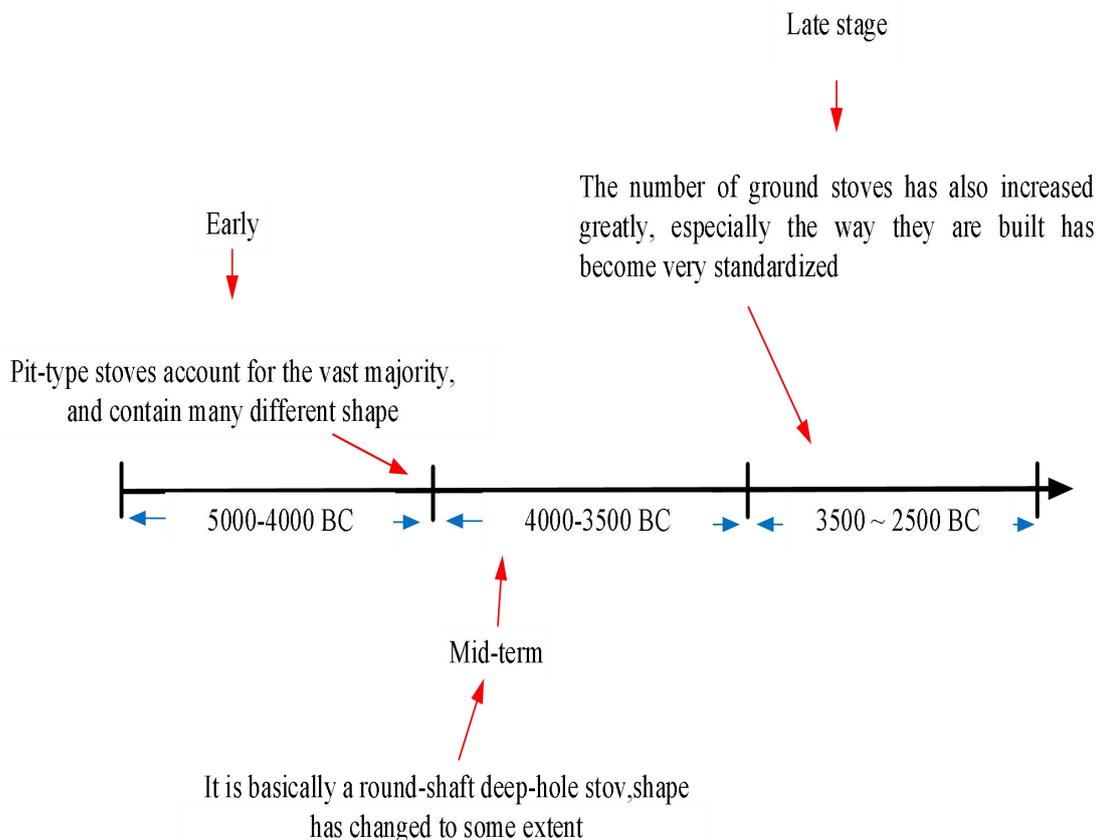


Figure 5. The Evolution of the Yangshao Culture Stove Site

Development of Folk Stoves

"Folk stove" refers to a kind of cooking application equipment that is more common in the folk, generally installed indoors. The development of folk stoves is similar to Yangshao culture; sometimes, folk stoves are also built outdoors for people to use for outdoor cooking activities. Folk stoves have evolved so far, and in terms of ventilation and fuel value control, people learn from the content of Yangshao culture. Although some stoves incorporate new technologies, such as electromagnetic induction and personalized design, the product design process also repeatedly considers factors such as fuel value and airflow. Yangshao culture is made of earthen or pottery stoves, bricks, stones, clay, ceramics, etc., while folk stoves mainly use aluminum, iron and other materials. Although there are different materials between the two, there is no significant industry regarding cooking requirements and cooking environment, which can promote the development of folk stoves. In many rural areas and wild habitats, people can still see folk stoves, which can meet the needs of stir-frying, boiling water, cooking delicacies and so on.

