

DOCTORAL (PHD)
DISSERTATION

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Debrecen 2023

**UNIVERSITY OF DEBRECEN FACULTY OF ECONOMICS AND
BUSINESS**



**KÁROLY IHRIG DOCTORAL SCHOOL OF MANAGEMENT AND
BUSINESS**

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**POVERTY, SUSTAINABILITY AND LIVELIHOOD
STRATEGIES OF HERDER HOUSEHOLDS IN
MONGOLIA**

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The aim of this dissertation is to obtain a doctoral (PhD) degree in the scientific field of “Management and Business.”

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1. INTRODUCTION

The Mongolian economy is driven by mining, and the traditional nomadic lifestyle is an overall picture of the current days. Mongolia is a country with a population of 3.5 million and a territory of 1.5 million square kilometres; more than half of the population lives in urban areas. The livestock sector has been a traditional and essential sector of the Mongolian economy in the past and will keep its importance near future. In the early 1990s, Mongolia transitioned to a market economy, livestock was privatised, and the old socialist collective system collapsed. The new constitution of Mongolia noted that "Livestock is a national wealth and shall be protected by the state" even though livestock became private property.

Mongolian pastoral livestock has unique characteristics compared to other countries in that the traditional economics sector dominates the national economy. Low-input livestock production systems, such as pastoralism, have little impact on climate, biodiversity, and water and are environmentally friendly (Houzer & Scoones, 2021). Nomadic herders account for nearly thirty percent of Mongolia's population, and they own a total of 70 million heads of livestock. Herders are responsible for their livelihood, livestock production, inputs and outputs, and mitigating risks. Herders are not only the suppliers of meat and milk for the urban people and the raw material suppliers for wool, cashmere, leather and meat processing factories but also carriers of intangible cultural heritage, owners of vast territories, and notable contributors to the preservation of culture and traditions. Pasture and water are common pool resources in rural Mongolia. Thus, herders openly access these common pool resources. They apply seasonally moving and rotational grazing management of pastures as a common pasture management tool against overgrazing and degradation of pastureland.

The agriculture sector in Mongolia is recognised as a high-risk industry and vulnerable to climatic shocks and bad weather (drought and *dzud*¹), which pushes herders to greater poverty. Mongolian herders' livelihoods are excessively interrelated to the natural resource

¹Mongolian term referring to livestock dying in vast numbers due to following dry, hot summers and cold, snowy winters.

with a fragile ecosystem (World Bank, 2015). A *dzud* happens in some parts of the country every year, and many relief and support activities are organised nationwide. During the last two excessive *dzud* herders lost about 15 million animals. Mongolian Government and international organisations' various aid programs were implemented to recover the negative impact of each *dzud*.

In addition to natural risks, a new human and social shock, Covid-19, has emerged and caused extensive damage to health, economic and social life (Ali & Alharbi, 2020). The World Bank stated that Covid-19 would impact poverty (R. F. Luo et al., 2020). During Covid-19, the Mongolian economy declined by 10.7 percent. Livestock origin raw material price shock, decreasing meat export, and borders closing have negatively affected all households and shrunk export earnings of Mongolia.

The Government of Mongolia is continuously focusing on rural development and poverty reduction. The Government introduced subsidies for sheep, camel wool, and horse and cattle hides supplied to national processing companies. During Covid-19, Government subsidised cashmere to cover herders' losses due to the Chinese border closure.

Herder households do not pay income or profit taxes except the recently enforced livestock tax. In 2021, the law on payment of livestock tax came into force. According to this law, the annual fee per head ranges between 0-2000 Mongolian tugrik (MNT). The local administration has the right to discount or exempt from the livestock tax to support poor herders' livelihoods.

The total number of livestock is increasing dramatically, but rural poverty is not decreasing for nearly 30 years. Thirty percent of the rural population is still in poverty (NSO and WB, 2021). Mongolia uses livestock numbers as a measuring unit of herder households' poverty defined by Worldbank (2009). Full-time herder households with over 500 livestock numbers are wealthy; 200-500 are middle households, and less than 200 are poor (NSO, 2022b)(NSO, 2022b)(NSO, 2022b). Reducing poverty in rural areas would stimulate a sustainable livelihood and healthy food supply and promote people living on the vast Mongolian plateau.

To reduce poverty in rural areas need to increase income. Herders' households' livestock product income consists of wool and cashmere, meat sales and skin and hides income. Moreover, pensions and social welfare benefits income is ranked the most significant share in non-livestock income sources. Herders have been willing to increase their livestock

numbers, as cashmere and meat are the primary sources of income. However, pasture carrying capacity is limiting. The researchers recommend that increasing livestock product export would help sustain and improve herders' income.

Mongolia's "VISION-2050" long-term development policy aims to be "a leading Asian country in terms of its social development, economic growth and citizens' quality of life". The policy measurements fit within all 17 Sustainable Development Goals (SDGs) that define national-level goals and activities based on the output or goal-based methodology.

The several parts of "VISION 2050" comprehensively touch on the herder's livelihood and livestock sector. Thus sectoral importance in terms of sustainable development triple pillars of economics, society and environment.

One of its long-term policies of Mongolia is to support economic diversification besides mining. About 50 percent of non-mining exports of Mongolia come from textiles, mainly wool, cashmere, and woven fabrics. More than 90 percent of export textile products are made of goat cashmere, the *first*-ranked income source of herders. Besides bringing cash income from cashmere, pasture degradation concerns limit the increase of goat numbers; because goats are more harmful than other animals on pasture. Current statistics noted that approximately 70 percent of Mongolia's pastureland had been degraded to some extent.

The following potential export product is meat, which is herder households' *second* most significant income source. As a result of various policies and negotiations between governments for several years, meat export is increased since 2014 and reached their peak point in 2018.

The *third*-ranked income source is hides and skins. It is the by-product of meat production. Therefore, when meat production increases, hides and skin income grows as likely.

The *fourth* income source for herder households is government pensions and social welfare income. Due to herders' low financial literacy and voluntary contributors' status, herders' participation in insurance coverage and the pension amount are mostly minimal.

Many of the factors mentioned above negatively affect the livelihoods of Mongolian nomadic herders and lead them to poverty, changing their livelihood strategies. The

scientific problem is that there is no systematic livelihood analysis to evaluate Mongolian herder households' livelihood strategies, including shocks, livelihood assets, activities, and outcomes and their underlying factors. Although scholars have studied the impact of cross-sectoral topics, rural poverty, natural disasters, *dzud*, and pasture degradation on the livelihoods of Mongolian herder households, there is currently no systematic study that suggests solutions based on sustainable livelihood theory. Therefore, the researcher wants to fill this gap and define the research objectives, questions and hypothesis.

1.1 Research objective

Overall, the PhD study aims to contribute to the literature by examining the current Mongolian herder households' livelihood strategies and possible interventions to cope with and recover from stresses and shocks and improve livelihood skills, capabilities, and assets. The research objective is **to explore the livelihood strategies of herder households in Mongolia, the factors influencing their choice, and contribute to finding ways out of poverty.**

1.2 Research questions

The research attempted to reach the research objective by answering the following research questions:

1. What is the importance of livestock number and its structure?
2. What are the critical primary livestock and non-livestock income sources?
3. What are the main essential capital elements, and what is their potential contribution to improve herder households' livelihood?
4. What are the main important type of risk (natural disaster risk, animal disease risk, income-related risk? How do the herder households cope with that?
5. What kind of institution is responsible for pasture management and poverty reduction? Are their activities efficient?
6. What are the characteristics of the supply chain and market access?

1.3 Research hypothesis

To answer the research questions, the study needs to test the following hypothesis at the end of the study:

Hypothesis 1 (H1): The number of livestock is critical in differentiating rural livelihood strategies among the herders' households.

Hypothesis 2 (H2): Vulnerability factors are the driving factor for selecting household livelihood strategies. Any shocks are threatening their livelihood but at different rates and forms.

Hypothesis 3 (H3): Poor herder households have few income sources and limited access to assets, market, supply chain and innovation services.

Hypothesis 4 (H4): The impact of government policies positively and sustainably promote rural development and anti-poverty.

Hypothesis 5 (H5): The growth of the mining sector, which is essential for the Mongolian economy, harms the development of the agricultural sector.

1.4 Research methodology

The study used two household surveys collected in 2017 and 2021 and time series of secondary data sets from the National Statistical Office of Mongolia (NSO). Data is analysed using several statistical and econometrical methods, including descriptive analysis, log-log and multivariate regression model, principal component analysis, growth model, income-based cluster analysis and seemingly unrelated regression model.

2. SUSTAINABLE LIVELIHOOD FRAMEWORK AND LITERATURE REVIEW

2.1 Introduction

A fourth of the world's land is occupied by nomadic herders who seek extensive pastures to feed and water their sheep, goat, cattle, horse, lamas, camels, yak and other animals. Approximately 200 million people live in nomadic livelihood forms, which is a sustainable way of using pasturelands (Tugjamba & Walkerden, 2021). Nomadics do not have many livelihood strategy options.

The agriculture sector is a high-risk industry (Gu et al., 2020), providing all food; however, its sustainability is questionable (UN Environment, 2019). The higher the risk, the greater the poverty in rural areas. About 80 percent of the world's extremely poor lives in rural (Castañeda et al., 2018). Their incomes depend highly on agricultural activities, making them vulnerable to any shocks and weather (FAO, 2019). Health shock and pandemics also negatively affect the rural poor who are already left behind (F. Ahmed et al., 2020). Seventy-five percent of the extreme poor, economically active people in rural areas are engaged in agriculture-based activities (Castaneda et al., 2018). Compared to other sectors, pastoralists and wage workers in the agricultural sector suffer from extreme poverty (Castañeda et al., 2018; Davis et al., 2017) and (de Haan, 2016). WB (2020) predicted that 88 to 115 million people would be in extreme poverty due to Covid-19.

Identifying the causes of poverty, poverty reduction policies, and rural development is critical to conducting systematic research on livelihood strategies, their changes, and the factors that influence them (Jiao et al., 2017). Researchers have been studying this for years.

Rural livelihood studies have a long history, dating back to 1885 when William Cobbett wrote the travelogue *Rural Rides*. Ancient geographers and sociologists have also conducted livelihood studies, calling them "livelihoods" or "modes of life." In 1992, Robert Chambers and Gordon Conway co-authored an influential work that laid the foundation for the modern livelihood approach. Furthermore, in the 1980s, the village and household and farming systems studies focused on development research. Their research focused on intra-household dynamics. Recently, a new study called "political ecology" has been joined, covering livelihood changes and environmental issues (Scoones, 2015a). In the 1980s and

1990s, attention began to be paid to linking long-term environmental issues to poverty reduction and rural development. (Scoones, 2007).

Since the late 1990s, numerous studies and publications have emerged promoting sustainable livelihoods. It emphasized the development of a comprehensive development program to promote sustainable livelihood. Livelihoods are a set of actions people deal with within their capacity and capital. Natural, physical, human, social, and financial resources are called livelihood capitals and are vital to people's survival while not compromising the natural resource (DFID, 2000a; Frank Ellis, 2000; Scoones, 2015b).

Thus, all the above mentioned approaches and definitions offer a variety of ideas about rural livelihoods.

2.2 Systematic literature review

Since rural livelihoods have a long history, there is a need to do a systematic literature review to avoid bias and rely on the work of a small number of researchers. Therefore, this dissertation's systematic literature review was done with the following steps.

1. The analysis was performed using three primary scientific sources: Web of Science, Scopus, and Sciencedirect. The review expanded the essential articles' references and those added to the database.
2. Collect grey literature related to the Mongolian herder households' livelihood.
3. A free online Rayyan software package was used to check duplication and include only relevant empiric research in the final literature analysis.
4. Free VOSviewer software was used in the science mapping to see authorship connections and keywords. The importance of the author's document was assessed based on the citations.

The keyword "rural livelihood" is the first step in the title and keyword search bar of Web of Science-Clarivate Analytics, Scopus, and Science direct.com; select English only and cover related subjects. After all, the filter refines Scopus database found 488 documents, and the Web of Science (WoS) database evidenced 418 documents. Science direct.com initially found 19217 research articles. The keywords' poverty' and 'Mongolia' were added, resulting in 353 research articles to narrow the search. A total of 59 grey literature sources are added.

Further, advanced refinements were made using the filters in retrievable articles with empirical research. The number of WoS articles came to 192, Scopus is 170 and Science direct.com released 45 articles. In the next stage, 466 research articles with 'ris' format and grey literature documents were imported Rayyan systematic literature review tool. They checked duplication first to identify the documents relevant to the research work. The final set of relevant studies was 132 documents until October 2021 (Figure 2.1)

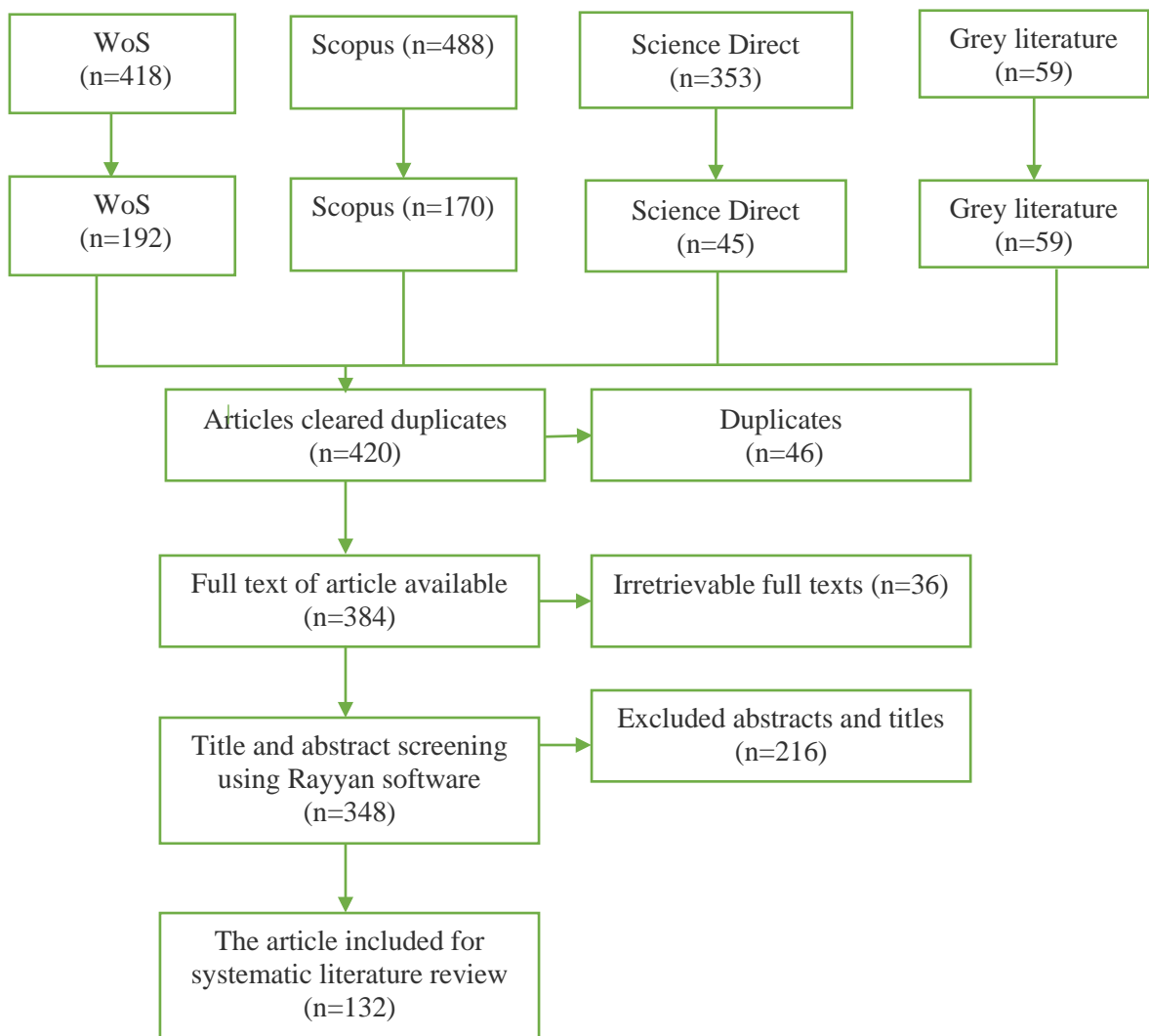


Figure 2.1. Reporting the systematic review diagram displaying the review stages

Source: Author's compilation

The Scopus analysis report was an example of the importance and frequency of the research. Figure 2.2 presents a number of documents studied between 1990-2021 in Scopus.

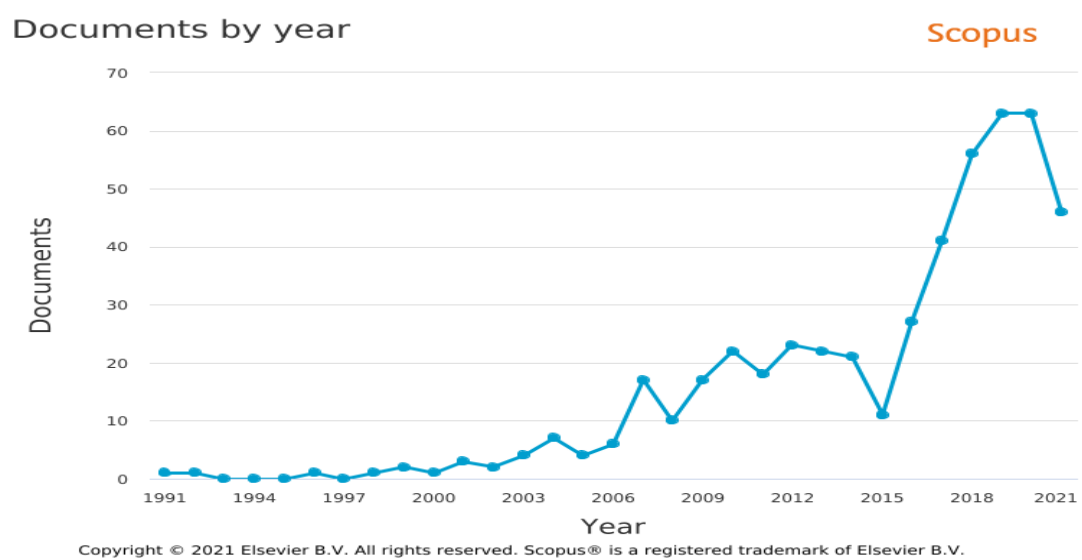


Figure 2.2. A number of documents related to rural livelihood are in the Scopus database.

Source: Generated by Scopus analysis report

Figure 2.2 illustrates that since the first article was published in 1991, it ranged from 1-7 articles annually until 2006. From 2007 to 2015, research was expanded and ranged between 6 and 23 publications. 2018 was the peak year of publication, with 63 research articles. Thus, the researcher concentrated on peak years of publications, including the most recent ones.

Sustainable rural livelihoods are interdisciplinary. Keyword search results prove it in Figure 2.3. A total of 4302 keywords were found under rural livelihood. 34.9 percent of the documents were related to Social Science, 25.4 percent to Environmental science, 12.9 percent to Agriculture and Biological Science, and 26.8 percent to other subject areas. Marine and forest-related livelihood studies were excluded in the title and abstract screening stage. The reason is that the Mongolian herder household's livelihood is nomadic and pastoralist. The colour of the circle distinguishes the year of publication. More yellow is close to the year 2021. The keyword "Covid-19" is yellow and a giant-sized circle, which means the number of articles published on the topic of livelihood and Covid-19 between 2019-2021 is high.

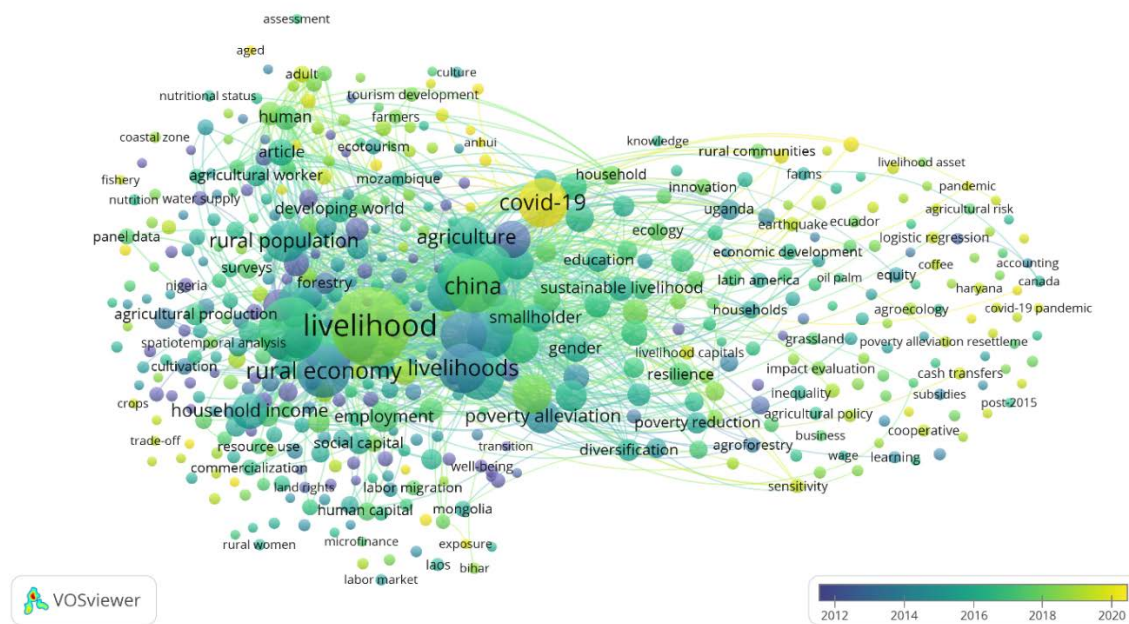


Figure 2.3. Keyword linkages with Rural livelihoods

Source: Generated by VOS viewer software for bibliometric analysis (2021-10-25)

Regarding the authors, China leads in the number of authors, followed by the USA, UK, South Africa, and others. All 1318 documents of 3652 authors were imported to the VOS viewer to check the strength of author connections. Consequently, articles of DFID, I.Scoones, Schacklton, Wang, Y, Zhang, Wang. C and Li. J were the most cited documents. Based on the systematic literature review results, the peak publication period was 2006-2021, and highly cited articles were selected for further literature review.

2.3 Sustainable livelihood framework

To reduce rural poverty and support people-centred development, must consider vulnerability context, livelihood assets and structures, and processes that actively influence/define people's livelihood strategies. Many factors influence the household livelihood strategy (Frank Ellis, 1999). For example, the number of animals (W. Ding et al., 2018; Hua et al., 2017; NSO & World Bank, 2000), household land area (Babulo et al., 2008; Hua et al., 2017; Qin & Zhang, 2016; X. Wang et al., 2019; X. Wu et al., 2019), gender of the household head (Sherbinin et al., 2008; Yang et al., 2020), and membership of any organisation (W. Ding et al., 2018; Hua et al., 2017; E. Li et al., 2017) distance to the nearest or central market (L. Zhang et al., 2018) and education level (Babulo et al., 2008; Blattman et al., 2012; D.Sherbinin et al., 2008; Hua et al., 2017; Khatiwada et al., 2017; Sewell et al., 2019).

Sustainable livelihoods (SL) is a framework based on the work of rural livelihoods study, agrarian changes, and community development, Integrated Rural Development, approaches of 1970-1980s. Nevertheless, it was not popular until 1992 Chambers and Conway published their work. Robert Chambers and Gordon Conway, Susanna Davies, Frank Ellis, and Ian Scoones are leading contributors to new livelihood definitions and approaches in the 1980s and 1990s. Chambers & Conway (1992) described a range of words that refers to sustainable rural livelihoods: support, values, capability, agriculture, resources, human, effects, change, concepts, households, opportunities, conditions, adequate income, rich, education, social, assets, activities, shocks, generations, global and many more (Chambers & Conway, 1992).

After that, Davies (1996) wrote a book that details food monitoring, advice for people's response to changes, and urges more sustainable food insecurity policies for rural poor rather than just sending food aid. Following, Frank Ellis produced a review article and discussion papers on rural livelihood diversification and poverty reduction policy implications for developing countries based on the evidence of Sub-Saharan countries such as Malawi, Tanzania, and Uganda (F Ellis et al., 2003; F Ellis & Bahiigwa, 2003; F Ellis & Freeman, 2004; Frank Ellis, 1998, 2000; Ellison, 2006). Later, HIV/AIDS health issues become livelihood issues; livelihood diversification, migration, nonfarm, and issues placed are a rural development (Scoones, 2015b).

Sustainable Livelihood Framework (SLF) originated from Chambers & Conway's (1992) book. Under the coordination Department for International Development (DFID) of the United Kingdom Government, the multidisciplinary research team redesigned the sustainable livelihood model as a "sustainable livelihood approach" and created the Sustainable Livelihood Framework. The framework provides a systematic theoretical basis for Sustainable livelihood research. The sustainable livelihood approach aims to promote "poor people's livelihood through improving access to quality education, advanced technology, training, nutrition, health, a supportive social environment, better management of natural resources, infrastructure, financial resources, and policy support" (DFID, 2000b). DFID defends the following: "A livelihood comprises the capabilities, assets and activities required for a living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future while not undermining the natural resources base". The framework has been widely used in rural livelihood research (Figure 2.4)

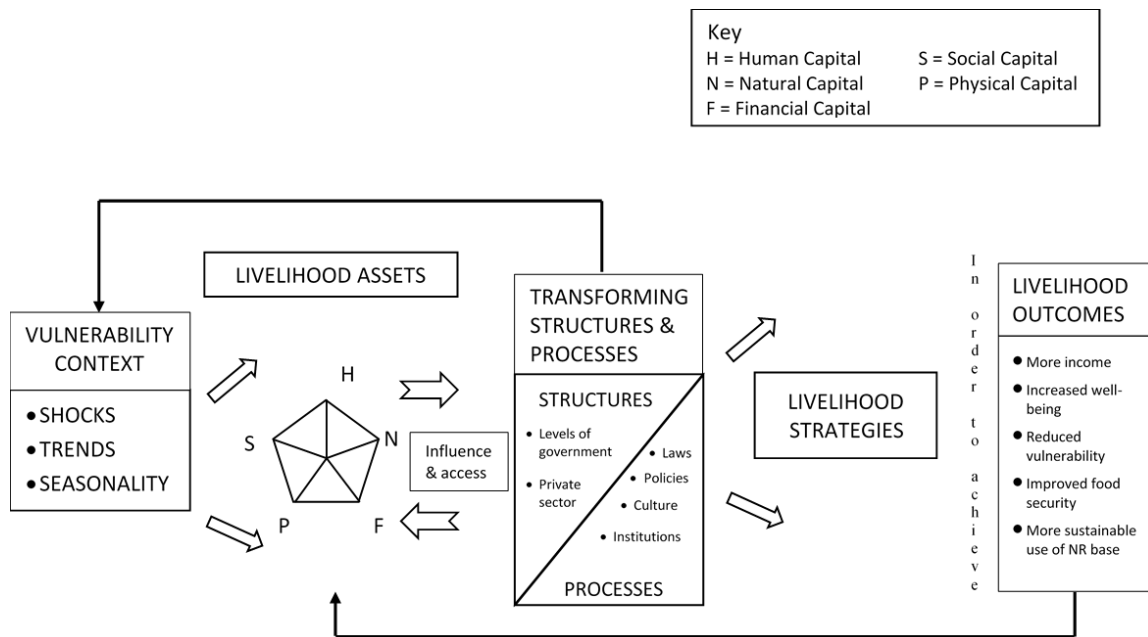


Figure 2.4. DFID's sustainable livelihoods framework (SLF)

Source:(DFID, 2001b)

The essence of the sustainable livelihood framework is that poor people are at the centre of development. Batterbury (2015) argued that all actors in the sustainable development framework emphasise it differently. However, it is widely accepted that sustainable rural livelihoods should be the basis for improving rural development and poverty alleviation. The following two frameworks are widely used and internationally accepted analytical frameworks.

Well-known scientist Ian Scoones developed the next SLF. He developed a diagram illustrating different livelihood capitals' impacts selection of different livelihood strategies outcomes, influenced by context, policy, and structures (Figure 2.5). Scoones has added new issues to the SLF, including global climate change, poverty-related natural resources, and political policies. He argued that promoting sustainable livelihoods for the poor means improving their skills, having multiple livelihood strategies, increasing their size, making household production more productive, and pursuing available policies (Scoones, 2015b).

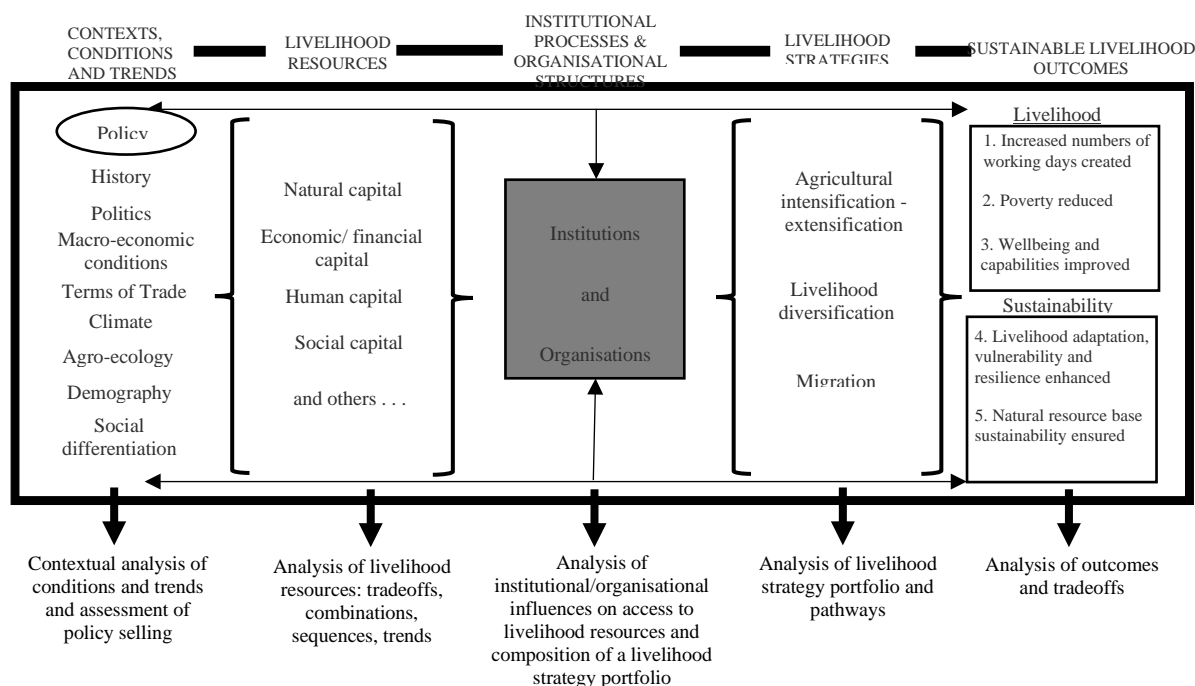


Figure 2.5. Ian Scoones's the sustainable livelihoods framework

Source: (Scoones, 2015a)

The difference between the two frameworks is that DFID created a general framework, and Ian Scoones created a more detailed framework with analysis (bottom of the diagram). Many scholars use these analytical frameworks and draw their particular ones (Ansah et al., 2020; Barbier, 2020; Berry et al., 2015; J. Ding et al., 2020; Frank Ellis, 2000; Liu & Liu, 2016; Soltani et al., 2012; X. Wu et al., 2019).

A sustainable Livelihood Approach (SLA) is diverse and flexible in many environments. Sustainable livelihood approach connects macro-micro level issues. When we consider development issues, we look at the macro or micro level separately, while SLA addresses the connection between these two levels. However, it is not a magic tool to eradicate poverty alone, nor is it a completely new idea to revolutionise development research and collaboration. SLF is an excellent schematic tool for guiding the development of research and development projects (Batterbury & Scoones, 2015).

2.4 Elements of the Sustainable Livelihood Framework and its application

In this sub section explains main elements and indicators of sustainable livelihood framework of DFID based on the scholarly references and literature review.

2.4.1 Vulnerability contexts

Trends, seasonality and shock are factors of vulnerability context; they directly impact livelihood capital and outcomes.

Population *trends*, resource availability trends, economic situation trends, government policy trends, and technological trends can happen. They have a significant influence on the output of chosen livelihood strategies. However, there is a slight chance of responding to trends or preparing for prevention and coping.

Seasonality and shocks have less chance to avoid or are limited to control. Seasonality is usually associated with rural economies. Price, job availability, and water and food access are significant problems for poor people (DFID, 2001b). Due to Mongolia's extreme climate and four seasons, livestock income is seasonal. Herders earn money by selling goat cashmere in the spring, wool in the summer, and meat in the fall, usually in bulk or one-off sales. However, the household's regular monthly expenses continue, resulting in poor households' deficiency of cash, poverty and inequality.

Natural disasters, economic and livestock health, and civil conflict are *shocks* that can directly influence assets and livelihoods. Ansah et al. (2020) identified 21 different shocks in farm households; however, only a few were frequent. Global economic crises, including exchange rates, politics, and trade terms, could directly impact the very poor.

Households with *human health shocks*, such as household members' illnesses, may need to sell livestock or spend family savings on securing their everyday consumption (DeLoach & Smith-Lin, 2018; Islam & Maitra, 2012; Isoto et al., 2017). Health problems of household members reduce human resources and increase health or funeral expenditures (Sung, 2017), reducing household income and calorie intake (Shammi et al., 2021). Households may need to adopt different strategies depending on the severity or singularity of the shock.

Asset-wealthy households are more capable of coping with any risks and shocks. The nature of the shock characteristics is the basis of the coping strategy (Lokonon, 2019). However, the seriousness of shock is a matter (Ansah et al., 2020). These might be caused by natural phenomena, draught, hot, cold, wind, snow, human and animal health problems, pests, or price shocks. Adverse weather risks are most common in agriculture (Gu et al., 2020).

Likewise, shocks such as natural disasters *dzud*, drought, and animal disease are the most frequent risks in the agriculture of Mongolia. Successive *dzud* in 1999-2001 and 2009-2010 strongly impacted livestock numbers and household livelihoods (Engler et al., 2021; Khan & Gottschalk, 2017; Mearns, 2004b; Oniki & Dagys, 2017).

Mearns (2004b) defined frequent shocks faced by rural Mongolian households: human health and cost of treatment, fee and cost of kids' education, job insecurity, loss of livestock due to natural risks, fuel price, theft, insufficient cash and funerals of a family member.

Due to these trends, seasonality and shocks, the lives of herders are forced to become extreme in poverty and lead to migration. After the *dzud* of 2010, about 40 thousand herders lost their livestock. Consequently, they are pulled to move to urban areas to find a better life (Emily, 2019). Currently, over 2.2 million people or 68 percent of the population, live in urban areas of Mongolia.

Ulaanbaatar, where the population density is 704 people per square mile, while there are five people per square mile in rural areas (World Population Review, 2021). Migration can lead to abandoned rural areas, overpopulation in urban areas, and air, water, and soil pollution. Therefore, rural development and the reduction of rural poverty, in turn, are related to many issues, such as the sustainable supply of food to the urban population, population density, and the keeping tradition of nomadic culture.

The primary vulnerability contexts that strongly impact the livelihood of nomadic herders are natural factors, drought, floods, and storms (FAO, 2019; Gu et al., 2020). Moreover, global warming, overgrazing, water shortages, animal diseases, herders' preparation for shocks, improper herd composition, and decreased herd productivity are trending to enhance vulnerability (Chadraabal et al., 2020; C. Du et al., 2018). In addition to the dangers of natural disasters, wolves, livestock theft, and animal disease contribute to livestock losses. 11.0 percent of livestock losses are from natural disasters, snow, *dzud*, floods, fires and thunderbolts, 2.7 percent from animal diseases, 2.7 percent caught by wild animals, and 83.6 percent from other reasons related to the responsibility of herders and herding in 2020.

The new global disease Covid-19 is one of the vulnerable contexts affecting every household and business (Alshaabani et al., 2021), especially in poor and vulnerable households (O. Ahmed & Sallam, 2020; World Bank, 2021). Covid-19 brought risks to agriculture: input

price increase, deficiency of workers, interruption of logistics transportation and a decline in sales at any stage of the value chain (S. T. Hossain, 2020).

There was no study yet on how this new type of shock, Covid-19, affects the livelihoods of Mongolian herders; therefore, the researcher conducted a comparative study of herder households with other types of households.

2.4.2 Livelihood assets

Assets are generated or destroyed due to the vulnerability contexts. Livelihood is determined by the activities that comprise how people live and the resources that ensure their well-being to create revenue for the household.

Livelihood assets/capitals can be saved, exchanged, and transferred (W. Ding et al., 2018; Van den Berg, 2010). The level of assets is a matter of overcoming any shocks. If the household's reserves are insufficient, it may be required to employ other tactics until all viable choices are explored before diminishing productive assets (Ansah et al., 2020). More assets can have more excellent multiple strategy options. The livelihood strategy manages or combines various livelihood assets to maintain or improve livelihoods (Hahury et al., 2020; W Peng et al., 2019). According to Barrett & Garg (2016) and Hoddinott (2006), asset accumulation is critical for overcoming chronic poverty and lowering food insecurity. If necessary, households use asset depletion as the last alternative (Ellis, 2000).

Many scholars studied how household assets influence family livelihood strategies and livelihood outcomes with different aspects with empirical data.

Hua et al. (2017) evaluated the relationship between livelihood assets and livelihood strategies in Eastern Tibetan Plateau, China, covering 357 households. W. Ding et al. (2018) studied the livelihood capital's impacts on livelihood strategies of herder households in Inner Mongolia, China, with a survey of 895 households. Erenstein et al. (2010) focused on poverty issues based on the livelihood assets in India. Bhandari (2013), using the SLA approach and examining capital resources' impact on livelihood changes in Nepal, covered 1180 farm households. X. Wang et al. (2019) examined using 395 surveys from the poor mountainous area of China to define the linkage between livelihood strategy and capital.

Baffoe & Matsuda (2018) analysed access to livelihood assets and its impact on the choice of household livelihood strategy in Rural Ghana with gender differences. Hua, Ding, Wu, and Wang described variables in more detail and used a similar approach to index household assets.

X. Wang et al. (2019) specified 23 types of livelihood capital, including cash, financial assistance from friends and relatives, the number of family members who work as government employees, age, cultivated land, livestock and poultry numbers, and market value of production instruments.

Ding et al. (2018) defined 12 variables from 5 different capitals and analysed Chinese herder households. Those variables are each evaluated by an index system. Human capital (HU) includes (1) Household labour capacity is defined by a full capacity person (index=1), + children and elders who are incompetent persons + semi-capacity person (index=0.5) who can do simple housework + less energetic person (index=0). HU variable Educational level indexes are 1; 0.75; 0.5; 0.25; and 0. The number of illiterate people in the family will multiply by 0; primary school education 0.25; junior high school 0.5; above junior high school education index 0.75; college degree or above is 1. Physical capital includes livestock, housing, animal shelter conditions, and other fixed assets. Number of livestock indexes are camel x7; horse x 5; cow x 5; sheep x1, goat x 0.9. Natural capital is indexed by its productivity. Meadow x 1.59; Typical steppe x 1.06; Desert steppe x 0.85; sandy steppe desert x 0.79; Steppe desert x 0.35. (W. Ding et al., 2018). Cash incomes and loans represent financial capital; (5) cooperation and gift spending is selected for social capital. All assets are classified into the following five types.

1. Human capital

Human capital is represented by soft and hard skills, knowledge, ability to work, and good health. Many researchers indicate human capital's importance. Poor people are less educated (Babulo et al., 2008; Blattman et al., 2012; Hua et al., 2017; Sherbinin et al., 2008). The education level of the family head had a strong positive impact on rural Nepal (Khatiwada et al., 2017). Health conditions are directly related to income level (Hua et al., 2017; P. Wang et al., 2019). According to the DFID, people need improved access to high-quality education, information, technologies and training and better nutrition and health to secure a sustainable livelihood. Thus, direct and indirect support is needed. Helping to reduce the timing of the

day-to-day activity enables access to qualified education, training, and better health, particularly in rural areas. In recent studies, human resources have been studied quantitatively. A full labour capacity refers to a healthy adult who does work. Children, the elderly and patient family members who cannot work should equal "zero" labour capital. Children and the elderly who can undertake minor house chores or farm work are considered half-labour. This multiplier is vital to examine the available farm or rural human resource capacity (W. Ding et al., 2018; Hua et al., 2017; P. Wang et al., 2019; X. Wu et al., 2019). Table 2.1 summarizes human capital indicators.

Table 2.1 Human capital indicators

Indicators	Description	Scholarly references
Education (Years) (take the logarithm)	Educational years of the head of the households	(Blattman et al., 2012) (Babulo et al., 2008) (Hua et al., 2017) (Sherbinin et al., 2008)
Education (Indexed)	Educational level indexes are 1; 0.75; 0.5; 0.25; and 0. The number of illiterate people in the family will be multiple by 0; primary school education 0.25; junior high school 0.5; above junior high school education index 0.75; college degree or above is 1	(Ding et al., (2018)
Age of household head (Years)	Age of household head	(X. Wang et al., 2019) (Hua et al., 2017) (Sherbinin et al., 2008) (X. Wu et al., 2019)
Household labour capacity	Each family member's labour capacity is assigned a value. Non-labor = 0; 0.5 = half-labor and 1 full labour (adult). (0=children who are too young to work, the elderly who are too old to work, and patients who are unable to work). (0.5= children and elderly who can help with household or farm work).	(Hua et al., 2017) (Ding et al., (2018) (X. Wu et al., 2019) (Wang et al.2019)
The proportion of family members in good health	The proportion of household family members in good health. 1=Very poor, 2=poor, 3=average, 4=good, 5=very good	(Hua et al., 2017) (Wang et al., 2019)

Source: Author's compilation

2. Social capital

The social resources are developed through: networks and connectedness (J. Ding et al., 2020; Hua et al., 2017; H. Li et al., 2020), which would increase trust and ability to collaborate, expand people's access to different and more organized groups or institutions (Z. Li et al., 2013; P. Wang et al., 2019), such as political or civic bodies; membership of more formalised groups (Sewell et al., 2019; Tumur et al., 2020); and relationships of trust, expenditure for an important social event during the year (new year, wedding, funerals) (W. Ding et al., 2018; Hua et al., 2017) friendship and exchanges that promote collaboration, lower transaction costs, and may serve as the foundation for impoverished people's informal safety nets. Improved economic relations and social capital efficiency help an individual's income and personal savings. Like other assets, social capital can contribute to people's sense of happiness through identity, honour and belonging. A more supportive and cohesive social environment is a sustainable livelihood objective related to social capital. One of the most significant of social capital is may effectively enhance shared resource management and infrastructure quality. There is much research on other factors, but very few studies on how cultural and social factors affect livelihoods (Rigg, 2006). For example, the ageing of farmers and the new generation's desire to reside in cities as a result of media-led consumption, education, and mobility are the most powerful forces driving rural developments. When accessible, kinship support, a tradition in Mongolia, prevents more vulnerable households from turning to poverty (Mearns, 2004b; NSO & World Bank, 2000). Table 2.2 summarizes social capital indicators.

Table 2.2 Social capital indicators

Indicators	Description	Scholarly references
Number of relatives and friends providing employment opportunities	Number of people available for assistance when seeking a migrant working opportunity	Wang et al., 2019 (X. Wu et al., 2019)
Gift, social expenditure (Currency)	Money spent on an important social event during the year (new year, wedding, funerals)	(Ding et al., (2018) (Hua et al., 2017)
Number of labour exchanges (People)	A household requires several labour exchanges to assist during a busy period for free, in-kind or with payment.	(Hua et al., 2017)

Number of civil servants (family members)	Number of civil servants in clan	Wang et al., 2019 (X. Wu et al., 2019)
Household size (People)	Number of family members living in one household	(NSO & World Bank, 2000)
Kinship support	When possible, the support of relatives and friends prevents vulnerable groups from falling into poverty and poor livelihoods.	(NSO & World Bank, 2000)
Competent spouse, Peaceful family life	Responsible and not addicted to alcohol	(NSO & World Bank, 2000)

Source: Author's compilation

3. Natural capital

Natural resources have both tangible and intangible forms. Such the atmosphere and biodiversity are intangible and utilized directly for agricultural production. Land, forest, pasture, marine, wild resources, and water are tangible forms of natural capital. The livelihoods approach seeks a broader perspective, focuses on people, and recognizes the significance of institutions and processes in shaping how natural capital is utilized and valued. Allow secure access to and better management of natural resources would be achieved through directly conserving resources and biodiversity (via technology innovation and direct action) and providing services/ inputs for natural capital; and indirectly (via developing structures and processes) (Khishigbayar et al., 2015; Sewell et al., 2019).