THE EVOLUTION OF FOLK STOVES

Folk Stoves in the Qin and Han Periods

The stoves in the Yangshao culture period (4500~3000 B) had various forms, and by the late evolution of the Yangshao culture, Ming ware pottery stoves began to appear and continued until the Spring and Autumn and Warring States periods (770~256 BC). The Ming ware pottery stove of the Spring and Autumn and Warring States periods became an indispensable existence in people's daily life, and according to archaeological data, the pottery stove at that time was also buried in the tombs of some dignitaries as daily necessities. In this period, pottery stoves became the primary type of Ming ware. In the Liangjing area evolution, for example, in the Qin and Han sites found in the Liangjing area by archaeologists, many pottery stoves were found pottery stoves is different. The types are relatively wealthy, exquisite decorations, which shows that people in the Qin and Han periods (221 BC to 220 AD) paid attention to the actual functional value of the stove but also paid attention to the shape and decoration of the stove. From the perspective of appearance characteristics, the pottery stoves of the 421 BC to 180 AD periods are generally divided into three categories: round pottery stoves, horseshoe-shaped pottery stoves, and diamond pottery stoves. This pursuit of the diversity of the shape of the ceramic stove can be traced back to the stove design during the evolution of the Yangshao culture, which shows that the Yangshao culture stove site has a particular influence on the shape design of the folk stove in the Qin and Han periods, which as shown in Figure 6.



Round cooktops

Horseshoe-shaped pottery oven

Square pottery stove

Figure 6. Comparison of round, horseshoe-shaped and square pottery ovens

Round pottery stove. Round pottery stoves were popular in the Qin and Han periods, mainly distributed in Guanzhona. The current discovery of the round pottery stoves of the Qin and Han periods (210 BC~110 AD) show specific characteristics, such as structural and customary characteristics. There is an apparent Yangshao culture period (5000~4100 BC) kettle stove shadow and from the two stove walls left behind by the smoke burner. However, the 100~198 AD period and 3200~2800 BC period of the round stove, although the materials used are different, are practical utensils, so the author believes that the 120~200 AD period of the round pottery stove

should have evolved from the late Yangshao culture based on the round kettle stove. At present, the Qin and Han round stoves unearthed in Shaanxi are more typical. Their stove body is round, and the stove surface is also set with three fire eyes. In addition, there is a square fire door, which may be for decorative considerations, in some unearthed 150~210 AD period round stoves, their stove body is often painted with different color paintings.

Horseshoe-shaped pottery stove. During the Qin Dynasty, horseshoe-shaped pottery stoves were already famous, and by the Han Dynasty, this shape of pottery stoves was more widely covered, and the number increased. Horseshoe-shaped pottery stoves generally have 2-3 fire eyes on the stove surface, and a small number may have fire eyes. If it is a design with three fire eyes, there will often be a 1-2 front and rear fire eye design. There is one large fire eye in front and two small fire eyes in the back, thus forming an isosceles triangle. This 3-fire eye design of pottery stoves was popular in the early Han Dynasty, and it was not until the late Western Han Dynasty that the number of such horseshoe-shaped pottery stoves decreased with the advent of 1.5 fire-eye design semicircular stoves. It can be seen that people in the Qin and Han periods changed the shape of the pottery stove or the number of fire eyes on its surface according to certain needs, and because of this, the folk stove has continuously evolved, and the change of "round stove - horseshoe stove - semicircular stove" has been realized.

Square pottery stove. People call a pottery stove with a square stove body plane a square pottery stove. There are 2 types of square pottery stoves, namely square and rectangular. The square pottery stove's shape is unrelated to the Yangshao culture, and it first appeared in the early Western Han Dynasty. Generally speaking, the square pottery stoves of the 202 BC~8 AD period were mainly distributed in the southwest and northern regions, and a few were distributed in the two lakes area. By the Eastern Han Dynasty, the number of rectangular pottery stoves began to increase, while the number of square pottery stoves was getting smaller and smaller until it rarely appeared. The rectangular pottery stoves in the 3500~2800 BC period can be divided into three types according to the number of fire eyes and their arrangement: one fire eye and two fire eyes, and three fire eyes of rectangular pottery stoves. Generally speaking, people in the Han Dynasty would put pottery stoves into the tomb as a kind of "underground life" needed by the tomb owner, symbolizing the beautiful sustenance of the tomb owner's past life. In the early Western Han Dynasty, people would place various pottery stoves in tombs, including square pottery stoves, but by the middle and late Western Han Dynasty, square pottery stoves rarely appeared in tombs, and it was not until the Eastern Han Dynasty that they were rediscovered in Han tombs.

Modern Folk Stoves

Modern folk stoves refer to stove facilities commonly used in home cooking before the 1980s. Since the living conditions of the Chinese at that time had not yet reached the current level, such stoves were still ordinary in some rural and economically underdeveloped areas. It is made of traditional materials, generally clay, bricks, tiles, terracotta, etc. Modern folk stoves have different shapes, among which the more common include round stoves, square stoves, semicircular stoves, oval stoves, etc. There are often simple tiles or other advanced material designs on the stove countertops. Only a few modern stoves still use simple mud to paint the plane. It is worth mentioning that in some remote mountainous areas, there are very few people still using simple earthen stoves, which are often not as beautiful as other stoves, but because the design is more primitive and more in line with the fire control of cooking, therefore, the rice cooked by such earthen stoves tends to be more fragrant and delicious.

Modern Folk Stoves

In modern times, the living conditions of every household have been greatly improved, so people's requirements for the aesthetics of the kitchen are getting higher and higher, at the same time, under the influence of the continuous evolution of electromagnetic induction technology and intelligent control technology, the design of modern folk stoves has become more and more abundant. Over time, the functions of modern folk stoves have become increasingly diverse and have been greatly improved. For example, the design of the combination of electromagnetic induction cooker and window stove is more common, in addition, some large households still use the combination form in their old homes to expand the scale of the stove. Generally speaking, the design of modern folk stoves will raise the stove surface, and at the same time, in order to make the living space more comfortable, some people will choose to redecorate the stove design, such as the use of aluminum alloy and other materials as a surface or other parts of the decoration to improve the aesthetics of the stove, as shown in [Figure 7](#).

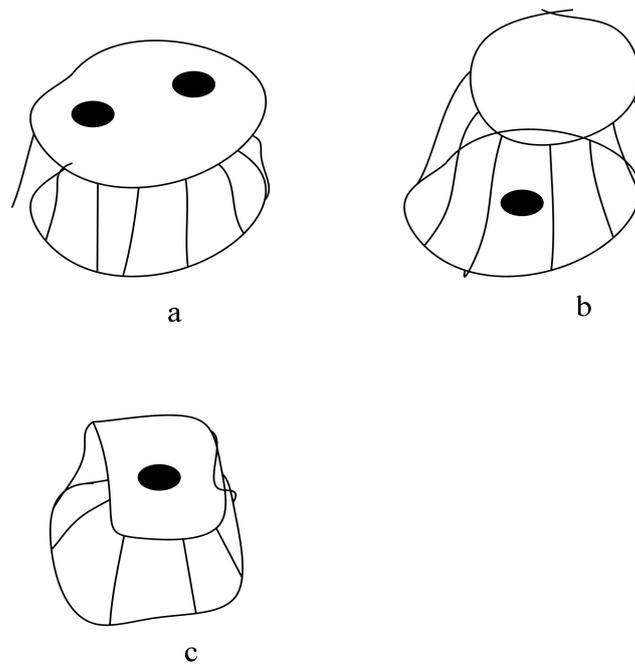


Figure 7. Round, Horseshoe and Square Cooktops

As can be seen from Figure 5, the overall shape of the three different shapes of the stove is the same. Both are wide at the bottom and narrow at the top, the purpose of which is to improve the ventilation rate. In addition, the stove is equipped with different vents according to the shape to avoid the backflow of smoke and improve the fuel combustion rate. The emergence of different shapes is mainly to meet the functions of different pottery and also indirectly prove the richness of human food types.