Moreover, DFID stated that land is a primary asset of rural livelihood but is not always sufficient to reduce rural poverty (DFID, 2001c). Rigg (2006) raised the issue that profound life transitions happened during the last decades. The number of rural households who do not engage directly in farming is increasing; therefore, rural livelihood and poverty are not directly dependent on land or animals they own (farming activity).

Water scarcity shaping rural livelihoods. Less water and annual precipitation cause *dzud* and drought (Marion et al., 2018; Schoderer et al., 2020; SDC and MMCG, 2017; Ulambayar & Fernández-Giménez, 2019). Thus, it directly and negatively influences herders' livelihood and wildlife. Table 2.3 summarizes natural capital indicators.

Table 2.3 Natural capital indicators

Indicators	Description	Scholarly references
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Inherited land (ha)	Household's inherited grassland area	(Hua et al., 2017)
Available land (ha)	Household's total available grassland area	
	Per capita farm land/ farming/grazing/ area of the family	(Babulo et al., 2008)
Productivity, edible plant percentage	Meadow x 1.59; Typical steppe x 1.06; Desert steppe x 0.85; sandy steppe desert x 0.79; Steppe desert x 0.35.	(W. Ding et al., 2018).
Crop land (ha)	Cultivated farmland per capita	(Wu et al., 2019) (X. Wang et al., 2019)
Well (quantity)	Deep well availability	(Agipar, 2016)
Otor(ha)	Available Otor (reserve) area	(Mearns, 2004b)
Natural water distance (km)	Access to watering livestock and crop (distance)	(Agipar, 2016)
Distance to market (km)	The distance from the village to the nearest (sub) urban area	(L. Zhang et al., 2018) (Artmann et al., 2020)

Source: Author's compilation

4. Financial capital

Financial capital refers to people's financial resources to attain their living goals. Mongolian herder households' financial resources make up a few resources. The primary sources of cash income are livestock product sales income, pensions, other transfers from the public body, and remittances (DFID, 2001b).

Access to formal and informal loans also shapes rural poor's livelihoods. Households able to receive informal loans (from parents, relatives and friends) are less vulnerable to shocks. Similarly, access to loans from banks and credit and saving unions or service availability is essential in choosing livelihood strategies (J. Ding et al., 2020; G. Wu et al., 2021). (X. Wang et al., (2019) examined how a donation impacts an individual's livelihood.

Pension is one of the primary income sources for the rural poor and aims for income replacement and poverty prevention (Dethier et al., 2011). However, higher pension amounts depend on consumer financial behaviour and pension planning. Retirement is a significant emotional, social, and economic event (Aaron, 2010). People who plan for retirement save more money (Rusconi, 2009). However, people often lack financial knowledge and retirement plans (Holzmann Edward, 2006). Financial literacy is critical in retirement

planning (Lusardi & Mitchell, 2011). Individuals' financial literacy skills vary, and numerous variables influence them. According to Kadoya & Khan (2019), gender, age, education, income and employment, and future perceptions substantially impact financial literacy. Table 2.4 summarizes financial capital indicators.

Table 2.4 Financial capital indicators

Indicators	Description	Scholarly references
Cash income (Currency)	Cash income per capita from the farm and other activities	(Ding et al., 2018), (X. Wang et al., 2019), (Hua et al., 2017) (X. Wu et al., 2019)
Loan	Borrowing from relatives/informal	(Ding et al., 2018), (X. Wang et al., 2019), (Hua et al., 2017) (X. Wu et al., 2019)
	Access to bank loan/formal yes=1/no=0	(Ding et al., 2018), (X. Wang et al., 2019), (Hua et al., 2017), (X. Wu et al., 2019)
Donations (Yes, no)	Whether households receive donations or remittances	(X. Wang et al., 2019)
Saving (currency)	Whether households have saving	J. Ding et al., 2020; G. Wu et al., 2021 DeLoach & Smith-Lin, 2018; Islam & Maitra, 2012; Isoto et al., 2017; Ruszczyk et al., 2021
Social-Insurance coverage	Herders who paid social insurance fees for some years.	(Madrian & Shea, 2001)
Livestock	The number of households, livestock, and primary source of income.	(Raaij, 2016)
Total income	Households' total farm and non-farm income sources	(Raaij, 2016)
Total cost	Total annual household expenditure.	

Source: Author's compilation

Although some studies and reports on the income of Mongolian herder families from livestock farming, there have been no research on old-age pensions and allowances, which play an essential role in income and guaranteeing future livelihood. However, the social insurance coverage of herder households is low, or 27.4 percent (NSO, 2019). The law amendment in 2017 opened several opportunities for herders. The main change is that the retirement age is decreased by five years (Parliament of Mongolia, 2017). According to the law, 55 for men and 50 for women can start an old age pension. As of 2017 (the last

agriculture sector census), 47.6 percent of all herders were over 45 years old. Thus, the researcher studied the financial knowledge of herders and their pension planning.

5. Physical capital

Roads, railways, electricity, and communications are infrastructures that are essential to unifying rural areas. Good roads, transport, and infrastructure facilitate people's movement between rural and urban areas. They are more likely to understand better the potential (or deficit) of the areas in which they intend to move, temporary or permanent (DFID, 2001a). Fixed assets of the household are driving factors for pursuing different strategies. The fixed assets include housing, *ger*² cars, trucks, tractors, computers, refrigerators, television, electric generator sets, shops, agritourists, motorcycles, threshers, grinders, etc. The quality of durable goods should be given special consideration.

The number of livestock, animal shelters, winter and spring places, and trucks are the most driving capitals in rural Mongolia. Livestock has multifunction roles in rural households; a job and income source, food supply for a family and relatives and insurance when facing a shock (NSO and WB, 2020). If herder households lose their animals due to *dzud* impact, it pushes them to migrate (NSO, 2019; NSO & World Bank, 2000; Oniki & Dagys, 2017) or change livelihood strategy. A livestock number is a measuring unit of herder households' wealth and poverty in Mongolia. According to the definition of Worldbank (2009), full-time herder households with over 500 livestock numbers are wealthy households; 200-500 are middle or lower wealth households, and less than 200 are poor households. Agipar (2016) concluded in his research that income from 200 heads of livestock is insufficient to feed an average rural family of four.

Herding different animals also depend on regions and household durable consumer goods. The sheep unit converts units of all types of animals into one unit. Scholars using a sheep unit in pasture degradation (Densambuu et al., 2018; Dietz et al., 2011; Oniki & Dagys, 2017; Rasmusen & Dorlig, 2011; Vova et al., 2020) and livelihood studies (W. Ding et al., 2018; Wenjia Peng et al., 2017; Soltani et al., 2012) are common. Table 2.5 summarizes physical capital indicators.

² Mongolian traditional house, very convenient, constructs easily to use during move.

Table 2.5 Physical capital indicators

Indicators	Description	Scholarly references
Total livestock owned (Number)	Each type of livestock is converted to one unit. Number of livestock indexes are camel x7; horse x 5; cow x 5; sheep x1, goat x 0.9.	(Hua et al., 2017) (Ding et al., (2018)
Fixed assets of households/Durable consumer goods (Percentage)	The proportion of fixed assets owned by the household, accounting for total fixed assets that assume to be 10. The ten fixed assets include cars, small tractors, taxis, shops, small family-run workshops, agritourists, motorcycles, threshers, grinders and others (which serve agricultural and non-agricultural purposes), own durable goods or machines none=1, one=2, three=4, four or more=5	(Hua et al., 2017) (X. Wu et al., 2019)
	Present value of production tool (Currency)	(X. Wang et al., 2019)
	Present value of vehicles (Currency)	(X. Wang et al., 2019)
Housing quality	Housing quality with concrete, brick, wood, stone, and wood and earth structures. The respective assigned values are 5, 4, 3, 2, and 1	(Hua et al., 2017) (X. Wu et al., 2019)
	Present value of housing	(X. Wang et al., 2019) (Hua et al., 2017)

Source: Author's compilation

2.4.3 Institutions and processes

Transforming Structures and Processes are the institutions, organisations, policies and legislation that shape livelihoods. Structures refer to the public sector, private commercial and civil society. Processes are policy, legislation, institution and culture. (DFID, 2001b).

According to Hahury et al. (2020), local institutionalism, such as norms and formal and informal policies, is a defining factor of effectiveness. They highlighted that this rural community and social relations mostly happen due to limited resources or access to natural resources. Rural communities' capability to respond to vulnerabilities highly depends on local and institutional adaptations. Traditions, customs and rules are referred to as institutional approaches and explore how they impact the choice of livelihood strategy. The

institutional adjustment is based on habits rooted in the community's local knowledge and life experience. Furthermore, they emphasized the importance of social interactions (kinship, religion, race) and institutional pressures frequently modifying rural livelihoods (rules, customs, practices) and organisations (church, government, NGO) (Hahury et al., 2020). E. Li et al. (2017) argued that local leaders are economic actors who always have good ideas. These ideas were soon adapted by local pioneers and spread among neighbourhoods. If these have become a model, it is paid attention to by local policymakers and then become local policies.

From the perspective of Mongolian herders' organisation, community, culture, and anthropology, research on kin relationship, herder cooperative, pasture user groups, and their impact on pasture management have been conducted by researchers. Research conducted in Mongolia shows how the community effectively cares for rangeland based on tradition and culture. Tumur et al. (2020)'s study results of community-based rangeland management in Mongolia show that a group of herders who use common pasture areas created a 'Pasture User Group' community that significantly impacts rangeland quality. All group members participate in the PUG activities and discuss their problematic issues using a bottom-up approach to overcome challenges and difficulties in improving rangeland quality.

The policies and programs adopted by the government regarding herders are aimed at improving the livelihood of herders and developing the countryside. The following Mongolian laws and regulations are effective in the livestock sector.

Laws:

- Genetic Fund of Livestock
- Protection of Livestock Health
- Support Small Medium enterprise and services /2019/
- Livestock tax /2020/

State policies:

- Mongolia's Long-term Development Vision – 2050
- Food and agriculture sector
- Herders
- Medicine /2010, 2020/

- Food and agriculture sector

Programms:

- Action Programme of the Government of Mongolia 2021-2025
- Mongolian Livestock
- Mongolian Agenda for Sustainable Livestock /2018 #A105/
- Supporting intensive animal husbandry development /2018 #400/
- Animal Health /2018 #12/
- Improving live animal and meat export /2017 #318/
- Increase of meat production /2017 #14/
- Sub Programme to support livestock sector production /2016 #114/
- Meat /2015 #492/
- Amendment on regulation /Sheep, camel wool subsidy /2015 #122/
- Increase of meat production /2017 #14/
- Mongol Herder /2020 #34/

The most recent program is the National Program of Mongol Herder. The program aims to provide information, and capacity building, ensure work comfortably in their communities, improve living conditions and social security, increase their productivity, income and profits, and empower them. Tax law on livestock is effective from 2021. The law aims to support the macro economy of Mongolia, reduce inequality of herders' livelihoods and create financial sources for pasture management activities at a local level. The tax rate per head of livestock is 0-2000 MNT, depending on the number of livestock owned by herders. In addition to these key policy documents, the Pasture law draft has not been discussed or approved for many years. In the dissertation, we selected one of the government policies for analysing the meat export promoting policy and its impact on herders' livelihood.

2.4.4 Types of livelihood strategies

Livelihood strategies refer to different livelihood activities, decisions, and combinations of activities (Zhang et al., 2018) that households pursue to achieve a goal. Defining and systematically studying a livelihood strategy and its transition is essential to identify the secure livelihood strategic choices, transitions, influencing factors, causes of poverty and

poverty reduction approach, and developing effective strategies and policies for rural development (Jiao et al., 2017).

Dixon et al. (2001) defined farming systems and livelihood strategies globally. The study was done by FAO and WB, covering six developing world regions. It initiated a general classification of farming systems based on (i) natural resource use, (ii) farm activities and household livelihoods, and (iii) the intensity of production. Consequently, over 70 farming systems have been found, with an average agricultural population of almost 40 million. Based on these parameters, eight broad agricultural system types have been identified:

1. Irrigated farming systems
2. Wetland rice-based farming systems
3. Rainfed farming systems in humid areas
4. Rainfed farming systems in steep and highland areas, which are often mixed crop-livestock systems
5. Rainfed farming systems in dry or cold low potential areas, with mixed crop-livestock and pastoral systems merging into systems with very low current productivity or potential because of extreme aridity or cold;
6. Dualistic farming systems across a variety of ecologies and with diverse production patterns;
7. Coastal artisanal fishing systems and
8. Urban-based farming systems (Dixon et al., 2001).

Mongolia is classified as a “Rainfed farming system in dry or cold low potential areas, with mixed crop-livestock and pastoral systems merging into systems with very low current productivity or potential because of extreme aridity or cold”. Further, Dixon et al. (2001) defined five key livelihood strategies to address the global challenges and ways out of poverty over the next 30 years. Hence:

1. Intensification
2. Diversification
3. Expanded farm or herd size
4. Increased off-farm income and
5. Complete exit from the agricultural sector.

The *asset-based*, *activity choice* and *income-based* approaches are all used to categorize livelihood alternatives. The *asset-based* approach considers input utilized across activities. In contrast, The *income-based* method categorizes livelihood options in production based on revenue from a particular source, such as nonfarm income, forest income, and cash transfer income. (Sun et al., 2019). Income-based Cluster analysis is the most commonly used approach for defining livelihood strategies (Nielsen et al., 2013). The *activity choice* method is derived from the concept and fundamentals of livelihood strategies and categorizes livelihood strategies from the process's perspective. Input, activity and output are interlinked. Thus, Nielsen et al. (2013) emphasised that activity variables should connect assets and outputs. The asset-based approach is from an input perspective, whilst the activity choice approach is a forming process, and the income-based approach is from the output perspective.

X. Wang et al. (2019) classified the following types of rural households' livelihood strategies in China utilising an activity choice approach with defined percentages (i) non-agricultural type; (ii) non-agricultural dominant type; (iii) agricultural dominant type; (iv) pure agricultural type. Specifically, pure agricultural meaning that rural households are without non-agricultural income. Agricultural dominant rural households are those whose non-agricultural income accounts for 0–50 percent of total household income. "Non-agricultural dominant rural households" refers to those receiving 50–90 percent of total income from non-agricultural income. Non-agricultural rural households denote rural households whose non-agricultural income accounts for more than 90 percent of total household income.

The following example of the activity-based approach is Zhang et al. (2018), who argued a lack of study on multi-level determinants of rural livelihood strategies in rural China. They were assessed on three levels: household, village, and peasant. The results show that the rural livelihood strategy has little difference between groups at the household level and significant inter-group variability at the village level. The variability at the village level accounts for the most significant percentage of the total variability—highly educated male young people in the village work only in nonfarm activities. They classified Chinese peasants' livelihood strategies into three types: on-farm, multiactivity, and off-farm.

More example that uses an activity-based approach is Mzuyanda, (2020); he classified households' livelihood strategies in Mnquma, South Africa, into three groups: (i) crop sales

only, (ii) livestock sales and a combination of crop and livestock sales; (iii) and off-farm income.

In an earlier study, Soltani et al. (2012) surveyed 75 semi-nomad rural households in Iran and examined the most sustainable strategies. As a result, households that rely heavily on forest extraction and animal grazing are the poorest, whereas those that utilize a combination of tactics earn more. The study used to output (income-based approach) and considered two outcomes of SLF poverty reduction and sustainability of natural resource use.

Households often pursue different or mixed strategies. The livelihood strategies in rural communities were applied differently depending on the available livelihood resources or assets and vulnerability circumstances (Hahury et al., 2020). In research in rural Mozambique, Africa, Walelign (2016) found that the lives of poor rural farmers depended on agricultural land as their livelihood assets. The same thing was also found in Central Nepal, where agricultural land owned by rural farmers was a significant determinant of household access to livelihood when the shock occurred (Khatiwada et al., 2017). The livelihood strategies within the same group or neighbourhoods might have strong similarities (E. Li et al., 2017). From an individual or family perspective, replacing existing income sources with unfamiliar alternative strategies is risky (Ireland et al., 2004). Individuals in high-poverty regions may be hesitant to transition to a different source of income because they cannot handle the degree of risk. However, over the long term, introducing alternative livelihood strategies would decrease households' and communities' risks (Roche, 2007). Non-agricultural and part-time labourers are becoming more prevalent among rural families' total labourers. In contrast, the share of pure agricultural labourers decreases, resulting in rural households' differentiation (X. Wang et al., 2019). Soltani et al. (2012) concluded, based on a study in rural Iran, that there is a tendency to shift from a forest or livestock-based livelihood strategy to a mixed livelihood strategy.

Although agricultural production plays a significant role in many rural areas, livelihoods are complicated. Rural households are frequently pluriactive, with broadly diversified activities and many other benefits to family well-being. There is much dispute in the literature about the significance of livelihood diversification, which may be broadly categorized as signifying either (i) distressed livelihood or (ii) increasing success. Distress livelihood means a strategy of spreading risk to reduce vulnerability. A progressive success strategy means adopting the DFID framework. Frank Ellis (2000) divides the diversification

decisions into necessity vs choice. Diversification by choice is related to the voluntary decision of a household to diversify. In off-farm diversification, middle-class households start, and poor and wealthy households stay behind. Different off-farm sectors demand different levels of investment and offer differential returns (Gautam & Andersen, 2016). High-return industries provide better livelihood returns but require greater resource investment capacity. As a result, impoverished households are less interested in investing in high-return industries.

2.4.5 Sustainable livelihood outcomes and poverty

The accomplishments of livelihood strategies are referred to as livelihood outcomes. Increased income may assess well-being, build resilience, enhance food security, and promote more sustainable natural resource usage. All those contribute to reducing poverty. Livelihood outcomes, in turn, influence assets, creating new beginnings for other livelihood strategies and outcomes.

Mongolia's socioeconomic and ecological growth are closely interlinked like other agricultural-based countries. A household is considered the fundamental decision-making unit regarding production and consumption (Frank Ellis, 1999; Zhao et al., 2018). Rural households' majority income earn from animal origin products. With the effort of the Government programs, favourable weather, increased livestock product demand and prices, better market access, government subsidies, and public transfers, herders' livelihood improved last decade. The rural poverty level of 58.4 percent in 2010 was reduced to 30.5 percent in 2020 (NSO and WB, 2021). A share of herders' households with less than 200 animals is 55 percent of the total number of herder households (NSO, 2022b), while their herd size accounts for only 12 percent of the total number of animals (FAO and MoFALI, 2018). Herders with herds of 101-200 animals had expenses almost equivalent to income but at a subsistence level; no money remains, according to research done by (NSO and WB, 2020) and JICA and MoFA (2006). They aren't worth spending on long-distance moves for pasturing livestock. Investment in breeds and others is also not possible.

Poverty drives herders into more minor sustainable resource utilisation patterns, such as limited or no seasonal mobility, out-of-season grazing, and the preference for resistant but ecologically more harmful animal species such as goats. The majority of income sources of herder households depend on goat cashmere; thus, herders tend to increase their goat

number. Mongolia had 26.4 million goats in 2021 (NSO, 2022b); an average share in total animals in the last 20 years was approximately 42 percent. Unfortunately, a number of an animal should be limited to the pasture carrying capacity. According to a recent analysis of collaborative research on rangeland health in Mongolia, rangeland degradation ranges from 9 to 90 percent (Densambuu et al., 2018), and 38 percent will likely take more than ten years to restore to reference conditions (Densambuu et al., 2018; Engler et al., 2021). Herders, whether they understand how pasture degradation and future conditions may threaten their livelihoods is doubtful (Fernandez-Gimenez & Le Febre, 2006).

However, when a herder household selects various livelihood strategies or changes existing strategies, it can significantly influence pasture quality (Alexander et al., 2016; A. Li et al., 2018) and the herder's well-being (Dong et al., 2015). These changes may further influence a pastoral region's sustainable development (Singh & Hiremath, 2010). Therefore, analyzing household livelihood strategies would help to implement policy interventions to promote the sustainability of pasture and sustainable livelihood (Soltani et al., 2012).

UNDP and the world bank defined poverty as low access to the state and the market. Poverty is poor people's inability to generate income and opportunities for everyday life. The poor generally operate their desperate socioeconomic activities in often ecologically fragile land (Ayadi et al., 2008). In the effort of 25 years, extreme global poverty was declining continuously. However, the fight to eradicate poverty has suffered its most serious blow. This setback is mainly due to significant challenges - Covid-19, conflict, and climate change. Extreme poverty will exist in the world (World Bank, 2021).

The debate on subjective well-being has evolved around its components and measurement. In the latest studies, subjective well-being is defined as a broad concept consisting of cognitive elements, including variables such as satisfaction with life as a whole or in specific domains, and affective elements, including positive affect (e.g., pleasant) and negative affect (e.g., sad, worried, depressed) (Fahmi & Sari, 2020).

The world is changing, and we need to rethink rural poor and livelihood. Furthermore, we no longer believe that agricultural development is the ideal way to promote rural development or that rural development is the best approach to increase rural income and enhance livelihoods (Rigg, 2006). Land wealthy people are no longer consistently successful in rural regions. We can no longer presume that small farmers have better lives than landless

labourers. We can no longer confidently assert that tenants are in a better situation than owner-occupiers. Agriculture and farming are no longer the intended default status of rural households. Poverty alleviation is a viable strategy for raising people's living standards (Werhane et al., 2020). In general, poverty alleviation is not a simple process or notion that involves distributing food and other things to the poor. Instead, coordinated efforts are required to strengthen local economies and enable them to function independently. Similarly, fostering high-quality, all-encompassing abilities in impoverished places can be a game changer for governments' long-term approach to poverty eradication (M. Li et al., 2019).

2.5 The research gap on sustainable rural livelihood in Mongolia

After the collapse socialist system, all livestock were privatised. As a result, new terms of income inequality and rural poverty emerged. The two big *dzuds* occurred between 1999-2002 and 2009-2010. During the successive *dzud*, 11 million animals and 8.8 million animals died, and more than 2369 and 8711 families lost their livelihoods, respectively. The evidence on the role of the *Dzud* in Mongolia has been inconclusive so far Vova et al., (2020), and herders remain vulnerable to severe weather (World Bank, 2020). Many herder households lost their livestock, and migration to urban areas led to poverty (Hahn, Allison, 2017). Since then, many researchers have studied the social, economic, and environmental impacts of herders' livelihoods, such as droughts and *dzuds*, and ways to overcome them. A rich body of research on poverty, livelihood and other factors linked to these issues in rural Mongolia can be divided into the following two groups. These include (1) project reports written by international development organisations; and (2) articles published in international journals by national and international researchers.

Project reports

In the first group of studies, many projects funded by international organisations were implemented in rural development. Projects funded by International Fund for Agricultural Development, United Nations Development Program, European Union, World Bank, and the Swiss Agency for Development and Cooperation focused on improving the livelihoods, poverty, and socioeconomic conditions of herders and rural households. They promoted and practised improving the well-being of the rural and urban poor by enhancing livestock-based agriculture systems' productivity, market access, and diversification.

Although many development projects are implemented and ongoing in Mongolia, project baseline studies, monitoring, and evaluation studies are not publicly available. It is impossible to determine whether each of these projects has affected the poverty and livelihoods of rural households. Mid-term or annual project reports were written based on real-life examples and case studies with some numeric data. Thus, it is unlikely to be cited in the scientific study.

Apart from the above international and donor organisations, the Food and Agriculture Organization of the United Nations and the World Bank provide publicly open and regularly updated data. Worldbank, in partnership with the National Statistics Office of Mongolia (NSO), conducts a poverty survey in Mongolia every two years (NSO and WB, 2020). This survey in 2000 was the first official source of Mongolian poverty updates and the first systematic and comprehensive assessment of the livelihoods of Mongolian households (NSO & World Bank, 2000). Mearns (2004a, 2004b) published articles based on these data. The Mearns' study concluded that there are five adaptive strategies in Mongolia: a) livelihood diversification, b) livelihood switching, c) migration, d) inter-household transfers and kinship networks, and e) others.

Diversification strategies of households refer to livestock husbandry, vegetable growing, hunting and gathering wild food, *otor*³ To find better pasture and a shift in herd composition favouring goats for cashmere income. The livelihood switching strategy includes trade, new herders, the establishment of SMEs, and wage labour or patron-client relations. The next adaptive strategy is migration (urban to rural and rural to urban) which denotes seasonal or circular, family-splitting, and permanent. Inter-household transfers and kinship networks are horizontal linkages between similar wealth status, high reciprocity, collective action, remittances and support from relatives. The last strategy is "other", which includes living with saving and budgeting. All households were categorised into four classifications: wealthy, average, poor, and very poor in terms of wealth. The limitation of the study noted that the survey was conducted in a stressful season of the worst *dzud* year. In addition, the

³ The traditional adaptive strategy of herder households is moving from one place to another to find better pastures for livestock—the rapid, long-distance movement to fatten animals in readiness for winter.

transition to a market economy period impacts all households. The study is outdated and lacks econometric methods that analyse contributing factors to poverty.

Usukh, Binswanger-Mkhize, et al. (2010) wrote the fostering the sustainable livelihoods of herders in Mongolia via collective action. This research is the monitoring report of the Green Gold Pastureland Ecosystem project. It focused on poverty, pasture and desertification, herder behaviour, the institutional framework for sustainable pasture management, collective action, and government actions covering 300 herder households to evaluate project output in implementing and controlling *soums* in 2009. Nevertheless, the report was limited by a descriptive study and did not systematically study herders' livelihoods.

International Monetary Fund (2019) conducted the study in September 2019. It focused on climate change, overgrazing and degradation and threatened to diversify the economy and green growth. Broad topics included such as the overgrazing challenge, land degradation; low productivity of the livestock sector; comparative advantage in the livestock sector, imbalanced livestock species, herders becoming climate refugees, migration, yellow dust storm, and policy to achieve green and inclusive growth: tax, tax exemption for small/medium herders, improve cashmere quality, boost meat export, the international community supports. The study was descriptive and written in a formal project report style.

Articles

The next group of research-related topics to rural livelihood is articles published in international journals. Topics are various:

The most trending topic is the *sustainable management of pastoral commons* linked to the herder's livelihood. All those studies pointed out how to use pasture sustainably. Their relation to herders' livelihood is limited mainly by social capital and animal numbers (Allington et al., 2017; Fernández-Giménez et al., 2017, 2018; Fernandez-Gimenez & Le Febre, 2006; Jamsranjav et al., 2018; Khishigbayar et al., 2015; Mehring et al., 2018; Tumur et al., 2020; Ulambayar & Fernández-Giménez, 2019). Tumur et al. (2020) highlighted the importance of community-based pastureland management in the issue of rangeland degradation and sustainable grazing use. Furthermore, this impacts herders' livelihoods. They pointed out that it will not be effective if the percentage of poor households in the community is high. Allington et al. (2017) assessed the Mongolian rangeland ecosystem interaction to produce dynamic outcomes in grassland productivity and livestock numbers

based on the evidence of two neighbouring provinces in Mongolia and Inner Mongolia, China. The results conclude that an environmental policy is vital in Xilingol, China, while economic development is crucial in Sukhbaatar, Mongolia. Fernández-Giménez et al. (2017, 2018); Fernandez-Gimenez & Le Febre (2006); Jamsranjav et al. (2018); Khishigbayar et al. (2015) measured livestock impacts across Mongolia's significant ecological zones difference using different methods and empirical data. Mehring et al. (2018) noted that pastoralism had been deeply rooted in Mongolian society for 5000 years. Pastoralism and livestock interact with wildlife and compete for pastures. They conclude that trends in diversifying rural livelihood and economic and environmental push- and pull factors shape poor herder households to migrate countryside to urban areas. Nevertheless, this is only a descriptive study that covers the Eastern part of Mongolia.

The next point of discussion is *harsh winter- Dzud* prevention, impact on livelihood and migration. Hahn (2018); Oniki & Dagys (2017) noted that *dzud* is one of the enormous problems affecting herder households. Preparedness and overcoming *Dzud* in Mongolia are linked to the herders' livelihood. Poor herders who lose their animals migrate to urban areas for a better livelihood.

Climate change and global warming directly influence nomadic life, which depends on nature and its yield. Researchers Hahn (2018) and Bayasgalan et al. (2009) concluded that global climate change affects the agricultural production of all countries and negatively impacts Mongolia's agriculture, especially the livestock sector. An increased frequency of hot summer days (*drought*) and freezing and snowy winters (*dzud*) significantly reduces the number of animals and directly negatively impacts herders' livelihoods (Vova et al., 2020). Those articles used time-series data of temperature, humidity, snow and loss of adult animals. According to Meurs et al. (2017), all Mongolian herding households engaged in marketplaces. Herder families with greater access to water, information, labour, and transportation make significant money. J. Wang et al. (2013) conducted a comparative study on the livelihood adaptation of border provinces in Mongolia and Inner Mongolia, China. The study concludes that herders in Mongolia pursue mobility and communal pooling strategies while Chinese Inner Mongolian herders hold main strategies such as storage, livelihood diversification and market exchange. The main area of the study was a forage preparation strategy that is important to adapt to the highly variable climate.

The rapid development of the mining industry in Mongolia over the past decade has had a positive and negative impact on herders' livelihoods, with a shortage of pastures and regular cash transfers by local mining companies. (Murphy, 2015; Upton, 2012) studied the *impact of mining on herders' livelihoods*.

Bayasgalan et al. (2009) examined the *livelihood conditions* of Mongolian herder households, which covered 255 households and classified poor, lower middle, middle and upper middle livelihood conditions based on the five main characteristics: income, immovable assets, movable assets, social indicators and resilience to external factors. However, this study aimed to assess herders' adaptation to climate change. Therefore they concentrated on precipitation, drought and dzud frequency, temperature, pasture vegetation, pasture carrying capacity and water resources. According to their research, 73.3 percent of the households are poor in social position, and 59.2 percent are classified as poor by income indicators. These percentages are much higher than any other statistics and poverty report. This study needs to be updated and checked for accuracy.

The last point, a study on Mongolian herders' *health and hygiene conditions*, has not yet been conducted except for research by Altangerel et al. (2015) and Dorjdagva et al. (2017).

In summary, numerous researchers have investigated the poverty of herder households and pastureland conditions from many perspectives throughout the last two to three decades. However, no definite conclusion has been reached so far. In addition, none of the studies explored the interconnections between vulnerability context, capital, structure and processes, livelihood strategy and outcome, and linkage with the Sustainable Livelihood Framework and these elements. Therefore, to fill this knowledge gap, a new study is required that confirms the exact link between those elements in Mongolian herder households' livelihood and poverty.

2.6 Sustainable livelihood framework for Mongolian herder households

Based on the literature review, the study designed a sustainable livelihood framework for Mongolian herder households.

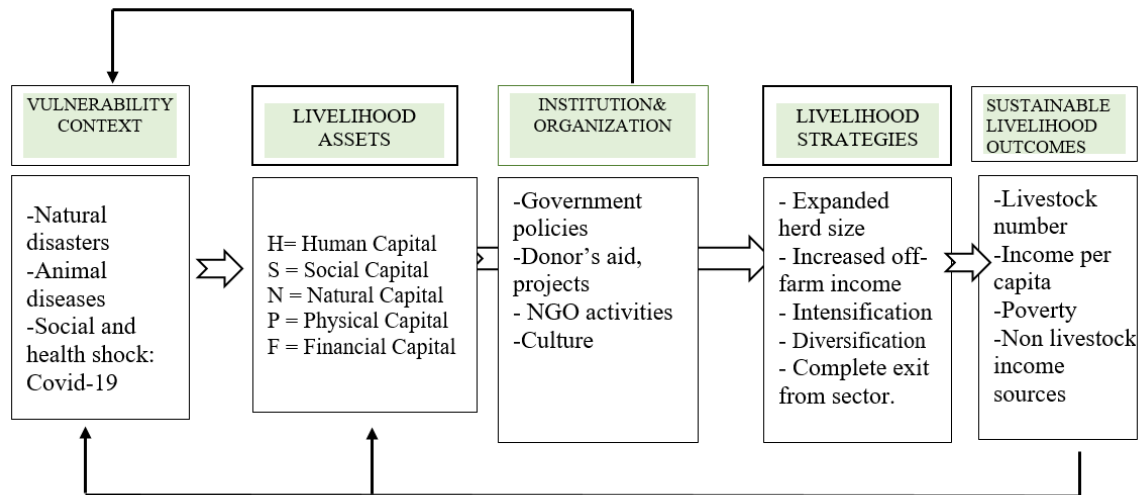


Figure 2.6. The sustainable livelihood framework for Mongolian herder households

Source: Author's compilation

The sustainable livelihood framework for Mongolian herder households consists of five components:

1. **Vulnerability context:** This component encompasses risks and shocks threatening herders, such as dry summer, harsh and cold winter, degraded pasturelands, animal infectious diseases and social and human shocks such as Covid-19. This component is crucial for the survival and well-being of herders as it provides the foundation for their livelihoods.
2. **Livelihood assets:** This component encompasses all the assets that herder households possess or have access to, including human, social, physical, financial and natural capital. Herder households need these assets to engage in livelihood activities, cope with shocks and stresses, and improve living standards.
3. **Institutional framework:** This component encompasses the rules, norms, regulations and policies that influence the ability of herder households to gain access to natural resources, assets, and markets. This framework encompasses local, national, and international levels and determines the incentives and constraints that herder households face to pursue sustainable livelihoods.

4. Livelihood strategies: This component encompasses the range of livelihood strategies in herder households. Most of the herders in Mongolia engaged in expanding herd size to increase household income. Significantly few herders diversified their activities to generate income, such as tourism, handcrafting, planting, and assistant herding. These strategies depend on the vulnerability context elements, household assets, government policies and herder behaviour.

5. Livelihood outcomes: This component encompasses the results of a herder household's livelihood strategies, including income changes, food security, health, education, and well-being. If the non-livestock income increases, it will be possible to maintain the number of animals at a stable level, breed more productive animals, and improve the livelihood of herders. These outcomes reflect the success of a household's livelihood strategies and their ability to attain their desired goals.

Overall, the sustainable livelihood framework for Mongolian herder households provides a holistic understanding of the complex relationships between natural resources, assets, livelihood strategies, outcomes, and institutional frameworks. This framework can guide policymakers, practitioners, and researchers in designing and implementing interventions that promote sustainable livelihoods for herder households in Mongolia.

2.7 Research conceptual framework

The research was divided into the following six stages within the sustainable livelihood framework for Mongolian herder households.

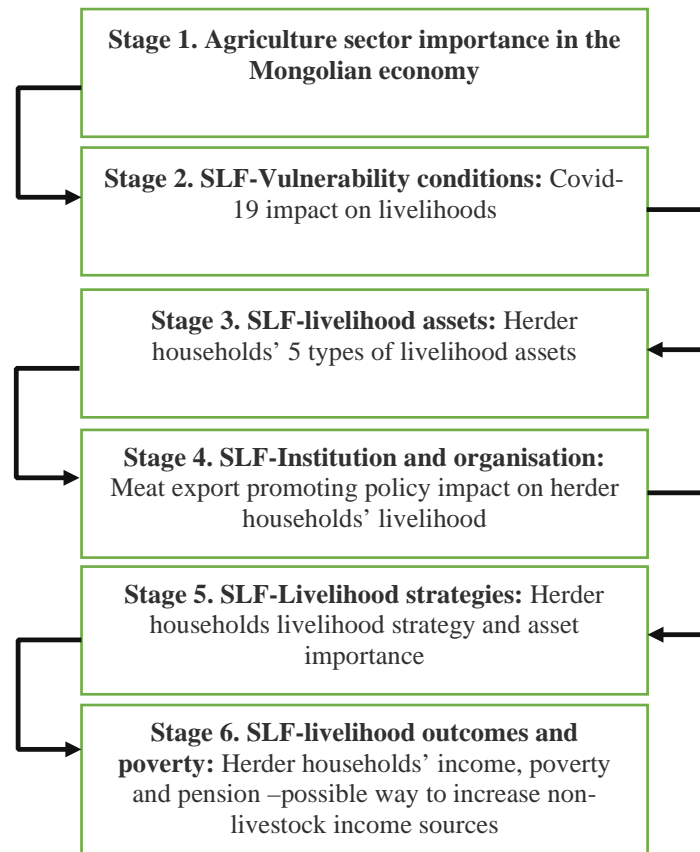


Figure 2.7. Research conceptual framework

Source: Author's compilation

The next chapter will describe the methodology and data used to conduct the research following this conceptual framework.

3. MATERIALS AND METHODS

3.1 Introduction

This chapter describes the data and methodologies applied in the study. The dissertation used two sets of primary and two sets of secondary data. Two sets of primary data covered 350 and 362 households survey. The author of this dissertation participated as a researcher in collecting two primary data in 2017 and 2021 and got official permission to use the data for research purposes. The two secondary data set is from the official sources of the NSO and the Mongolian Customs General Administration (MCGA). The following table summarises the data, purposes and methodologies to analyse data (Table 3.1)

Table 3.1 Data sources and methods used throughout the dissertation

Sub section	Purposes	Methodology	Data
3.2	To define the agriculture sector's importance in the national economy	Growth model, Multivariate regression model	Time series data from NSO (2000-2019)
3.3	To compare Covid-19 impact on household livelihood	Principal component analysis and regression model	A telephone survey of 362 households in 2021
3.4	To analyse livelihood assets	Descriptive statistics	Survey of 350 herder households conducted in 2017
3.5	To assess meat export promoting policy impact on herder households' income	Log-Log regression model	22-year (1997-2018) time-series data from NSO
3.6	To define herder households' livelihood strategies and assets importance	Income-based cluster analysis and Seemingly unrelated regression model	Survey of 350 herder households conducted in 2017
3.7	To define herders' financial literacy and pension planning	Linear regression model	

Source: Author's compilation

The following four sub-sections briefly describe the methodology, and each includes data collection methods, variable selection and the statistical and econometric methods used for data analysis.

3.2 Economic growth and agriculture sector importance

Data: Time series data from 2000 to 2009 are in 2005 constant prices, whereas data from 2010 to 2019 are in 2010 MNT constant prices from NSO are used to analyse natural resources using two sectors: mining and agriculture.

Variable: The variable selection was chosen based on a review of existing academic works (Table 3.2) that provides the primary economic growth variables and their explanations and studies that employed them. These factors assessed how natural resource user sectors influence economic growth.

Table 3.2 The variable description and references

	Variables	Impact*	Variable explanations and references
<i>Dependent variable</i>			
Y	Economic growth rate GDP		The annual growth rate of GDP in log (Ronald, 2006; Sachs & Andrew, 2001)
<i>Experimental variables:</i>			
X ₁	Log GDP per capita	+	GDP per capita, by WorldBank Atlas method, US\$ (Ronald, 2006; Sachs & Andrew, 2001)
X ₂	ShareMINING	+	Share of the mining sector in GDP in percent (Barro, 1997; Ronald, 2006; Sachs & Andrew, 2001; Sala-i-Martin et al., 2004)
X ₃	ShareAG	+	Share of agriculture sector in GDP in percent (Barro, 1997; Ronald, 2006; Sachs & Andrew, 2001; Sala-i-Martin et al., 2004)
<i>Control variables:</i>			
X ₄	Education	+	Gross enrollment ratio (Almas, 2018; Barro, 1997; Sachs & Andrew, 2001; Sala-i-Martin et al., 2004)
X ₅	ShareNetTax	-	Income tax contribution to the GDP (Ronald, 2006)
X ₆	ShareGov	-	Share of Government expenditure in the GDP (Barro, 1997; Ronald, 2006; Sala-i-Martin et al., 2004)

Note: * + positive impact; - negative impact; +/- unknown impact

Source: Author's compilation

Methodology: Model setting : The study employed the most widely used growth model (Ronald, 2006; Sachs & Andrew, 2001). This model has become the standard method for studying the factors influencing growth. After testing the different functional forms, the growth model was applied through a multivariate regression model (Marno, 2008). The researcher created a three-step economic growth model to analyse the sectoral influence on

economic growth (Y1, Y2, and Y3). The Y1 model has three sub-models (Y1-1, Y1-2 and Y1-3) that exclude control variables.

Thus:

$$Y_t = \alpha + \beta \log PC_t + \gamma X_{i_t} + e \quad (1)$$

$$Y_t = \frac{\log GDP_t - \log GDP_{t-1}}{\log GDP_{t-1}} \quad (2)$$

Where:

Y- the annualised growth rate for Mongolia.

i- share mining, share agriculture, education and share net tax

$\log PC_i$ is the initial level of Per Capita GDP in logarithm

$t \in \{0; 20\}$ $t_0 = 2000$ and $t_{20} = 2019$.

The growth model Y is explained in three different forms. Y1, Y2 and Y3. Y1 has three sub-models Y1-1, Y1-2 and Y1-3.

The first, the growth model Y1-1, calculated three independent variables: log GDP per capita, agriculture share and mining. Then next, the growth model Y1-2 is calculated to control variable Education added to the model Y1-1. The last, the growth model Y1-3, added tax share to the Y1-2.

$$Y_t^1 = \alpha + \beta \log PC_t + \gamma X_{i_t} + e; \quad (3)$$

where $Y_t^1 = \frac{\log GDP_t - \log GDP_{t-1}}{\log GDP_{t-1}}$

The growth model Y2- annual growth of GDP excludes the share of the agriculture sector; and

$$Y_t^2 = \alpha + \beta \log PC_t + \gamma X_{i_t} + e; \quad (4)$$

where $Y_t^2 = \frac{\log(GDP_t - GAP_t) - \log(GDP_{t-1} - GAP_{t-1})}{\log(GDP_{t-1} - GAP_{t-1})}$

The growth model Y3-annual growth of GDP excludes both resource extractive sectors, agriculture and mining.

$$Y_t^3 = \alpha + \beta \log PC_t + \gamma X_{i_t} + e; \quad (5)$$

where $Y_t^3 = \frac{\log(GDP_t - GAP_t) - \log(GDP_{t-1} - GAP_{t-1} - GMP_{t-1})}{\log(GDP_{t-1} - GAP_{t-1} - GMP_{t-1})}$

These various forms aim to look at the sectoral influences on economic growth. Experiment variables are GDP per capita, agriculture sector share (ShareAg), and mining sector share

(ShareMining). Furthermore, control variables such as Education (Education) and Net taxes (ShareNetTax) are chosen. The selected independent variables denoted X_i are the shares of selected variables in GDP, except for the variable Education.

3.3 SLF: Vulnerability context: Covid-19 impact on livelihoods

Data. The research was conducted during the Covid-19 quarantine to assess its impact on different households' livelihoods. The Institute of Natural Resource and Agriculture Economics NGO researcher executed a telephone survey using a semi-structured questionnaire with 205 questions between June and July 2021. The survey included 362 families from 16 soums throughout eight provinces and six districts in the capital city. Selected sample locations are marked in colour on the map (Figure 3.1).