THE INFLUENCE OF THE YANGSHAO CULTURAL STOVE SITE ON THE EVOLUTION OF FOLK STOVES

The Yangshao culture stove site is representative of the Neolithic period (5000~2500 BC) in China. It has significant archaeological significance and value, which can help modern people study the way primitive people live, live, eat and drink and understand the living culture of primitive people. According to the author's analysis and combing, the author believes that the impact of the Yangshao cultural stove site on the evolution of folk stove is mainly reflected in these aspects.

Impact of Technical Improvements and Design

From the analysis of this paper, it can be seen that the earliest formation feature of the Yangshao culture stove site is that it gradually evolved from the crude form of the stove to the more advanced ceramic stove form. Moreover, the ceramic stove was formed in the later evolution of the Yangshao culture stove site. Although the ceramic stove at that time was far less than the design scale of the 150~201 AD period ceramic stove, and the production was relatively rough, there is no doubt that the ceramic stove in the 180~190 AD period was influenced by the Yangshao culture stove site and improved to a certain extent, and only began to form. In addition, in later generations of folk stoves, especially modern folk stoves, the shape characteristics of many stoves are very close to the shape of the stoves in the Yangshao cultural sites, and even their arrangement position inside the house (for example, in some modern folk stoves, the position of the stove is basically on the side of the house), there are obvious signs of being affected by the Yangshao cultural stove site. Moreover, after analysis, the author also found that many advantages of folk pottery stoves, such as being able to maintain a good fire and temperature and being able to regulate food heat better when cooking, are inspired by the principle of pottery stoves in the Yangshao culture period, and have been continuously learned and imitated by future generations, so as to continue. For example, through the exploration of modern Chinese folk stoves, we know that in some remote areas, although the earthen stoves used by people are relatively simple, they are made because the stoves are made by imitating the stove structure of the Yangshao culture stove site. As a result, meals cooked with them are more delicious and mellow. It can be seen that the influence of Yangshao cultural stove site on folk stoves is far-reaching, which is not only reflected in technical improvement but also reflected in the design of stove structure and materials.

In addition, in the design of modern folk stoves, people can also see the impact of Yangshao cultural stove sites, for example, the combined stove in modern folk stoves. Although its scale and design have changed greatly, the Yangshao cultural stove site in the combined stove structure is more solid and has more rich advantages and characteristics. However it is undeniable that the original form of this combined stove comes from the Yangshao cultural stove site. For example, although many designs have been added to modern folk stoves, such as electromagnetic induction stoves, etc., the inspiration for some of these design principles is derived from the Yangshao cultural stove site. Specifically, for example, the window stove design is commonly used by modern people, including the application of the layered design concept, and as early as the late Yangshao culture stove site, people have found the application of this layered design concept. It can be seen that the Yangshao cultural stove site also has a certain impact on the layered design of modern folk stoves.

Influence of Life Philosophy

From the early, middle and late research on the Yangshao culture stove site in this paper, it can be seen that at the beginning, the primitive people where the Yangshao culture stove site was located had almost zero pursuits of cooking technology and stove structure, and only used some simple and unreferenced shallow stoves to complete the cooking, which shows that the primitive people of the original Yangshao culture stove site did not understand the taste of food and the heat of cooking, etc., but only required that the food be cooked and ensure that the food could be safely eaten. But later, with the awakening of the consciousness of primitive people with the deepening of their understanding of cooking, the stove type in the Yangshao culture stove site began to show certain changes. After improvement, the stove type of the Yangshao culture stove site became more and more diverse, and the number of single stoves and combined stoves increased. At the same time, there were many different shapes and sizes. With the continuous evolution of technology and the increase of structural design, primitive people began to use fire retention facilities and gradually formed a situation of ceramic table-type top stoves as a fixed form. It can be seen that the continuous evolution of the stove shape and design of the Yangshao culture stove site reflects the continuous pursuit of cooking effects by primitive people, and in essence, it reflects the continuous pursuit of life concepts by Human beings in the late Neolithic Age of the 5000~2500 BC period in China.