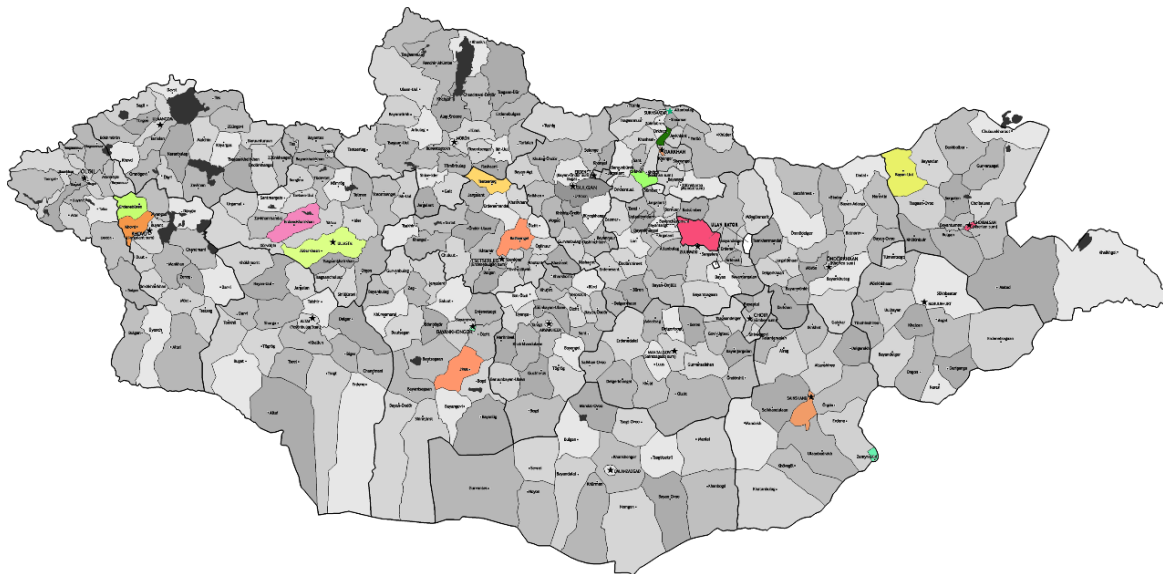


Figure 3.1. Covid-19 impact study sampling in Mongolia, 2021

To compare the influence of Covid-19 on herder households' livelihoods, researchers chose households residing in ger districts⁴, apartment households, vegetable grower households, and small farmer businesses nearby suburban areas. The stratified random sampling method is used to sample herder families. The households in each stratum are sorted by livestock number. From each livestock group, two to three herder families were chosen from the sampling *soums*. A total of 362 households were included in the survey; 72 were herder

⁴Traditional Mongolian house district in the capital city

households, 40 were vegetable growing households, 137 were households living in the *ger* district, 109 were households living in apartments, and 4 were small farming households in the suburban city. The questionnaire asked for general information on each household, income sources, household and satisfaction with government measures against Covid-19, main challenges before and during Covid-19, risks, and market-related information.

Variable: Table 3.3 summarises the indicators related to Covid-19 and household livelihood based on the scholarly articles.

Table 3.3. Variables related to Covid-19 impact on livelihood and references

Variables	Variable explanations and scholarly references
Gender	Gender of the household head. Male household heads tend to have lower risks (Holly Wang et al., 2011) and covid shocks (Hatab et al., 2021)(Bukari, Essilfie, et al., 2021). Women and the urban poor are hit by unemployment due to Covid (F Davila et al., 2021). Women are isolated more from the information and extension service due to Covid-19 (Alvi et al., 2021). Gender inequalities across a range of areas, including health, education, and livelihoods (Nazneen & Araujo, 2021)
Vulnerability of household head and member	If the income of poor households falls below the threshold level, it becomes difficult to get out of poverty, and they enter the circle of poverty. A higher proportion of households with young children or older people are found to be food insecure (Bidisha et al., 2021) and single parenting, rural households with kids are most affected (Durán, 2021). Middle and upper-middle-income households are less affected than the lower classes (Bukari, Essilfie, et al., 2021). Unemployment has adversely affected vulnerable groups, most notably women, the urban poor, and the youth (Federico Davila et al., 2021).
Education	Farmers with higher education have more knowledge and skills to sell their goods to the high-price end market and reduce the risk of invalid circulation. (Holly Wang et al., 2011). The formal and informal business, economy, and education sectors will be severely hampered if the country is placed under complete lockdown (Shammi et al., 2021)
Livestock number	Households with many animals are more resistant to risks and recover quickly (Oniki & Dagsys, 2017). (Hatab et al., 2021).
Wealth and poverty	Food and nutrition security was issued for poor and marginalised households and communities during the Covid pandemic (Ebata et al., 2021). Higher poverty has induced a faster spread of the virus (Singh & Hiremath, 2010)
Market	If agricultural products are sold over a short distance and quickly circulated, risks related to storage, protection, logistics and infrastructure will be avoided (Zhang et al. 2019; Artmann et al. 2020).

	The closure of the market where they sell their produce/livestock will significantly disrupt production (Middendorf et al., 2021); as a result, they cannot generate sales as they did before covid (Jaacks et al., 2021). Prices of daily commodities have increased, and supply has also been interrupted (Shammi et al., 2021)
Community and Organisation	By joining together and forming cooperatives and groups, it will be easier to overcome risks and obtain financial services, as well as save costs (A. Li et al., 2018; E. Li et al., 2017) (Tumur et al., 2020) Due to a lack of managerial capital during the period; small businesses were unable to counteract market disruptions (Francesconi et al., 2021)
The lower price of rural product	Due to Covid-19, the prices of rural products are falling (Ragasa et al., 2021).
Channel	Using modern marketing channels such as e-commerce and online delivery can reduce the risk of sales delays (Guo et al., 2019)
Distance to market	The closer to the target consumer market, the better the farmers can promote, distribute and sell their products and access higher-end markets (Tankam & Djimeu, 2020); (Artmann et al., 2020)
Stress and fear of Covid	The levels of stress, fear, and pessimism about the effects of Covid-19 differ between men and women (Ragasa et al., 2021). Rural females are significantly more concerned about the Covid-19 pandemic than men (Stöber et al., 2021). Because of the lockdown during the pandemic, caregivers' care for older people with disabilities declined dramatically. This has left those in need isolated, some even thinking about suicide. (Kwegyir Tsiboe, 2020).
Covid case	As the number of confirmed Covid-19 cases increases in a particular area, the losses for farm households will increase (Gregorioa & Ancog, 2020) (S. T. Hossain, 2020)
Lockdown-	Complete lockdowns and travel restrictions impact everyone (Jaacks et al., 2021). Service sectors are most affected (Alshaabani et al., 2021). Unreasonable constraints impede income access and agricultural production (Pu & Zhong, 2020).
Governments' cash transfer programs, social protections	In times of shock and risk, the cash transfer program through the current pension system and unemployment insurance program supports social safety and unemployment (Bottan et al., 2021). The robust state support systems are critically important in protecting essential well-being during times of crisis (D. Gupta et al., 2021)
Savings	Citizens with secured incomes and adequate savings coped well during the lockdown (Ruszczuk et al., 2021)
Loan	During the Covid, higher demand for the in-kind loan (A. Gupta et al., 2021)

Food shortage, less nutrient intake	Period of the pandemic, the financial difficulties of households affected their ability to meet their basic needs such as food, fuel, education, and health care (M. T. Hossain et al., 2021)(Kansiime et al., 2021) (Jaacks et al., 2021)
Income changes	Income shocks happened due to the Covid-19 crisis (Kansiime et al., 2021)

Source: Author's compilation

Methodology: The following two methods were applied to calculate the impact of covid-19 on different households.

1. Principle Component Analysis (PCA)

A Principle Components Analysis (PCA) is utilised to get insight into the survey respondents' perceptions of their answers. PCA minimises the number of correlated variables to a few factors that best explain the variation in the variables. The PCA process begins with the correlation matrices between all variables to determine whether there are correlations. Furthermore, the determinant of the correlation matrix was tested to ensure multicollinearity/singularity. The data was extracted using the Principal Component Analysis technique, and the rotation method was Varimax with Kaiser Normalization. These elements can be viewed as the underlying perceptions that led to the responses to our survey questions. KMO, Barlett's test of Sphericity, anti-image choices, and general PCA approaches are used for studies (Andy, 2013).

2. Multiple linear regression analyses

Multiple regression analyses the relationship between income and other explanatory variables. The regression variables have been selected after running the PCA explained briefly in the previous section. Therefore, stepwise multiple regression is used to determine the smallest number of predictors you need, which significantly contribute to explaining the maximum amount of variance in the criterion variable, what these independent variables are, and how much of the variance of the criterion variable they explain. It is helpful to use multiple regression since we have many predictor variables and want a quick impression of which explains most of the variance in the criterion variable (Howitt et al., 2011).

3. Model setting:

For analysing the association between income change and independent variables, the following model is estimated:

$$Y_i = \text{constant} + \beta_1 P_i + \beta_2 H_i + \beta_3 V_i + e_i \quad (6)$$

Where: i = household type

Y – Income changes as a dependent variable

Independent variables are:

P – set of factors relating to respondents' perceptions of various government policies

H – set of variables to define respondents' experiences (age), education level and family size

V – set of variables showing the risk and vulnerability from Covid-19 impact

Data cleaning and aggregation were completed in MS Excel, and regression analysis was done using SPSS and Stata. Due to not reflecting the whole population, '4 small farmer households' are removed from the model.

3.4 SLF: Herder households livelihood assets

Data: The dissertation used a 350 herder households survey conducted in 2017 for the following three purposes.

1. *The first is to analyse the human, social, financial, natural and physical assets of herder households in Mongolia;*
2. *The second is to define herder households' livelihood strategies and influencing factors;*
3. *The third is to analyse herders' financial literacy and participation in pension and welfare.*

Primary data was obtained from an introductory socioeconomic survey of herder households conducted by the Mongolian Marketing Consulting Group NGO between July and August 2017 with the support of the Swiss Development Cooperation's Green Gold and Animal Health projects. Out of 309 soums, 15 soums from 9 aimags were regrouped based on standard deviations in the number of livestock from herder households (Figure 3.2).

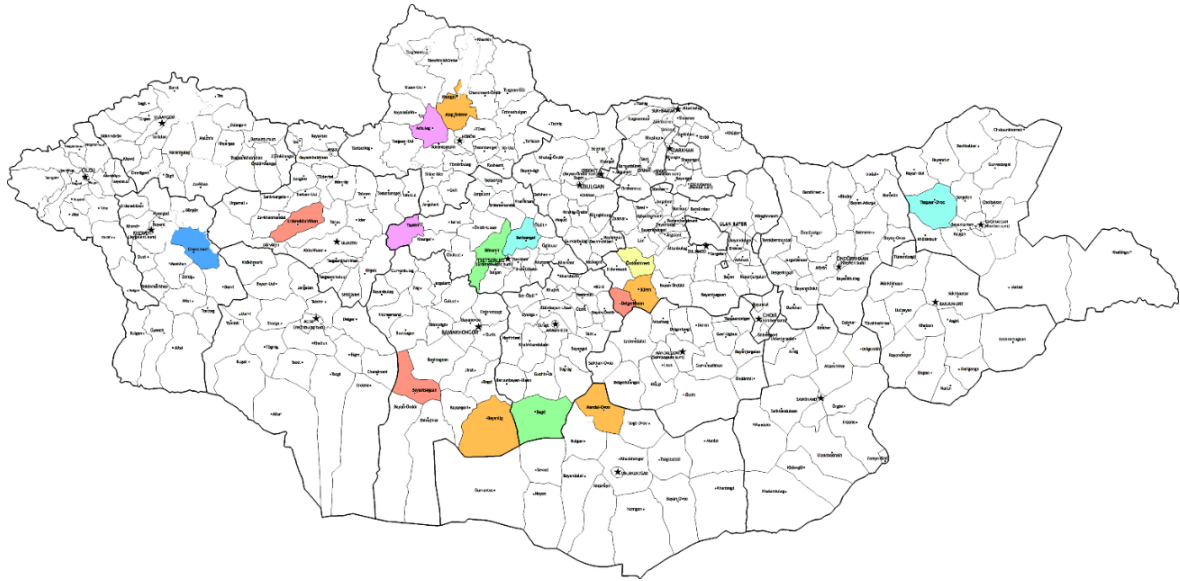


Figure 3.2. Herder households survey sampling (15 soums of 9 aimags, 2017)

Using the Neiman equal distribution method, the total sample size determined the number of units surveyed from the selected soums $350:15 = 23$. As a result, 23-24 herder households participated from each selected soum. To analyse the differences in livelihoods of herders, the herders were selected from each *soum*, representing the following ten groups of livestock: herder households with up to 10 livestock, 11-30, 31-50, 51-100, 101-200, 201-500, 501-999, 1000-1499, 1500-2000 and more than 2000 livestock.

The survey questionnaire consists of general information about household members and their housing conditions, as well as access to water and electricity, rangeland management practices, animal health and hay, fodder preparation, income and expenditure, loan saving and banking services, participation in elections, and information about challenges and risks.

Methodology: Descriptive statistics

Descriptive statistical analysis was used to explain the five types of assets owned by herder households. Before performing descriptive statistical analysis, assets were classified based on the literature review and scholarly articles in section 2.4.2. Among the Descriptive statistical analysis types (Figure 3.3), range, mean, and standard deviation are mainly used using SPSS-25 software.

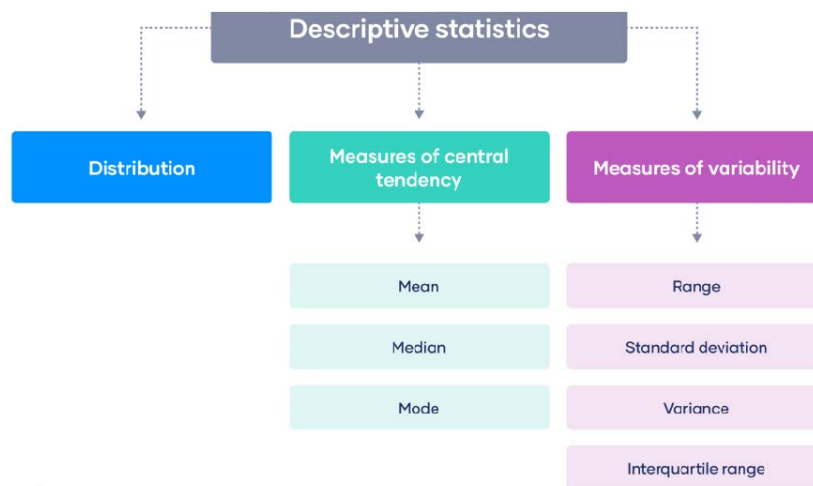


Figure 3.3 Types of descriptive statistics

Source: (P. Bhandari, 2023)

Tables and diagrams are significant for describing variables (Howitt et al., 2011), and several tables and figures are created.

3.5 SLF: Institutions and processes: Meat export promoting policy impact on herders' livelihood

Data: The research relied on secondary data from NSO and the MCGA between 1997- 2018. Variables are selected based on scholarly articles, and values are converted to the logarithm to reduce wide-ranging quantities (Table 3.4).

Table 3.4 Variables setting and expected impact for meat export

	Variables	Expected impact	Implication of variables
Dependent variable			
Y	Rural household income per month		Continues variable, average household monthly income converted to US\$
Independent variables			
X ₁	Monthly urban household income	+	The average income of capital city and aimag centre household, in US\$
X ₂	Livestock product export	+	Value of exported meat and meat product in US\$
X ₃	Number of livestock	+	Number of livestock registered in the annual census, head
X ₄	Export price of beef	+	Average export price of beef in US\$, (2013-2018)

X ₅	Export price of horse meat	+	Average export price of horse meat in US\$, (2013-2018)
X ₆	Export price of ovine and goat meat	+	Average export price of sheep and goat meat in US\$, (2013-2018)
X ₇	Average domestic market meat price	-	The average Mongolian market price of 5 types of animal meat is US\$

Note: * + positive impact; - negative impact;

Source: Author's compilation

Methodology: Regression model setting

The following regression model has been set to examine how the amount of meat export impacts the livelihood of herder households.

$$Y_t = \alpha + \beta X_t + \varepsilon_t, \text{ for } t = 1, \dots, 22 \quad (7)$$

Where:

Y_t = Rural household income per month of year t ;

- X_t = set of independent variables in year t ;
- ε_t = Error term with standard properties

A regression model was estimated using SPSS. Monthly rural household income is selected as a dependent variable. The urban household income, livestock product export, number of livestock, export beef price, export horse meat price, the export price of ovine goat meat and average domestic market meat price explain this variable.

3.6 SLF: Herder households livelihood strategies

Data: The dissertation used a 350 herder households survey conducted in 2017 for three purposes. The *first* is to analyse the human, social, financial, natural and physical assets of herder households in Mongolia; the *second is to define herder households' livelihood strategies and influencing factors*; the *third* is to analyse herders' financial literacy and participation in pension and welfare. It uses the same data described in Section 3.4 for the **second purpose**.

Variables: The 350 herder households survey data was accessed to analyse the livelihood strategy study. Approximately 120 variables from 350 households survey were considered to select the appropriate indicators to represent the livelihood assets of herding households.

Based on the descriptive statistics and other relevant statistical tests most appropriate variables are selected amongst all 120. The following table presents the selected variables that indicate the five livelihood assets (Table 3.5).

Table 3.5. Variables of different livelihood assets

Assets	Indicators/ Variables	Definition
Natural	Land	Total pasture land (sq. km)
	Otor move	Number of long distances moved (otor) per year
	Pasture quality	Share of palatable good grass per square meter of pastureland
Physical	Smart tools	Number of smartphones and other tools per family member
	Fixed assets	Number of household electrical equipment
	Livestock number	Livestock number, by sheep unit (SU): SU converting coefficients are Camel 5, Horse 7, Cattle 6, Sheep 1, Goat 0.9
Human	Human resource	Number of labourers in households
	Education Index	Education index of household members age six and above. The following equivalent coefficient (Eq.C) was used for estimating the education index: The number of illiterate people in the family will be multiple by 0; primary school education 0.25; junior high school 0.5; above junior high school education index 0.75; college degree or above is 1 The formula: Education index = $\sum (Eq. C \times P_i) / P$ Eq.C - Equivalent coefficient P _i - number of family members in respective i education level, e.g. no education, primary education etc. P - Total number of family members above the age of six
	Health Insurance	Share of family members having health insurance
Financial	Social Insurance	Number of family members covered by social insurance
	Loan	Number of getting loans
	Savings	Household savings
Social	Political participation	(Number of family members participating in local and national elections/total number of family members with vote right/age)*100
	Participation in the local community	Number of participations for bag and soum citizens meeting
	Gift exchange	Number of animals (by SU) given to others as a gift

Source: Author's compilation

Methodology:

1. Data normalisation

To remove data redundancy, we normalised data using the maximising deviation methods by the following formula:

$$x'_{ij} = (X_{ij} - X_{\min}) / (X_{\max} - X_{\min}) \quad (8)$$

where x'_{ij} is the livelihood assets indicator j's normalised value of sample i, x_{ij} is the actual value of indicator j of sample I, and $x_{\max}-x_{\min}$ are the maximum and minimum values of livelihood assets of indicator j, respectively.

2. Model selection and setting: Income-based cluster analysis

Two steps analysis was applied in this study. In the first step, different household livelihoods are classified by income using the nearest neighbour clustering method of SPSS covering 350 herder households in Mongolia. Nearest neighbour analysis can also be used to compute values for a continuous target. In this situation, the nearest neighbours' average or median target value is used to obtain the predicted value for the new case.

a). The mean nearest neighbour distance

$$\bar{d} = \frac{\sum_{i=1}^N d_i}{N} \quad (9)$$

Where:

N is the number of points. d_i is the nearest neighbour distance for point i.

b) The expected value of the nearest neighbour distance in a random pattern

$$E(d_i) = 0.5 \sqrt{\frac{A}{N}} + (0.0514 + \frac{0.041}{\sqrt{N}}) \frac{B}{N} \quad (10)$$

Where:

A is the area, and B is the length of the perimeter of the study area.

c) The variance

$$\text{Var}(\bar{d}) = 0.070 \frac{A}{N^2} + 0.037 * B \sqrt{\frac{A}{N^5}} \quad (11)$$

d) The Z statistic

$$Z = \frac{\bar{d} - E(d_i)}{\sqrt{\text{Var}(\bar{d})}} \quad (12)$$

3. Multiple equation model - Seemingly unrelated regression (SUR)

SUR is selected to estimate the relationship between household income of four clusters and evaluation indicators of five different assets. The model aims to investigate the effects of assets on income and to analyse herders' household livelihood strategies.

SUR model could solve the identification problem that individual equations cannot be consistently estimated. Order and rank conditions are checked for consistency in estimating a system of simultaneous equations (Marno, 2008).

The following system of simultaneous equations is estimated using standard software Stata (Lee C. Adkins, 2011):

$$\begin{aligned}
 (1) \ y_1 &= b_{12}y_2 + b_{13}y_3 + b_{14}y_4 + \sum b_{1j}x_{ij} + \varepsilon_{ij} \\
 (2) \ y_2 &= b_{21}y_1 + \sum b_{2j}x_{ij} + \varepsilon_{ij} \\
 (3) \ y_3 &= b_{32}y_2 + \sum b_{3j}x_{ij} + \varepsilon_{ij} \\
 (4) \ y_4 &= b_{41}y_1 + \sum b_{4j}x_{ij} + \varepsilon_{ij}
 \end{aligned} \tag{13}$$

Here x_{ij} is the actual value of the livelihood assets indicator j of sample i .

Each equation has a single response variable $y_{1,2,3,4}$, and a k -dimensional vector of regressors x_{ij} . If we stack observations corresponding to each four equations into j -dimensional vectors and matrices, then the model can be written in vector form as:

$$\begin{pmatrix} y1 \\ y2 \\ y3 \\ y4 \end{pmatrix} = \begin{pmatrix} X1 & 0 & 0 & 0 \\ 0 & X2 & 0 & 0 \\ 0 & 0 & X3 & 0 \\ 0 & 0 & 0 & X4 \end{pmatrix} \begin{pmatrix} B1 \\ B2 \\ B3 \\ B4 \end{pmatrix} + \begin{pmatrix} \varepsilon1 \\ \varepsilon2 \\ \varepsilon3 \\ \varepsilon4 \end{pmatrix} = X\beta + \varepsilon. \tag{14}$$

3.7 SLF: Livelihood outcomes and poverty: Financial literacy and pension planning

Data: The dissertation used a 350 herder households survey conducted in 2017 for three purposes. Here it is used for **the third purpose**; to analyse herders' financial literacy and participation in pension and welfare. It uses the same data described in Section 3.4 for the third purpose.

Variable: The dependent variable Y is the Social insurance fee amount herders paid. Ten independent variables were developed based on the association between financial behaviour, financial literacy, pension planning, and data availability. All independent variables were

divided into two groups, namely social and economical, and five variables were selected for each (Table 3.6).

Table 3.6. Variables for financial literacy and pension planning

	Variables	Impact	Variable explanations and scholarly references
Dependent variable			
Y	Herders paid social insurance fee amount		Continues variable, Mongolian tugriks (Raaij, 2014) (Arellano et al., 2018)
Independent variables			
<i>Demographic and social variables</i>			
X ₁	Sex	+	Male and females financial literacy difference is statistically significant. (Raaij, 2014) (Arellano et al., 2018)
X ₂	Age	+	Age impact on pension planning (Raaij, 2014) (Caroline E. van Dullemen and Jeanne G. M. de Bruijn, 2015)
X ₃	Education level	+	Education is a matter of financial literacy. Illiterate =0 to university level=6. (Lusardi & Mitchell, 2011) (Van Rooij et al., 2009) (Christelis et al., 2010), (Raaij, 2016)
X ₄	Social-Insurance coverage	+	Herders who paid social insurance fees for some years. Most herders caught the opportunity to decompensate the Social insurance fees in 2013 and 2021 (Madrian & Shea, 2001)
X ₅	Bag meeting	+	People who have more information catch opportunities. Bag meeting is the lowest channel for getting official information source in rural Mongolia. Its frequency in the countryside is on average 4 in a year. (Lusardi, 2004), (Clark and d'Ambrosio, 2008), (Bernheim & Garrett, 2003), (Raaij, 2016) (Duflo & Saez, 2003) (Clark & d'Ambrosio, 2008)
<i>Economic variables</i>			
	Livestock	+	The number of households, livestock, and primary source of income. (Raaij, 2016)
X ₆	Total income	+	Households' total farm and non-farm income sources (Raaij, 2016)
X ₇	Total cost	-	Total annual household expenditure. When household expenditure is challenging to participate in social insurance fee payments.
X ₈	Loan amount	-	Total loan amount. Households borrow money from individuals and financial organisations (Lusardi & Tufano, 2009).
X ₉	Size of savings	+	Household saving amount in a bank (Bernheim & Garrett, 2003).

Note: * + positive impact; - negative impact; +/- unknown impact

Source: Author's compilation

The average life expectancy of men and women is different, and it is assumed that women are more interested in paying social insurance than male. The variable *age* is expected to be positive for the payment of social insurance fees. A researcher wanted to see how this coverage rate connected to herders' willingness to pay the social insurance fee in the model. We expected this variable to be positive. Respondents were asked how often they had attended a regular "*bag meeting*".⁵ Bag meetings investigate information and awareness for other herders, so herders with more motivation and knowledge are expected to pay more than herders with less information.

Five criteria were chosen to demonstrate herders' economic competence. The number of animals, total revenue, and savings are predicted to be positively related to the dependent variable, but total cost and loan are expected to be negatively related. Since social insurance payments and credit are herders' cost items that compete with consumption costs; as a result, herders with higher expenses would put off paying voluntary social insurance. More than 80 percent of herder household income comes from livestock. In this regard, multicollinearity was discovered between the number of livestock and the overall revenue of the herder household. The variable- total income- was included in the model based on the test assessment.

Methodology: Model setting: To analyse the herders' financial literacy, an expectation of the amount of old age pension, attitude readiness to pay voluntary social insurance and identify reasons, the researcher defined ten variables based on the relevant research. The following model is set to examine the relationship between the social insurance fee (amount) paid by each herder and a set of economic and social variables:

$$Y_i = f(A_i, B_i) + \varepsilon_i, \text{ for } i = 1, \dots, 350 \quad (15)$$

Where:

Y_i = Social insurance fee paid by a herder i voluntarily, continues variable, in money term;

- A_i = Set demographic and social variables of herder i ;
- B_i = set of economic variables for herder i ;

⁵ The smallest administrative levels official meeting.

- ε_i = Error term with standard properties

Computation is made using SPSS and typical econometric processes. (Andy, 2013; Marno, 2008)

4. RESEARCH FINDINGS

The chapter presents empirical analysis and research findings. The following table summarises the sub-chapter's objective and hypothesis relations.

Table 4.1 Summary of sub-chapters of research finding

Sub-chapters	Purposes	Sustainable livelihood elements	Hypothesis relevance
4.1	Overview of the features of nomadic herders' livelihood		
4.2	Agricultural sector's role in the economy in comparison to the mining sector.		H5
4.3	Analysing Covid-19 impact on herders' livelihood	SLF: Vulnerability context, conditions and trends	H2
4.4	Analyze five types of assets factors for specific livelihood strategies	SLF: Livelihood assets	H1, H3
4.5	Analyse meat export supporting policy and its impact on herders' livelihood	SLF: Institutional process and organizational structures	H4
4.6	Determine livelihood strategies based on income sources	SLF: Herder household livelihood strategies	H1, H3
4.7	Investigating the financial literacy of herders and the possibility of setting a higher pension amount as a way to prevent poverty	SLF: Sustainable livelihood outcomes and poverty	H1, H3, H4

Source: Author's compilation

4.1 Overview of the study area

Mongolia is a landlocked country with 3.4 million inhabitants and neighbouring Russia and China. Mongolia has 1.5 million square kilometres, with frequent extreme weather events, hot, dry summers and freezing winters. A majority (70 percent) of the area, or 1.1 million hectares, is rangeland (NSO, 2022b) which supports the traditional nomadic livelihoods and other sectors (Addison et al., 2012). Mongolia is divided into six ecological zones: high mountain, mountain taiga, forest-steppe, steppe, desert steppe and desert. Those regions respond differently to environmental pressures (Sainnemekh et al., 2022).

End of 2021, 69 percent of the total population live in urban areas, while 31 percent live in rural areas where they move around the country with their livestock all year round. 47.6 percent of the total population lives in Ulaanbaatar capital city (NSO, 2022b). The population density of the capital city is 339.8 people per square km. West, Khangai, Central, and East regions are sparsely populated, with 0.8-1.6 people per square km (NSO, 2022b).

Mongolia has rich natural resources. From an economic point of view, natural resources are an essential source of the nation's economic growth and wealth. Coal, copper and gold are the primary export commodities. According to BMI research (2017), Mongolia's production capacity is estimated at 450,000 tonnes per annum of copper and 18.4 tonnes per annum of gold. Furthermore, iron ore, zinc, molybdenum, fluorspar, tungsten, silver, tin, gypsum, zeolite, lead, and clinker follow. The national economy dependent on the mining sector is ranked 4th, after the Democratic Republic of the Congo, Chile and Australia (Gombodorj & Pető, 2022a). Mongolia's fastest-growing sectors are mining, trade and agriculture. Compared to 20 years ago, the position of agriculture, which was the main pillar of Mongolia's economy, has been replaced by the mining and quarrying sector (Figure 4.1).

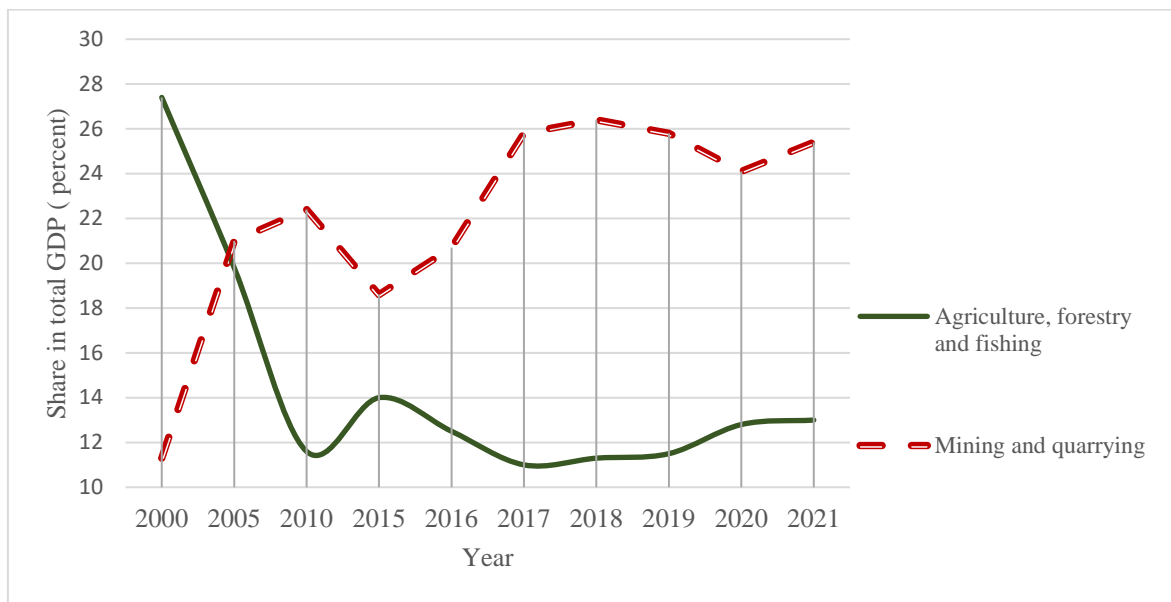


Figure 4.1 Mining and agriculture sectors' GDP

Source: Author's compilation based on the National Statistical Office data (2000-2021).

Mongolian GDP growth in 2021 was 1.4 percent. The agriculture sector is a crucial traditional sector in the economy that employs 25.9 percent of employees, approximately 13.0 percent of GDP, and 6.0 percent of export earnings (NSO, 2022b).

The livestock sector shares 92.3 percent of agriculture sector. In 2021, the gross agricultural product reached 5162.2 bln MNT, of which the livestock sector produced 4764.7 bln MNT in 2021 or 92.3 percent (Figure 4.2).

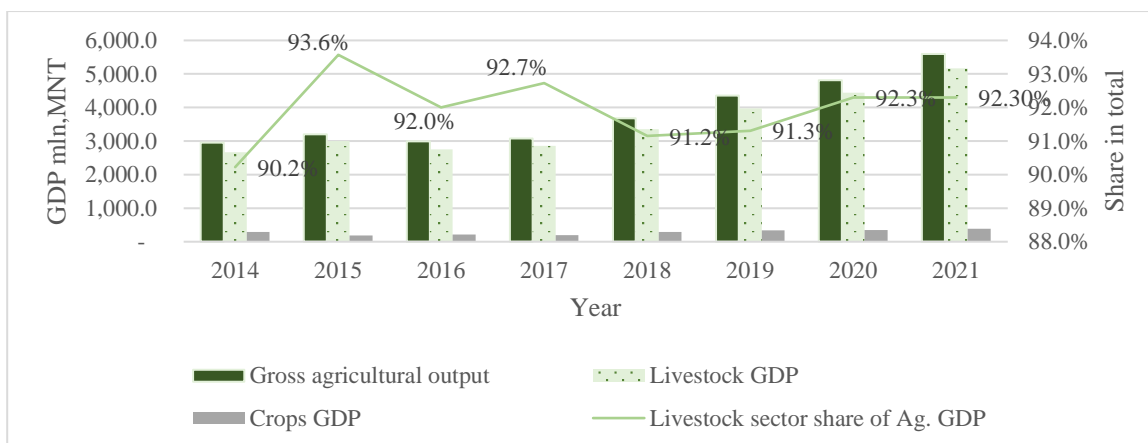


Figure 4.2 Agriculture sector output, in billion MNT, crop and livestock sector shares

Source: Author's compilation based on the National Statistical Office data (2014-2021)

After the transition to a market economy, livestock was privatized, and the state cooperative-based livestock system collapsed. As a result of privatization, the number of livestock increased by five types from 25.9 to 67.3 million (1990-2021). The number of livestock reached its highest in 2019, 70.9 million heads. (Figure 4.3)

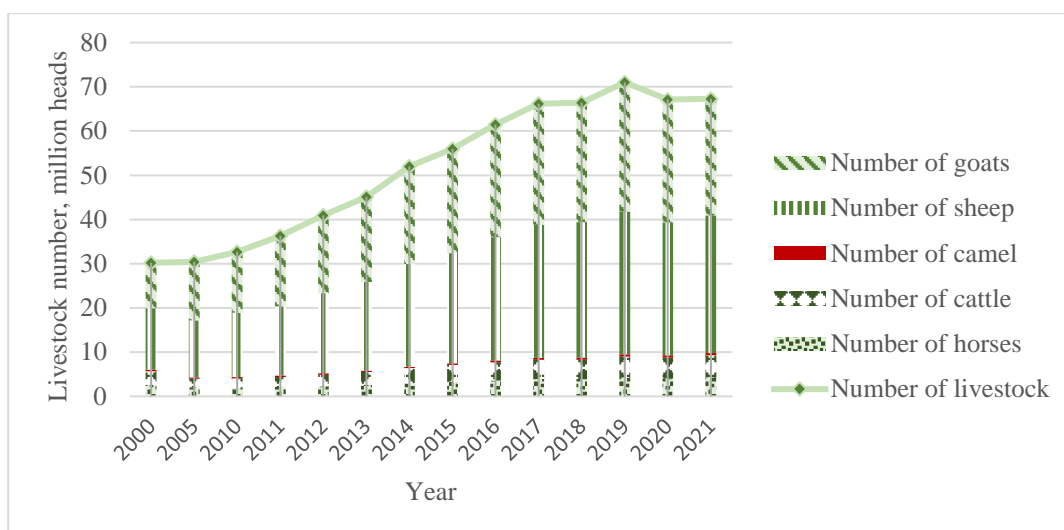


Figure 4.3. Livestock number, million heads

Source: Author's compilation based on the National Statistical Office data 2000-2021.

The livestock sector is growing and contributing significantly to the Mongolian economy. However, the sector is vulnerable to natural disasters such as overgrazing, drought and *dzud*, and problems such as animal health, rural poverty, decreasing productivity, migration, future generations, health, education, and social status issues remain problematic and pending proper solutions.

Herders are willing to increase livestock numbers to secure their livelihood. Then increased livestock numbers decrease grassland quality and its ecosystem (A. Li et al., 2018; Tumor et al., 2020). The Mongolian rangeland can carry approximately 50 million heads of livestock or 86 million sheep head units (NSO, 2018c). Based on this reference, it has already exceeded 20 million heads of animals. Densambuu et al. (2018) estimated that 121.7 million ha of pastureland is degraded to some extent. Pasture degradation makes it impossible for livestock to graze and leads to livestock loss. Mongolia's pastoralists have largely abandoned the traditional rotation grazing system whereby previously they moved their herds to different areas based on the season. This has resulted in more pressure and land, leading to increased degradation. The additional causes of land degradation in Mongolia can be summarised as follows:

- increase in the number of livestock
- movement of herders to better grazing areas due to poor management of some grazing areas (soum governors)
- mechanic centralization due to decreasing number of drilled wells
- poor law enforcement of land inputs, nature conservation and pasture-related laws and regulations, which lead to new areas at risk of degradation and conflict
- change in pasture management skills
- decrease in herd mobility.

The country's water scarcity was another reason for pasture degradation. Mongolia has relatively low rainfall, averaging 350mm north and 80mm south. World Resources Institute evaluated, mapped and scored 100 River basins ranked by area and population of 180 nations. They found that 36 countries in the baseline survey face "extremely high" water stress. Mongolia ranks in 34th place with a water stress score of 4.05. A water stress score above 4 indicates that more than 80 percent of the water available is withdrawn annually, which means that companies, farms and residents are highly dependent on a limited amount of water and vulnerable to the slightest change in water supply (Luo et al., 2015).

The most frequent and highly damaging factor to livestock numbers is natural disaster *dzud*. Studies concluded that in addition to natural weather and climate change, the vulnerability of herders and herds significantly impacts the large number of animals killed by the dzud disaster. It is also believed that the lack of grass growing during a drought summer is a sign

of dzud winters (Vova et al., 2020). In the last 100 years since 1918, considering the excessive loss of adult animals (mortality rate), there have been 18 large-scale *dzuds* happened, each of which resulted in the loss of more than 2 million livestock. As a result of the *dzud*, significant damage was caused to the economy and social life. The significant *dzud* years based on the adult livestock loss rates exceeding 10 percent are 1943, 1945, 1950, 1968, 2000, 2001, 2002, and 2010. The highest livestock loss rate was recorded for 1945 (33.2 percent), followed by 2010 (23.4 percent) (C. Du et al., 2018). Over the last two decades, successive devastating *dzuds* occurred in the winter and spring seasons of 1999–2002 and 2009–2010, leading to total losses of about 18 million livestock (Chadraabal et al., 2020) (Figure 4.4).

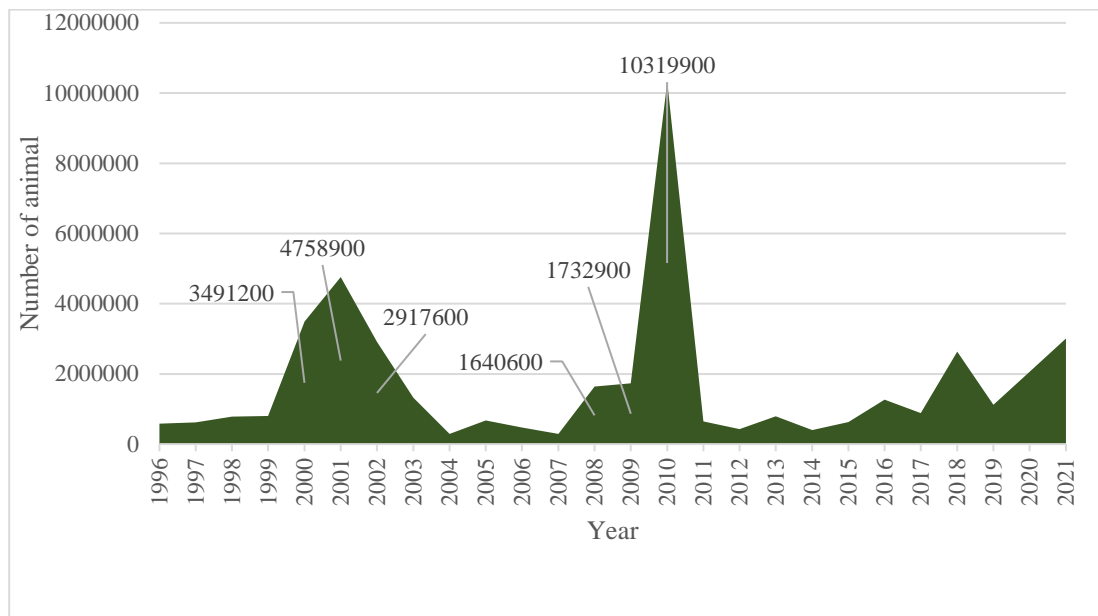


Figure 4.4 Adult livestock losses (1996-2021)

Source: Author's compilation based on the National Statistical Office data.

Another factor that impacts animal losses is highly infectious animal diseases, such as foot and mouth disease, which spread to several regions of Mongolia and killed approximately 70 thousand animals on average in the last decade (Figure 4.5).

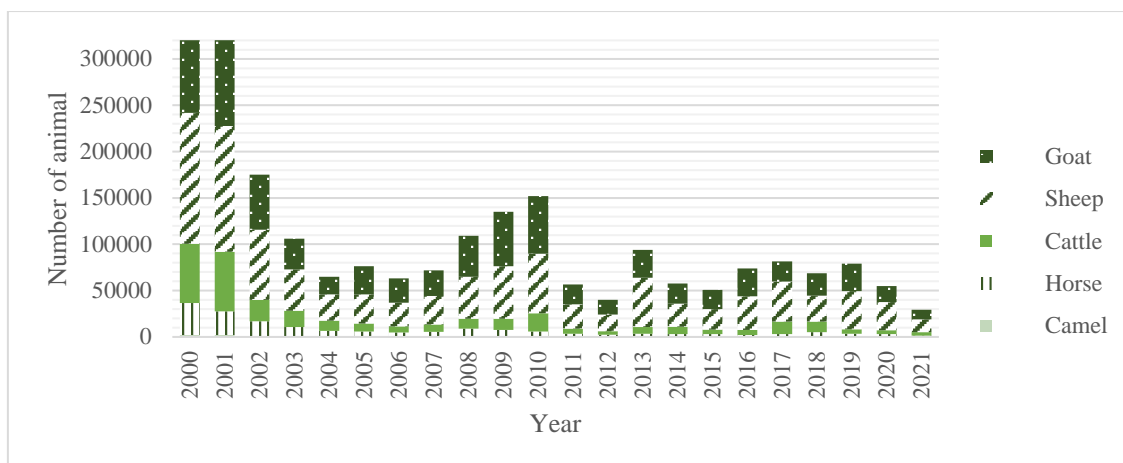


Figure 4.5. Number of livestock losses due to animal diseases (2000-2021)

Source: Author's compilation based on the National Statistical Office data 2021.

Although the number of livestock is overgrowing and has reached 70 million, the proportion of poor households with few animals in the total herder household is high. The gap between the rich and the poor herders increased (Figure 4.6)

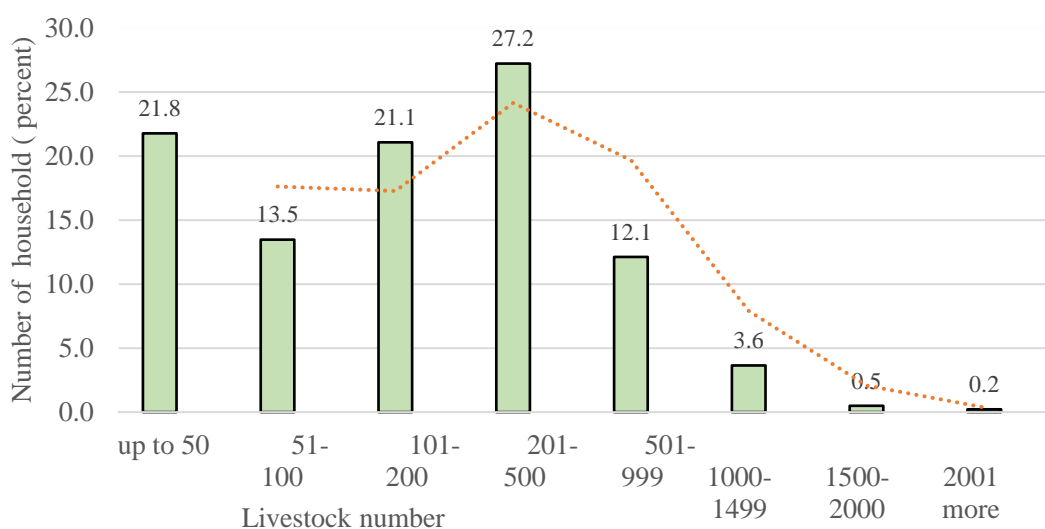


Figure 4.6. Grouping of households with livestock by herd size (share in total, %)

Source: Author's compilation based on the National Statistical Office data 2021.

Herder households with less than 50 animals account for 9.9 percent of all herder households, and herder households with up to 200 animals account for 45.2 percent of all herder households. According to the last poverty survey in 2018, 25.9 percent of total poor

households in Ulaanbaatar, 30.1 percent in *aimag*⁶ centres, 28.9 percent in *soum*⁷ centres and 32.9 percent in rural areas, respectively (NSO and WB, 2020).

The income composition of nomadic herder households differs from soum, aimag and capital city households. Most urban household income is monetary, and the percentage of food consumed free of charge from household farms is very small. Nevertheless, in rural areas, more than 20% of the income of herder households is generated free from their farms (Figure 4.7 and Figure 4.8).

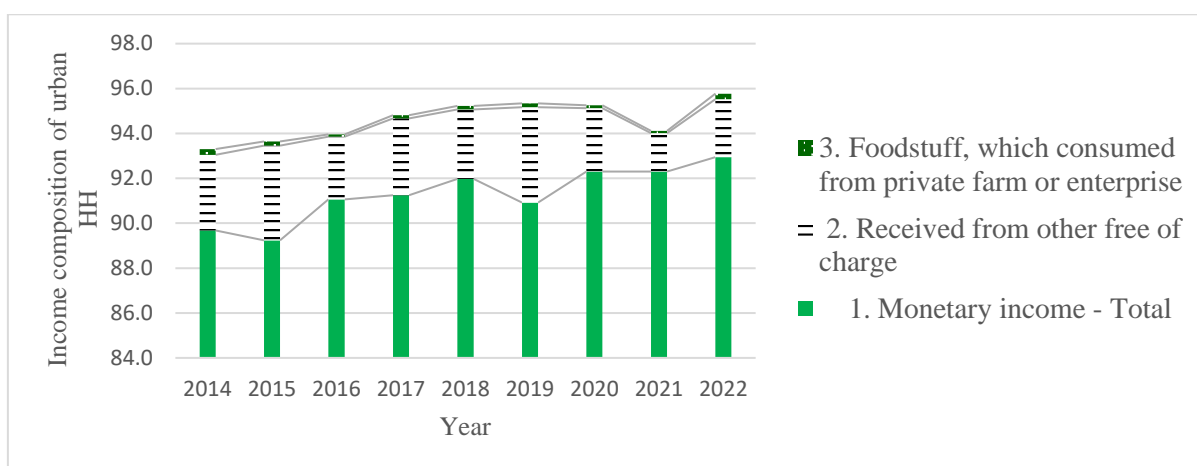


Figure 4.7 Urban household income sources (percent)

Source: Author's compilation based on the National Statistical Office data (2014-2022).

⁶ The first level of the administrative unit of Mongolia

⁷ The second level of the administrative unit of Mongolia

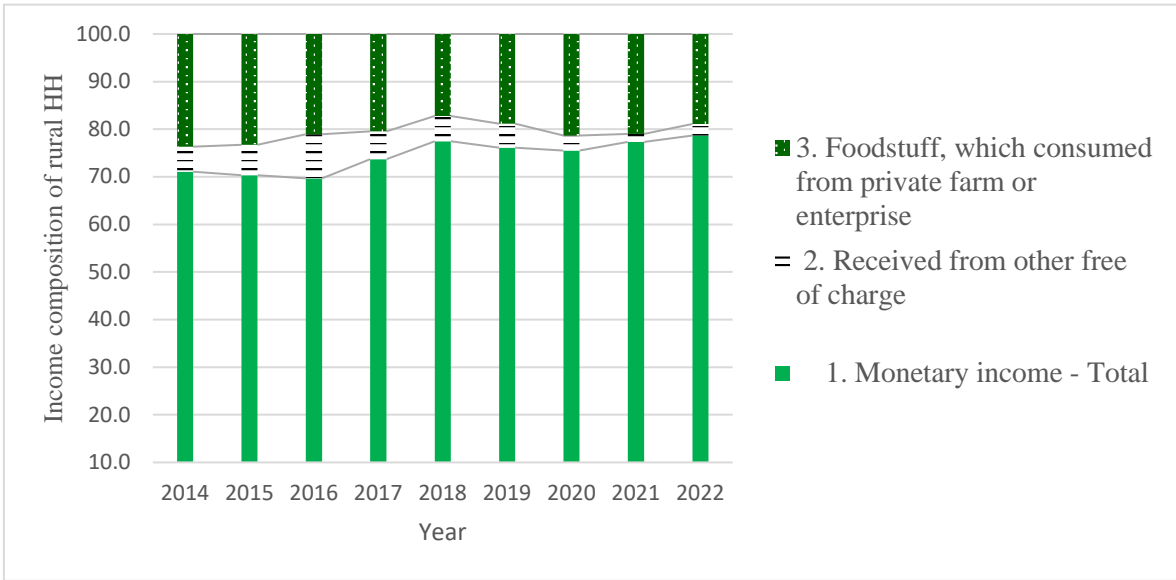


Figure 4.8 Herder households income sources (percent)

Source: Author's compilation based on the National Statistical Office data (2014-2022)

Compared to other developing agribusiness-based countries, most Mongolian herders' income comes from livestock. Cashmere and wool income ranked the enormous contribution, followed by meat, hides, and skins. Very few households earn income from dairy products; others are used as gifts or for family consumption. Non-livestock income source is limited to a few sources. Government old-age pensions and allowances form the majority of non-livestock income sources. It can be seen from Figure 4.9 that the share of livestock product income in the total monetary income has decreased year to year, and the share of pension and allowance income share has increased to 32.8 percent.

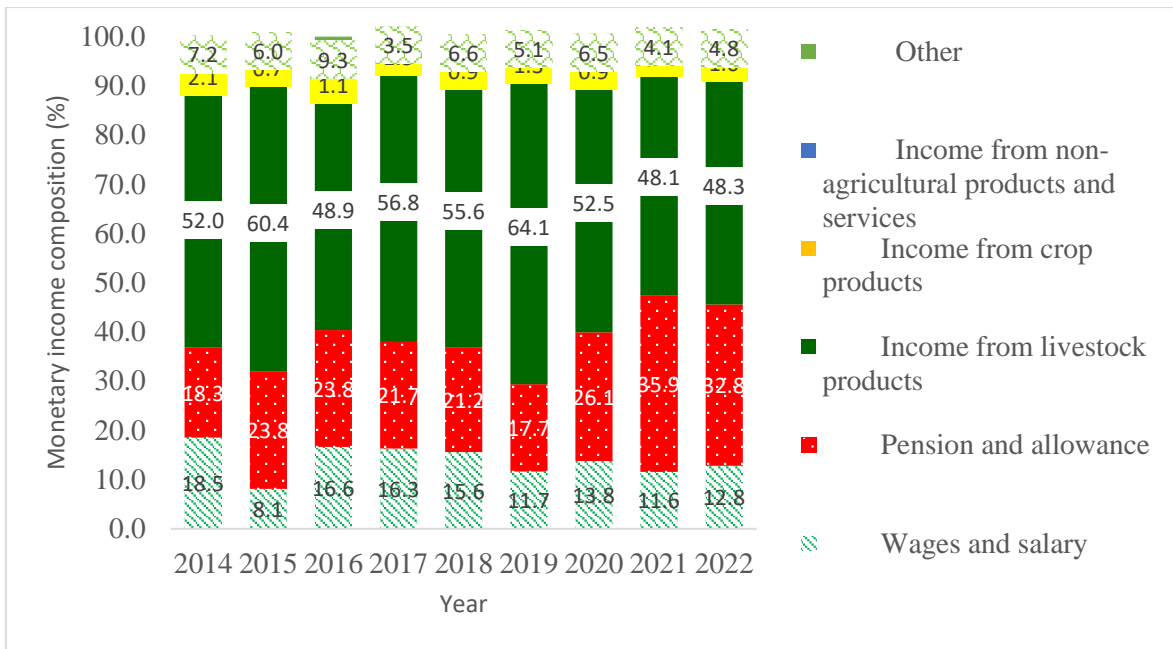


Figure 4.9 Herder households' monetary income sources (percent)

Source: Author's compilation based on the National Statistical Office data (2014-2022)

Although goat cashmere is the primary source of livestock income, it has been proven that goat is more harmful to pasture than other animals. Therefore, it has been a tradition to limit the number of goats in the herd composition to a reasonable level. However, herders are willing to increase the number of goats because cashmere is the most significant portion of the total household income. The share of goats in the herd is 38.8 percent (NSO, 2022b). (Figure 4.10) and (Figure 4.11).

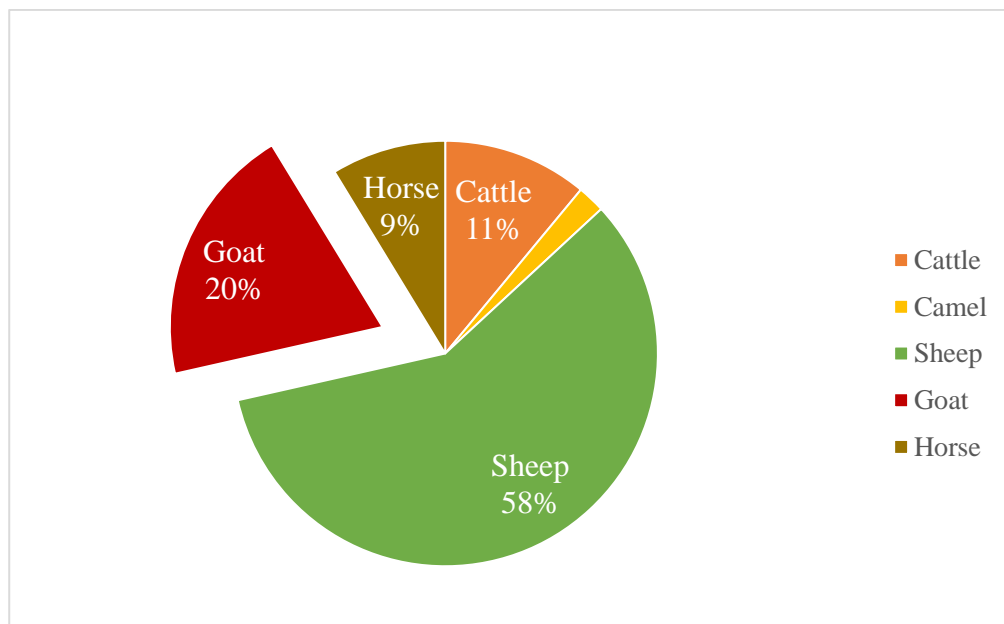


Figure 4.10 Herd composition in 1990 (percent)

Source: Author's compilation based on the National Statistical Office data

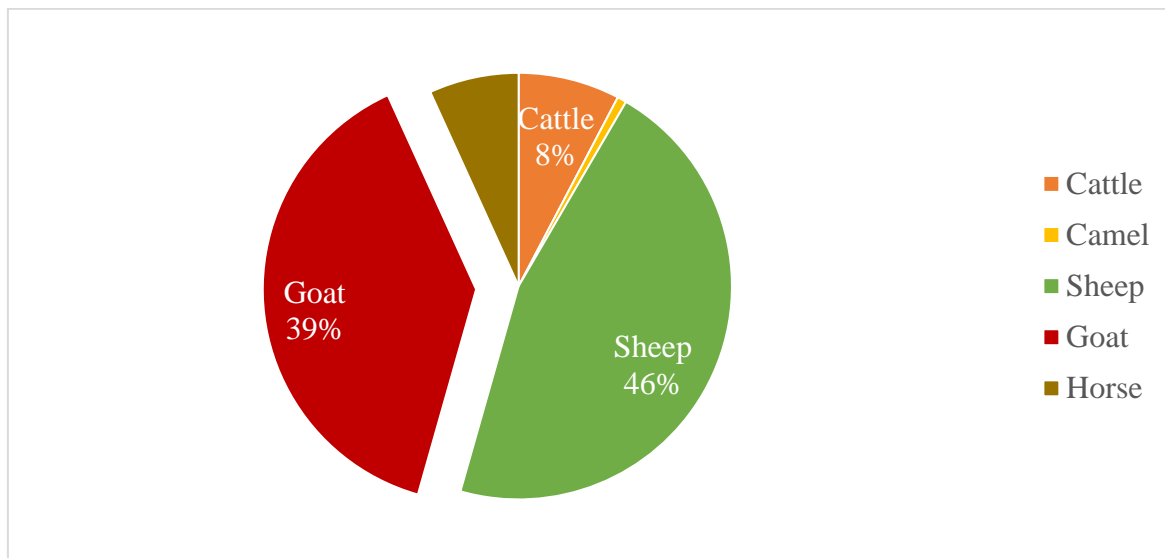


Figure 4.11 Herd composition in 2022 (percent)

Source: Author's compilation based on the National Statistical Office data

The percentage is high compared to about 19 percent in the total herd between 1990-2022. A high proportion of goats in the herd is more common in poor households with less than 500 animals (Agipar, 2016). It means poor households have a considerable impact on pasture degradation.

The growing number of goats and a more significant share of total livestock greatly contribute to pasture degradation (Figure 4.12).

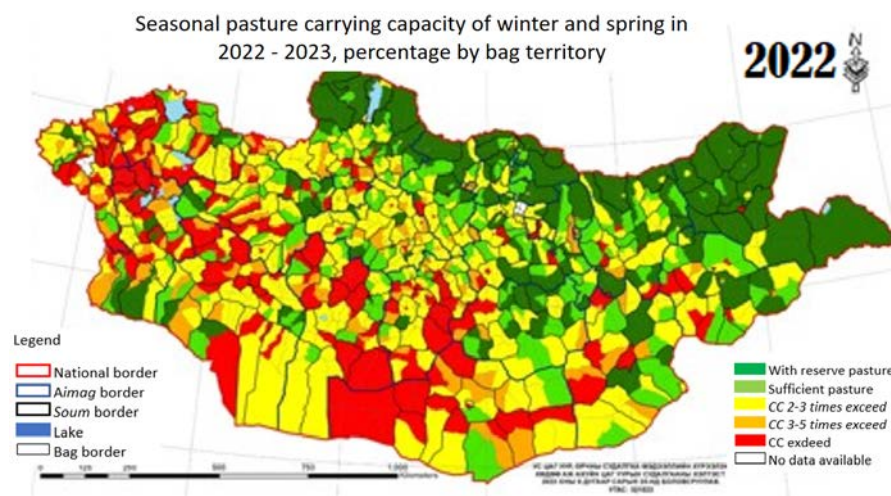
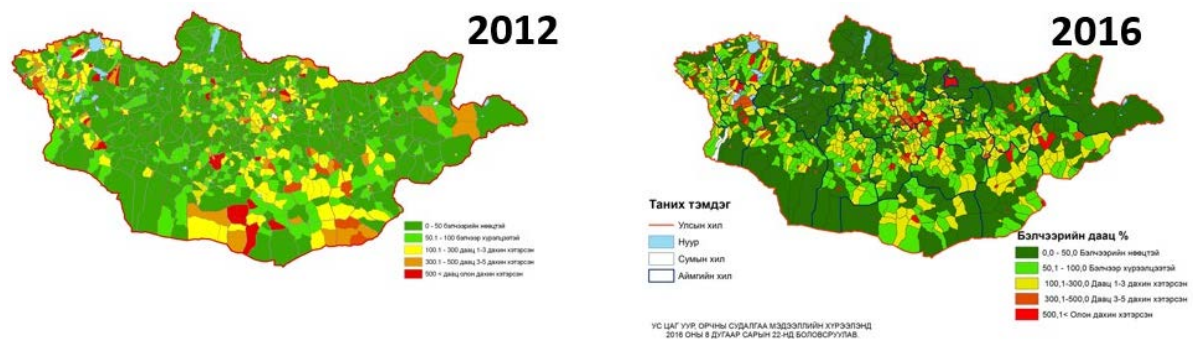


Figure 4.12 Pasture carrying capacity (2012-2022)

Source: (National Agency Meteorology and the Environmental Monitoring, 2022)

A bright green area indicates that the area has grazing reserves. The red area indicates that the grazing capacity has exceeded the carrying capacity several times. The figure shows that the carrying capacity of the entire grasslands of Mongolia is at an alarming level. One of the possible options to reduce the number of livestock without harming nomadic herder's livelihood is to promote animal-origin product export. Meat is an export potential product.

Since 2017, meat has become an increasingly attractive export product, the second most significant income source for herder households. Meat and meat exports in Mongolia have increased since 2014; in 2018, they reached their highest level in twenty-eight years and exported 54,900 tonnes of meat (MCGA, 2018). Hides and skins are by-products of meat production. Therefore, when meat production increases, hides and skin income grow.

In addition to these problems, there are also social problems of herders, such as poor health due to the busy work of herders, young people's unwillingness to become herders, and herders' wishes to send their children to urban life to avoid hard labour. The productivity of Mongolian livestock is decreased compared to before 1990 (Agipar, 2016).

4.2 Agricultural sector's importance in the economic growth of Mongolia

As explained in Chapter 3.2, the following results were obtained when calculating the contribution of the mining and agricultural sectors to the national economy at three levels.

Growth model – 1. The three steps explain the growth model Y1. The regression results of the first type of growth model (Y1-1 to Y1-3) are presented in Table 4.2.

Table 4.2. Mining and agricultural sectors contribution to economic growth (2000-2019)

	Variables	Y1-Annual economic growth rate		
		Y1-1	Y1-2	Y1-3
X ₁	Log GDP per capita	-0.014 (-1.65*)	-0.015 (-1.61*)	-0.005 (-0.576)
X ₂	ShareMINING	0.055 (1.88**)	0.057 (1.81*)	0.73 (2.49**)
X ₃	ShareAG	-0.061 (-0.85)	-0.072 (-0.81)	0.002 (0.022)
X ₄	Education		0.00 (-0.22)	0.00 (0.233)
X ₅	ShareNetTax			0.269 (2.088**)
Constant		0.057 (1.5*)	0.072 (0.943)	0.026 (-0.31)
R-squared		0.266	0.268	0.452
Adj R-squared		0.119	0.059	0.241
Durbin Watson		1.91	1.92	2.3

Note: *t*- statistics in parentheses;

*, ** indicates that significant at 10 and 5 percent levels, respectively.

Source: (Gombodorj & Pető, 2022a)

The log GDP per capita coefficient interprets a conditional rate of convergence. This coefficient is statistically significant in two regression models, i.e. Y1-1 and Y1-2. The estimated coefficient of -0.014 and -0.015 implies a convergence rate for these two cases, respectively (Peter et al., 2005). The variable Share of agriculture on GDP is negative but insignificant in all forms. The ShareMINING variable is positive and highly significant, indicating that Mongolia's economic growth depends on the mining sector's contribution. The variable Education is insignificant. Thus, this variable has no impact on GDP growth.

A future study needs to replace other variables to represent Education, e.g., the share of highly educated people, expenditures on higher education and others. The variable ShareNetTax is highly significant and positively related to GDP growth. This result implies that an increase in tax income supports economic growth. Government tax has a high portion of natural resources income and extraction. Therefore, sometimes the government becomes highly dependent on resource-related taxes.

Growth model – 2 and 3

The second type of regression analysis excluded a contribution of the agriculture and mining sector in the GDP growth step by step from dependent variables. Model Y2 estimated the exclusion of agriculture's share in GDP, and model Y3 ran without considering both agriculture and mining sectors' share in GDP growth in the dependent variable. Table 4.3 provides the regression results of these two models.

Table 4.3. Regression of annual growth of GDP less the contribution of agriculture and mining sectors (2000-2019)

Variable	Y2 (exclude agriculture in Y)	Y3 (exclude both sectors in Y)
Log GDP per capita	-0.012 (-1.185)	0.001 (0.081)
ShareAG	-0.044 (-0.457)	0.035 (0.311)
ShareMINING	0.071 (2.186**)	0.058 (1.51*)
Education	8.819 (0.128)	0.00 (0.16)
ShareNetTax	0.248 (1.74*)	0.389 (2.32**)
Constant	1.012 (11.1***)	0.941 (8.73***)
R-squared & Adj R-squared	0.45 & 0.239	0.367 & 0.124
Durbin Watson	2.36	2.19

Note: t- statistics in parentheses;

*, **, *** indicate that significance at 10, 5 and 1 percent levels, respectively.

Source: (Gombodorj & Pető, 2022a)

The estimation results are pretty similar to the results of the growth model Y1. The log GDP per capita coefficient indicates that a conditional convergence rate is no longer significant in these two cases. While the coefficients of ShareMINING and ShareNetTax are positive and remain highly significant. All other variables are insignificant. In the two models, the subtraction of agriculture and mining sector contribution to the economic growth has not affected the mining sector's importance in economic growth. The coefficients on the control variables are very close to the first regression model's result in Table 4.2. According to this

result, the contribution of mining to the current economy is much higher than that of agriculture. However, mining is a non-renewable resource, and agriculture is a renewable resource. Thus, investing appropriately in things that will bring long-term development is crucial.

4.3 SLF: Vulnerability context- Covid-19 impacts on livelihood

As explained in section 2.4.1, vulnerability contexts: trends, seasonality, and shock directly impact livelihood. In this sub-section, I present the study result of the Covid-19 impact on different types of households in Mongolia. The study area, materials and methods are explained in sub-section 3.3. A total of 362 households were selected from urban, rural, and suburban areas.

4.3.1 Covid-19 impacts on livelihood: Descriptive results

The descriptive statistics findings are shown in Table 4.4. The survey covered 362 households, and 65 percent of respondents were men. However, 9.9 percent of female-headed households stated simultaneously that they are almost all under the subsistence level of income. Male head households willing to lower risks (Bukari, Aning-Agyei, et al., 2021; Hatab et al., 2021) and women and poor people are hit by unemployment due to Covid-19 (F Davila et al., 2021). The average age of the participants is 45, with a high school education mainly.

Table 4.4 Basic characteristics of different households

Variables	Unit	Household types									
		Urban				Rural				Sub-urban	
		Apartment		Ger district		Herder		Vegetable grower		Small farmer	
		M	Sd	M	Sd	M	Sd	M	Sd	M	Sd
Age	Years	43	15	43	14	48	12	45	11	46	13
Male head respondents	percent	.55	.50	.48	.50	.69	.46	.53	.51	.75	.50
Education level	1-5	4.36	1.06	3.92	1.23	3.00	1.40	3.55	1.36	3.75	.50
Family Size	Person	3.60	1.19	4.00	1.62	4.42	1.65	3.95	1.67	5.00	.81
Income change	(Mln.M NT)	-1.9	8.5	-1.2	5.6	1.6	14.5	1.1	26.9	-2.4	2.7
Government measures importance	1-5 points	3.4	1.4	3.6	1.3	3.3	1.4	3.0	1.4	3.4	0.7
Interruption of main foodstuffs	1-5 points	3.5	0.8	3.3	0.9	3.7	0.7	3.6	0.7	3.7	0.3

during Covid-19											
Price changes	1-5 points	3.6	1.0	3.7	1.0	3.5	1.2	3.3	1.1	3.6	0.3
Valid (listwise)	N N	109		138		72		40		4	

Note: Mean (M) and Standard deviation (Sd)

Source: (Gombodorj & Pető, 2022b)

During the Covid-19 restriction, public services, including food and health services, were allowed to operate. Other types of business almost all completely or partially stopped, and income shocks happened in other developing countries (Kansiime et al., 2021). Respondents of households in the ger district and apartments were mainly selected from the capital city. Therefore, their income decreased due to the interruption of successive lockdowns (Gombodorj & Pető, 2022b). (Figure 4.13). Complete lockdown and travel restrictions control everyone and impede income access and agricultural production (Jaacks et al., 2021; Pu & Zhong, 2020)

The situation was different for the sub-urban farmer households, who herd a few cattle and sell milk and milk products to city citizens. They lost their whole revenue due to the lockdown. In a similar study by Monirul Alam et al. (2022), small-scale farmers lost significant revenue caused to a halt in domestic and international travel and a lockdown. This result contradicts the general principle of market proximity. Artmann et al. (2020), Tankam & Djimeu (2020) and Zhang et al. (2019) discovered that if farmers are close to the market, they have a greater chance of selling their products and lowering their risks.

Livestock and vegetable farming operations were unaffected thanks to the far distance from the capital city and province centres. The research results confirmed this situation, and the **income of herder and vegetable grower households** increased slightly from the previous year. Out of the five types of households, these two types are rural households. Among the most critical factors that contributed to the non-declining income of rural households are:

1. The government measures: cash transfer program
2. Food such as meat, milk, and vegetables are used free of charge from the family's farm
3. Food stamp program for vulnerable households.

In general, the Mongolian government's measures against Covid-19 for all citizens were significant to stable their income (Figure 4.13).

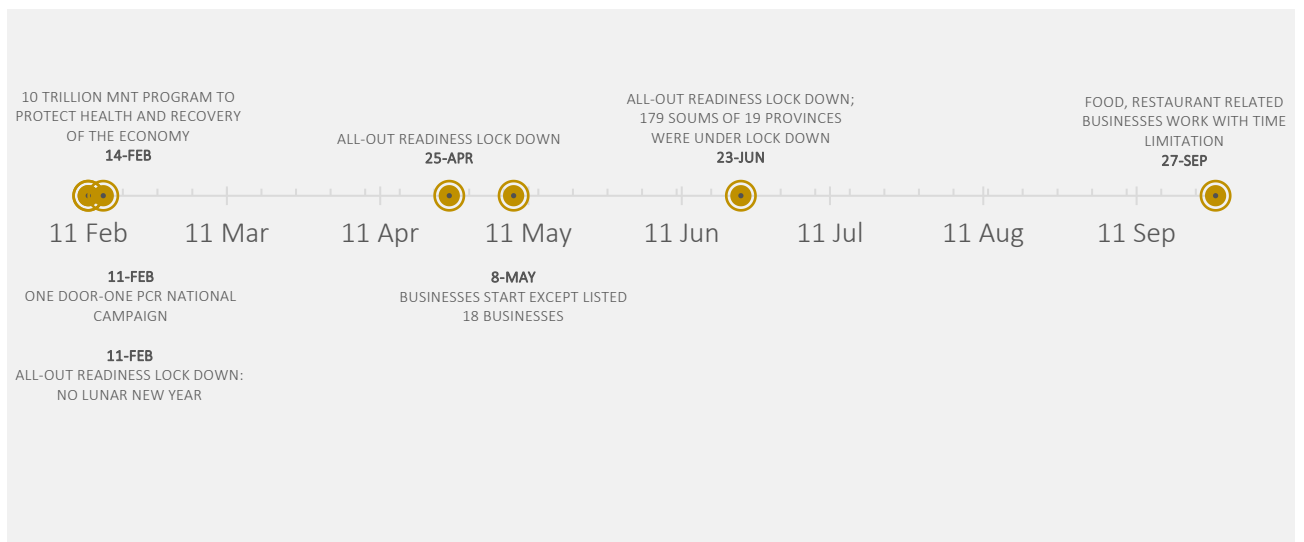


Figure 4.13. Timeline: All-out readiness lockdowns and Government main measures

Source: Author's compilation

The Government of Mongolia (GoM) has taken measures against Covid-19. Responding to the adverse socio-economic impact of Covid-19, the GoM has declared the following social protection measures:

- *On 26 January 2020, MNT 5.5 billion was approved to prevent Covid-19 (GoM Resolution №30, 2020); on 27 March 2020, under government resolution 114, the social insurance contribution exemptions and waived corporate and income tax from 1 April to 1 October 2020, applicable to all contributors (employers and employees) enrolled through their mandatory and voluntary schemes except for public sector workers and employees, vat tax exemptions for sugar, all kind of rice, wheat seed and wheat itself for a given period;*

- *On 29 April 2020, the Parliament of Mongolia approved a Covid law of Mongolia (Covid-19 Law of Mongolia, 2020); on 6 May 2020, provisions to increase child money payments and allowances for vulnerable people, the monthly benefit size (MNT 20,000) is increased to MNT 100,000 and approved Child Money Program covers all children under 18 years old effective from April 2020 to 1 January 2022;*
- *Food Stamp Program for the poor is also approved: the monthly benefit size (MNT 16,000 for adults and MNT 8,000 for children) is increased up to 32,000 and 16,000 respectively (1 May 2020, to 1 January 2022), and the social welfare pension: the monthly benefit size (MNT 188,000) is increased by MNT 100,000.*
- *GoM subsidised an MNT 20,000 bonus program per kilogram of cashmere for the herder households to substitute income loss from cashmere (effective only for 2020).*
- *On 18 November 2020, The Bank of Mongolia deferred mortgage repayments until the end of 2022 (GoM Resolution №183, 2020);*
- *On 2 December 2020, measures were taken for the vulnerable citizens of the capital city living in the ger district, the discounted price of improved fuel 50-75 percent (GoM Resolution № 200, 2020);*
- *On 14 February 2021, MNT 10 trillion economic stimulus package was approved (National Emergency of Management Agency, 2020);*
- *On 8 April 2021, GoM released Government resolution № 93 that approved 300 thousand Mongolian tugriks (or US\$ 107.9 at the official rate of Mongol bank for the day) cash transfer to every Mongolian citizen (GoM Resolution №93, 2021).*
- *On 13 December 2020, the government decided to pay for electricity, heating, water and garbage bills of households' houses (for up to 100 m²) from 1 December 2020 to 1 July 2022.*

From the above measures, the decision directed for a rural household is a cashmere bonus program and a soft loan with a 3 percent annual interest rate with a total budget of MNT 500 billion to support agricultural production and increase herders' incomes and livelihoods within the framework of MNT 10 trillion economic stimulus package (GoM, 2020).

Respondents evaluated that all these **government measures** helped their livelihood. When evaluating the government's actions on a scale of 1-5, all households scored an average of 3 or more. It is in line with other studies that cash transfer programs, unemployment insurance and pension systems support social safety and citizens' well-being during a crisis (Bottan et al., 2021; D. Gupta et al., 2021).

The study by Alsuwailem et al. (2022) demonstrates that the global **food supply** system was disrupted. A comparable outcome during the lockdown, flour was the most popular product in the United Kingdom (Alsuwailem et al., 2022) and Poland (Dudek & Śpiewak, 2022). However, it is not easy to find a cheaper product due to the quarantine. Mongolia has the same situation. There was little alternative except to pay a higher price for the hardly accessible things in the *soum* centre and only sell their products when a few traders and purchasers came to where they lived.

Households responded that there was a food shortage to some extent, regardless of urban and rural households. According to Kumar et al. (2021), the urban poor in India, international and regional market closure, and insufficient supply of products contributed to food shortages for urban households. This study result is similar to Ebata et al. (2021), who stated that the Covid-19 problem threatened vulnerable households in low and middle-income countries' ensuring food security. Moreover, Shammi et al. (2021) discovered that increases in product prices reduce regular intake. M. T. Hossain et al. (2021); Jaacks et al. (2021); Kansime et al. (2021) stated that households' access disrupted food, fuel, education, and healthcare. Mongolian households faced the same situation, such as a shortage of eggs, vegetables and fruits. Increased prices of eggs, meat, wheat, and imported vegetables negatively impacted regular intake and nutrients in all households, especially urban ones.

In contrast, Jia et al. (2021) and Raju et al. (2021) discovered that rural families are less affected by food shortages than urban households due to self-sufficiency in meat, milk, and vegetables. According to our research, herders receive free milk and meat from their farms, but rising flour price has significantly impacted their food intake. Meat, milk, and flour have always been staples in rural communities' food baskets. Therefore, rural households answered that the food availability and supply have deteriorated. Some respondents in urban areas stated they had relied on food assistance from their rural parents and relatives because all temporary work had stopped. It is in line with the research of Waibel et al. (2020); before Covid-19, urban families transferred money to relatives and parents in the countryside and received food and other assistance. Conversely, with Covid-19, urban households need additional food assistance from rural households.

When asked whether the change in purchases, 26 percent said there was no change in purchases, and 16 percent said the amount was decreased. The reason for the reduction in purchases, 34 percent of all respondents answered that the product **price** increased. The

increase in food and consumer goods prices was mainly due to the border closure. However, when the prices of domestically supplied products such as meat, milk, and flour increased, it was because everyone could no longer transport these products from the countryside to the city, as was the case before Covid -19. When transporting meat and milk in a few large vehicles, new costs have been added to the basic price, such as multiple en route inspections, certification of origin, storage and security costs, multiple PCR tests and sterilisation costs for the transporter. Shammi et al. (2021) concluded the result of a study done in Bangladesh that logistics and risk can be reduced if agricultural products reach short distances smoothly. However, due to the large territory of Mongolia and the scattered herders, livestock products are transported thousands of kilometres away.

The researcher asked whether there were problems before this sudden shock happened and, if yes, to what extent and whether they increased; the following problems were ranked (Figure 4.14).

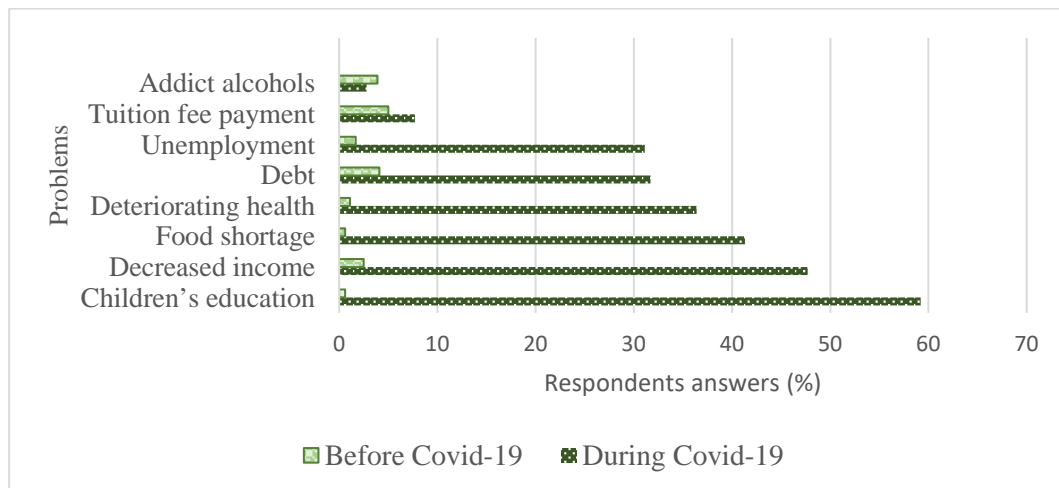


Figure 4.14. The main problems before and during the Covid-19 (percent of 362 respondents)

Source: (Gombodorj & Pető, 2022b)

With the release of Covid-19, the education problem was rated the most, followed by declining incomes, food shortages, health issues, debt, unemployment and student fees. On the positive side, alcohol addiction has decreased. A study by Mearns, (2004b) showed that all of these challenges were faced by nomadic herders even before Covid-19, including alcohol addiction. In addition, respondents expressed that declined temporary jobs, frequent

depression and anxiety, medicines prices, and increased family food consumption were additional challenges due to new shocks regardless of where they live.

During Covid-19, students' lack of electricity, internet connection and access to TV and online education significantly impacted their learning outcomes in Mongolia (Dembereldorj, 2021; Kokhan et al., 2021). Moreover, herders did not receive a total discount for electricity, water and heat paid by the government.

Transaction costs have been added for rural households when travelling to the cities. For example, the cost of requiring multiple PCR tests and travel permits to reach health care services or transfer livestock products has risen. The increase in transaction costs greatly affected food variety shortage and decreased income.

4.3.2 Covid-19 impacts on livelihood: Principal component analysis (PCA) results

Using the techniques in section 3.3, all variables are identified after rotation and converted into three sets of variables, i.e. named component 1, component 2 and component 3. PCA findings revealed two components for ger district households and three for other categories. Table 4.5 summarises the PCA findings that are statistically significant.

Table 4.5 Perception by household types, principal component analysis result

Variables	Urban households					Rural households					
	Apartment			Ger district		Herders			Vegetable growers		
Components	1	2	3	1	2	1	2	3	1	2	3
Vulnerability assessment by extended code double-counted more than one person in a household			.52		- .63		.60			- .63	
A number of measures need to take to cope Covid19			.88		.67		.53			.54	
Increased child money amount and covered all kids								- .52	.79		
Food vouchers for the poor	.80			.74		.72					.60
Increased social welfare benefits	.75			.68		.73			.68		
Free electricity and water		.60				.75			.72		
Deferred mortgage loans	.55			.77		.69			.78		
Soft loans for SMSs	.77			.81		.71				.55	
Tax and social insurance discounts	.64			.67		.80			.71		

Distributed 300 thousand MNT to each		.58			.58			-.80							
1 mln MNT old age pensioners				.58		.51					.61				
Food Shortage			-.52		.60				.78			-.62			
Price increase			.64		.64				.50			-.66			
Before Covid 19, a number of problematic issues		-								.52					
During Covid 19 Number of problematic issues			.83		.56			.64		.58	-				
Variance explained (percent)	22	21	18	27	23	28	23	18	25	24	22				
KMO Measure of Sampling Adequacy				.628				.723				.673			.550
Bartlett's Test of Sphericity (Sig.)				0.000				0.000				0.000			0.000
Number of observations				109				138				72			40

Source: (Gombodorj & Petó, 2022b)

Variables of *component 1* are specified and significant for all four types of households. This component did not include any other factors. Component 1 would only address government actions: food vouchers for vulnerable households, increased monthly amount of social welfare benefits for a disabled person, government subsidy for free electricity and water for all citizens and businesses, deferred mortgage loans, a soft loan package for SMSs and tax and social insurance discounts. The Mongolian Government has taken many measures against Covid-19, like other countries. Many governments have offered food coupons to the needy, postponed loan repayments, free power and utility bills, soft loans to enterprises and cash transfers (Monirul Alam et al., 2022). The Government of Mongolia provided food vouchers, soft loans, tax and social insurance discounts, and cash transfers. In particular, the Government provided MNT 20,000 per kg of cashmere to cover the cashmere prices fall in 2019, which positively impacted herders' livelihoods (Food and Agriculture Organization, 2020; UNDP NSO and WB, 2021). Shah et al. (2020) noted that the household's livelihood might be secure if government measurements are deemed adequate. Our survey participants were satisfied with government assistance and support and rated it as contributing to their lives.

Component 2 addresses respondents' perceptions of the obstacles posed by Covid-19 problems and challenges. It included cash transfers, food shortages and price increases. To examine the effects of Covid-19, respondents were asked to tick from answer choices: sell

livestock; sell land and fixed assets, use savings, borrow products from shops, loan from credit and saving the union, loan from friends and relatives, work more (part-time job), migrate from one province to another, reduce food product intake, reduce meal, look for cheaper food and responses are shown in Figure 4.15.

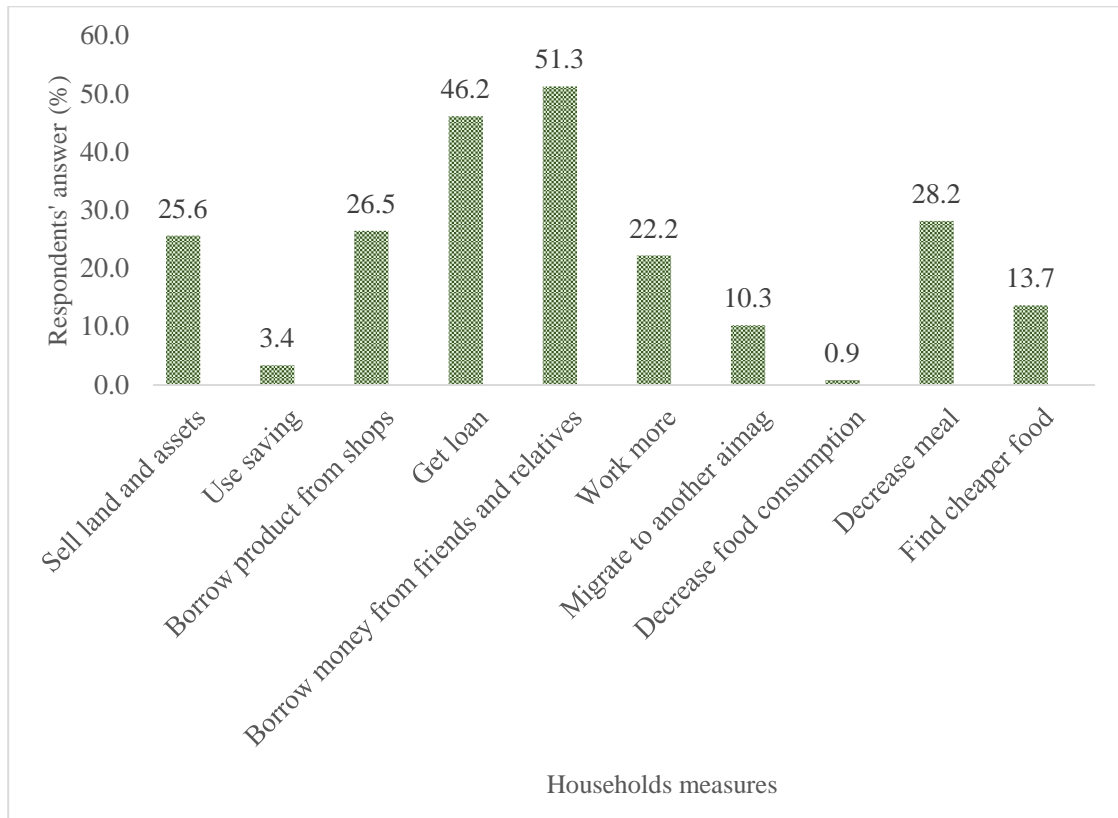


Figure 4.15 Measures taken by rural households due to Covid-19 (%)

Source: Author's compilation

To understand more deeply the reasons for selling assets and getting a loan, we asked for loan spending purposes. Most respondents (77.8 percent) answered to spend on food and regular consumption. This shows that during the pandemic, family food consumption increased everywhere. On the other hand, herders and rural households are cash-strapped, and even when the government has implemented a cash transfer program during Covid-19, there is demand for credit.

Regarding the problems and challenges before and during Covid-19, quarantine is a significant issue (67.3 percent), followed by labour scarcity (35.1 percent), vehicle shortages, and rising rental rates (30.4 percent). Quarantine was the most critical problem, harming livelihoods the most, as shown in another research result covering member countries of the Asian Productivity Organisation (S. T. Hossain, 2020).

Component 3 discusses the risk and vulnerability of Covid-19. This categorisation includes variables about fast vulnerability assessment, food scarcity, and price increase. Of all participating households, disabled head households were 5 percent, single was 4.1 percent, women-headed households were 9.4 percent, male-headed were 1.1 percent, households with a disabled person were 1.7 percent, and households with income below subsistence level were 14 percent. Vulnerable households or households lacking assets are less capable of coping with shocks and risks (Ansah et al., 2020).

The variables in components 2 and 3 are not specified as component 1. As a result, the subsequent regression analyses are based on component 1 and include identified variables from components 2 and 3.

4.3.3 Covid-19 impacts on livelihood: Multiple regression model results

Table 4.6 presents the multiple regression model results of calculating the factors that affected the household income changes due to the impact of Covid-19 for each of the four types of households, where Income Changes are the dependent variable.

Table 4.6 The impact of COVID-19 on different type of households

Variables	Urban households		Rural households	
	Apartment	Ger district	Herder	Vegetable growing
(Constant)	28.9 (3.22***)	20.8 (3.31***)	24.2 -1.44	-66.9 (-2.9***)
Family Size	0.156 (1.6*)	0.324 (3.59***)	0.073 -0.51	0.212 -1.2
Covid impact (Y=1 otherwise 0)	-0.176 (-1.73*)	-0.206 (-2.41***)	-0.172 (-1.44)	0.027 -0.18
Age	-0.253 (-2.45**)	-0.001 -0.012	-0.169 (-1.27)	0.55 (2.58***)
Profession_V	0.24 (2.51**)	-0.042 (-0.49)	-0.043 (-0.36)	0.192 -1.2
Increase in the amount of child allowance	-0.137 (-1.19)	-0.111 (-1.17)	-0.062 (-0.42)	0.109 -0.58
Food vouchers for poor	-0.001 (-0.005)	-0.142 (-1.37)	-0.049 (-0.32)	0.652 (3.2***)
Deferred loan repayment	-0.119 (-1.04)	0.153 -1.09	-0.255 (-1.75*)	0.154 -0.8
Soft loans for entities	0.265 (2.06**)	-0.005 (-0.04)	0.073 -0.44	0.093 -0.43

Tax and social insurance waive/exemption	0.084	0.033	0.347	-0.105
	-0.79	-0.28	(2.04**)	(-0.51)
Cash transfer of 300 thousand MNT to each	-0.046	-0.185	-0.027	0.055
	(-0.45)	(-2.03**)	(-0.22)	-0.36
1 million MNT to the retired people	-0.146	0.078	193	0.362
	(-1.31)	-0.82	-1.45	(1.62*)
R	49.4	43.4	49.1	65.9
Adj. R Sqr.	15.8	11.8	10.2	21.3

Notes: *, **, *** indicate significance at 10 percent, 5 percent, and 1 percent levels, respectively.