According to the research of this paper, in the Qin and Han periods, the ceramic stove has been well evolved. The ancients of the 180~210 AD period also evolved many stoves of different shapes and production processes based on the ceramic tabletop stove of the Yangshao culture stove site, which not only reflects the inheritance of the technology and production technology and shape of the Yangshao cultural stove site by the ancients of the Qin and Han dynasties but also reflects the innovative pursuit of the ancients in the Qin and Han dynasties, in the final analysis, which also reflects their pursuit of the concept of life.

From the technical upgrade of modern folk stoves and modern folk stoves, as well as the upgrading of different decorations and designs of stoves, we can also find that modern folk stoves and modern folk stoves also continue to play new ideas or ideas based on inheriting the stove style of Yangshao cultural stove site, to achieve progress and evolution in all aspects. Moreover, the stove's design meets the different requirements of modern people for food taste. To this end, designers are looking for ways to improve modern folk stoves and use intelligent or magnetic induction technology to achieve this purpose. Therefore, this also reflects the continuous upgrading pursuit of modern people's concept of life.

Combined with the analysis of this part, the author believes that the continuous upgrading of the concept of the life of the ancient primitive people reflected in the Yangshao cultural stove site affects the Chinese of different periods, such as the ancients in the Qin and Han periods and the Chinese people in modern times.

DISCUSSION

As a vital stove cultural site, the Yangshao cultural stove site is valuable for studying archaeological stoves. Among them are round, horseshoe and square stoves in the Yangshao culture stove site to meet different food production needs. Moreover, the stove has evolved from a pit type to a ground stove and a benchtop stove to improve the combustion rate of fuel and the total heat release. In addition, the combustion process of different stoves is the same, which shows the rationality of the stove design at that time. In terms of technical improvement, design and life philosophy, the Yangshao culture stove site has an impact on the folk stove and also has great practical and historical significance in illustrating the evolution of cooking skills in Chinese food culture, especially the shape of the stove, the location of the exhaust hole of the stove, and the role of the stove.

AUTHOR CONTRIBUTIONS

All the author's contributions are equally in the manuscript.

ACKNOWLEDGEMENTS

The 2022 Jiangsu Provincial Department of Education's Philosophy and Social Sciences Project "Research on Folk Stoves in the Jianghuai Region" (Project Number: 2022SJYB1505).

The first-class course "Appreciation of Traditional Chinese Arts and Crafts" at Changshu Institute of Technology in 2021 (Project Number: 2021YLKCo1).