Source: (Gombodorj & Pető, 2022b)

The number of family members positively relates to apartment and ger district household income. Variable Covid impact is a dummy variable. As predicted, Covid19 impacted the income change of the apartment and ger district. The findings are comparable to (Z. X. Du et al., 2020). According to Du et al. (2020), Covid-19 had no direct influence on family farms compared to other risks. Moreover, household factors such as gender, age, and education were not associated with the short-term impact. Another research, Dudek & Śpiewak (2022), discovered that Covid-19 had a lower impact on non-labour-intensive agriculture. Because Mongolian pastoralism is non-labour intensive, it is less affected by Covid-19, and the impact is likely to occur later.

A border closure impacted herder households' livelihoods on two sides negatively and positively. Meat export decreased. Horse meat and beef sales were down. This may be explained by the dramatic fall in horse meat exports caused by the Chinese border closure and the sharp decline in beef demand in restaurants, caterers, schools, and kindergartens, which are the primary beef consumers. This trend is consistent with the research findings by Dudek & Śpiewak (2022); Lokonon (2019). They demonstrate that global food markets are changing; consumers choose more readily available and uncomplicated food to store and transport. Mongolians have a long history of preserving animal-origin foods. However, sheep and goat sales slightly increased to an increase in domestic meat consumption.

Since Covid-19, the number of animals used for health and household needs has increased, while the cost of travel, weddings, house repairs, and students has dropped dramatically since Covid-19. The answers “*dzud*” had no noticeable change. Ellis (2000) and Møller et al. (2019) agree that the leading strategy for households to cope with shocks is to reduce consumption and that the final choice is to sell their land and real estate. The *dzud* and Covid-19 shocks occurred concurrently in certain rural regions, but both had a minor influence

during the survey. As a result, according to Waibel et al. (2020) and Ellis (2000), families were not compelled to take drastic action in response to the cumulative effect.

Luo et al. (2020) found that the income of poor rural households is highly dependent on non-farm income. Since Covid-19 emerged, off-farm income has stopped and pushed them into poverty. However, for Mongolian herders, income diversification is low, and most of the income is earned only from livestock; thus, their income has not decreased.

The regression results show no statistically significant Covid-19 factors impact herder households. This is consistent with Du et al. (2020), who discovered that Covid-19 had no direct effect on family farms compared to other types of risks.

Interestingly there is some negative impact of the government support on the income changes, i.e. deferred loan for herder households; distributed 300 thousand MNT to each person for ger district households. This result is not a meaningful explanation, which might need additional in-depth study focusing on this subject.

4.4 SLF: Herder households livelihood capitals

This section presents the results of the study of five types of assets in the framework of SLF, using a 350 herder households survey. Descriptive statistics of human, social, financial, natural and physical capital will be followed by a discussion.

4.4.1 Human capital

Lack of human resources is one of the problems for pastoral livestock. According to the 2021 livestock census, 305.4 thousand herders are registered and working in livestock production, 27.1 percent of the total number of workers. The number of herders increased by 6.6 thousand or 2.2 percent from year 2020 (Figure 4.16).

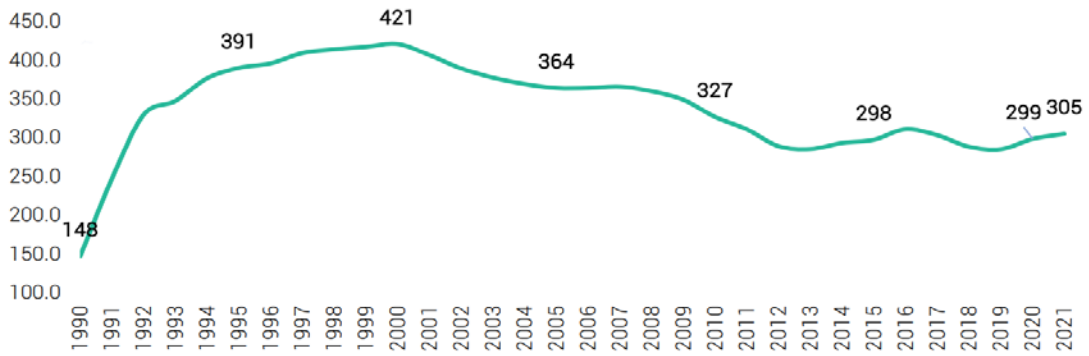


Figure 4.16 Number of herders, thousands people (1990-2021)

Source: (NSO, 2022b)

Figure 4.17 shows that in the years of *dzud*, drought and natural disasters, herders decreased as herders went to work in the urban areas due to lost livestock. New herders are entering the community mainly in favourable weather years. In addition to the number of herders, the lack of young successors is one of the problems in this sector. The share of herders under the age of 34 in the total number of herders continuously decreased and reached 28 percent. For herders, it is typical that they become herders just after graduating from high school or secondary school. Many reasons include avoiding herders' hard work and the desire to study and live in urban areas.

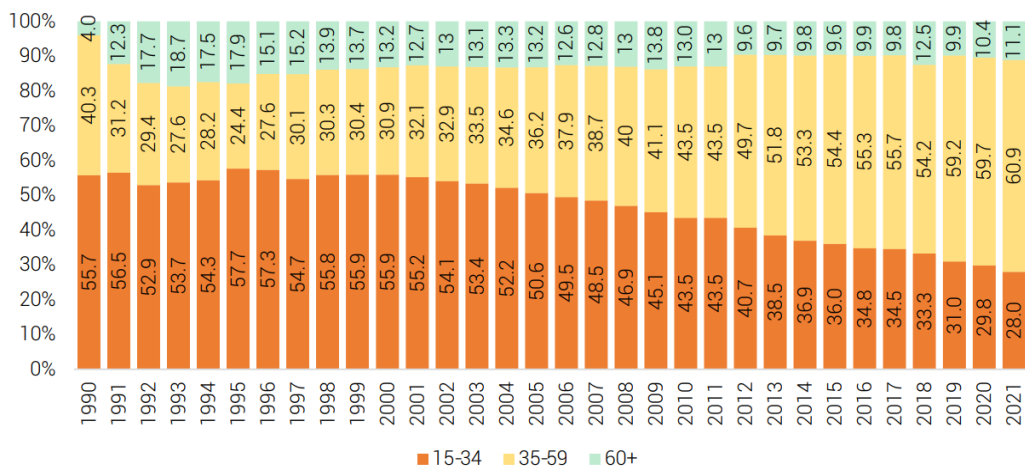


Figure 4.17 Herders' age composition (percent)

Source: National Statistical Office data (1990-2021). (NSO, 2022a)

The survey respondents' average household size was five people, and the maximum was 12 people per household. The average age of male heads of herder households is 45, while the average age of female heads of households is 52. 95.9 percent of herder households have a

male head of household. The percentage of labour-active-age people within the total household members was 49.3 percent (Table 4.7)

Table 4.7 Descriptive statistics of human capital

Variables	Minimum	Maximum	Mean	Std. Deviation
Family size	2	12	5.21	1.59
Number of household labourers	1	8	2.48	.998
Share of household labourers in a household	14.3	85.7	49.28	16.5308
Household education index (illiterate=0, primary school=0.25, junior high school=0.5, above junior high school=0.75, college and above=1)	.00	1.00	.53	.18724
Number of people in the household who have a health problem	0	2	.08	.278
Distance to get health care (km)	1.0	700.0	39.65	59.42
Percentage of household members who have had a health problem in the last year	.0	83.3	19.05	22.27
Valid N (listwise)	350			

Source: Authors estimation (2022)

42.2 percent of herder households have 2-3 children between 1-5 years old. Moreover, 30.2 percent of the children aged 2-5 years old in herder households go to kindergartens. 91.3 percent of herders' school-age children attended secondary schools at soum and aimag centres. Some people believe that one of the human resource problems faced by nomadic herders is that 6-year-old children are starting to enrol in school. When a 6-year-old kid starts school, someone must live with him or her. Therefore, mothers usually live in the sum centre to look after their kids, and the father takes care of the animals in the countryside. It affects not only the lack of human power but also family relationships.

92.8 percent of total herders are literate. 62.8 percent of adult herders have primary and secondary education. Of these, 36.9 percent of male and 54.5 percent of female herders have completed secondary education. However, 20.6 percent of herders aged 20-29 had higher education (Figure 4.18).

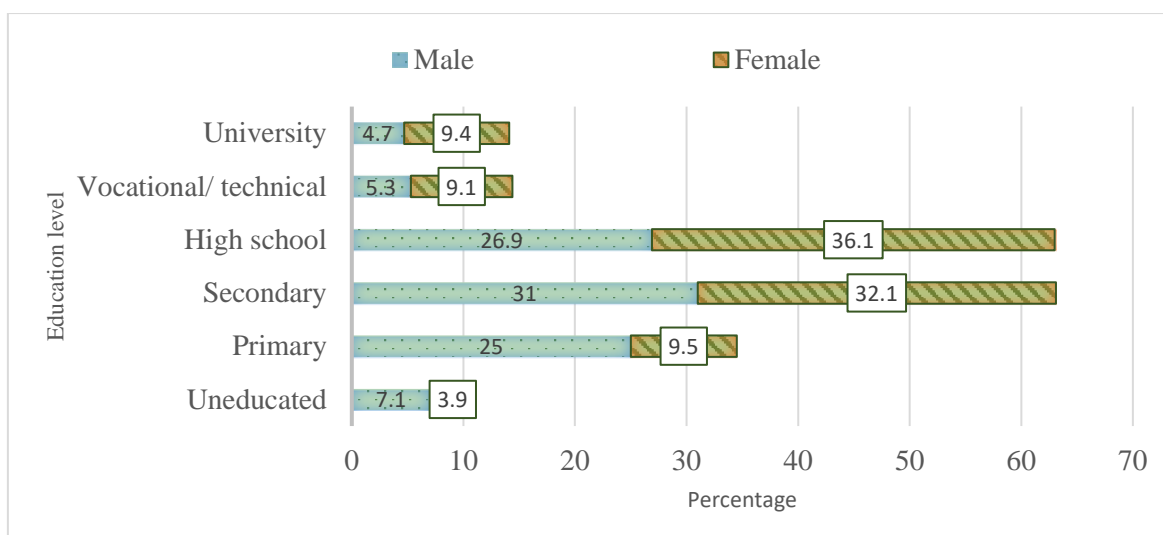


Figure 4.18. Herder's level of education by sex (percent)

Source: Author's compilation

Herders' busy working schedule obstacles them from improving their education and attending adult and continuing training. As of 2021, there are a total of 10.3 thousand uneducated herders in Mongolia. There are few opportunities for these herders to improve their knowledge and education. However, the possibility of getting information through TV and radio increases yearly. Assisting and handy tools to ease work and innovation might help improve the knowledge and education of herders.

Health directly impacts household income (Hua et al., 2017; P.Wang et al., 2019). 36.2 percent of herders have had a health problem in the last year. 80.1 percent of herders over 18 are covered by health insurance. When they were ill, 53.7 percent went to the soum hospitals, 21.6 percent to aimag hospitals, 20.8 percent to capital city hospitals, and the remaining 3.9 percent did not go to health facilities. Herders travel an average of 35.5 kilometres to get medical care.

4.4.2 Social capital

Social capital includes indicators such as the participation of herders in social relations, their voice in decision-making, belonging to a community group and exchanging gifts. The use of mobile phones and the Internet for social interaction is increasing every year. As of 2021, 94.6 percent of all herders are using mobile phones, which is an immediate increase of 12 percent compared to 2017. The number of herders using the Internet increased by 42.1 thousand from the previous year and reached 42.1 percent of all herders (NSO, 2022a).

Table 4.8 summarises the descriptive statistics of the social capital of 350 herders surveyed in 2017.

Table 4.8 Some characteristics of social capital

Variables	Min	Max	Mean	Std. Deviation
Number of household members with a mobile phone	0	6	2.58	1.18
Household membership in any herder group? (1=yes, 2=no)	1	2	1.72	.451
Number of members involved in adult and continuing training	0	4	.25	.630
Training needs on animal diseases (1=yes, 2=no)	1	2	1.05	.215
Percentage in the parliamentary, aimag and city citizenship meeting elections	.0	100.0	93.31	17.46
Percentage of household members voting in local elections	.0	100.0	92.40	17.1
Percentage of household members in the presidential election	.0	100.0	89.47	25.8
How many <i>bag</i> CRM did you attend last year?	0	7	1.79	1.45
Number of animals donated/gifted last year	0	230	10.7	24.3
The amount of dried meat given to others /kg/	0	68	1.49	5.75
The amount of milk, yoghurt and fermented milk is given to others, /litre/	.00	1100	58.01	98.89
Other dairy products were given to others, /kg/	.00	641	49.57	67.65
Traditionally distilled vodka given to others, /litre/	.00	240	6.36	18.37

Source: Author's estimation

One of the tools for herders to socialise is the mobile phone. 82.6 percent of herders over the age of 15 have a mobile phone. 67.9 percent use ordinary mobile phones, while 31.3 percent use smartphones. Herders increasingly use mobile phones to report livestock and human health problems, stay in touch with their neighbours and seek out missing animals from other herders. According to Rigg's (2006) research, the younger generation is attracted by the technological development of cities and willing to live there. However, the availability of smartphones and the internet in rural areas will help reduce this flow.

In addition, 16.2 percent of all herder households use the Internet 29.5 percent of herder households with mobile phones do not receive any information from their mobile phones. 62.5 percent of households that receive news and information from their mobile phones receive weather information more often than other information. In contrast, 28.8 percent answered that they get information about livestock products' prices. 68.2 percent of herder

households receive information about highly contagious animal diseases from television. 96.8 percent of herders expressed that animal health training is needed. However, the number of adults and continuing training participants is few. Soum authorities complain that herders are inactive and do not attend training.

Voter turnout in local, parliamentary, and presidential elections is higher than the national average, indicating active participation in elections. However, participation in citizen representative meetings (CRMs) was few, with a maximum of 7 times and an average of 2 times. The reason for not attending the meeting is that he was busy, had little faith in his local leadership, became politicised in the local area, and voted for another party.

Through identity, honour, and belonging, social capital can significantly contribute to people's sense of happiness (Rigg, 2006). 39.3 percent of them are members of cooperatives, partnerships and groups. 25.5 percent are members of the herder group who do not know the name or are inactive members. They joined a cooperative to receive government subsidies for leather and wool subsidies. 41.2 percent of herders are satisfied that such community-based organisations support herder activities. Despite the reluctance to be an active member of cooperatives and groups, as defined by Mearn, the tradition of helping one's family and working together, known as kinship support, is still preserved. Kinship support constantly helps poor herder families in difficult times, lack of food, and health issues (Mearns, 2004b).

Giving gifts is an integral part of social capital. According to Mongolian tradition, guests should be given presents. For herders, milk, fermented vodka, and meat are gifts for weddings, celebrations, guests, relatives, children, and grandchildren living in urban areas. If these gifts are valued at the market price, herder households are gifted an average of MNT 475,113 or 4 percent of annual income (US\$ 192.5). Of this, 50.9 percent were milk and dairy products, and 42.8 percent were meat products.

4.4.3 Financial capital

Herder households earned an average of 12,049,922 MNT (US\$ 4,882) per year, and half of their income came from cashmere alone in the spring. In the summer, dairy and wool revenues are generated, while live animal or meat sales are in the fall, and the remaining income comes from winter food, frozen milk, and dairy products (Figure 4.19).

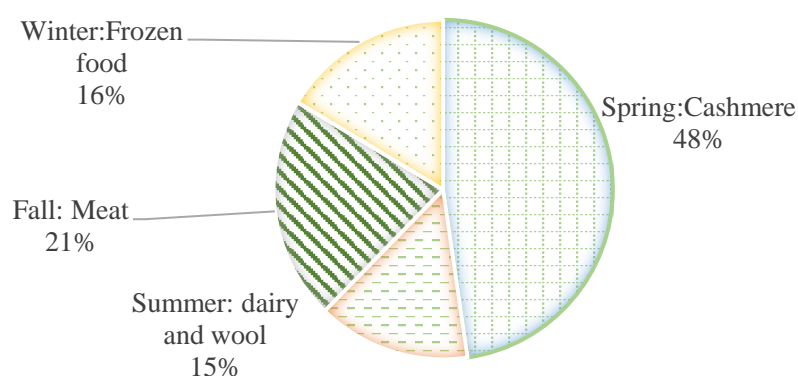


Figure 4.19 Seasonal income of herder households

Source: Author's compilation

The lowest household income is 480000 MNT (US\$ 194), and the highest is 136 015 000 MNT (US\$ 55106). The annual income per household member is 120000-22669167 MNT (US\$ 49-9184) (Table 4.9). This means that low-income households have 17 times lower incomes than monthly per capita consumption expenditure (as of 2017). Std. dev is higher because the average annual income of households varies.

Table 4.9 Descriptive statistics of annual household income (MNT)

Variables		Min	Max	Mean	Std. D
Household total income		480000	136015000	12049922	14030280
The income per herder household member		120000	22669167	2483726.1	2942121.6
Livestock income; Of which		125000	104295000	10406260	13192405
1	Meat and live animal sales income	0	31720000	1643662.9	2930224.59
2	Meat and dried meat sale income	0	64000000	3294628.6	8009116.1
3	Milk and milk product income	0	17800000	1568895.4	2980346.69
4	Leather, cashmere and wool income	0	10000000	309612.4	850937.26
Non-livestock income		0	1780000	15662.9	139118.6
1	Wage income	120000	22669167	2483726.1	2942121.56
2	Part-time (seasonal) job income	0	15600000	395374.3	1657147.10
3	Crop income (cereals)	0	1200000	6571.4	76358.48
4	Crop income (fodder plant)	0	100000	285.7	5345.23
5	Crop income (potato, vegetable)	0	2000000	8571.4	119385.79

6	Natural resource income: (pick up fruits and nuts)	0	1500000	9200.0	95721.90
7	Natural resource income:(gold mining)	0	2000000	24400.0	160391.93
8	Service income (tourism)	0	800000	3642.9	47906.92
9	Business activity income	0	250000	714.3	13363.06
10	Pension and state welfare income	0	3100000	113714.3	1670984.62
11	Handcraft income	0	8400000	1024897.1	1809497.08
12	Other income	0	1600000	40628.6	191543.73

Source: Author's estimation

Non-livestock income sources

For households, income diversification reduces any risk and is a way to rid of poverty (Dixon et al., 2001). Of the 350 households surveyed, 33.1 percent answered that they have non-livestock income sources. These include the highest percentage from the public old age pensions and benefits, followed by wage earnings, handicraft earnings, and natural resource earnings (fruit picking, logging, dung picking, onion picking, stone picking, etc.). Income from planting and selling various crops, business activities, artificial mining, and one household earned income from tourism-related services (Figure 4.20)

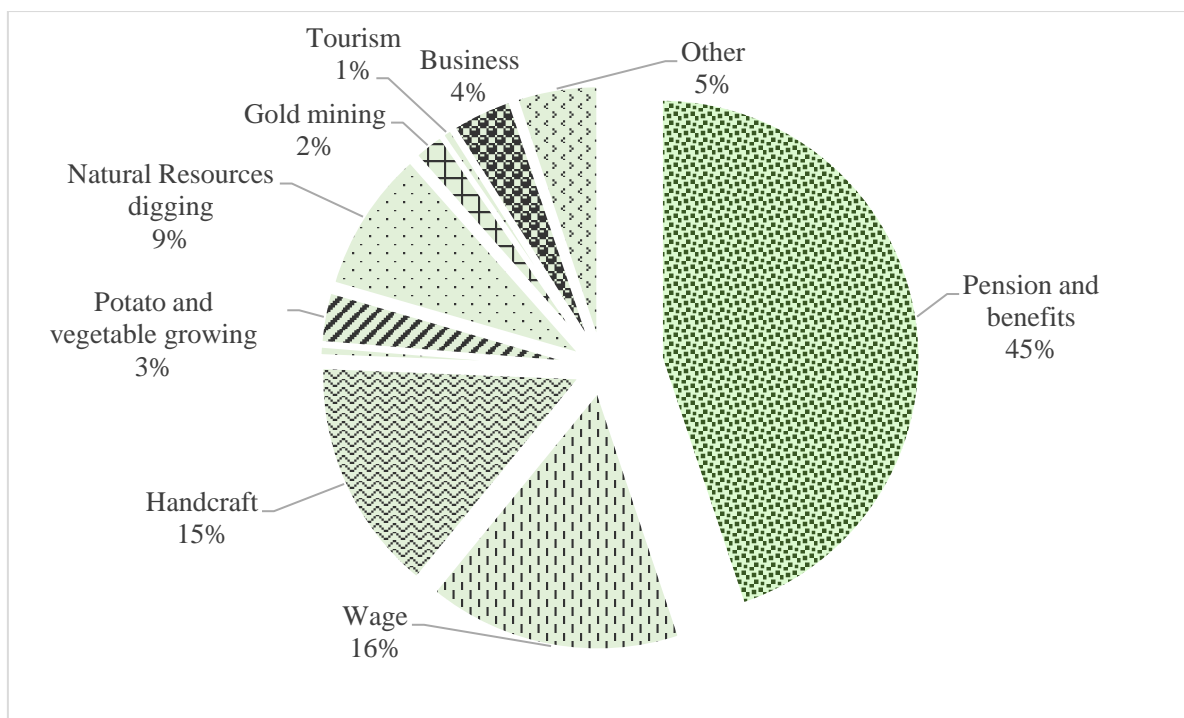


Figure 4.20. Herder households' non-livestock income sources (percent)

Source: Author's compilation

After state old age pension and social benefit income, the wage is followed. In the rural area, some herdsman earn a monthly wage, such as *bag* governors, *bag*-level human doctors, nature conservationists, cooperative heads, and guards of a fenced area or haymaking area. There are also families with part-time job income: goat cashmere combing in spring, sheering sheep wool in summer, milking a cow in summer, transferring slaughtering animals to market in autumn, slaughtering service for winter bulk food, wood logging, training horses and other activities. Fees are varied depending on year and region. For example, in Khuvsgul aimag, the western part of Mongolia, some fees were 2017 the following;

- Combing goat cashmere 4500-5500 MNT per goat or 25000 MNT per day/person;
- Slaughtering horses and cattle 20000 MNT per animal;
- Slaughtering sheep and goats 1500-2000 MNT per animal;
- Cleaning animal offal and intestine 300 MNT per sheep or goat;
- Prepared firewood of small track (2.5-tonne car) 250000 MNT;

- Ram and billy goat herding from December to October with a fee of 1 lamb for each ram and cashmere (apr 700 gramm, valued at 70000 MNT) from each billy goat.

In addition, herders earn wages from herding livestock of soum centre households that owns few animals. Also, households with many livestock separate their some herds separately and hire another herdsman.

Livestock product income sources

For the livestock product income, herder households earn their income from wool, cashmere, meat, hides, milk, and dairy products. 97.1 percent of all households sell cashmere and wool, while very few earn income from dairy products (Figure 4.21).

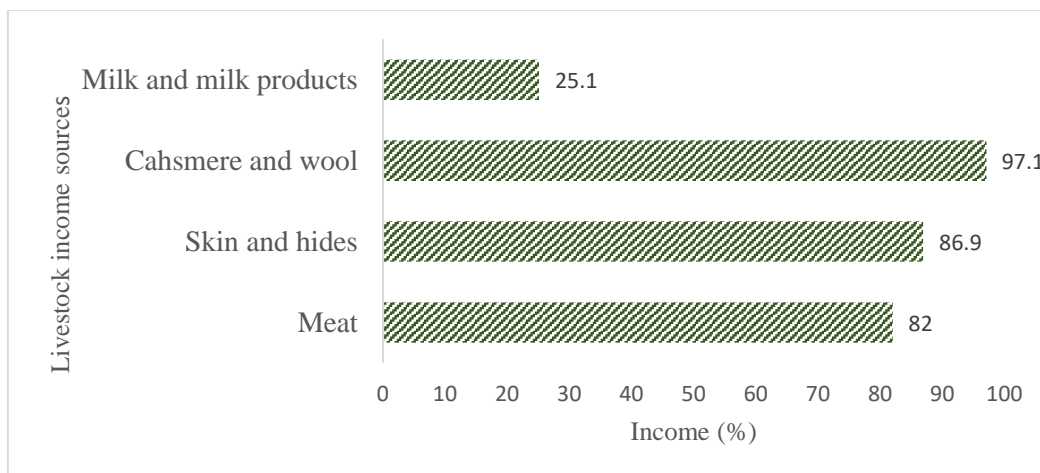


Figure 4.21. Livestock income sources of herder households (percent)

Source: Author's compilation

Loan

According to J. Ding et al. (2020); Wu et al. (2021), a loan is an essential factor that changes the rural poor's livelihoods. They stated that loans, including from parents, relatives and friends and access to formal loans from banks and financing institutions are defining factors of shock, vulnerability and choosing livelihood strategies. 81.6 percent of herder households received loans and leasing services from commercial banks. 25.1 percent of herder households who received loans received commercial loans for household use, 17.2 percent for purchasing a car, 14.1 percent for their children's wedding, and 9.1 percent for livestock purchase.

Herder households work together to create a mutual fund and obtain low-interest loans. 29.4 percent of herder households know about mutual funds, and 15.9 percent have borrowed from mutual funds. Herder households received loans from the mutual fund 2-3 times. The average loan term is one year. However, households face difficulty accessing those loan services. They said the interest rates were high, and livestock was valued at a low price, insufficient collateral, and loan settlement time was too long. 96.4 percent of herders consider commercial banks to be reliable lenders. The government of Mongolia made a deal with commercial banks and reduced the interest rate for livestock loans provided by Khaanbank and Turiinbank, which have branches in each district. Of the total surveyed households, 149 have deposits in commercial banks, with an average of 3753088MNT (US\$ 1521) (Table 4.10).

Table 4.10 Descriptive statistics of household loans and saving

Variables	N	Min	Max	Mean	Std. D
Frequency of loan	19	1	8	2.53	2.195
Family saving (1=yes, 2=no)	350	1	2	1.57	.495
Saving amount	149	0	75000000	3753088	8902494

Source: Author's estimation

Herder households with a few animals have taken out loans frequently. They often have students and children studying at universities are common. In late summer and early autumn, need for loans for expenses such as weddings and student tuition fees. At the same time, wool and cashmere income is used for regular consumption and to pay off previous loans. At this high cash demand, animal fattenings are not ready for slaughter in large numbers.

4.4.4 Natural capital

The most important natural capital for herders who traditionally look for better pastures for four seasons of the year is the pasture availability and quality of pasture and water. In the study, pasture quality was determined by the herders' assessment of the proportion of edible plants. According to the herders, 63.53 percent of the rangeland is covered with edible plants, 32.9 percent with non-edible plants, and 4.6 percent with poisonous plants. 28.5 percent of herders conduct *otor*⁸ on average two times a year. 62.1 percent of herder

⁸ Otor- summer and autumn, move around for better pasture and water to fatten the animals

households moved *otor* once a year. On average, *otor* rangeland is located 39.9 km from the household winter camp (Table 4.11).

Table 4.11 Descriptive statistics of natural capital

Variables	N	Min	Max	Mean	Std. Dev
Number of <i>otor</i> move within the year	350	1	5	1.81	1.02
Percentage of the edible plants in pastureland	350	10	100	63.53	19.7
The distance of the remote rangeland /km/	350	1.0	90.0	9.49	9.08
The distance of the nearby rangeland /km/	350	1.0	20.0	2.88	2.28
Adequacy of pasture (perceived 1- 4, inadequate to adequate)	350	1	4	2.19	.878
Changes in pastures compared to 15-20 years ago (evaluated 1 – 8, from bad to good)	348	1.00	8.00	2.83	1.91636
Distance from soum centre to winter camp	350	.0	160.0	30.26	23.0178
Distance from soum centre to spring camp	350	.0	170.0	26.51	22.4724
Distance from soum centre to summer camp	350	.0	170.0	25.82	27.1440
Distance from soum centre to autumn camp	350	.0	125.0	25.05	20.0380
Valid N (listwise)	170				

Source: Author's estimation

Herders estimate that the pasture availability is 64.3 percent, and they see that the pasture availability for herding is moderate. However, the quality changes in pasture compared to 15-20 years ago are considered the following. 38.5 percent of herders report that water has decreased and springs have dried up. And 12.5 percent said there are reduced grass and plant yields. 23.2 percent of all herder households have haymaking fields. 16.8 percent of these herder households are licensed to use their hayfields and have an average of 25.9 ha of haymaking permits. Although there is no fixed area for haymaking, herders prepare their hay yearly based on the yield. 92.1 percent of the respondents said they prepare their hay from hayfields. The average distance from *Khot ail*⁹ to the soum centre is 23.9 km, to the hand well is 2km, and to the *bag*, centre is 19.4km.

4.4.5 Physical capital

Researchers have studied livestock numbers by classifying them as financial or physical assets. In this study, livestock number is classified as physical capital. The lowest number of livestock in a herder household is 6, while the highest number is 3059, and the average is 529. When a number is converted to sheep heads, the minimum is 11, the maximum number

⁹ Group of herder household living close together and mostly have kinship support

is 4,527, and the average is 786 sheep heads. 98.7 percent of herder households live in gers. In addition, 27.9 percent of them have separate houses in their summer and winter camps. 38 percent own a building, storage shed, and container in the soum centre. It is used for their children's lives during the school year and for storage purposes. 95.2 percent of herder households use solar power for low-wattage lighting an average of 3-4 hours a day, and 87.7 percent have a TV and use it for 5-6 hours with solar power. 84.9 percent of herder households, or 4 out of 5 herder households, have one winter camp, while 3 out of 5 have one spring and summer camp. In addition, 7.5 percent of herder households do not have winter camps, and 27.5 percent do not have spring camps. The distance between one herder household's winter, spring, autumn, and summer camps is approximately 13-20 km) (Table 4.12).

Table 4.12 Descriptive statistics of physical capital

Variables	N	Min	Max	Mean	Std. Deviation
Household livestock number		6	3059	529.4	484.14
Household livestock number by sheep unit	350	11	4527	786.13	768.154
Accessibility to the electricity sources by types 1=central gridlines from soum, 2= solar panel, 3=wind, 4=no electricity, 9=Other	350	1	5	2.01	.363
Number of mobile phones per household member	350	.00	1.17	.5272	.21431
Number of electric appliances	350	0	6	2.49	1.073
Total usage of electric appliances by hour	350	.0	61.0	13.27	10.0368
Number of winter camps	350	0	3	1.01	.393
Number of spring camps	350	0	4	.77	.612
Number of summer camps	350	0	7	.86	.772
Number of autumn camps	350	0	5	.67	.721

Source: Author's estimation

Things like modern tools used for the daily use of herding households, musical instruments for entertainment, etc., are included in the physical assets. On the other hand, they can indicate the level of development and modernisation of the herder households. Therefore, it is included in the questionnaire about household assets such as computers, freezers, TV, modern musical instruments, washing machines and others. Most households have a small TV that allows them to stay informed, and small lights are very helpful in increasing the productivity of the household. Freezers and washing machines powered by 12-volt electric

generators are becoming available and affordable in rural areas. This makes the work of the house wives much easier, prolonging food storage in rural households. (Figure 4.22).

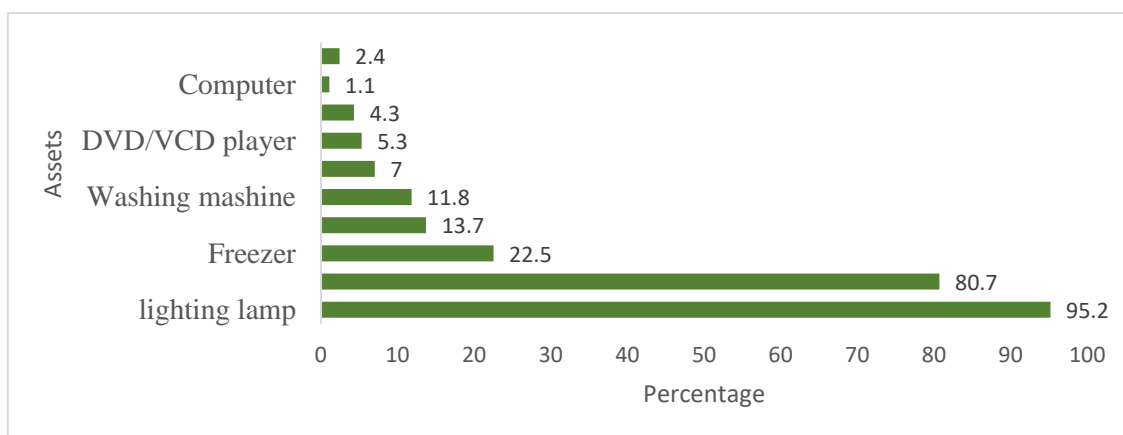


Figure 4.22 Herder households' physical capitals

Source: Author's compilation

In addition, 40 percent of the respondents have their trucks for moving, 20 percent borrow trucks from neighbours, and the rest use other methods such as horse carts, camel carts, motorcycles, and seat cars.

4.5 SLF: Institutions and processes: Meat export enhancing policy impacts on herders' livelihoods

Mongolia is divided into 21 aimags, 330 soums and 1810 bags. Aimag, soum, and bag 10 administrations independently organize their territories' economic and social life by combining local self-government with the state administration. The government continuously develops and implements policies to develop the countryside and improve the livelihoods of herder households. With Mongolia's election system, there is a bias that it is beneficial to have much poverty in rural areas and needs a lot of aid and support. Although many policies and programs have been implemented and aid is still being provided (See chapter 2.4.3), there is no publicly available monitoring and evaluation report. Therefore, the researcher aims to analyze one of the government's policies' impact of enhancing meat export on herders' livelihood.

¹⁰ The smallest administration unit in Mongolia

4.5.1 Introduction

Meat is the second-largest source of cash income for herder households. Special programs on meat export promotion have been implemented to increase export income, reduce overgrazing and poverty and increase herders' incomes since 2015. The policy paid off.

As of 31 December 2022, Mongolia exports 16.1 thousand tons of meat and by-products worth 50.6 million US dollars to China, Russia, Japan, Kazakhstan, Kyrgyzstan, Uzbekistan, Azerbaijan, Iran, United Arab Emirates, Qatar, Hong Kong, Exported to Vietnam in 2022. By composition, 6.9 thousand tons of horse meat, 144.5 tons of beef, 3.9 thousand tons of raw sheep and goat meat, 5.0 thousand tons of processed meat, and 252.0 tons of by-products were exported (MoFALI, 2023). The export of live animals started in October, and as of 31 December, 23100 sheep, 5392 goats, and 11 horses totalling 28503 animals worth 2.4 million USD, have been exported. This shows that the export of meat has been stagnant since 2020 due to many reasons, such as the closure of the border due to covid and the outbreak of animal diseases, is recovering. In 2019-2021, only horse meat was exported, but the volume decreased enormously. The reasons for stopping other types of animal meat are primarily due to outbreaks of infectious diseases such as foot-and-mouth disease, anthrax, and border closure due to Covid-19.

Since there was no export of live animals and meat during the years of the Covid restrictions, the dissertation research included statistical data up to 2021 and Custom export statistics up to 2018.

Livestock numbers have been rising continuously except for 2001 and 2010 (very harsh winters). The following graph shows whether there is a relationship between the number of animals and the export of meat. Meat exports have not kept up with the increase in livestock numbers. (Figure 4.23).

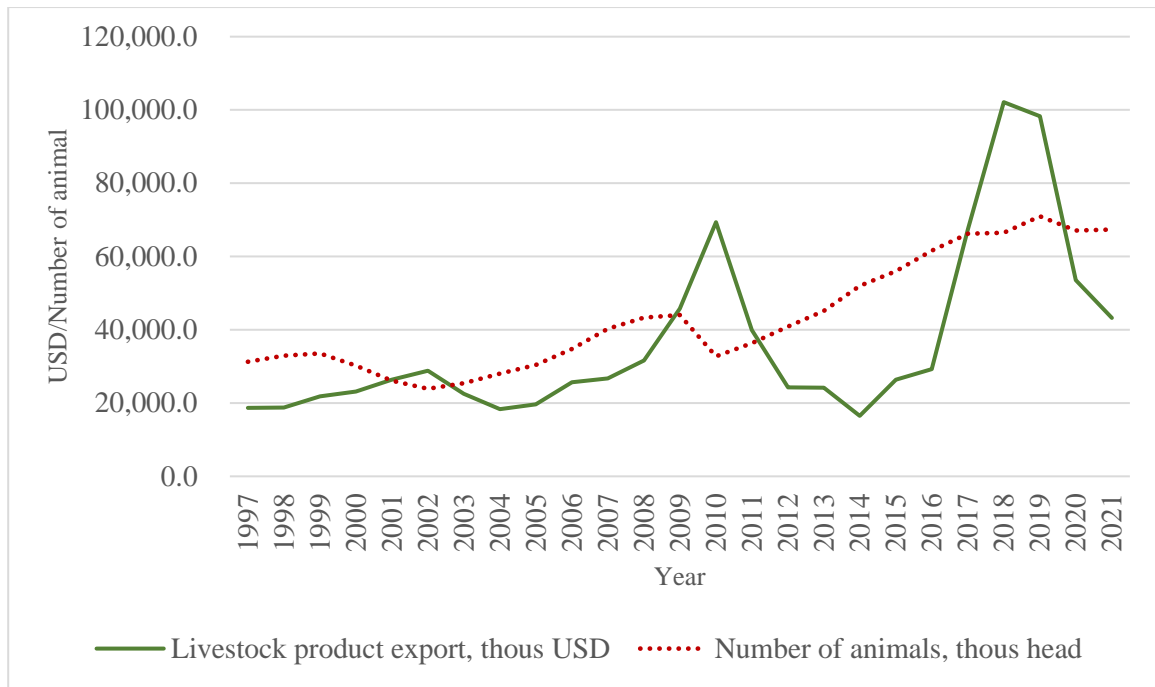


Figure 4.23. Livestock number (thous. head) and meat export (thous. tonnes)

Source: Author's compilation based on the National Statistical Office data (1997-2021).

Mongolia exported more than 70 percent of its meat products to China and 6.9 percent to Russia in 2018. Exports of livestock products averaged US\$ 33.1 million a year. In 2018, meat exports increased to 54,900 tons and earned US\$102.1 million.

4.5.2 Ex post analyses of the meat export

As explained in Chapter 3.5, the following results were obtained when analyzing the impact of the Government of Mongolia's meat export enhancing policies on herder households' livelihood. Table 4.13 provides the descriptive statistics of the selected variables for the model. Dependent variable Y is "Rural household income per month", and Independent variables are X1-X7.

The average herder household has 3.4 people. Herder households' income ranges from US\$ 55 to 534. Domestic meat consumption per capita is high in Mongolia; about 88 kg per capita and about 269 thousand tons of meat are produced annually for domestic consumption (Danforth & Dash, 2017). As domestic meat consumption is high, income trends in urban areas, which are the primary consumers, are also significant. The average monthly household income in urban areas is US\$ 318, which is 1.2 times higher than in herder households.

Table 4.13. Descriptive statistics of key variables

	Variables	Unit	Min	Mean	Max	Median	Std. deviation
Y	Income herder household	US\$/month	55.3	256.2	533.6	223.9	157.8
X ₁	Income Urban Households	US\$/month	70.4	318.0	684.7	273.3	213.8
X ₂	Export Liv. Product	Million US\$	16.5	33.1	102.1	26.02	21.0
X ₃	Total livestock number (1997-2018)	Million heads	23.9	40.1	66.4	35.6	13.0
X ₄	Export price Beef	US\$/kg	0.9	2.0	3.4	1.8	0.9
X ₅	Export price Horse meat	US\$/kg	0.4	1.5	3.3	1.5	0.8
X ₆	Export price Sheep Goat	US\$/kg	0.7	2.2	7.0	1.8	1.6
X ₇	Average domestic meat price	US\$/kg	0.7	2.0	4.4	1.9	1.1

Source: (Gombodorj & Tumur, 2020)

There was no significant difference between the monthly incomes of herder households and urban households between 1997 and 2006, but income inequality has increased since the 2009-2010 dzud disaster. However, there are the same trends in income deviations in both types of households (Figure 4.24).

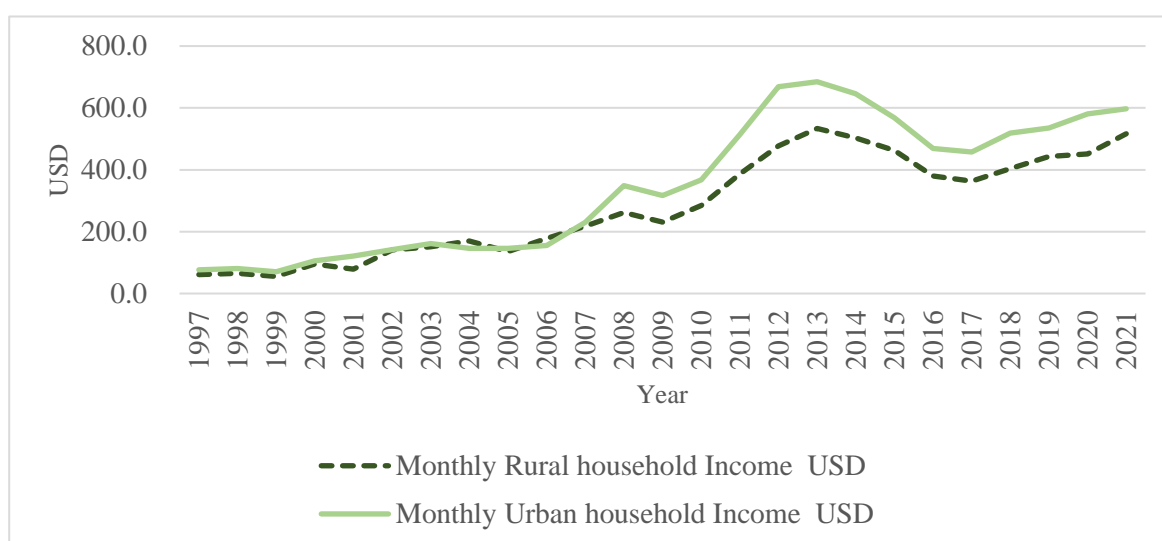


Figure 4.24. Rural, urban household monthly income, US\$

Source: Author's compilation based on statistical data (1997-2021)

Mongolia has the potential to export 9 million heads of livestock or more than 180,000 tons of meat annually. As of 2020, 19.7 million heads of livestock were sold on the market, and 4.3 million heads of livestock were used for own household consumption (NSO, 2020).

Mongolian meat can create an organic brand that is ecologically clean, genetically modified and naturally grazed (Danforth & Dash, 2017). China, which accounts for more than 70 percent of its exports, expects to increase its meat imports steadily and significantly until 2050 (Wu Sheng & Li Juan, 2015). That proves Mongolia has excellent potential for exporting meat. The average export price of beef was US\$2.0/kg. The sheep, goat, and beef export prices were similar. However, export price depends on the country (MCGA, 2018). Except for horse meat, export prices are lower than domestic average market prices (NSO, 2018b) (Figure 4.25).

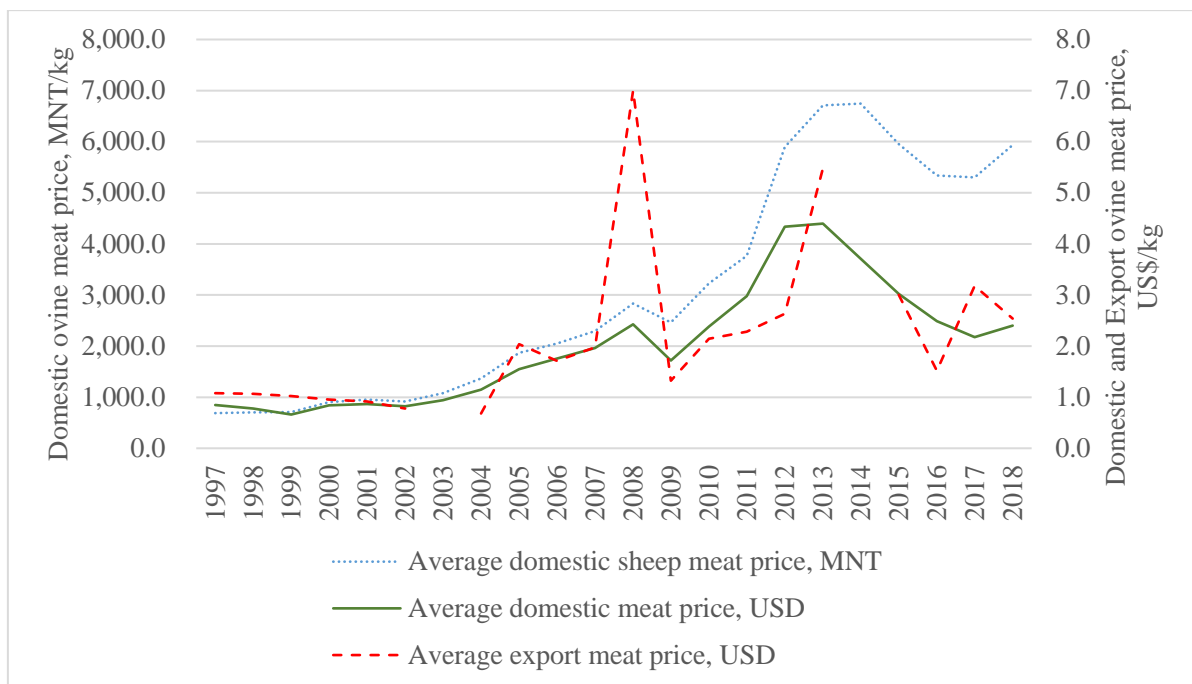


Figure 4.25. Mutton price differences, MNT and US\$/kg

Source: Author's compilation (2020) based on statistical data (1997-2018)

According to the FAO World meat market overview, the average meat price in 2017 for ovine meat rose by 25.6 per cent and bovine meat by 6.3 per cent. The bovine and ovine price index rose by 208-211 at a base level in 2002 and 2004 (FAO, 2018). Mongolian meat export average price is 3-4 times lower than Australian and New Zealand exporters. The reason behind it is the market recognition and “A” level infectious diseases. Mongolian ovine goat meat export price once reached 7 US\$/kg in 2008, and the rest year's price fluctuated around 2 US\$ with the highest standard deviation at 1.6. Contrary, the meat price in the domestic market increases yearly due to income, inflation, the profit of intermediary salespeople and other factors. The average domestic meat price is 2 US\$.

4.5.3 Herder households income: Log-Log regression model results

The log-log regression model results, which estimated whether the meat export increase affected herder households' income, are presented in Table 4.14.

Table 4.14 Key factors of the herder households' income

	Variables	Explanation	Coefficient	t Stat
Y	Dependent variable: Ir	Monthly income of herder household		
X ₁	Iu	Urban household income	0.6638***	3.8676
X ₂	ExportL	Livestock product export	-0.0662	-0.8388
X ₃	Livestock	Number of livestock	0.2037**	2.1225
X ₄	PxBeef	Export price beef	-0.4576**	-2.3866
X ₅	PxHorse	Export price Horse meat	0.0246	0.1444
X ₆	PxSheep Goat	Export price Sheep Goat meat	-0.1565**	-1.8964
X ₇	PDm	Average domestic market meat price	0.5578**	2.2970
	T	Time	0.0207*	1.6988
	Adj. R Sqr.	Adjusted R Square		0.928
	Obs.	Number of the observation year		22

Notes: *, **, *** indicate 10 percent, 5 percent, and 1 percent significance levels, respectively.

Source: Author's estimation (2020)

The income of herder households is highly dependent on the income of urban households. Explanatory variables ExportL and PxHorse are contrary to the expectations but not significant. The amount of meat export shares in the total number of livestock has been low; thus, they have no notable effect on the herders' livelihood. The increase in meat export and export prices negatively impacted herder households' income. This might be because export income did not benefit herders directly. Thus, meat export benefits the upper level of the value chain, such as logistics companies and meat processors. Domestic meat prices impact herder households' income positively. This is in line with basic economic theory, where price increases stimulate supply and producer income. The average price of Mongolian meat exports to China is four times lower than the meat imported from China, Australia and New Zealand. In addition, when meat prices in the Mongolian domestic market are the same (or higher) than export prices, it is logical that meat producers and exporting companies will have a little interest in exports.

The ‘T’ dummy variable positively relates to the dependent variable. The reason is that herder households' nominal income is increasing year by year. Variables “livestock exports” and “horse meat prices” were insignificant.

When Covid-19 started, meat exporting decreased. Researchers believe that if Russia's import tariffs are reduced, there is a high potential and experience to export meat and meat products (Erdenechuluun et al., 2019).

4.6 SLF: Livelihood strategies

According to the definition of L. Zhang et al. (2018), livelihood strategies refer to different livelihood activities, decisions, and combinations of activities that households pursue to achieve the goal of the desired quality of life. Studying household livelihood strategies is crucial to overcome rural poverty in developing countries. The sustainable Livelihood Framework encompasses five interacting elements: vulnerability context, asset pentagon, mediating factors, livelihood strategy, and outcomes that jointly create the livelihood of poor people. Vulnerability context, livelihood assets, structures and processes shape livelihood strategies. The most crucial shaping factor is livelihood assets. The sub-section started with a classification of livelihood strategies and was followed by a connection of livelihood capitals and livelihood strategies.

4.6.1 Classification of herder households' livelihood strategies

The income-based approach is used for classifying herders' livelihood strategies (LS) of the selected herding households in Mongolia. Classification has been done using the methodology explained in previous chapter 3.6. The following four clusters have been defined as results of nearest neighbour cluster analysis:

- | | |
|-------------------------|--|
| Cluster 1, (LS1) | Herder households that are reliant on the income from livestock-related products and activities solely |
| Cluster 2, (LS2) | Herder households that have primary income from wages (paid income) |
| Cluster 3, (LS3) | Herder households that are dependent on social welfare, pension, allowances and special care services |

Cluster 4, (LS4) Herder households rely on undermining natural resources and livestock income (Gombodorj & Gurjav, 2020).

The result shows that 88.9 percent of the herder households' livelihood depends on livestock that belongs to Cluster 1. The other three clusters jointly contribute 11.1 percent to herder households' livelihood in terms of income (Table 4.15).

Table 4.15. Basic characteristics of four livelihood strategies clusters

Variables	Livelihood strategies clusters			
	LS1 Livestock	LS2 Wage	LS3 Social Benefits	LS4 Natural Resource
Number of households	311	10	27	2
Households, (percent)	88.9	2.9	7.71	0.57
The average number of livestock per household	546	90	171	55
Annual income, mln MNT	10.9	6.3	5.7	0.8
Annual household income, thousand US\$ (ex. rate 2454, by 2017)	4.4	2.6	2.3	0.3
Livestock income share in total income (percent)	90.22	16.00	31.99	2.32
Wage income in total income (percent)	1.74	72.89	.24	0
Pension and state welfare income share in total income (percent)	6.66	3.62	63.55	8.54
Natural resource income share in total income (percent)	0.44	0.30	0.63	67.80
Other income source share in total income (percent)	0.94	7.19	3.59	21.34

Source: (Gombodorj & Gurjav, 2020))

Herder households in **Cluster LS1** earn a direct income from selling products of animal origin, such as cashmere, wool, meat, and dairy products. The Mongolian government is providing subsidies per kilogram of sheep, camel wool and hides of cattle and horses. The households in this cluster can be less economically efficient in terms of productivity animals due to their strategy to have more animals lead to more income. For instance, the average number of livestock in this cluster is 3-10 times more than other clusters, while the income is 1.7-3.6 times higher than other clusters.

Cluster LS2 represent the herder households that earn wages and salaries in addition to income from animal-oriented products. The cluster share in the total number of herder households is as low as 3 percent. However, this type of strategy is becoming more popular. These herder households have a relatively small number of animals, which is not enough to feed their livelihood. Wages come from herding someone's livestock who resides in non-rural areas. They have made payments for wages in both cash and in-kind. Assistant herder is a significant representative of this cluster, a new type of labour for fewer livestock herders. As of 2018, 5.3 percent of total herders were assistant herders (NSO, 2018a). The number of wage-based labour contracts has increased in Mongolia, but neither clientelism nor kin-based cooperation has been replaced (Murphy, 2015). There is a propensity for an expanding number of herders to proactively consider becoming assistant herders as the number of livestock increases.

Moreover, the new (Law of Mongolia on Labor (Revised Edition) (Хөдөлмөрийн Тухай Хууль Шинэчилсэн Найруулга), 2021) start regulating issues between assistant herders and people with livestock. As for wage distribution, many forms are being used as a combination. Considering the age group, it can be seen from Figure 4.26 with the data of 2021 that the percentage of assistant herders in the age group of young herders is higher compared to other age groups. When young couples become new families/ herders, they usually have fewer animals. Therefore they can take care of other people's livestock with wages.

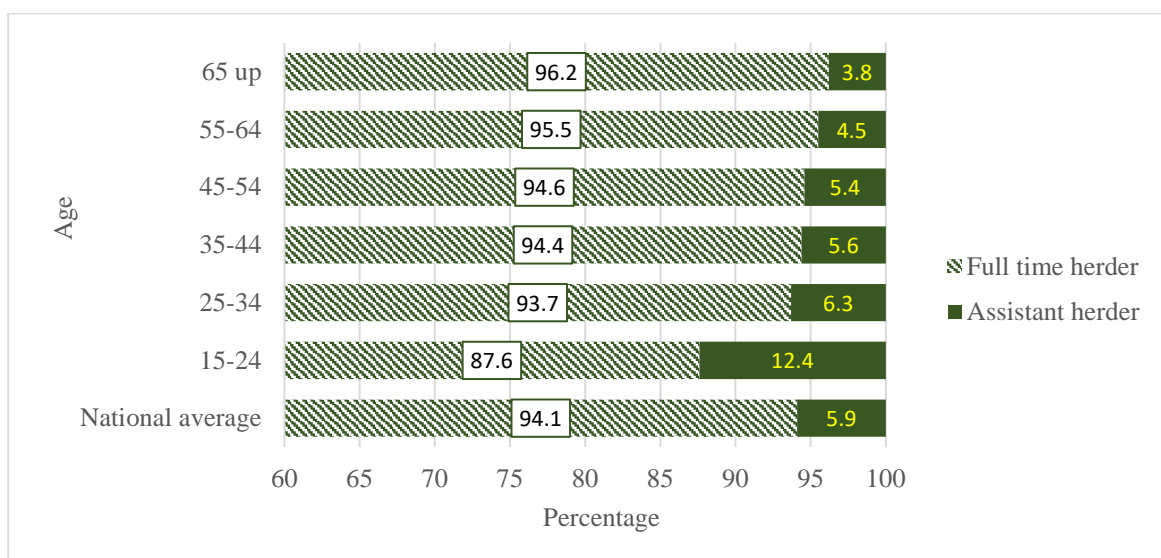


Figure 4.26 Full-time and assistant herders, the year 2021 (percent)

Source: Author's compilation based on the National Statistical Office data 2021

According to Resolution No.05 of the Government of Mongolia dated 6 January 2021, the "Regulation for the Selection of National Best Herding Households" were newly approved. According to this regulation, the best herder should fulfil the requirement that they create full-time or part-time young herder positions to reduce local poverty. Therefore, the number of assistant herders with wages is expected to grow in the coming years.

Herder households in **Cluster LS3** depend on social welfare, pensions, allowances, special care services, and income from animal-originated products. Their average number of livestock is 171 heads. It is challenging to survive without additional revenue, such as few animals, when considering the productivity and condition of the country. In 2018, the retirement age for herders was lowered by five years for each, making it possible to raise their old age pension. (Gombodorj et al., 2019). The Covid-19 epidemic has directly increased the income of herder families through social assistance programs such as the distribution of 100,000 MNT to people under 18 starting in March 2020. As illustrated in Figure 4.9, pension and allowance income share in total household income is increasing continuously. Educated herders willing to participate in social insurance that leads to herders' education support the size of this cluster. Herders' family members with disabilities are nearly 10 percent of the total herders. These members receive a monthly allowance from the welfare fund and contribute regular income to their families (Figure 4.27). Depending on the type of disability, a significant percentage of them can participate in work such as livestock production, housework, milk processing, etc. Any type of hand-in is important in the herding society as their busy daily lifestyle.

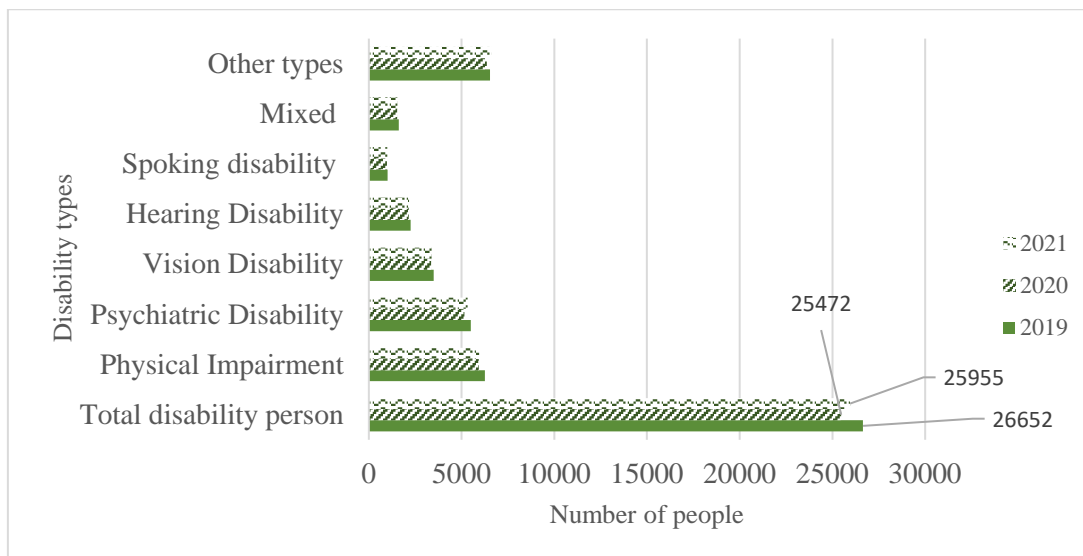


Figure 4.27 Number of disabled family members in herder households by types (2019-2021)

Source: Author's compilation based on the National Statistical Office data 2021

Cluster LS4 consists of herding households that depend on natural resources and income from animal-originated products. They only account for 1 percent of the total herder households participating in the survey. They may get their primary source of income from nature while herding a few animals since they live close to forests where they can collect pine nuts, fruit in the fall, and many wild animals for hunting. There is no official information or chronological data about these types of households because it is standard for these types of households to use illegal hunting and natural resources without permission.

4.6.2 Livelihood capitals and livelihood strategy: SUR model results

The following results were gathered after running the SUR model methodology, as described in section 3.6. The results indicate that the five different types of capital impact the four main herder household livelihood strategies that we abbreviated as **LS1-LS4**.

All four equations in the SUR model has interrelated, i.e. equation of **LS1** is explained by the other three dependent variables, namely **LS2**, **LS3** and **LS4**. Wage income and income from social benefits significantly positively influence livestock income; in other words, LS1 is supported by LS2 and LS4. The LS1 supports the LS2 and LS4, and LS3 is supported by the LS2 (Table 4.16).

Table 4.16 Relationship between livelihood strategies and livelihood assets

	Explanatory variables	LS1 Livestock	LS2 Wage	LS3 Social Benefits	LS4 Natural resources
Livelihood strategies L1-L4	Income Livestock (LS1)		0.1667*** (4.65)		0.0531** (1.89)
	Income Wage (LS2)	0.3010*** (4.09)		0.2356** (1.95)	
	Income Social Benefits (LS3)	0.2057*** (6.36)			
	Income Natural resources (LS4)	0.1397 (1.47)			
Natural Assets	Land	-0.07415 (-0.77)	-0.4118 (-0.51)	0.1253 (0.74)	-0.0348 (-0.54)
	Otor move	0.1558*** (5.6)	0.0093 (0.39)	0.0671* (1.38)	-0.0199 (-1.08)
	Pasture quality	0.0981*** (6.9)	0.0359*** (2.95)	0.1561* (6.24)	0.0309*** (3.26)

Physical Assets	Smart tools	0.0031 (0.15)	0.0419** (1.66)	-0.0465 (-0.91)	
	Home electric appliances	0.0279 (1.15)	0.0228 (0.78)	0.2838*** (4.79)	0.0343 (1.49)
	Livestock number	0.5113*** (17.1)	-0.0334 (-0.92)		
Human Assets	Human resource	0.0758* (1.47)	0.1144*** (2.69)		-0.0142 (-0.42)
	Education Index	0.0953*** (3.14)	0.0073 (0.29)	0.1099*** (2.09)	0.0353** (1.78)
	Health Insurance	0.0502** (1.8)	-0.0081 (-0.35)	0.0622 (1.29)	
Financial Assets	Social Insurance	0.2542*** (9.97)	0.0767*** (3.48)	0.2415*** (4.98)	0.0474*** (2.76)
	Loan	0.1012*** (1.45)	0.0264 (0.44)	0.0810 (0.61)	0.0111 (0.23)
	Savings	0.6996*** (8.55)	-0.235 (-0.33)	0.2873** (1.85)	
Social Assets	Political participation	0.0655*** (6.28)	0.0162** (1.67)	0.1195*** (6.05)	0.0139** (1.83)
	Participation in the local community	0.0433 (1.47)		0.0181 (0.32)	
	Gift exchange	0.5341*** (9.34)	0.0015 (0.03)	0.0616 (0.57)	
R-sq		0.4746	0.053	0.1997	0.0273
Chi2		368.932	19.636	89.2222	9.838
P		0.0000	0.0010	0.0000	0.0243

Note: Values within brackets are 'z' values.

* significant at 10 percent, ** significant at 5 percent, *** significant at 1 percent, respectively

Source: Author's estimation

Social insurance participation and political participation were significant for all four strategies. At the same time, the education and pasture quality variables were significant for three of the strategies, and human resource, otor move, was significant for two livelihood strategies. The livestock number was significant and had a positive impact only for the **LS1**. Logically, their primary source of livelihood came from the sales of livestock products (products of animal origin). Human resources, education index and health insurance significantly and positively influenced **LS1**. Therefore, more healthy labour forces with a higher level of education bring more livestock income for the herders. The loan was significant only for **LS1**; the reason might be that number of livestock guarantees the collateral for a loan in the countryside. The larger the number of livestock, the more significant the amount of loan one can get. For herder households using the **LS1** strategy, except for innovative tools and electronic appliances, every other type of the five different assets is significant. Of the assets that are significant to them, one of the least significant was the human asset. Savings was significant for both **LS1** and **LS3**. Since income from

livestock production is seasonal, high-income herder households with large numbers of livestock tend to save their income throughout the year to use when necessary. Herder households with few animals and those dependent on salaries with a constant monthly income are significantly less likely to have a habit of saving.

For households that depend on wage and salaries in **LS2**, social insurance coverage, political participation, human resources, personal development, and assets related to financial security are more significant. The level of education is high compared to other types of households, which contributes to the fact that they do not lose the opportunity to earn an additional regular income in addition to animal husbandry. This includes households and herders living in the countryside as bag doctors, bag governors, environmentalists, and herding livestock of others. Furthermore, young herders with a few livestock get paid to herd the livestock of herder households who live in soum centres. According to the author's survey carried out in 2021, herder households living in soum centres with less than 100 heads of livestock pay 100 000 MNT (approximately 30 US\$) per month to others to take care of their livestock.

Herder households that are a part of **LS3**, receiving social welfare, disability benefits, and old age pension in addition to the livestock income, have more electronic appliances, such as a 12V fridge, freezer, electric generator, washing machine, and television. Having a permanent source of income promotes purchasing electrical appliances. Moreover, herding a few animals allows them to move less, so there are fewer chances of breaking the appliances for more prolonged use. The guaranteed financial resources discourage willingness to increase their livestock. In addition, these households do not have enough labour to herd many animals; some are aged and disabled. If a family has a physically impaired member or seriously disabled person, the herder family can not move regularly. Thus they prefer fewer animal herding.

Households that are a part of **LS4** have fewer significant assets than the previous three types, and their statistical significance is low. Households that make up their household income from different sources, such as natural resources, hunting, fruit, hay, and wood harvesting, have a small share of the total number of herding households (Gombodorj, 2022).

In addition to the SUR analyses, the following figure compared the weighted average of the quality score of each asset for the respective livelihood strategies. Overall larger radar of **LS1** represents most of the herders who participated in the survey having this strategy as

having major income sources of livestock (Figure 4.28).

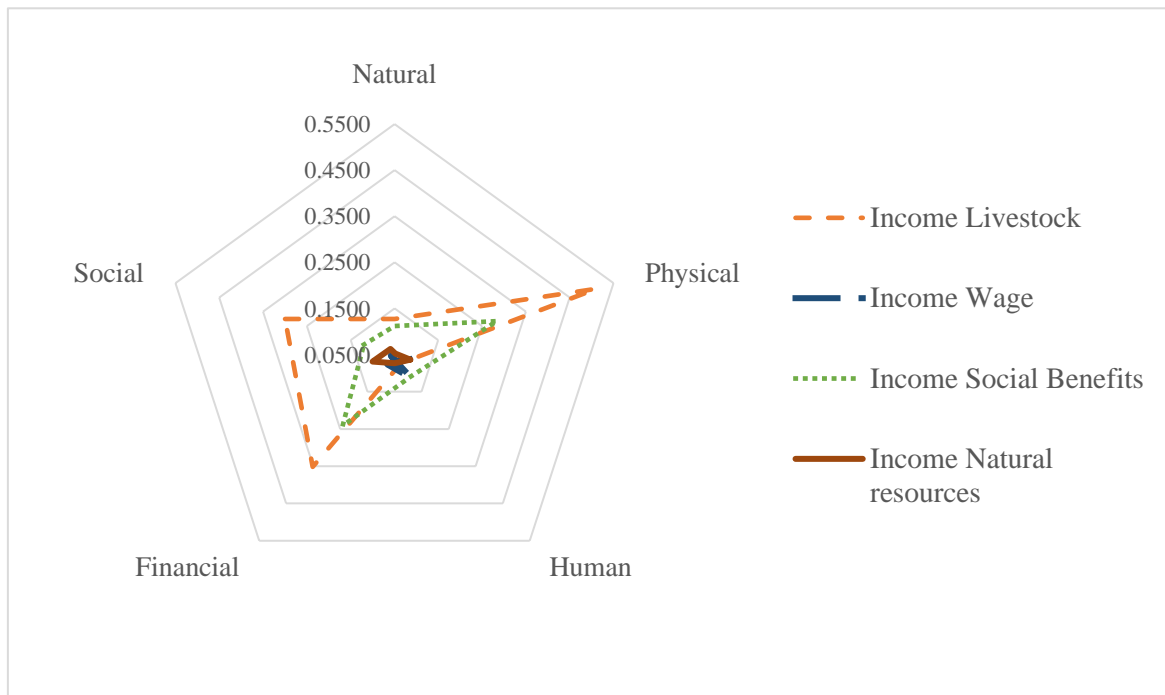
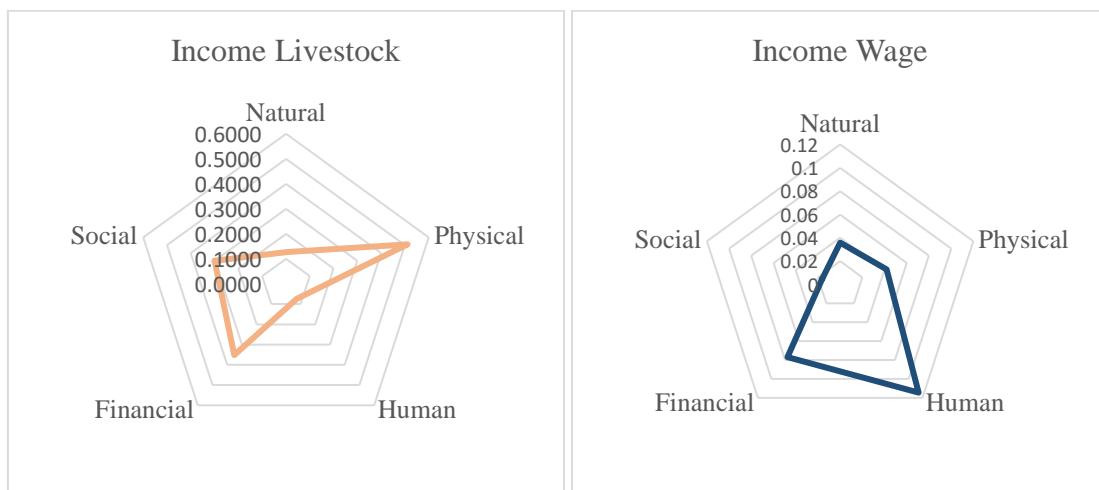


Figure 4.28 Comparison of an average weight of assets score.

Source: Author's compilation

The extraction of Figure 4.28 presents the importance of five assets in each livelihood strategy (Figure 4.29).



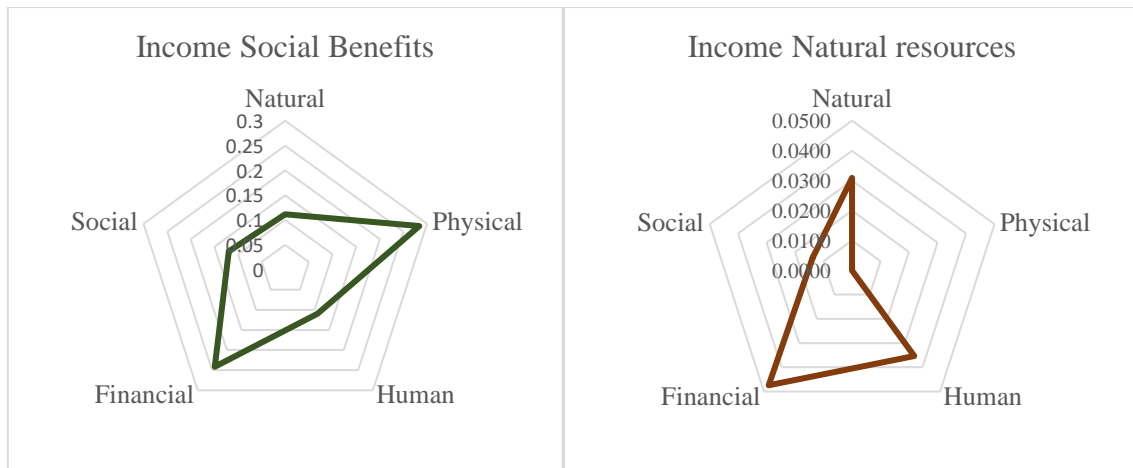


Figure 4.29 Comparison of an average weight of assets scores: by each livelihood strategy clusters

Source: Author's compilation

Dixon et al. (2001) have identified the overall strategies for nomads until 2030; Intensification, Diversification, Expanded farm or herd size, Increased off-farm income and Complete exit from the agricultural sector. From these strategies, Mongolian nomadic herders have mainly chosen to increase the number of livestock. In the coming years, this strategy will kept if the weather is favourable and less natural disasters. Besides the primary strategy of increasing animal numbers, herders are willing to have the option to diversify their off-farm income, such as state pension and welfare and tourism.

According to the **LS** classification defined by X. Wang et al. (2019), dominant agricultural refers to agricultural income that accounts for 0–50 percent of total household income. "Non-agricultural dominant rural households" refers to receiving 50–90 percent of income from non-agricultural income. In our study, more than 80 percent of the total interviewed 350 households' 90 percent income comes from only products of animal origin. It means 80 more percent of total herder households are in the agricultural dominant rural households classification.

Another classification by Zhang et al. (2018), Mzuyanda, (2020), and Soltani et al. (2012) showed that herder households' livelihood strategies in different countries are in the forms of on-farm, multiactivity, and off-farm. According to Soltani et al. (2012), households that live dependent on natural resources (In our case, **LS4**) and herder households (**LS1**) should

be the poorest, while households with a combination strategy should be wealthy. However, in our research, this was not proven.

For **LS1**, which is entirely dependent on income from products of animal origin, the number of livestock is their most important asset. Therefore, losing their livestock would push them to exit the current strategy. For instance, in the case of natural disasters such as drought, dzud happens, and the number of livestock reduces sharply due to unmanageable animal diets, the herder households would shift into LS2-LS4 strategies, even leading them to leave the livestock sector entirely. This is in line with an earlier study of Mearns' conclusion that there are five adaptive strategies in Mongolia: a) livelihood diversification, b) livelihood switching, c) migration, d) inter-household transfers and kinship networks, and e) others. According to our study, migration and inter-household transfers and kinship belong to the strategy **LS1**; livelihood diversification belongs to **LS2-LS4**, and livelihood switching belongs to the exit strategy. This result proves the findings of other studies, stating, 'if herder households lose their animals due to *dzud* impact, it pushes them to migrate' (Emily, 2019; NSO, 2019; NSO & World Bank, 2000; Oniki & Dagys, 2017).

Hahury et al. (2020) and W Peng et al. (2019) thought that having many assets would allow households to switch between strategies easily. However, according to our research result, having one dominant asset (physical asset) contributed to the household's more livestock-dominant strategy. If a household has all five types of assets that are shared equally, it could be switched between strategies easily.

Finally, these results can be explained by the conclusion that 'the livelihood strategies within the same group or neighbourhoods might have strong similarities' (E. Li et al., 2017). Because they live on a broad stretch of land away from the city and civilization and receive their primary education in the countryside (Ireland et al., 2004), they may think that choosing unfamiliar alternative strategies may be too risky.

4.7 SLF: Sustainable livelihood outcomes and poverty

A livelihood strategy's successes are referred to as a livelihood outcome. Income growth may help people feel better, develop resilience, improve their food security, and use natural resources more sustainably. All those contribute to reducing local poverty. Livelihood outcomes, in turn, influence assets, creating new beginnings for other livelihood strategies and outcomes. In turn, poor and vulnerable households will lack livelihood capital and fewer

livelihood strategy choices. That is why getting out of poverty, increasing income, and benefiting from each of the five types of assets opens up the opportunity to have many options for livelihood strategies.

4.7.1 Herder households' livelihood: comparison of livestock number and income per capita

A livestock number is a proxy indicator to measure the level of herder households' wealth and poverty in Mongolia. The study used Worldbank's (2009) classification; full-time herder households with over 500 livestock numbers are wealthy households; 200-500 are middle or lower-wealth households, and less than 200 are poor households. Total herder households are classified into three groups. According to the international scholars' methodology, households' wealth and poverty are measured by Income Per Capita per day in US dollars. Therefore, the IPC indicator estimation was included compared to other studies. (Table 4.17).

Table 4.17 Herder households' livelihood: comparison of livestock number and income per capita (actual head, MNT per year)

Descriptive statistics	Poor		Middle		Wealthy	
	Livestock number	IPC	Livestock number	IPC	Livestock number	IPC
Mean	106	95913 6	358	167234 5	1250	343667 3
Median	104	95913 6	354	137696 0	947	241896 4
Std.Dev	56	72442 0	82	149037 1	807	360657 7
Range	188	26625 00	294	128842 50	4025	225233 33
Minimum	11	12000 0	203	123750	502	145833
Maximum	199	27825 00	497	130080 00	4527	226691 67
Count	57		109		184	
Percentage	16.3		31.1		52.6	

Source: Author's estimation

Households with up to 200 livestock are considered poor, accounting for 45 percent of households with livestock (Figure 4.6). Our study uses sampling methods to represent the following 10 groups of livestock: herder households with up to 10 livestock, 11-30, 31-50, 51-100, 101-200, 201-500, 501-999, 1000-1499, 1500-2000 and more than 2000 livestock. In our sample, 16.3 percent of all herders fall into the poor category. This percentage is two

times lower than the official statistics. The median number of animals in poor households is 106, or generally fewer animals. Half of the total interviewed herders (52.6) belong to the wealthy category. Therefore, it is appropriate to study *actual herder households* separately from households with livestock to calculate poverty. Here, actual herder households refer to those herders who herd their animals all year round. *Households with livestock* refer to households with animals; however, they do not herd themselves all year round. If necessary, they take care of their animals during summer with the support of kids and relatives. In most cases, rural households with livestock have other livelihood strategies, living in soum centres, school teachers and unemployed people.

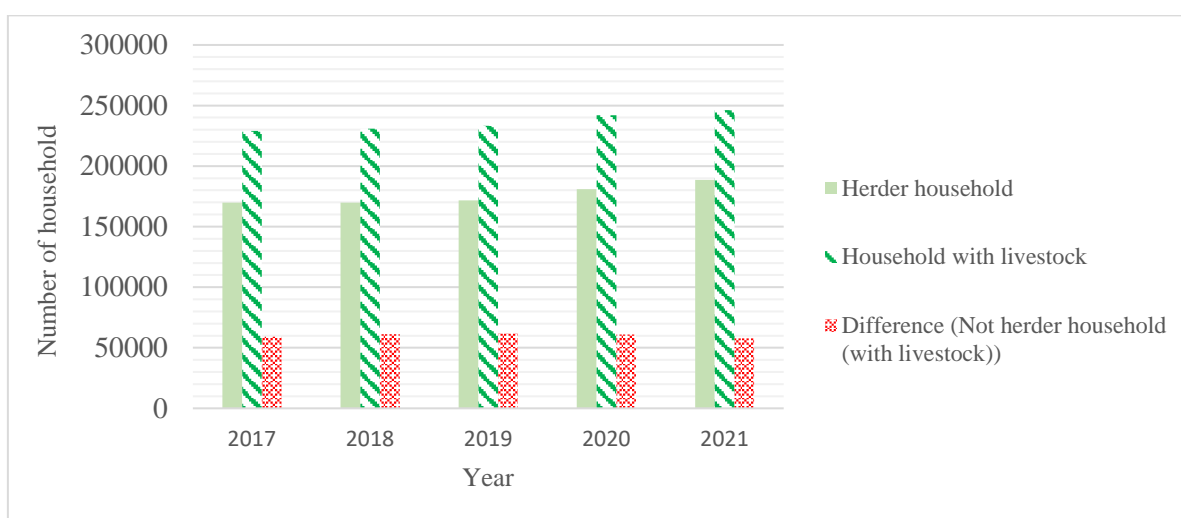


Figure 4.30 Difference between herder and non-herder households with livestock

Source: Author's compilation based on statistical data (2017-2021)

Figure 4.30 shows that those households in the "difference" do not keep their livestock. However, in the rural poverty survey, they are included in poor households with up to 200 livestock. Therefore, it is not appropriate to determine the poverty of herder households by the number of animals.

Table 4.18 Herder households' Income per capita per day by wealth groups

IPC per day		Poor	Middle	Wealthy
In Mongolian currency	Min	328.77	339.04	399.54
	Max	7623.3	35638.4	62107.3
In US \$ (exchange rate 2632.2MNT)	Min	0.12	0.13	0.15
	Max	2.90	13.54	23.60
Median (US\$)		1.00	1.43	2.52
Mean (US\$)		1.511	6.834	11.873

Source: Author's estimation

As can be seen from Table 4.18, if look at the average, the income per capita per day of the poor, middle and wealthy households are pretty different, which is 1.5, 6.8 and 11.9, but the median is 1.0, 1.43, and 2.52, which is very close to the poverty line. This shows that income inequality is high in rural areas, and few wealthy households own the wealth.

According to the researcher on the poverty of rural households, increased income diversification is one of the ways out of poverty. However, income diversification is low in all clusters.

33.1 percent of survey respondents answered that they have non-livestock income sources i.e. state pensions and benefits, wage, handicraft income, and natural resource digging (fruit picking, logging, dung picking, onion picking and precious stone picking). In addition, some households have income from planting and selling various crops, business activities, and artificial mining, and one household earns income from tourism-related services.

Non-livestock income accounts for more than 90 percent of the income of poor and low-income households, while it accounts for less than 1 percent of the total income of the wealthiest households. This may be because pastoralism requires human resources and does not have many strategic options (Houzer & Scoones, 2021). In addition, it is difficult and a burden for herders to do other types of business simultaneously. Regarding the composition of non-livestock income, pension income is the highest proportion in middle-income households and in general, pension income is contributed to poor, middle and wealthy households.

The social insurance coverage rate of herders has been gradually increasing yearly, from only 6 percent in 2000 to 35.2 percent by the end of 2021 (NSO, 2022a). Although the participation rate is increasing, it is much lower than the national average (90.5 percent). Also, the amount of pension received is small. Therefore, the researcher aimed to study the herders' pension coverage and financial knowledge. This is one of the possible ways to increase the livelihood of poor herder households, increase well-being and promote more sustainable use of natural resource base.

4.7.2 Non-livestock income sources: Pension and welfare income contribution

One source that contributes significantly to household income is income from pensions and benefits. For some households, there are households whose household income consists only of this type of income. As of 2021, 1,126,000 registered workers are working in Mongolia, and 90.5 percent are covered by voluntary and compulsory social insurance. 64.5 percent of voluntary insurance participants are women, which shows that women are more concerned about their future and life after retirement than men. As for herders, 35.2 percent of the total 305 thousand herders or 107.4 thousand herders, have participated in voluntary social insurance. This is an immediate increase of 11.3 percentage points compared to 23.9 percent in 2017 when we conducted our research. On the national average, the rate of voluntarily insured women workers is higher, while there are more male herders covered by voluntary social insurance.

Table 4.19 Workers and herders' participation on social insurance scheme

	Total	By sex			
		Male		Female	
	Thous. person	Thous. person	Percent	Thous. person	Percent
Total workers	1125.6	592.8	52.7	532.8	47.3
Compulsory social insurance payer	862.1	442.6	51.3	419.5	48.7
Voluntary social insurance payer	157	56	35.7	101	64.3
Herders	305.4	180.4	59.1	125	40.9
Herders paid social insurance	107.4	59.7	55.5	47.8	44.5

Source: (NSO, 2022a)

In addition to a weak use of social insurance benefits, herders lose the opportunity to get higher pensions due to their lack of financial literacy. The average pension amount is 282700 MNT or 107.4 US\$. The amount is low compared to the national average of 378 thousand tugriks or 143.6 US\$ (Gombodorj et al., 2019). Law Amendment for the Pension and Benefits Provided by the Social Insurance Fund provided herders with a higher chance of benefiting from the old-age pension system than other regular workers:

- From 2018, herder's retirement age decreased to 55 for men and 50 for women. This is an opportunity to get retired earlier and start receiving monthly income. Age 55 and 50 is much lower than the international average of 64.7 for males and 64.3 for females and Mongolian average of 65 for males and 60 for females (Gombodorj &

Nyam-Ochir, 2019).

- As a voluntary insurance payer, herder can determine a higher pension by managing his monthly fee.
- Arrangements have been made to ensure that the social insurance contributions payment period is not interrupted for a mother who takes care of her child until the age of three.
- The number of children get birth or adopted up to age three is multiplied by 1.5 years, which will be accounted as worked years.
- The number of years worked as a herder is multiply with by a 1.2 coefficient.
- Citizens who have not been able to pay their social insurance contributions since becoming a herdsman or self-employed will be granted the right to one-time compensation from 01-01-2018. Covering the years 1995-2017, it can be compensated by calculating the minimum wage.

Taking advantage of the opportunities outlined here requires financial literacy and related information. Therefore, the study aimed to analyze which factors relate to a higher amount of fee payers.

Table 4.20 represents the regression results examining the relationship between herders' social insurance payment amount and some economic and social indicators.

Table 4.20. Relationship between social insurance payment amount and economic and social variables

Variables	Unstandardized Coefficients		Standardized Coefficients	t statistics
	B	Std. Error	Beta	
<i>(Y: Payment of Social Insurance Fee)</i>				
<i>A_j: Demographic and social variables</i>				
Age			.258	2.604**
Education level	5.888	2.164	.372	2.721**
Social insurance coverage	34.542	7.835	.448	4.409**
Bag meeting	-.283	2.215	-.014	-.128
<i>By: Economic variables</i>				
Total revenue	.170	.204	.093	.837
Total cost	.483	.530	.099	.911
Loan amount	-18.018	9.466	-.209	-1.903*

Size of savings		-.442	.692	-.051	-.639
R Square					.499
F statistics (.000)					14.962

Notes: *, ** indicate significance at 5 percent and 1 percent, respectively.

Source:(Gombodorj et al., 2019)

In the estimation, already pensioned people are excluded. The average education level of respondents was secondary education, with 6-9 years of schooling. Variable social insurance coverage is a dummy variable that indicates whether a respondent has any form of social insurance coverage. Hence, 42 percent of the herders have social insurance coverage, whereas 27 percent of participants paid the social insurance fee. The research result is similar to Raaij's (2016) study, concluding that people pay too much attention to their careers and family, therefore not paying concern to their life after retirement.

Herders paid an average of 8 US\$, far lower than the maximum amount paid by some herders. According to the survey data, 0.5 percent of herders paid more than 120 US\$, 1.4 percent paid between 40-76 US\$, and more than 90 percent of herders paid less than 40 US\$ annually. A regression model result shows that older people are more concerned about pensions. Age is crucial for participation in the old age pension (Raaij, 2014, 2016). Our research correlates with the notion that people tend to think about their future and look to change their financial state after crossing 40 years old. Their participation in the Social insurance payment was higher than the younger herders. Variable education was significant; thus, more educated herders were willing to pay more for their social insurance. People who have received previous opportunities for compensation paid their social insurance payments to have more understanding and desire to pay the social insurance fee. This result is kept and proven by data from the latest statistics in 2021. Regarding education, as the herders' education level increases, social insurance coverage increases (NSO, 2022a).

As poor herder households, they cannot pay for social insurance due to other competing livelihood expenditures. A herder household's expenditure varies depending on the number of livestock and other factors; the lowest cost is 100 US\$, and the average is 2040 US\$ in a year.

On the contrary, people with loans would have less chance of paying higher social insurance payments. At the time of the questionnaire, 288 households had taken loans, and the average amount of loans was 1600 US\$. Lusardi and Tufano (2009) found that illiterate people were

more likely to incur high-cost debt. Herders facing financial difficulties get a loan (mainly for consumption) from financial institutions, i.e., credit is a competitive situation for pension fees. Why do herders fail to plan their retirement; planning requires some calculations, many facilitated by financial literacy and information on specific laws.

Social gatherings such as *Bag* meetings, households' total income, total cost and savings are not significant contrary to the research expectations. The study hypothesis is that if herders regularly participate in *bag* meetings, the number of people covered by pension would increase. The hypothesis rejected is maybe because *bag* meeting attendance was few, and providing information related to retirement is insufficient.

5. CONCLUSIONS AND RECOMMENDATIONS

H1: The number of livestock is critical in differentiating rural livelihood strategies among the herders' households. Hypothesis accepted.

The larger the number of animals, the higher the income, and LS relies on an on-farm activity. On the other hand, as the number of livestock decreases, the ability to have other sources of income and discover other opportunities is increasing. Herders' households having many animals brings negative aspects such as dependence on them, inability to use many other opportunities, and not providing subjective well-being. Therefore, one should consider the ideas of the researchers who say that one needs to review the old concept that if households have animals and big lands, they are rich. For example, living with many animals and living a nomadic life limits the possibility of obtaining the necessities of modern life. Bulky items can hinder herding households, which must move up to 30 times a year.

Social insurance participation also contributes to all households' livelihood, and the new law amendments give herders an even more crucial future income source. In this case, herders might not increase the number of livestock when they take the LS3 strategy.

The number of herding households with LS2 or wage and salary income livelihood strategy tends to increase. Due to the increased number of livestock, mining sites, business entities, and wealthier herders need to hire assistant herders. This has the effect of increasing households holding the LS2 strategy. Poor herders with a few livestock earn additional income from herding someone's livestock. In addition, herders benefit from milking cattle, sheep, and goats when they herd. This is one of the traditional in-kind support for poor people.

For herder households with the LS4 strategy, if the number of livestock increases and income sources varies, they might switch to LS 1, LS2, and LS3 or have a mixed strategy. Households that depend on hunting and natural resources are a unique strategy followed by a small number of households, such as hereditary hunters.

Previous studies have shown that migration is often chosen by households that have lost livestock due to natural disasters as an exit strategy. Therefore, LS 2 and LS 3 strategies are the most stable and work-life balancing strategies.

This study has shed light on the factors contributing to choosing LS1, LS2, LS3, and LS4 strategies. Future studies could examine the long-term viability of different livelihood strategies in changing economic, environmental, and social conditions. Moreover, a study has highlighted the potential benefits of social insurance participation for herders. Future studies could explore the extent to which these benefits materialize in practice and assess the impact of social insurance on herders' financial stability and overall well-being.

H2: Vulnerability factors are the driving factor for selecting household livelihood strategies. Any shocks are threatening their livelihood but at different rates and forms.
Hypothesis Rejected.