REFERENCES

- Bertolin, C., & Cavazzani, S. (2022). Potential of frost damage of off-ground foundation stones in Norwegian Stave Churches since 1950 using land surface temperature. *Heliyon*, 8(11). <https://doi.org/10.1016/j.heliyon.2022.e11591>
- Califano, A., Baiesi, M., & Bertolin, C. (2022). Analysing the main standards for climate-induced mechanical risk in heritage wooden structures: The case of the Ringebu and Heddal Stave Churches (Norway). *Atmosphere*, 13(5), 791.
- Gutiérrez, J. D., & Cadena, S. M. M. (2023). Assessing government design practices from a human-centered perspective: Case study of an improved cookstoves program in Colombia. *Desafíos*, 35(1), 4.
- Halford, A., Gaura, E., Bhargava, K., Verba, N., Brusey, J., & Nixon, J. (2022). Off the boil? The challenges of monitoring cooking behaviour in refugee settlements. *Energy Research & Social Science*, 90. <https://doi.org/10.1016/j.erss.2022.102603>
- Kikhney, L. G., & Temirshina, O. R.(2022). «ДОСТОЕВСКИЙ И БЕСНОВАТЫЙ...»: РЕЦЕПЦИИ ФМ ДОСТОЕВСКОГО В «ПОЭМЕ БЕЗ ГЕРОЯ» АННЫ АХМАТОВОЙ И МЕХАНИЗМЫ СОЗДАНИЯ ПОЛИГЕНЕТИЧНОЙ ЦИТАТЫ [“Dostoyevsky and possessed...”: F. M. Dostoevsky's reception in Anna Akhmatova's “Poem Without a Hero” and the ways of creating a polygenetic quotation]. *Novyi Filologicheskii Vestnik-New Philological Bulletin*, 1(60), 136-150.
- Liritzis, I., Laskaris, N., Vafiadou, A., Karapanagiotis, I., Volonakis, P., Papageorgopoulou, C., & Bratitsi, M. (2020). Archaeometry: An overview. *Scientific Culture*, 6(1), 49-98.
- Marijan, M., & Kudelić, A. (2022). Upotreba ognjišnih keramičkih predmeta u domaćinstvima kasnog brončanog doba [The usage of hearth-related ceramic objects in Late Bronze Age households]. *Annales Instituti Archaeologici*, 18(1), 164-179.
- Miglioranza, P., Scanu, A., Simionato, G., Sinigaglia, N., & Califano, A. (2022). Machine learning and engineering feature approaches to detect events perturbing the indoor microclimate in Ringebu and Heddal stave churches (Norway). *International Journal of Building Pathology and Adaptation*. <https://doi.org/10.1108/IJBPA-01-2022-0018>
- Millard, A., Hale, R. L., & Burnham, M. (2022). Diverse stakeholders navigate divergent perspectives on stream restoration success in Western rangelands. *Restoration Ecology*, 31(4). <https://doi.org/10.1111/rec.13820>
- Mutiso, V. N., Ndetei, D. M., Muia, E. N., Musyimi, C., Masake, M., Osborn, T. L., . . . Mamah, D. (2023). Students stress patterns in a Kenyan socio-cultural and economic context: Toward a public health intervention. *Scientific reports*, 13(1), 580.
- Okereke, C., Onyeneke, R. U., Ijeoma, S., Fadero, T., Ahanotu, K., & Anieze, E. E. (2023). Attitude, knowledge and perception of choice of cooking fuels: Evidence from two large communities in South-east Nigeria. *Environmental Progress & Sustainable Energy*, 42(1), e13983.
- Phillip, E., Conroy, R. M., Walsh, A., Jumbe, V., Jewitt, S., Lee, S., & Stanistreet, D. (2023). Using mixed methods and community participation to explore household and ambient air pollution practices in a rural community in Malawi. *Journal of Public Health*. <https://doi.org/10.1007/s10389-023-02008-x>
- Ravillard, P., Chueca, E., Weiss, M., Levy, A., Tolmasquim, M., & Hallack, M. (2023). Removing barriers to clean cooking programs in Latin America. *Energy for Sustainable Development*, 73, 247-262.
- Ruiz-Serrano, E., Serrano-Barquín, H., Serrano-Barquín, C., & Zarza-Delgado, P. (2022). El maíz, vínculo de identidad, sacralidad y cosmogonía mexicana desde el género [Corn, A bond of identity, sacredness and mexican cosmogony from gender]. *La Colmena*, (113), 61-76.
- Teslenko, I., & Myronenko, L. (2022). Ceramics of the Medieval Bilhorod: Excavation Materials of 1969, 1971. *Arheologia*, (2), 128-152.
- Zhou, N. (2022). Application of factor analysis in image modeling design of environmental protection gold stove. *Mathematical Problems in Engineering*, 2022. <https://doi.org/10.1155/2022/4370161>