Many studies proved that poor, rural farmers and nomadic herders are vulnerable to shocks, weather, and other risks. Many previous studies have concluded that due to the dzud disaster, nomadic herders' pastoralist families changed their livelihood strategies and moved to central settlements.

A new social and health shock, Covid-19, has impacted every livelihood worldwide. According to the results of a comparative study of households, which mainly included Vulnerable households, Mongolian rural households are more resistant to the Covid-19 shock than urban households. Herder households and vegetable farmer households are rural households. Rural households were largely self-sufficient in food, making them less vulnerable to shocks. During Covid-19, the demand for goods and services other than food and consumer goods fell sharply, and people became more important than having enough food and being healthy. At this time, households that prepare most of their food from their farms have reduced the need to spend on other types of expenses. As a result, despite Covid-19, herders did not need to alter their livelihood strategies. Therefore, the hypothesis is rejected.

The study has limitations as follows. This study aimed to detect the impact of Covid-19, so other vulnerability factors were omitted. Because the impact of adverse natural and climatic factors, the most significant factor in changing herders' livelihood strategies, happened very few in recent years, a limited number of questions related to natural disasters were included in the questionnaire. Moreover, the sampling of households was small due to the lockdown and the pandemic. Since the study was conducted when the disease outbreak in Mongolia

was at its peak, only short-term results are reflected, and further follow-up studies should be conducted to assess the long-term effects.

Additionally, future studies could focus on identifying the factors that enable rural households to maintain their resilience over time and how these can be supported by policies that address rural development and livelihood diversification. Furthermore, future research could examine the long-term effects of Covid-19 on rural livelihoods and explore whether there are any changes in the resilience of rural households due to the pandemic over time. Ultimately, these studies would contribute to understanding how rural communities can be supported in the face of shocks and vulnerabilities.

H3: Poor herder households have few income sources and limited access to assets, market, supply chain and innovation services. *Hypothesis partially rejected.*

This research is contrary to many international studies that show that wealthy rural households have multiple sources of income. The study result shows that poor and middle-income households have more sources of income than wealthy herders. This is the main distinctive characteristic of nomadic herders.

Regardless of income, they live in a ger suitable for moving and use simple necessities. If we look at the list of physical capital, there is no significant difference between poor, middle and wealthy households except for the number of animals. However, they are distinguished by other types of assets.

Suppose the herders export a large amount of meat and, consequently, the number of livestock is decreased. In that case, human resources and other types of assets are freed, and poor and middle-income herders can access the market more quickly, attend any training, and receive helpful information. They might get smart tools to simplify and facilitate their lives and work.

A tradition that relatives and friends help each other, including poor herders, is called kinship support. This prevents them from falling into extreme poverty, so poor herders do not face extreme difficulties with basic physiological needs such as food and shelter.

The poor herders are not playing a part in the supply chain; thus, their livestock is mainly for the subsistence resources of their livelihood. In other words, they have too little share

and power in the market. However, currently supporting collective action models could bring them into the part of the supply chain through any form of herders organization on the market.

For the more significant number of livestock, there is a persistent general tendency toward higher income per capita. However, some households are in the "poor" category concerning livestock numbers, but their income per capita is higher than the mean of households in the "middle" category. Therefore, if the income per capita is considered when calculating poverty, the official level of rural poverty might decrease slightly. It takes time to apply the income-based poverty approach to herder households. Reasons include no regular record of the things used for free from their farm, additional income not recorded, such as working as an assistant herder, and some types of income being in physical form.

The research concluded that the number of poor herder households is lower than rural poverty defined by the official statistical office. The reason might be that all rural households' mixture of herder households and households with livestock determines the national rural poverty in statistics. In official statistic info, households classification by the number of animals is only grouped by households with livestock. Therefore, it is challenging to distinguish herder households from rural households in the current publicly based on an available statistical database. Therefore, it should separate those households when considering herders' poverty issues.

Some legal acts and frameworks related to the herders' and herders' household status were developed relatively recently, and detailed statistical data on herder households emerged much later. A new category was added to the Social Insurance Law: "herder insured" in 2005; "the assistant herders" was amended to the Labor Law Mongolia in 2020, and the agricultural census conducted once every three years makes it challenging to study herders' livelihood in chronological order.

Future research can examine how much kinship support networks contribute to reducing extreme poverty among herders. This will help develop strategies to strengthen social safety nets and enhance community resilience. Moreover, research can be conducted to develop an income-based poverty calculation approach for herder households that accurately captures their unique income sources.

H4: The impact of government policies positively and sustainably promote rural development and anti-poverty. Hypothesis partially accepted.

This dissertation analyses the impact of two policies implemented by the government of Mongolia to support household livelihood. The Government policies implemented during Covid-19 had a positive and direct impact on the household's livelihood, while the policies to promote meat export have not impacted the herders' livelihood.

The study result confirmed that the Government of Mongolia implemented several programs to promote the national economy and support the citizens' livelihood during the Covid pandemic, which was particularly important in overcoming the mental and health crisis. The people benefited from these programs and were grateful.

In addition to the Government of Mongolia's inclusive program, it paid particular attention to herders and implemented a cash transfer program to ensure their income did not decrease. In 2019, when cashmere prices fell due to the closure of the Chinese border, Government subsidies were given to herders based on the number of goats, which directly affected herder households' income. Also, other cash transfer policies to all citizens paid off, and herders' cash income slightly increased compared to the previous year. The impact of government policies positively and sustainably promote rural development and anti-poverty.

Another Government policy aims to increase meat export. The meat export promoting policy's main goal was to diversify non-mining export income, reduce the issue of overgrazing and pasture degradation, create jobs, and increase the herder households' income. The study result showed that government policy implemented successfully until 2019 had not impacted herders' income. The reason might be that herders are meat producers and not exporters. Agricultural producers benefit from participation at the beginning of the value chain. Although agricultural producers participate at the beginning of the value chain, they receive low benefits.

However, when examining other factors influencing the income of herder households, the changes in urban household income and the price of meat in the domestic market rather than export were the most influential. Mongolians have a high meat consumption; thus, the domestic market meat price is high. In the current situation, where the price of meat for export and the domestic market is almost the same, producers have little incentive to export

meat without adding value. Also, getting an official permit for meat export is complex; very few meat processing factories have passed the requirement and gotten a license. Export meat processing is a risky business when outbreaks of animal diseases continue. Therefore, due to the unstable market of meat exports, meat processing companies do not enter into stable supply contracts with herders or herder cooperatives.

The main conclusion is that the government should encourage herders to participate in the meat export value chain through rural cooperatives or other arrangements to bring more benefits from the meat export to herder households' livelihoods.

The study has limitations. Not all government policies are studied. Future research should examine the effectiveness of different government programs to enhance the living conditions of herders and create equitable and sustainable economic growth.

H5: The growth of the mining sector, which is essential for the Mongolian economy, harms the development of the agricultural sector. Hypothesis rejected.

Natural resources are a significant source of economic growth. However, the overuse of renewable and non-renewable resources resulted in biodiversity loss, environmental degradation, and other negative consequences. Nowadays, the issue of natural resource use is becoming more critical. The study focused on the natural resource user in two main sectors, mining and agriculture. It concluded that although both sectors are essential, the Mongolian economy highly depends on the mining sector. The mining sector does not harm the development of other sectors and does not affect the growth of the agricultural sector. The study results prove Mongolia's economic growth is positive and highly dependent on the mining sector. Likewise, the net tax share in GDP is highly significant and positively related to GDP per capita growth. The result implies that an increase in tax income promotes economic growth, which explains the relatively high Government tax on a portion of natural resource income and extraction. The log GDP per capita coefficient interprets a conditional rate of convergence. Thus, the resource endowment of Mongolia is not supporting reducing poverty. Therefore, since mining resources are depleting, their benefits should be used to support the development of renewable sectors, namely agriculture. Mongolia has vast pasture land, and the manufacturing sector lies on renewable resources. Mongolia is known for its organic meat and pasture-fed animal and as a high-quality cashmere supplier to the

world market. Based on these advantages, there is an excellent opportunity to use the capital from mining and mining restoration for agricultural purposes.

The study has limitations. The study's main limitation was a lack of reliable data. As a result, the follow-up investigation could also consider gathering more data from various sources, including primary and secondary sources. Similarly, the regression model needs to be expanded to include additional experimental and control variables with significant panel data.

6. MAIN CONCLUSIONS AND NEW FINDINGS OF THE DISSERTATION

The research contributes to the literature by examining the current Mongolian herder households' livelihood strategies and possible interventions to cope and recover from stresses and shocks and help maintain or enhance their capabilities and assets now and in the future. The research objective was to identify Mongolian herder households' livelihood strategies and assess factors that impact their choice and livelihood outcomes related to wealth and poverty.

The main conclusions from the research are as follows:

1. The research proved that having multiple sources of income *does not offer* a wealthy lifestyle for the nomadic households and allows them to earn a high income. However, it is the most appropriate life strategy for sustainability, allows them to be less vulnerable to natural disasters and shocks, and helps secure a work-life balance.
2. Based on my research, I verified that animal number is crucial to differentiate between herders' livelihoods. Five types of different assets have different effects on livelihood strategy choices. About 90 percent of herder households belong to the cluster LS1-livestock dependent. Thus, the number of animals is significant when choosing the LS1 strategy. Meanwhile, social welfare was significant to four livelihood strategies.
3. The study result proves that, due to herders' lack of financial literacy, they lose the opportunity to earn non-livestock income.
4. Pastoral households are vulnerable to many shocks and risks, but they are sometimes the least vulnerable type of lifestyle to some shocks, such as Covid-19.

5. Using the results of my investigation, I confirmed that using the number of animal heads to measure the livelihood of herder households ignores the other incomes of herder households and contributes to the high poverty level. We must consider using other methods to measure the livelihood of herder households, such as income per capita and subjective well-being.
6. During my research, it has been confirmed that livestock household statistics are reported together with rural livestock households, which hinders the generalization of research and the development of poverty reduction policies aimed at livestock herders.
7. My research has shown that although the government is continuously working to support the livelihood of herders and to reduce poverty, all policies and programs are not sufficiently achieving their all goals.

The following number of points explain this research work's new findings and practical importance:

1. The PhD research verified that a comprehensive study of the livelihood of Mongolian nomadic herders using the SLF had added a new case to international rural livelihood studies.
2. Mongolian herder household's livelihood strategies are classified into four clusters using the income-based cluster analysis. The type of clusters based on more important income types are: Income Livestock (LS1), Income Wage (LS2) Income Social Benefits (LS3), Income Natural resources (LS4). Based on the results of examining relationship between livelihood strategies, livelihood assets and poverty issues this study proves that the characteristics of Mongolian nomadic livestock farming are different from the general findings of rural research in other countries.
3. The possibility of increasing non-livestock income by raising pension insurance coverage and benefits has been investigated for the first time. Improving herders' financial literacy could impact participation in social insurance coverage and increase the amount of fees paid. In this way, herders can benefit from the new law changes and increase cash income without increasing their number of animals.
4. Assistant herders and those with wage income are classified into cluster 2 livelihood strategies. This type of income is ranked after social welfare income among non-livestock incomes, and the trend is likely to increase further. It is a source of income for

families with few animals and younger herder households.

5. One of the policies implemented by the Mongolian government to reduce the poverty of herders and rural areas was the meat export promoting policy. The study results showed that the policy did not affect the income of herder households. The income of livestock farmers depends on the domestic market, not meat export.
6. Pastoral herder households are vulnerable to many shocks and risks, but they are sometimes the least vulnerable type of lifestyle to some shocks, such as Covid-19. The study proved that the Covid-19 shock less impacted Mongolian rural households than urban households. They were more resistant because they lived in remote areas, were non-labour intensive, and were family farmers.
7. According to the study result, it is proven that the contribution of mining to the current economy is much higher than that of the agriculture sector. However, mining is a non-renewable resource, and agriculture is a renewable resource. Thus, investing appropriately in the renewable resource sector, which will bring long-term sustainable development, is crucial.
8. According to international rural studies, households that depend on natural resources and herders should be the poorest, and households with a combination of strategies should be the richest. However, this was not proven in our study. This study proves that the characteristics of Mongolian nomadic livestock farming are different from the general findings of rural research in other countries.
9. Using the results of my investigation, I confirmed that using the number of animal heads to measure the livelihood of herder households ignores the other incomes of herder households and contributes to the high poverty level. We must consider using other methods to measure the livelihood of herder households, such as income per capita and subjective well-being.

SUMMARY

The dissertation is thoroughly done within the conceptual framework of the Sustainable Livelihood Framework. Similar to international publications, the study results show that livelihood strategies can be changed as a result of a variety of factors. The research covered a number of essential topics of SLF, namely the newly emerged shock impact of Covid-19; livelihood assets; government policy on meat exporting and its impact on herders' livelihoods; and one of the possible ways to increase non-livestock income - state pensions and welfare; livelihood strategies; and, poverty of herder households. The dissertation consists of six chapters, and a brief introduction of each chapter is placed in the following paragraphs.

The **Introduction** explains the research background and needs based on herder households' problems. The justification starts with explaining the problem of increased livestock number leading to the overgrazing issues with regards to pasture carrying capacity potential, which this large herd size does not have an impact on poverty reduction of herding households. Currently, herder households have limited livelihood strategy options and few income sources that increase the vulnerability of herders households when facing natural disasters, risks and shocks. The research objectives and hypotheses are formulated based on a lack of systematic study to solve these problems.

Chapter two, entitled Sustainable livelihood framework and literature review. A research framework is defined based on a systematic literature review. It leads to follow-up comparative discussions of the SLF models and the SLF components applied in the livelihood of rural households and the sustainable livelihood of poor households. The research design was formulated after defining the research gap on sustainable rural livelihood in Mongolia. The research work on Mongolian herders' livelihood was grouped into two parts and explained extensively.

In **chapter three**, the materials and methods used in the research have been introduced. Data collection, cleaning, variable selection, data analysis, and model selection of every study are explained in this part and referred to the major reference sources. The 350 herder households data (2017) were used to analyse livelihood strategies of herder households, asset situation, poverty, and financial literacy and pension planning, and 362 households data (2021) were utilised to assess the impacts of Covid-19. Moreover, two sets of secondary data were used for two sectors' contributions to Mongolia's economic growth as natural resource users and

meat export potential and impact on herder households. The particular, relevant functional forms of models are interpreted in this chapter concerning testing the selected theoretical framework of the research.

Chapter four begins with a brief description of the characteristics of Mongolian nomadic herder households, providing statistical data for describing the current situation and problems of these herder households. Then, the growth model was applied to define and analyse the agriculture sector's importance and the mining sector's impact on the agriculture sector. The result shows mining sector is vital to the economy and does not harm the development of the agriculture sector. New shock, Covid-19 impact on household livelihoods was studied by comparing urban and rural households. According to the study results, rural households were less vulnerable to Covid-19 negative influences, and government measures supported all types of households. A meat export study was conducted as one of the government policies to support reducing rural poverty as an element of the structures and institutions of SLF. The study result found that the current government policy to support meat export does not have an impact on herders' household livelihood. This chapter's significant research is on livelihood assets and livelihood strategies. Five types of SLF assets are described in the case of herders households in Mongolia. Herder households were classified into four livelihood strategies from the income-based cluster analysis.

Furthermore, assets that prompt to choice of four different livelihood strategies were analysed using the SUR model. The most dominant strategy was a livestock-based livelihood strategy, as LS1. LS3 is a state pension and welfare-based livelihood strategy for herder households contributing to all livelihood strategies. Households that make up their household income from natural resources, e.g. hunting, collecting fruit, and wood harvesting, belong to LS4, which has a small share of the total number of herding households in Mongolia. LS2 wage income and LS3 state pension and welfare mixed strategies are the most appropriate and sustainable strategies among the four livelihood strategies of herders households in Mongolia.

At the end of the fourth chapter, herder households' participation in social insurance and herders' financial literacy factors are analysed to find a way to increase non-livestock income sources. The study result shows that if educated and well-informed, herders can catch the possibilities to increase their income and sustain their livelihood.

Chapter five presents conclusions by accepting or rejecting research hypotheses and

provides conclusions and recommendations for improving the livelihood of herder households in Mongolia, with a particular focus on poor herders' households.

The **final chapter six** presented the main conclusions of the research and extended to present the new contribution of the research work to the scientific field. This research contributed to the livelihood of nomadic herder households in Mongolia according to the DFID methodology in a more comprehensive way. The research brings attention to a possible way of increasing the herders' income without increasing the number of animals.

REFERENCES

- Aaron, H. (2010). *Behavioral Dimensions of Retirement Economics*. Brookings Institution Press.
- Addison, J., Friedel, M., Brown, C., Davies, J., & Waldron, S. (2012). A critical review of degradation assumptions applied to Mongolia's Gobi Desert. *Rangeland Journal*, 34(2), 125–137. <https://doi.org/10.1071/RJ11013>
- Agipar, B. (2016). *Sustainable development of animal husbandry (Бэлчээрийн мал аж ахуйн тогтвортой хөгжил)*. Mongolian Academy of Science.
- Ahmed, F., Ahmed, N., Pissarides, C., & Stiglitz, J. (2020). Why inequality could spread COVID-19. *The Lancet Public Health*, 5(5), e240. [https://doi.org/10.1016/S2468-2667\(20\)30085-2](https://doi.org/10.1016/S2468-2667(20)30085-2)
- Ahmed, O., & Sallam, W. (2020). Assessing the potential of improving livelihoods and creating sustainable socio-economic circumstances for rural communities in upper Egypt. *Sustainability (Switzerland)*, 12(16). <https://doi.org/10.3390/SU12166307>
- Alexander, S., Aronson, J., Whaley, O., & Lamb, D. (2016). The relationship between ecological restoration and the ecosystem services concept. *Ecology and Society*, 21(1). <https://doi.org/10.5751/ES-08288-210134>
- Allington, G. R. H., Li, W., & Brown, D. G. (2017). Urbanization and environmental policy effects on the future availability of grazing resources on the Mongolian Plateau: Modeling socio-environmental system dynamics. *Environmental Science and Policy*, 68, 35–46. <https://doi.org/10.1016/j.envsci.2016.11.005>
- Almas, H. (Ed.). (2018). *Determinants of economic growth in Africa*. Palgrave Macmillan. <https://doi.org/10.1007/978-3-319-76493-1>
- Alshaabani, A., Naz, F., Magda, R., & Rudnák, I. (2021). Impact of perceived organizational support on ocb in the time of covid-19 pandemic in hungary: Employee engagement and affective commitment as mediators. *Sustainability (Switzerland)*, 13(14). <https://doi.org/10.3390/su13147800>
- Alsuwailem, A. A., Salem, E., Saudagar, A. K. J., Altameem, A., Alkathami, M., Khan, M. B., & Hasanat, M. H. A. (2022). Impacts of COVID-19 on the food supply chain: A case study on Saudi Arabia. *Sustainability (Switzerland)*, 14(1), 1–16. <https://doi.org/10.3390/su14010254>
- Altangerel, A., Kupul, J., Shurentsetseg, K., Saijaa, N., & Nyamosor, D. (2015). *The study of herders livelihood, health, sanitary condition*. 1–8.
- Alvi, M., Barooah, P., Gupta, S., & Saini, S. (2021). Women's access to agriculture extension amidst COVID-19: Insights from Gujarat, India and Dang, Nepal. *Agricultural Systems*, 188. <https://doi.org/10.1016/j.agsy.2020.103035>

- Andy, F. (2013). *Discovering Statistics Using IBM SPSS sex and drugs and rock'n roll* (M. Carmichael (Ed.); Fourth edi). SAGE Publications Ltd.
- Ansah, I. G. K., Gardebroek, C., & Ihle, R. (2020). Shock interactions, coping strategy choices and household food security. *Climate and Development*, 0(0), 1–13. <https://doi.org/10.1080/17565529.2020.1785832>
- Arellano, A., Cámara, N., & Tuesta, D. (2018). Explaining the Gender Gap in Financial Literacy: The Role of Non-Cognitive Skills. *Economic Notes*, 47(2–3), 495–518. <https://doi.org/10.1111/ecno.12113>
- Artmann, M., Sartison, K., & Vávra, J. (2020). The role of edible cities supporting sustainability transformation – A conceptual multi-dimensional framework tested on a case study in Germany. *Journal of Cleaner Production*, 255, 120220. <https://doi.org/https://doi.org/10.1016/j.jclepro.2020.120220>
- Ayadi, F. F., Ayadi, F. F., & Ashiomanedu, J. (2008). Poverty and sustainable development in the Niger delta region of Nigeria. *Journal of Sustainable Development in Africa*, 10(3).
- Babulo, B., Muys, B., Nega, F., Tollens, E., Nyssen, J., Deckers, J., & Mathijs, E. (2008). Household livelihood strategies and forest dependence in the highlands of Tigray, Northern Ethiopia. *Agricultural Systems*, 98(2), 147–155. <https://doi.org/10.1016/J.AGSY.2008.06.001>
- Baffoe, G., & Matsuda, H. (2018). An Empirical Assessment of Households Livelihood Vulnerability: The Case of Rural Ghana. *Social Indicators Research*, 140(3), 1225–1257. <https://doi.org/10.1007/s11205-017-1796-9>
- Barbier, E. B. (2020). Is green rural transformation possible in developing countries? *World Development*, 131, 104955. <https://doi.org/10.1016/j.worlddev.2020.104955>
- Barrett, C. B., & Garg, T. (2016). Well-Being Dynamics and Poverty Traps. In *Annual Review of Resource Economics*, Vol.8 (pp. 303–327). <https://doi.org/10.1146/annurev-resource-100815-095235>
- Barro, R. J. (1997). Determinants of economic growth: a cross-country empirical study. In R. Halvorsen & D. F. Layton (Eds.), *Cambridge: MIT Press*. Edward Elgar Publishing Limited.
- Batterbury, S., & Scoones, I. (2015). Prelims - Sustainable Livelihoods and Rural Development. *Sustainable Livelihoods and Rural Development*, 23(Figure 1), iv–xvi. <https://doi.org/10.3362/9781780448749.000>
- Bayasgalan, B., Mijiddorj, R., Gomboluudev, P., Oyunbaatar, D., Bayasgalan, M., Tas, A., Narantuya, T., & Molomjamts, L. (2009). Climate change and sustainable livelihood of rural people in. *T. Devissner, G. O'Brien, P. O'Keefe, & I. Tellam (Eds.), The Adaptation Continuum: Groundwork for the Future*, 193–213.
- Bernheim, B. D., & Garrett, D. M. (2003). The effects of financial education in the

- workplace: evidence from a survey of households. *Journal of Public Economics*, 87(7–8), 1487–1519. [https://doi.org/10.1016/S0047-2727\(01\)00184-0](https://doi.org/10.1016/S0047-2727(01)00184-0)
- Berry, C., Barnett, E., & Hinton, R. (2015). What does learning for all mean for DFID's global education work? *International Journal of Educational Development*, 40, 323–329. <https://doi.org/10.1016/j.ijedudev.2014.11.007>
- Bhandari, P. (2023). *Descriptive Statistics Definitions, Types, Examples*. Scribbr. <https://www.scribbr.com/statistics/descriptive-statistics/>
- Bhandari, P. B. (2013). Rural livelihood change? Household capital, community resources and livelihood transition. *Journal of Rural Studies*, 32, 126–136. <https://doi.org/10.1016/j.jrurstud.2013.05.001>
- Bidisha, S. H., Mahmood, T., & Hossain, M. B. (2021). Assessing Food Poverty, Vulnerability and Food Consumption Inequality in the Context of COVID-19: A Case of Bangladesh. *Social Indicators Research*, 155(1), 187–210. <https://doi.org/10.1007/s11205-020-02596-1>
- Blattman, C., Hartman, A., & Blair, R. (2012). *Building institutions at the micro-level: Results from a field experiment in property dispute and conflict resolution*. <http://www.polisci.ucla.edu/workshops/cp-workshop-papers/blattman.pdf>
- BMI research. (2017). Mongolia Mining Report - Q2 2017 INCLUDES 5-YEAR FORECASTS TO 2021. In *Mongolia Mining Report*.
- Bottan, N., Hoffmann, B., & Vera-Cossio, D. A. (2021). Stepping up during a crisis: The unintended effects of a noncontributory pension program during the Covid-19 pandemic. *Journal of Development Economics*, 150. <https://doi.org/10.1016/j.jdeveco.2021.102635>
- Bukari, C., Aning-Agyei, M. A., Kyeremeh, C., Essilfie, G., Amuquandoh, K. F., Owusu, A. A., Otoo, I. C., & Bukari, K. I. (2021). Effect of COVID-19 on Household Food Insecurity and Poverty: Evidence from Ghana. *Social Indicators Research*. <https://doi.org/10.1007/s11205-021-02766-9>
- Bukari, C., Essilfie, G., Aning-Agyei, M. A., Otoo, I. C., Kyeremeh, C., Owusu, A. A., Amuquandoh, K. F., & Bukari, K. I. (2021). Impact of COVID-19 on poverty and living standards in Ghana: A micro-perspective. *Cogent Economics and Finance*, 9(1). <https://doi.org/10.1080/23322039.2021.1879716>
- Caroline E. van Dullemen and Jeanne G. M. de Bruijn. (2015). Micro Pensions for Women; Initiatives and Challenges in India. *Ageing International*, 40(2). <https://doi.org/DOI10.1007/s12126-014-9207-x>
- Castañeda, A., Doan, D., Newhouse, D., Nguyen, M. C., Uematsu, H., & Azevedo, J. P. (2018). A New Profile of the Global Poor. *World Development*, 101(C), 250–267. <https://econpapers.repec.org/RePEc:eee:wdevel:v:101:y:2018:i:c:p:250-267>
- Chadraabal, A., Shinoda, M., Suzuki, Y., & Komiyama, H. (2020). Mitigation of severe

winter time disasters in northern Mongolia through the early implementation of local action. *International Journal of Disaster Risk Reduction*, 50(June), 101739. <https://doi.org/10.1016/j.ijdr.2020.101739>

Chambers, R., & Conway, G. R. (1992). Sustainable rural livelihoods: practical concepts for the 21st century. *IDS Discussion Paper*, 296.

Christelis, D., Jappelli, T., Padula, M., Dimitris Christelis, T. J., Padula, M., Christelis, D., Jappelli, T., & Padula, M. (2010). Cognitive abilities and portfolio choice. *European Economic Review*, 54(1), 18–38. <https://doi.org/10.1016/j.eurocorev.2009.04.001>

Clark, R., & d'Ambrosio, M. (2008). Adjusting Retirement Goals and Saving Behavior: The Role of Financial Education. *Improving the Effectiveness of Financial Education and Saving Programs*, February, 237–256.

Danforth, W., & Dash, M. (2017). *Agricultural Industry Report Animal Health , Mongolian Wealth : Unlocking Mongolia ' s Other Treasure Chest Analyst.*

Davies, S. (1996). *Adaptable Livelihoods Coping with Food Insecurity in the Malian Sahel.* Palgrave Macmillan.

Davila, F, Bourke, R. M., McWilliam, A., Crimp, S., Robins, L., van Wensveen, M., Alders, R. G., & Butler, J. R. A. (2021). COVID-19 and food systems in Pacific Island Countries, Papua New Guinea, and Timor-Leste: Opportunities for actions towards the sustainable development goals. *Agricultural Systems*, 191. <https://doi.org/10.1016/j.agsy.2021.103137>

Davila, Federico, Bourke, R. M., McWilliam, A., Crimp, S., Robins, L., van Wensveen, M., Alders, R. G., & Butler, J. R. A. A. (2021). COVID-19 and food systems in Pacific Island Countries, Papua New Guinea, and Timor-Leste: Opportunities for actions towards the sustainable development goals. *Agricultural Systems*, 191, 103137. <https://doi.org/10.1016/j.agsy.2021.103137>

Davis, B., Di Giuseppe, S., & Zezza, A. (2017). Are African households (not) leaving agriculture? Patterns of households' income sources in rural Sub-Saharan Africa. *Food Policy*, 67, 153–174. <https://doi.org/https://doi.org/10.1016/j.foodpol.2016.09.018>

de Haan, C. (2016). Prospects for Livestock-Based Livelihoods in Africa's Drylands. In C. de Haan (Ed.), *Prospects for Livestock-Based Livelihoods in Africa's Drylands* (Issue October). World bank. <https://doi.org/10.1596/978-1-4648-0836-4>

DeLoach, S. B., & Smith-Lin, M. (2018). The Role of Savings and Credit in Coping with Idiosyncratic Household Shocks. *The Journal of Development Studies*, 54(9), 1513–1533. <https://doi.org/10.1080/00220388.2017.1380795>

Dembereldorj, Z. (2021). Exploring Online Student Engagement During COVID-19 Pandemic in Mongolia. *International Journal of Higher Education*, 10(7). <https://doi.org/10.5430/ijhe.v10n7p10>

Densambuu, B., Sainnemekh, S., Bestelmeyer, B., & Budbaatar, U. (2018). *National report*

on the rangeland health of Mongolia.
https://jornada.nmsu.edu/sites/jornada.nmsu.edu/files/nogoon_english.pdf

- Dethier, J.-J. J., Pestieau, P., & Ali, R. (2011). The impact of a minimum pension on old age poverty and its budgetary cost. Evidence from Latin America. *Revista de Economía Del Rosario*, 14(2), 135–163. <https://doi.org/10.12804/revistas.urosario.edu.co/economia/a.2155>
- DFID. (2000a). Sustainable Livelihoods Guidance Sheets - Vulnerability Context. *Methods*.
- DFID. (2000b). Sustainable livelihoods guidance sheets methods overview. *Department for International Development*, 4, 1–14.
- DFID. (2001a). Drought and Water Security. *Sustainable Livelihoods Guidance Sheets*, 7(1), 1–24. [papers2://publication/uuid/FC413348-5AC4-4C8D-8B63-AD3F3FE15B02](https://publication.uuid/FC413348-5AC4-4C8D-8B63-AD3F3FE15B02)
- DFID. (2001b). *Sustainable livelihood guidance sheets: Section 1-8*.
- DFID. (2001c). Sustainable Livelihoods Guidance Sheets. SL Approaches in practice. *Ids Discussion Paper*, 1–24. <https://doi.org/10.1002/smj>
- Dietz, T. J., Erdenechuluun, T., Hess, S., & Enkh-Amgalan, A. (2011). Carrying Capacity Dynamics, Livestock Commercialisation and Land Degradation in Mongolia's Free Market Era. *SSRN Electronic Journal, Ivm*. <https://doi.org/10.2139/ssrn.850075>
- Ding, J., Wang, Z., Liu, Y., & Yu, F. (2020). Rural households' livelihood responses to industry-based poverty alleviation as a sustainable route out of poverty. *Regional Sustainability*, 1(1), 68–81. <https://doi.org/10.1016/j.regsus.2020.07.002>
- Ding, W., Jimoh, S. O., Hou, Y., Hou, X., & Zhang, W. (2018). Influence of livelihood capitals on livelihood strategies of herdsman in inner Mongolia, China. *Sustainability (Switzerland)*, 10(9). <https://doi.org/10.3390/su10093325>
- Dixon, J., Gulliver, A., & Gibbon, D. (2001). Summary Farming Systems and Poverty: Improving Farmers' Livelihoods in a Changing World. In M. Hall (Ed.), *FAO, Rome; World Bank, Washington, D.C.* FAO and WB.
- Dong, X., Dai, G., Ulgiati, S., Na, R., Zhang, X., Kang, M., & Wang, X. (2015). On the relationship between economic development, environmental integrity and well-being: The point of view of herdsman in northern China grassland. *PLoS ONE*, 10(9), 1–23. <https://doi.org/10.1371/journal.pone.0134786>
- Dorjdagva, J., Batbaatar, E., Svensson, M., Dorjsuren, B., Batmunkh, B., & Kauhanen, J. (2017). Free and universal, but unequal utilization of primary health care in the rural and urban areas of Mongolia. *International Journal for Equity in Health*, 16(1), 1–9. <https://doi.org/10.1186/s12939-017-0572-4>
- Du, C., Shinoda, M., Tachiiri, K., Nandintsetseg, B., Komiyama, H., & Matsushita, S. (2018). Mongolian herders' vulnerability to dzud: a study of record livestock mortality

- levels during the severe 2009/2010 winter. *Natural Hazards*, 92(1), 3–17. <https://doi.org/10.1007/s11069-017-2893-4>
- Du, Z. X., Lai, X. D., Long, W. J., & Gao, L. L. (2020). The short- and long-term impacts of the COVID-19 pandemic on family farms in China – Evidence from a survey of 2 324 farms. *Journal of Integrative Agriculture*, 19(12), 2877–2890. [https://doi.org/10.1016/S2095-3119\(20\)63390-1](https://doi.org/10.1016/S2095-3119(20)63390-1)
- Dudek, M., & Śpiewak, R. (2022). Effects of the COVID-19 Pandemic on Sustainable Food Systems: Lessons Learned for Public Policies? The Case of Poland. *Agriculture (Switzerland)*, 12(1). <https://doi.org/10.3390/agriculture12010061>
- Duflo, E., & Saez, E. (2003). Interactions in Retirement Plan Decisions : *Quarterly Journal of Economics*, 118(August), 815–842. <https://doi.org/10.1109/ICRA.2011.5980267>
- Durán, R. L. (2021). COVID-19 and heterogeneous vulnerabilities in the Peruvian labor market: implications for social inequalities and for gender gaps. *Economía Política*. <https://doi.org/10.1007/s40888-021-00245-5>
- Ebata, A., Nisbett, N., & Gillespie, S. (2021). Food systems after covid-19. *IDS Bulletin*, 52(1), 73–94. <https://doi.org/10.19088/1968-2021.107>
- Ellis, F., & Bahiigwa, G. (2003). Livelihoods and rural poverty reduction in Uganda. *World Development*, 31(6), 997–1013. [https://doi.org/10.1016/S0305-750X\(03\)00043-3](https://doi.org/10.1016/S0305-750X(03)00043-3)
- Ellis, F., & Freeman, H. A. (2004). Rural livelihoods and Poverty Reduction Strategies in four African countries. *JOURNAL OF DEVELOPMENT STUDIES*, 40(4), 1–30. <https://doi.org/10.1080/00220380410001673175>
- Ellis, F., Kutengule, M., & Nyasulu, A. (2003). Livelihoods and rural poverty reduction in Malawi. *World Development*, 31(9), 1495–1510. [https://doi.org/10.1016/S0305-750X\(03\)00111-6](https://doi.org/10.1016/S0305-750X(03)00111-6)
- Ellis, Frank. (1998). Household strategies and rural livelihood diversification. *Journal of Development Studies*, 35(1), 1–38. <https://doi.org/10.1080/00220389808422553>
- Ellis, Frank. (1999). Rural Livelihood Diversity in Developing Countries: Evidence and Policy Implications. *Overseas Development Institute, London*, 40.
- Ellis, Frank. (2000). The determinants of rural livelihood diversification in developing countries. *Journal of Agricultural Economics*, 51(2), 289–302. <https://doi.org/10.1111/j.1477-9552.2000.tb01229.x>
- Ellison, M. (2006). Wellbeing , Livelihoods and Resources in Social. *Public Administration and Development*, October.
- Emily, K. (2019). *The Deadly Winters That Have Transformed Life For Herders In Mongolia*. <https://www.npr.org/>.
- Engler, J. O., Wesche, K., Kaczensky, P., Dhakal, P., Chuluunkhuyag, O., & von Wehrden,

- H. (2021). Biophysical variability and politico-economic singularity: Responses of livestock numbers in South Mongolian nomadic pastoralism. *Ecological Economics*, 187(March 2020), 107073. <https://doi.org/10.1016/j.ecolecon.2021.107073>
- Erdenechuluun, T., Nomintsetseg, U., Erdenebayar, M., Enkhamgalan, G., Anudari, E., & Doljin, B. (2019). *The impact assessment of concluding a free trade agreement between EAEU and Mongolia*.
- Erenstein, O., Hellin, J., & Chandna, P. (2010). Poverty mapping based on livelihood assets: A meso-level application in the Indo-Gangetic Plains, India. *Applied Geography*, 30(1), 112–125. <https://doi.org/10.1016/j.apgeog.2009.05.001>
- Fahmi, F. Z., & Sari, I. D. (2020). Rural transformation, digitalisation and subjective wellbeing: A case study from Indonesia. *Habitat International*, 98(March), 102150. <https://doi.org/10.1016/j.habitatint.2020.102150>
- FAO. (2018). World meat market overview 2017. *Meat Market Review*, April, 1–11.
- FAO. (2019). The role of agriculture and rural development in achieving SDG 1.1. *UN Experts Group Meeting on Eradicating Rural Poverty to Implement the 2030 Agenda for Sustainable Development*, 2, 1–13.
- FAO and MoFALI. (2018). Action plan for the Mongolian agenda for sustainable livestock. In *Global agenda for sustainable livestock*.
- Fernández-Giménez, M. E., Allington, G. R. H., Angerer, J., Reid, R. S., Jamsranjav, C., Ulambayar, T., Hondula, K., Baival, B., Batjav, B., Altanzul, T., & Baasandorj, Y. (2018). Using an integrated social-ecological analysis to detect effects of household herding practices on indicators of rangeland resilience in Mongolia. *Environmental Research Letters*, 13(7). <https://doi.org/10.1088/1748-9326/aacf6f>
- Fernández-Giménez, M. E., Venable, N. H., Angerer, J., Fassnacht, S. R., Reid, R. S., & Khishigbayar, J. (2017). Exploring linked ecological and cultural tipping points in Mongolia. *Anthropocene*, 17(May 2018), 46–69. <https://doi.org/10.1016/j.ancene.2017.01.003>
- Fernandez-Gimenez, M., & Le Febre, S. (2006). Mobility in pastoral systems: Dynamic flux or downward trend? *International Journal of Sustainable Development and World Ecology*, 13(5), 341–362. <https://doi.org/10.1080/13504500609469685>
- Food and Agriculture Organization. (2020). *Rapid assessment: State of food and agricultural among herders and farmer in Mongolia during covid-19*.
- Francesconi, N., Wouterse, F., & Namuyiga, D. B. (2021). Agricultural cooperatives and covid-19 in southeast africa. The role of managerial capital for rural resilience. *Sustainability (Switzerland)*, 13(3), 1–13. <https://doi.org/10.3390/su13031046>
- Gautam, Y., & Andersen, P. (2016). Rural livelihood diversification and household wellbeing: Insights from Humla, Nepal. *Journal of Rural Studies*, 44, 239–249. <https://doi.org/10.1016/j.jrurstud.2016.02.001>

- GoM. (2020). *Covid-19 situation of Mongolia*. www.covidmongolia.mn
- GoM Resolution № 200, Pub. L. No. Some measures to be taken about improved fire bricks (Сайжруулсан шахмал түлшний талаар авах зарим арга хэмжээний тухай) (2020). <https://www.legalinfo.mn/law/details/15769?lawid=15769>
- GoM Resolution №183, (2020). <https://www.legalinfo.mn/law/details/15730?lawid=15730>
- GoM resolution №30, (2020). <https://www.legalinfo.mn/law/details/15030?lawid=15030>
- GoM Resolution №93, (2021).
- Gombodorj, G. (2022). Exploring livelihood strategies of herder households in Mongolia: income-based approach. *Applied Studies in Agribusiness and Commerce*, 15(3-4 SE-Articles). <https://ojs.lib.unideb.hu/apstract/article/view/10049>
- Gombodorj, G., & Gurjav, E. (2020). Livelihood strategies of Mongolian herder households. In P. Prof.Dr Róbert Magda & P. P. Dr. Dhanashree Katekhaye (Eds.), *Scientific Session Conference Proceedings of the “ Challenges and changes under the shadow of COVID- 19 ” 7thVUA YOUTH scientific session* (Issue November, pp. 102–111). Szent István Egyetem. <http://www.vua.uniag.sk/>
- Gombodorj, G., & Nyam-Ochir, G. (2019). *PENSION PLANNING OF HERDERS MONGOLIA*. Munkhiin Useg. <https://m2.mtmt.hu/api/publication/32917998>
- Gombodorj, G., & Pető, K. (2022a). IMPACT OF THE MINING AND AGRICULTURE SECTOR ON THE MONGOLIAN ECONOMY. *ORADEA JOURNAL OF BUSINESS AND ECONOMICS*, VII, 74–85.
- Gombodorj, G., & Pető, K. (2022b). What Type of Households in Mongolia Are Most Hit by COVID-19? *SUSTAINABILITY*, 14. <https://doi.org/10.3390/su14063557>
- Gombodorj, G., & Tumur, E. (2020). Does export support household export income in Mongolia? *SEA-Practical Application of Science*, VIII(22–1), 43–48. <https://doi.org/ISSN: 2360-2554> (Online)
- Gombodorj, G., Van Ophem, J., & Nyam-Ochir, G. (2019). Financial literacy and pension planning of Mongolian herders. *The Annals of University of Oradea. Economic Science*, XXVIII(2), 137–149.
- Gregorioa, G. B., & Ancog, R. C. (2020). Assessing the Impact of the COVID-19 Pandemic on Agricultural Production in Southeast Asia: Toward Transformative Change in Agricultural Food Systems. *Asian Journal of Agriculture and Development Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA)*, 17(1). <https://doi.org/10.22004/ag.econ.303781>
- Gu, H. ying, WANG, C. wei, ying Gu, H., wei Wang, C., Gu, H. ying, & WANG, C. wei. (2020). Impacts of the COVID-19 pandemic on vegetable production and countermeasures from an agricultural insurance perspective. *Journal of Integrative Agriculture*, 19(12), 2866–2876. [https://doi.org/10.1016/S2095-3119\(20\)63429-3](https://doi.org/10.1016/S2095-3119(20)63429-3)

- Guo, S., Lin, L., Liu, S., Wei, Y., Xu, D., Li, Q., & Su, S. (2019). Interactions between sustainable livelihood of rural household and agricultural land transfer in the mountainous and hilly regions of Sichuan, China. *Sustainable Development*, 27(4), 725–742. <https://doi.org/10.1002/sd.1937>
- Gupta, A., Zhu, H., Doan, M. K., Michuda, A., & Majumder, B. (2021). Economic Impacts of the COVID–19 Lockdown in a Remittance-Dependent Region. *American Journal of Agricultural Economics*, 103(2), 466–485. <https://doi.org/10.1111/ajae.12178>
- Gupta, D., Fischer, H., Shrestha, S., Shoaib Ali, S., Chhatre, A., Devkota, K., Fleischman, F., Khatri, D. B., & Rana, P. (2021). Dark and bright spots in the shadow of the pandemic: Rural livelihoods, social vulnerability, and local governance in India and Nepal. *World Development*, 141. <https://doi.org/10.1016/j.worlddev.2020.105370>
- Hahn, Allison, H. (2017). Mongolian Dzud: threats to and protection of Mongolia’s herding communities. *Association for Asian Studies*, 22(2). <https://tinyurl.com/y9ubvpot>.
- Hahn, A. (2018). Complexity of Mongolian stakeholders’ dzud preparation and response. *Natural Hazards*, 92(s1), 127–143. <https://doi.org/10.1007/s11069-017-2907-2>
- Hahury, H. D., Prabawa, T. S., Wiloso, P. G., Soumokil, T., & Ndoen, M. L. (2020). Institutional impacts on choice of traditional agroforestry-based rural community livelihood strategies in maluku (Utilization of “Dusung” and Nutmeg in Booi Village, Maluku). *Jurnal Manajemen Hutan Tropika*, 26(2), 189–200. <https://doi.org/10.7226/JTFM.26.2.189>
- Hatab, A. A., Liu, Z., Nasser, A., & Esmat, A. (2021). Determinants of sars-cov-2 impacts on small-scale commercial broiler production systems in egypt: Implications for mitigation strategies. *Animals*, 11(5). <https://doi.org/10.3390/ani11051354>
- Hoddinott, J. (2006). Shocks and their consequences across and within households in Rural Zimbabwe. *The Journal of Development Studies*, 42(2), 37–41. <https://doi.org/10.1080/00220380500405501>
- Holly Wang, H., Zhang, Y., & Wu, L. (2011). Is contract farming a risk management instrument for Chinese farmers? *China Agricultural Economic Review*, 3(4), 489–505. <https://doi.org/10.1108/17561371111192347>
- Holzmann Edward, R. P. (2006). *Pension Reform*. The World Bank.
- Hossain, M. T., Lima, T. R., Ela, M. Z., Khan, L., Ahmed, F., Shovo, T.-E.-A., Al Masud, A., Rahman, K.-S., Jahan, N., Rahman, S. M., & Islam, M. N. (2021). Livelihood challenges and healthcare-seeking behavior of fishermen amidst the COVID-19 pandemic in the Sundarbans mangrove forest of Bangladesh. *Aquaculture*, 546. <https://doi.org/10.1016/j.aquaculture.2021.737348>
- Hossain, S. T. (2020). Impacts of COVID-19 on the agri-food sector: Food security policies of Asian productivity organization members. *Journal of Agricultural Sciences - Sri Lanka*, 15(2), 116–132. <https://doi.org/10.4038/jas.v15i2.8794>

- Houzer, E., & Scoones, I. (2021). *Are livestock always bad for the planet ? Rethinking the protein transition and climate change debate*. Brighton: PASTRES. <https://doi.org/10.19088/STEPS.2021.003>
- Howitt, D., Cramer, D., & Howitt, D. (2011). *Introduction to SPSS statistics in psychology : for version 19 and earlier* (5th editio). Pearson.
- Hua, X., Yan, J., & Zhang, Y. (2017). Evaluating the role of livelihood assets in suitable livelihood strategies: Protocol for anti-poverty policy in the Eastern Tibetan Plateau, China. *Ecological Indicators*, 78, 62–74. <https://doi.org/10.1016/j.ecolind.2017.03.009>
- International Monetary Fund. (2019). *Country report No.19/298: Mongolia selected issues*.
- Ireland, C., Malleret, D., & Baker, L. (2004). Alternative Sustainable Livelihoods for Coastal Communities: A Review of Experience and Guide to Best Practice. In *IUCN Eastern Africa Regional Programme, Nairobi, Kenya* (Vol. 12, Issue 11). <https://doi.org/10.1007/s00520-004-0736-9>
- Islam, A., & Maitra, P. (2012). Health shocks and consumption smoothing in rural households: Does microcredit have a role to play? *Journal of Development Economics*, 97(2), 232–243. <https://doi.org/https://doi.org/10.1016/j.jdeveco.2011.05.003>
- Isoto, R. E., Sam, A. G., & Kraybill, D. S. (2017). Uninsured Health Shocks and Agricultural Productivity among Rural Households: The Mitigating Role of Micro-credit. *The Journal of Development Studies*, 53(12), 2050–2066. <https://doi.org/10.1080/00220388.2016.1262027>
- Jaacks, L. M., Veluguri, D., Serupally, R., Roy, A., Prabhakaran, P., & Ramanjaneyulu, G. (2021). Impact of the COVID-19 pandemic on agricultural production, livelihoods, and food security in India: baseline results of a phone survey. *Food Security*. <https://doi.org/10.1007/s12571-021-01164-w>
- Jamsranjav, C., Reid, R. S., Fernández-Giménez, M. E., Tsevlee, A., Yadamsuren, B., & Heiner, M. (2018). Applying a dryland degradation framework for rangelands: the case of Mongolia. *Ecological Applications*, 28(3), 622–642. <https://doi.org/10.1002/eap.1684>
- Jia, Z., Xu, S., Zhang, Z., Cheng, Z., Han, H., & Xu, H. (2021). Association between mental health and community support in lockdown communities during the COVID-19 pandemic : Evidence from rural China. *Journal of Rural Studies*, 82(January), 87–97.
- Jiao, X., Pouliot, M., & Walelign, S. Z. (2017). Livelihood Strategies and Dynamics in Rural Cambodia. *World Development*, 97, 266–278. <https://doi.org/10.1016/j.worlddev.2017.04.019>
- JICA and MoFA. (2006). *Mongolia The study for improvement plan of Livestock farming system in Rural Area*. https://openjicareport.jica.go.jp/pdf/11821865_01.pdf
- Kadoya, Y., & Khan, M. S. R. (2019). What determines financial literacy in Japan? *Journal of Pension Economics and Finance*, 1–19.

<https://doi.org/10.1017/S1474747218000379>

- Kansiime, M. K., Tambo, J. A., Mugambi, I., Bundi, M., Kara, A., & Owuor, C. (2021). COVID-19 implications on household income and food security in Kenya and Uganda: Findings from a rapid assessment. *World Development*, 137. <https://doi.org/10.1016/j.worlddev.2020.105199>
- Khan, T. S., & Gottschalk, J. (2017). Investigating the Transmission Channels behind Dutch Disease Effects: Lessons from Mongolia Using a CGE Model. In *Policy research working paper of Worldbank* (No. 8183; Issue September). World Bank, Washington, DC. <https://doi.org/10.1596/1813-9450-8183>
- Khatiwada, S. P., Deng, W., Paudel, B., Khatiwada, J. R., Zhang, J., & Su, Y. (2017). Household Livelihood Strategies and Implication for Poverty Reduction in Rural Areas of Central Nepal. *Sustainability*, 9(4). <https://doi.org/10.3390/su9040612>
- Khishigbayar, J., Fernández-Giménez, M. E., Angerer, J. P., Reid, R. S., Chantsallkham, J., Baasandorj, Y., & Zumberelmaa, D. (2015). Mongolian rangelands at a tipping point? Biomass and cover are stable but composition shifts and richness declines after 20years of grazing and increasing temperatures. *Journal of Arid Environments*, 115, 100–112. <https://doi.org/10.1016/j.jaridenv.2015.01.007>
- Kokhan, S., Purevdorj, D., Khusman, O., Shagdarsuren, O., & Baatar, B. (2021). Online distance education system in remote region in the Russian and Mongolian universities during the COVID-19 pandemic. *E3S Web of Conferences*, 284. <https://doi.org/10.1051/e3sconf/202128409024>
- Kumar, P., Singh, S. S., Pandey, A. K., Singh, R. K., Srivastava, P. K., Kumar, M., Dubey, S. K., Sah, U., Nandan, R., Singh, S. K., Agrawal, P., Kushwaha, A., Rani, M., Biswas, J. K., & Drews, M. (2021). Multi-level impacts of the COVID-19 lockdown on agricultural systems in India: The case of Uttar Pradesh. *Agricultural Systems*, 187(December 2020), 103027. <https://doi.org/10.1016/j.agsy.2020.103027>
- Kwegyir Tsiboe, A. (2020). Describing the experiences of older persons with visual impairments during COVID-19 in rural Ghana. *Journal of Adult Protection*, 22(6), 371–383. <https://doi.org/10.1108/JAP-07-2020-0026>
- Lee C. Adkins, R. C. H. (2011). *Using Stata for principles of econometrics*. John Wiley and Sons Inc.
- Li, A., Wu, J., Zhang, X., Xue, J., Liu, Z., Han, X., & Huang, J. (2018). China's new rural "separating three property rights" land reform results in grassland degradation: Evidence from Inner Mongolia. *Land Use Policy*, 71(December 2017), 170–182. <https://doi.org/10.1016/j.landusepol.2017.11.052>
- Li, E., Coates, K., Li, X., Ye, X., & Leipnik, M. (2017). Analyzing Agricultural Agglomeration in China. *Sustainability (Switzerland)*, 9(2), 313. <https://doi.org/10.3390/SU9020313>
- Li, H., Nijkamp, P., Xie, X., & Liu, J. (2020). A new livelihood sustainability index for rural

- revitalization assessment-a modelling study on smart tourism specialization in China. *Sustainability (Switzerland)*, 12(8). <https://doi.org/10.3390/SU12083148>
- Li, M., Johnson, S. B., Newman, S., & Riley, A. W. (2019). Residential mobility and long-term exposure to neighborhood poverty among children born in poor families: A U.S. longitudinal cohort study. *Social Science & Medicine*, 226, 69–76. <https://doi.org/https://doi.org/10.1016/j.socscimed.2019.02.042>
- Li, Z., Deng, H., & Cheng, A. (2013). The study of the relationship between natural resource abundance and economic growth. In N. Wu, J and Lu, X and Xu, H and Nakagoshi (Ed.), *Resources and sustainable development, PTS 1-4: Vol. AMR 734-73* (pp. 3337–3341). <https://doi.org/10.4028/www.scientific.net/AMR.734-737.3337>
- Liu, Z., & Liu, L. (2016). Characteristics and driving factors of rural livelihood transition in the east coastal region of China: A case study of suburban Shanghai. *Journal of Rural Studies*, 43, 145–158. <https://doi.org/10.1016/j.jrurstud.2015.12.008>
- Lokonon, B. O. K. (2019). Farmers ' vulnerability to climate shocks : insights from the Niger basin of Benin. *Climate An*, 5529(11:7), 585–596. <https://doi.org/10.1080/17565529.2018.1511403>
- Luo, T., Young, R., & Reig., P. (2015). *Aqueduct Projected Water Stress Country Rankings*. World Resources Institute. <https://www.wri.org/resources/data-sets/aqueduct-projected-water-stress-country-rankings>
- Lusardi, A. (2004). Pension Design and Structure: New Lessons from Behavioral Finance. In Olivia S. Mitchell and Stephen P. Utkus (Ed.), *Pension Design and Structure: New Lessons from Behavioral Finance* (pp. 157–184). Oxford University Press. <https://doi.org/DOI:10.1093/0199273391.003.0009>
- Lusardi, A., & Mitchell, O. S. (2011). *Financial literacy around the world: an overview*. 10(4), 497–508. <https://doi.org/10.1017/S1474747211000448>
- Lusardi, A., & Tufano, P. (2009). *Debt Literacy, Financial Experiences, and Overindebtedness*. <https://doi.org/10.3386/w14808>
- Madrian, B. C., & Shea, D. F. (2001). The power of suggestion - Inertia in 401(k) participation and savings behavior. *Quarterly Journal of Economics*, CXVI(4), 1149–1187. <https://doi.org/10.1162/003355302753399535>
- Marion, M., Lukas, D., Buuveibaatar, B., & Ganzorig, G. (2018). *Keep on moving-How to facilitate nomadic pastoralism in Mongolian in the light of current societal transformation process*.
- Marno, V. (2008). *A guide to Modern Econometrics* (Third edit). John Wiley&Sons, Ltd.
- MCGA. (2018). *Customs statistics*. Mongolian Customs General Administration.
- Mearns, R. (2004a). Decentralisation, rural livelihoods and pasture-land management in post-socialist Mongolia. *European Journal of Development Research*, 16(1), 133–152.

<https://doi.org/10.1080/09578810410001688770>

- Mearns, R. (2004b). Sustaining livelihoods on Mongolia's pastoral commons: Insights from a participatory poverty assessment. *Development and Change*, 35(1), 107–139. <https://doi.org/10.1111/j.1467-7660.2004.00345.x>
- Mehring, M., Bayarbaatar, B., Drees, L., & Gonchigsumlaa, G. (2018). *Keep on moving: How to facilitate nomadic pastoralism in Mongolia in the light of current societal transformation processes* (Issue November).
- Meurs, M., Amartuvshin, A., & Banzragch, O. (2017). Livestock income of Mongolian herders: A path to rural prosperity? *Nomadic Peoples*, 21(1), 87–110. <https://doi.org/10.3197/np.2017.210105>
- Middendorf, B. J., Faye, A., Middendorf, G., Stewart, Z. P., Jha, P. K., & Prasad, P. V. V. (2021). Smallholder farmer perceptions about the impact of COVID-19 on agriculture and livelihoods in Senegal. *Agricultural Systems*, 190. <https://doi.org/10.1016/j.agsy.2021.103108>
- MoFALI. (2023). *Statistic news: number of livestock and meat export*. <https://www.mofa.gov.mn/news/TIME/63bccca220527841f5c30e872>
- Møller, L. R., Smith-Hall, C., Meilby, H., Rayamajhi, S., Herslund, L. B., Larsen, H. O., Nielsen, Ø. J., & Byg, A. (2019). Empirically based analysis of households coping with unexpected shocks in the central Himalayas. *Climate and Development*, 11(7), 597–606. <https://doi.org/10.1080/17565529.2018.1518812>
- Monirul Alam, G. M., Sarker, M. N. I., Gatto, M., Bhandari, H., & Naziri, D. (2022). Impacts of COVID-19 on the Fisheries and Aquaculture Sector in Developing Countries and Ways Forward. *Sustainability (Switzerland)*, 14(3), 1–13. <https://doi.org/10.3390/su14031071>
- Murphy, D. J. (2015). From kin to contract: labor, work and the production of authority in rural Mongolia. *Journal of Peasant Studies*, 42(2), 397–424. <https://doi.org/10.1080/03066150.2014.974569>
- Mzuyanda, C. (2020). Land access, livelihood diversification strategies and rural household well-being in Mnyama, Eastern Cape: Implications to extension agents. *Business Administration and Business Economics: Oeconomica*, 15(5), 7–37. <https://www.proquest.com/docview/2282684176/fulltextPDF/C312349FB0DD4E3DPQ/3?accountid=37509#>
- National Agency Meteorology and the Environmental Monitoring. (2022). *Winter and spring pasture carrying capacity (by bag unit)*. <https://www.namem.gov.mn/eng/>
- National Emergency of Management Agency. (2020). *NEMA news: Decisions of the Cabinet meeting*. National Emergency Management Agency. <https://nema.gov.mn/n/112511>
- Nazneen, S., & Araujo, S. (2021). Building back better, gender equality, and feminist dilemmas. *IDS Bulletin*, 52(1), 105–126. <https://doi.org/10.19088/1968-2021.109>

- Nielsen, Ø. J., Rayamajhi, S., Uberhuaga, P., Meilby, H., & Smith-Hall, C. (2013). Quantifying rural livelihood strategies in developing countries using an activity choice approach. *Agricultural Economics (United Kingdom)*, 44(1), 57–71. <https://doi.org/10.1111/j.1574-0862.2012.00632.x>
- NSO. (2018a). *Review of the agriculture sector* (Mongolian National Statistical Office (Ed.)). National Statistical Office of Mongolia.
- NSO. (2018b). *Statistical year book*.
- NSO. (2018c). *Мал сүргийн тоог бэлчээрийн даац, нөхцөлтэй уялдуулж тогтоох [Determine the number of livestock in relation to the carrying capacity and conditions of the pastureland]* (S. Serjkhoo (Ed.)). National Statistical Office of Mongolia. <https://www.1212.mn/BookLibraryDownload.ashx?url=Бэлчээр-2017.pdf&ln=Mn>
- NSO. (2019). *Review of agricultural sector 2019*. National Statistical Office of Mongolia (NSO). https://1212.mn/BookLibraryDownload.ashx?url=huduu_aj_ahui_2019.pdf&ln=Mn
- NSO. (2020). *Review of agriculture sector-2019*.
- NSO. (2022a). *Agriculture sector 2021*. 1212.mn
- NSO. (2022b). *Mongolian Statistical information service*. <https://www.1212.mn>
- NSO and WB. (2020). *Mongolia poverty update 2018*.
- NSO and WB. (2021). *Mongolia poverty update 2020*.
- NSO, & World Bank. (2000). *Mongolia Participatory Living Standards Assessment* (No. 29670). <https://openknowledge.worldbank.org/>
- Oniki, S., & Dagys, K. (2017). Recovery from a winter disaster in Töv Province of Mongolia. *Journal of Arid Environments*, 139, 49–57. <https://doi.org/10.1016/j.jaridenv.2016.12.010>
- Covid-19 Law of Mongolia, (2020). <https://www.legalinfo.mn/law/details/15312>
- law of Mongolia on labor (Revised edition) (Хөдөлмөрийн тухай хууль шинэчилсэн найруулга), (2021). [//legalinfo.mn/mn/detail?lawId=16230709635751](https://www.legalinfo.mn/mn/detail?lawId=16230709635751)
- Parliament of Mongolia. (2017). *law amendment for the Pension and Benefits provided by the Social Insurance Fund*. legalinfo.mn. <https://legalinfo.mn/mn/detail/12465>
- Peng, W, Robinson, B. E., Zheng, H., Li, C., Wang, F., & Li, R. (2019). Telecoupled sustainable livelihoods in an Era of rural-urban dynamics: The case of China. *Sustainability (Switzerland)*, 11(9). <https://doi.org/10.3390/su11092716>
- Peng, Wenjia, Zheng, H., Robinson, B. E., Li, C., & Wang, F. (2017). Household livelihood strategy choices, impact factors, and environmental consequences in Miyun Reservoir

- Watershed, China. *Sustainability (Switzerland)*, 9(2), 1–12.
<https://doi.org/10.3390/su9020175>
- Peter, B. S., Hans, J. W.-J., Sorensen, P. B., & Whitta-Jacobsen, H. J. (2005). *Introducing Advanced Macroeconomics: Growth and Business Cycles*. McGraw-Hill.
- Pu, M., & Zhong, Y. (2020). Rising concerns over agricultural production as COVID-19 spreads: Lessons from China. *Global Food Security*, 26.
<https://doi.org/10.1016/j.gfs.2020.100409>
- Qin, Y., & Zhang, X. B. (2016). The Road to Specialization in Agricultural Production: Evidence from Rural China. *World Development*, 77, 1–16.
<https://doi.org/10.1016/j.worlddev.2015.08.007>
- Raaij, W. F. van. (2014). Consumer Financial Behavior. *Foundations and Trends® in Marketing*, 7(4), 231–351. <https://doi.org/10.1561/17000000039>
- Raaij, W. F. van. (2016). *Understanding consumer financial behavior Money management in an age of financial illiteracy* (1st editio). Palgrave Macmillan.
<https://doi.org/10.1057/9781137544254>
- Ragasa, C., Lambrecht, I., Mahrt, K., Aung, Z. W., & Wang, M. (2021). Immediate impacts of COVID-19 on female and male farmers in central Myanmar: Phone-based household survey evidence. *Agricultural Economics (United Kingdom)*, 52(3), 505–523.
<https://doi.org/10.1111/agec.12632>
- Raju, E., Dutta, A., & Ayeb-Karlsson, S. (2021). COVID-19 in India: Who are we leaving behind? *Progress in Disaster Science*, 10, 100163.
<https://doi.org/10.1016/j.pdisas.2021.100163>
- Rasmusen, D., & Dorlig, S. (2011). Improving Feed and Fodder Supply for Dzud Management: Mongolia. In *World Bank* (Issue June).
<https://openknowledge.worldbank.org/bitstream/handle/10986/12757/702180ESW0P1200ussen000June02102011.pdf?sequence=1>
- Rigg, J. (2006). Land, farming, livelihoods, and poverty: Rethinking the links in the Rural South. *World Development*, 34(1), 180–202.
<https://doi.org/10.1016/j.worlddev.2005.07.015>
- Roche, R. (2007). *Livelihoods approaches as a conservation tool* (Issue June).
- Ronald, N. J. (2006). Economic growth and natural resources: does the curse of natural resources extend to the 50 US states? In R. Halvorsen & D. F. Layton (Eds.), *Explorations in Environmental and natural resource economics: Essays in honor of gardner M Brown, Jr* (Series, pp. 122–138). Edward Elgar Publishing Limited.
- Rusconi, R. (2009). Improving pension system coverage: understanding & meeting needs. *Conference Paper, OECD IOPS Global Forum on Private Pensions, Brazil*, 1–17.
- Ruszczuk, H. A., Rahman, M. F., Bracken, L. J., & Sudha, S. (2021). Contextualizing the

- COVID-19 pandemic's impact on food security in two small cities in Bangladesh. *Environment and Urbanization*, 33(1), 239–254. <https://doi.org/10.1177/0956247820965156>
- Sachs, J. D., & Andrew, M. W. (2001). The curse of natural resources. *European Economic Review*, 45, 827–838. <https://www.earth.columbia.edu/sitefiles/file/about/director/pubs/EuroEconReview2001.pdf>
- Sainnemekh, S., Barrio, I. C., Densambuu, B., Bestelmeyer, B., & Aradóttir, Á. L. (2022). Rangeland degradation in Mongolia: A systematic review of the evidence. *Journal of Arid Environments*, 196(October 2021), 104654. <https://doi.org/10.1016/j.jaridenv.2021.104654>
- Sala-i-Martin, X., Doppelhofer, G., & Miller, R. I. (2004). Determinants of long-term growth: A bayesian averaging of classical estimates (BACE) approach. *American Economic Review*, 94(4), 813–835. <https://doi.org/10.1257/0002828042002570>
- Schoderer, M., Dell'Angelo, J., & Huitema, D. (2020). Water policy and mining: Mainstreaming in international guidelines and certification schemes. *Environmental Science & Policy*, 111, 42–54. <https://doi.org/https://doi.org/10.1016/j.envsci.2020.04.011>
- Scoones, I. (2007). *Sustainability. Development in Practice*. <https://doi.org/10.1080/09614520701469609>
- Scoones, I. (2015a). *Sustainable Livelihoods and Rural Development: Agrarian Change and Peasant Studies*.
- Scoones, I. (2015b). *Sustainable Livelihoods and Rural Development*. Fernwood publishing and Practical action publishing.
- SDC and MMCG. (2017). *Report socio-economic baseline study of herder households*. <https://www.slideshare.net/GreengoldMongolia/socio-economic-baseline-study-of-hhs-reporteng-103926577>
- Sewell, S. J., Desai, S. A., Mutsaa, E., Lottering, R. T., Peng, W., Zheng, H., Robinson, B. E., Li, C., Wang, F., Xu, D., Zhang, J., Rasul, G., Liu, S., Xie, F., Cao, M., Liu, E., Régnier, P., Neri, B., Scuteri, S., ... Bonar, L. (2019). A comparative study of community perceptions regarding the role of roads as a poverty alleviation strategy in rural areas. *Journal of Rural Studies*, 71(September), 73–84. <https://doi.org/10.1016/j.jrurstud.2019.09.001>
- Shah, A. U. M., Safri, S. N. A., Thevadas, R., Noordin, N. K., Rahman, A. A., Sekawi, Z., Ideris, A., & Sultan, M. T. H. (2020). COVID-19 outbreak in Malaysia: Actions taken by the Malaysian government. *International Journal of Infectious Diseases*, 97, 108–116. <https://doi.org/10.1016/j.ijid.2020.05.093>
- Shammi, M., Bodrud-Doza, M., Islam, A. R. M. T., & Rahman, M. M. (2021). Strategic assessment of COVID-19 pandemic in Bangladesh: comparative lockdown scenario

- analysis, public perception, and management for sustainability. *Environment, Development and Sustainability*, 23(4), 6148–6191. <https://doi.org/10.1007/s10668-020-00867-y>
- Sherbinin, D. A., VanWey, L. K., McSweeney, K., Aggarwal, R., Barbieri, A., Henry, S., Hunter, L. M., Twine, W., & Walker, R. (2008). Rural household demographics, livelihoods and the environment. *Global Environmental Change*, 18(1), 38–53. <https://doi.org/https://doi.org/10.1016/j.gloenvcha.2007.05.005>
- Singh, P. K., & Hiremath, B. N. (2010). Sustainable livelihood security index in a developing country: A tool for development planning. *Ecological Indicators*, 10(2), 442–451. <https://doi.org/10.1016/j.ecolind.2009.07.015>
- Soltani, A., Angelsen, A., Eid, T., Naieni, M. S. N., & Shamekhi, T. (2012). Poverty, sustainability, and household livelihood strategies in Zagros, Iran. *Ecological Economics*, 79, 60–70. <https://doi.org/10.1016/j.ecolecon.2012.04.019>
- Stöber, S., Adinata, K., Ramba, T., Paganini, N., & Sulejmanović, N. (2021). Small holder farmers' challenges of coping with covid-19 containments: insights from two food regions in Indonesia. *African Journal of Food, Agriculture, Nutrition and Development*, 21(6), 18223–18244. <https://doi.org/10.18697/ajfand.101.20900>
- Sun, R., Mi, J., Cao, S., & Gong, X. (2019). Classifying livelihood strategies adopting the activity choice approach in rural China. *Sustainability (Switzerland)*, 11(11). <https://doi.org/10.3390/su11113019>
- Sung, S. L. (2017). In Times of Sickness: Intra-household Labour Substitution in Rural Indonesian Households. *The Journal of Development Studies*, 53(6), 788–804. <https://doi.org/10.1080/00220388.2016.1199860>
- Tankam, C., & Djimeu, E. W. (2020). Organic farming for local markets in Kenya: Contribution of conversion and certification to environmental benefits. *Canadian Journal of Agricultural Economics*, 68(1), 83–105. <https://doi.org/10.1111/cjag.12209>
- Tugjamba, N., & Walkerden, G. (2021). Traditional and modern ecosystem services thinking in nomadic Mongolia: Framing differences, common concerns, and ways forward. *Ecosystem Services*, 51(September), 101360. <https://doi.org/10.1016/j.ecoser.2021.101360>
- Tumur, E., Heijman, W. J. M., Heerink, N., & Agipar, B. (2020). Critical factors enabling sustainable rangeland management in Mongolia. *China Economic Review*, 60(Volume 60), 101237. <https://doi.org/10.1016/j.chieco.2018.10.004>
- Ulambayar, T., & Fernández-Giménez, M. E. (2019). How Community-Based Rangeland Management Achieves Positive Social Outcomes In Mongolia: A Moderated Mediation Analysis. *Land Use Policy*, 82(December), 93–104. <https://doi.org/10.1016/j.landusepol.2018.11.008>
- UN Environment. (2019). Global Environment Outlook – GEO-6: Healthy Planet, Healthy People. In UN Environment (Ed.), *Global Environment Outlook – GEO-6: Healthy*

- UNDP NSO and WB. (2021). *Poverty and inequality during COVID-19 using big data* (Issue May).
- Upton, C. (2012). Mining, Resistance and Pastoral Livelihoods in Contemporary Mongolia. In J. Dierkes (Ed.), *Change in Democratic Mongolia: Social Relations, Health, Mobile Pastoralism, and Mining* (Brill's In, pp. 223–248). Brill.
- Usukh, B., Binswanger-Mkhize, H. P., Himmelsbach, R., Schuler, K., Binswanger-mkhize, Hans P Himmelsbach, R., & Schuler, K. (2010). *Fostering the Sustainable Livelihoods of Herders in Mongolia via Collective Action* (Issue June).
- Van den Berg, M. (2010). Household income strategies and natural disasters: Dynamic livelihoods in rural Nicaragua. *Ecological Economics*, 69(3), 592–602. <https://doi.org/10.1016/j.ecolecon.2009.09.006>
- Van Rooij, M., Lusardi, A., & Alessie, R. (2009). DNB WorkiNg PaPer DNB Working Paper Financial Literacy and Retirement Planning in the Netherlands. *DNB Working Paper*, 231, 1–38.
- Vova, O., Kappas, M., Renchin, T., & Fassnacht, S. R. (2020). Extreme climate event and its impact on landscape resilience in gobi region of Mongolia. *Remote Sensing*, 12(18). <https://doi.org/10.3390/RS12182881>
- Waibel, H., Grote, U., Min, S., Nguyen, T. T., & Praneetvatakul, S. (2020). COVID-19 in the Greater Mekong Subregion: how resilient are rural households? *Food Security*, 12(4), 779–782. <https://doi.org/10.1007/s12571-020-01069-0>
- Walelign, S. Z. (2016). Livelihood strategies, environmental dependency and rural poverty: the case of two villages in rural Mozambique. *Environment, Development and Sustainability*, 18(2), 593–613. <https://doi.org/10.1007/s10668-015-9658-6>
- Wang, J., Brown, D. G., & Agrawal, A. (2013). Climate adaptation, local institutions, and rural livelihoods: A comparative study of herder communities in Mongolia and Inner Mongolia, China. *Global Environmental Change*, 23(6), 1673–1683. <https://doi.org/10.1016/j.gloenvcha.2013.08.014>
- Wang, P., Yan, J., Hua, X., & Yang, L. (2019). Determinants of livelihood choice and implications for targeted poverty reduction policies: A case study in the YNL river region, Tibetan Plateau. *Ecological Indicators*, 101(August 2018), 1055–1063. <https://doi.org/10.1016/j.ecolind.2019.02.007>
- Wang, X., Peng, L., Xu, D., & Wang, X. (2019). Sensitivity of rural households' livelihood strategies to livelihood capital in poor mountainous areas: An empirical analysis in the upper reaches of the Min River, China. *Sustainability (Switzerland)*, 11(8). <https://doi.org/10.3390/su11082193>
- Werhane, P. ., Newton, L. ., & Wolfe, R. (2020). *Alleviating poverty through profitable*

partnerships: globalisation, markets, and economic well being (2nd editio). Routledge.
<https://doi.org/https://doi.org/10.4324/9780429329043>

World Bank. (2015). *Natural Capital Accounting*.

World Bank. (2020). *Poverty and shared prosperity: Reversals of fortune*. IBRD WB.
<https://www.worldbank.org/en/publication/poverty-and-shared-prosperity>

World Bank. (2021). Long COVID:World bank East Asia and Pacific economic update 2021 (October). In *World bank group* (Vol. 22, Issue 8). <https://doi.org/10.1038/s41590-021-00992-4>

World Population Review. (2021). *Ulaanbaatar population 2021*. World Population Review. <https://worldpopulationreview.com/world-cities/ulaanbaatar-population>

Worldbank. (2009). *Livestock sector study, Mongolia Volume 1 -Syntesis report* (Issues 50277-MN).

Wu, G., Li, J., Chong, D., & Niu, X. (2021). Analysis on the housing price relationship network of large and medium-sized cities in china based on gravity model. *Sustainability (Switzerland)*, *13*(7). <https://doi.org/10.3390/su13074071>

Wu Sheng, Y., & Li Juan, C. (2015). China's meat and grain imports during 2000-2012 and beyond: A comparative perspective. *Journal of Integrative Agriculture*, *14*(6), 1101–1114. [https://doi.org/10.1016/S2095-3119\(14\)60993-X](https://doi.org/10.1016/S2095-3119(14)60993-X)

Wu, X., Qi, X., Yang, S., Ye, C., & Sun, B. (2019). Research on the intergenerational transmission of poverty in rural China based on sustainable livelihood analysis framework: A case study of six poverty-stricken counties. *Sustainability (Switzerland)*, *11*(8). <https://doi.org/10.3390/su11082341>

Yang, Y., De Sherbinin, A., & Liu, Y. (2020). China's poverty alleviation resettlement: Progress, problems and solutions. *Habitat International*, *98*(March), 102135. <https://doi.org/10.1016/j.habitatint.2020.102135>

Zhang, J., Mishra, A. K., & Zhu, P. (2019). Identifying livelihood strategies and transitions in rural China: Is land holding an obstacle? *Land Use Policy*, *80*, 107–117. <https://doi.org/10.1016/j.landusepol.2018.09.042>

Zhang, L., Liao, C., Zhang, H., & Hua, X. (2018). Multilevel modeling of rural livelihood strategies from peasant to village level in Henan Province, China. *Sustainability (Switzerland)*, *10*(9), 1–13. <https://doi.org/10.3390/su10092967>

Zhao, Y. ., Yan, Y. ., Liu, Q. ., & Li, F. Y. . (2018). How willing are herders to participate in carbon sequestration and mitigation? Inner Mongolian Grassland case. *Sustainability*, *10*(2808). <https://doi.org/10.3390/su10082808>

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ANNEX 1. SOCIO ECONOMIC SURVEY OF HERDER HOUSEHOLD- 2017

Hello. My name is "....." (name). I am conducting a survey from the The Mongolian National Federation of Pasture User Groups . The aim of the survey is to analyze the social and economic conditions of herder households. The interview will last approximately 20 minutes. We confirm that no information that identifies you will be included in the report without your consent in accordance with the "Mongolian Law on Privacy", MNS ISO 20252:2012.

1. GENERAL INFORMATION		
Surname		
Given name		
Sex	Male 1, Female 2	
Age		
Education		1.No education
		1. Primary (1-5)
		3.Secondary (1-9)
		4.High school (1-12)
		5.Vocational school
		6.Higher education
		90.Other/Specify
Do your kids go to school or kindergarten?Where?		1. Aimag center
		2. Soum center
		3. Bag center
		4. Other/Specify
Do you participate in public social insurance?		1.Yes
		2.No
Do you pay health insurance?		1.Yes
		2.No
How many years have you been herding ?		
How many animals do you have?	Horse	
	Cattle	
	Yak	
	Sheep	
	Goat	
	Camel	

2. SOCIO ECONOMIC CONDITION

What type of house do you have?	Ger	1
	Small house	2
	Appartment	3
	Others	90
	Refused to answer	99
Does your household have a source of electricity? If so, what kind of generator does it have?	1. Yes, from central gridlines form aimag and soum	
	2. Yes, solar panel	
	3. Yes, wind mill	

	4. <i>No, use candle</i>
	5. <i>Other/ Specify</i>
Do you have any of the following electrical appliances in your household? (Ask the lists)	1. <i>Yes</i>
	2. <i>No</i>
	3. <i>Yes have, but don't use</i>
Do you have and watch TV?	1. <i>Yes</i>
	2. <i>No</i>
	3. <i>Yes have, but don't use</i>
Do you have a radio ?	1. <i>Yes</i>
	2. <i>No</i>
	3. <i>Yes have, but don't use</i>
Do you read newspaper ?	1. <i>Yes</i>
	2. <i>No</i>
Do you use internet ?	1. <i>Yes</i>
	2. <i>No</i>
Does your household receive weather info through mobilephone?	1. <i>Yes</i>
	2. <i>No</i>

3. *HOUSEHOLD INCOME AND EXPENDITURE*

1. How much was your household monetary income in last year?	Livestock sales	
	Meat sales	
	Leather and skin sales	
	Wool and cashmere	
	Milk product	
	Hay and green fodder	
	Potato and vegetable	
	Wages for part time job/temporary work	
	Tourism	
	Trade	
	Utilize natural resources	
	Other	
2. How much money did your household spend last year?	Food	
	Clothes and household use	
	Tuition fee	
	Bank loan	
	Purchase livestock	
	Purchase house, apartment	
	Purchase car and motorcycle	
	Gasoline	
	Saving	
	Buy hay and fodder	

4. WATER SUPPLY OF HERDER HOUSEHOLDS				
1. Where do you get your livestock and drinking water? (put 1 number in the relevant cell)				
Water sources	Winter	Spring	Summer	Autumn
Protected hand well	1	2	3	4
Mechanic well	1	2	3	4
Un-protected hand well	1	2	3	4
Protected spring	1	2	3	4
Unprotected river, large river, lake,	1	2	3	4
Snow, ice	1	2	3	4
Others /Please define/	1	2	3	4
2. How many households share drinking water source? (number of households)	Winter	Spring	Summer	Autumn

3. On average, how many animals share the drinking water source for your animals?	.....		
4. How many kilometers away is the source of drinking water for your animals? (write kilometers)	Winter	Spring	Summer	Autumn

	Hay and fodder making cost			
	Maintenance cost for animal shelter			
	Maintenance for well, water source			
	Otor cost			
	Hiring man power cost			
	Assistant herder wage, cost			
	Treatment, medicine cost for family member			
	Veterinary medicine cost			
	Other			

How much income of the household is enough to meet the annual needs of the household?.....

5. PASTURE MANAGEMENT		
1. How many winter, spring, summer and fall camps do you have? Write the number of winter, spring, summer, and autumn camps where mostly live.		#
	Winter camp	
	Spring camp	
	Summer camp	
2. Does your family have official ownership documents for winter and spring camps?	Certificate of ownership of land for joint family use	
	No documents	
	Other/please specify/	
3. How many hectares does your winter, spring, summer, and autumn pastures cover?	<i>How many ha</i>	
	Winter camp	
	Spring camp	
	Summer camp	

	Autumn camp	
4. Based on your years of herding experience, what are the characteristics of winter, spring, summer and autumn pastures in your area?		
6. How should pastures be used in winter, spring, summer and autumn?		
7. How do you and your neighbors use the pasture?		
For winter pastures		
For spring pastures		
For summer pastures		
For autumn pastures		

8. Now I will talk to you about the plants that grow in the pastures where your animals graze. Answer by thinking about plants that grow in areas where you live with 4 seasons. Which of the following types of plants grow where you live? Please circle from list of plant names 1-40

Name of the plants	Grow	It used to grow	I don't know
Хялганууд	1	2	3
.....	1	2	3

9. What kind of useful plants grow in your livestock pasture? (Select from list of plant names 1-40)

	Yes	1
10. Have you ever had useful plants not growing in your pasture area??	Please name a plant name	
	No	2
	I don't know	3

11. What kinds of poisonous plants grow in your pastures that are harmful to livestock? What are the symptoms of animals that have eaten the plant?
Please write
.....
.....

12. What measures do you take for animals that have eaten poisonous plants?
Please write
.....

13. How do you know if your animal is lacking in protein or feed?
Please write

14. What measures do you take?
Please write

15. How many kilometers do you have distant pastures and nearby pastures for the 4 seasons of the year?
distant pastures, km

nearby pastures, km

Please write km

16. How many kilometers is your summer, spring and autumn camps from the winter camp where you usually live/stay?
From winter camp to spring camp

From winter camp to summer camp

From winter camp to autumn camp

		Please write km		
17. How many kilometers from your winter camp does the neighbor family start their winter camp? (Ask and mark the space for each of the 4 settlements.)	From your winter camp to your neighbor's winter camp	.....	
	From your spring camp to your neighbor's spring camp	.....	
	From your summer camp to your neighbor's summer camp	.....	
	From your autumn camp to your neighbor's autumn camp	.....	
18. Does your household go "otor"? When does the otor leave?	Yes, Year with low rainfall		1	
	Yes, Grow fewer of useful plant		2	
	Yes. A lot of herders from other aimags and soums land and settle in the settlement area		3	
	Yes, Other/please specify...../		4	
	No (Why)			
19. Have you ever heard of "Pasture Degradation"?	Yes		1	
	No		2	
20. If you have heard, what is "pasture degradation"?	.....		
21. If you haven't heard of it, what is the first thing that comes to your mind when you think of "Pasture Degradation"?	.....		
22. Do you agree or disagree with the following statements? /Tick the appropriate answer for each question/		Totally agree	Disagree	Can't tell
	a. Despite the decrease in forage plants that are good for livestock, good pasture yields are a sign that pastures have not been degraded.	1	2	3
	b. One of the signs of pasture degradation is the decrease in the number of forage plants that are good for livestock, the impoverishment of pastures, the loss of soil, the erosion of bare soil by wind and water, and the loss of fertility.	1	2	3
	c. Overgrazing can lead to pasture degradation.	1	2	3
	d. As the number of animals increases, it is the beginning of pasture degradation.	1	2	3
	e. The proliferation of pests and rodents degrades pastures, so they should all be destroyed.	1	2	3
	f. Due to the decrease in pasture plant species, livestock cannot get fat, and meat yield decreases.	1	2	3
23. Have you ever heard of "Pasture Use Agreement"? How much do you know?	Heard (well know)		1	
	Heard (moderately aware)		2	
	Heard (but don't really know)		3	
	Never heard		4	
24. Do you have a "Pasture Use Agreement"?	Yes		1	
	No		2	

25. Who in your household signed the "Pasture Use Agreement"?	.....
	Soum governor	1
	Bag governor	2
26. "With whom was the contract for the use of grasslands signed?"	With local people	3
	Other/please specify/	4
27. "What are the advantages of "pasture use agreement"?"	Regulation of the number of animals for grazing	1
	Herdsmen treat their pasture with the heart of the owner	2
	Grazing disputes are on the decline	3
	Herdsmen are guaranteed the right to be the owner of the land they live on	4
	The cooperation and joint assets of herders increased	5
	Contracted pastures are no longer duplicated	6
	Other/please specify...../	7
28. Is it necessary to conclude a "pasture use agreement"? What is needed?	Yes	1
	No	2
29. How would you like to create a "Pasture Use Agreement"?	As a family	1
	As <i>khot ail</i>	2
	As neighbors	3
	Relatives	4
	One river, locally	5
30. Do you have disputes over grazing?	Water sources, well	1
	Pasture availability	2
	Pasture border	3
	Hay making area	4
	Otor	5
	Winter camp,	6
	Spring, Summer, Autumn pasture availability	7
31. If so, have you ever resolved your grazing disputes?	Yes	1
	No	2
32. If so, how was it resolved?	.....

6. ANIMAL FODDER AND ANIMAL HEALTH

1. Did you use hay last year, 2016?	Need	1
	Yes, prepared from hay making area	2
	No need	3
	Do not use hay	4
	I don't know	5
2. Do you have your own hay field?	Yes	1
	No don't have	2
	I don't know	3
	Other/Please specify.....	4
	/	
3. Have you received a certificate of use for your hay field?	Yes Got	1
	No not	2
	I don't know	3
	Other/Please specify.....	4
	/	
4. Did you prepare your own hay last year, 2016?	Prepared by ourselves	1
	Hired (paid cash, goods, livestock)	2
	Prepared by another person without payment	3
	I don't know	4
	Other/Please specify...../	5
5. How many hectares did your household harvest hay from in 2016?	write the size of the area in ha	.....
6. How much was spent on hay production in 2016?	The cost of making hay	.....
7. How many kilograms of grass and hay did you buy in the last 12 months? How much money was spent on buying grass and hay?	Amount of grass and hay purchased (kg)	.....
8. What kind of fodder plants have you cultivated in the last 12 years?	.....
9. What types of animal feed have you purchased in the last 12 months ?	1. Cultivated forage plants	2. Purchased fodder plants and fodder
Alfalfa	1	1
Corn	2	2
Sunflower	3	3
Oats	4	4
Rye	5	5
Wheat	6	6
Barley	7	7

Bran	8	8
Mixed fodder	9	9
Khorgoljin	10	10
Other/Please specify	11	11

10. How many kilograms of fodder did you buy in the last 12 months? How much did you spend on fodder and fodder?

Amount of fodder and fodder purchased (kg)	.....
Cost (Mongolian tugrig)	.....

11. Did you receive veterinary services last year?

yes	1
no	2

12. Have you been vaccinated against the following highly infectious animals diseases of last year? /Tick the appropriate answer for each question/

Name of the highly infectious animals diseases	Vaccinated	Not vaccinated	I don't know	Refused	
Highly infectious	Anthrax	1	2	3	4
	Rabies	1	2	3	4
	Foot and mouth disease	1	2	3	4
	Other/Please specify...../	1	2	3	4
Infectious	Hemorrhagic septimaemia	1	2	3	4
	Enterotoxaemia	1	2	3	4
	Brucellosis	1	2	3	4
	Tuberculosiis	1	2	3	4
	Strangles	1	2	3	4
	Influenza	1	2	3	4
	Black leg	1	2	3	4
	Contagious agalactia	1	2	3	4
Other/Please specify...../	1	2	3	4	

13. Did you wash and deworm your animals last year to prevent the following types of animal parasitic diseases? /Tick the appropriate answer for each question/

Parasite diseases	Disinfect washed and dewormed	Not washed and dewormed	I don't know	Refused
Disinfect wash for scabies, ticks, scabies, lice	1	2	3	4
Disinfect wash for white tapeworm	1	2	3	4
Ivomec	1	2	3	4
Other/Please specify...../	1	2	3	4

14. Has your animal suffered from any of the following highly infectious diseases during the past year?

Type	Anthrax	Rabies	FMD	Other
Camel	1	2	3	4
Horse	1	2	3	4
Cattle	1	2	3	4
Sheep	1	2	3	4

Goat	1	2	3	4
	By ourselves		1	
15. <i>Who did your animal's vaccinations and washing/ deworming last year??</i>	Be veterinarian unit		2	
	By known veterinarian		3	
	By Neighbor person		4	
	Other/Please specify...../		5	

7. HERDER COOPERATIVES

1. <i>Do you have a herdsman group?</i>	Yes	1
	No	2
2. <i>If yes, how many years has it been?</i>	.....
3. <i>Will you join a herder group ?</i>	Yes	1
	No	2
4. <i>If no, what is the reason?</i>	Yes	1
	No	2
5. <i>Do your soum have a herdsman's cooperative?</i>	Yes	1
	No	2
6. <i>If yes, how many years has it been?</i>	.....
7. <i>Do you want to join a herders cooperative?</i>	Yes	1
	No	2
8. <i>If no, what is the reason?</i>	.....
9. <i>If you are member of cooperative, how many members does your cooperative have?</i>	.....
10. <i>How do you market animal products? ..</i>	Animal, meat -middleman	1
	Cooperative	2
	By myself	3
	Wool, cashmere	4
	Leather, skin, intestines	5
	Milk and milk products	6

8. PARTICIPATION IN DECISION MAKING AND ACCESS TO SERVICES (ASK EACH HOUSEHOLDS MEMBER)

1. <i>Do you participate parliament election?</i>	Yes	1
	No	2
2. <i>Do you participate local government election?</i>	.....
3. <i>Do you participate president's election?</i>	Yes	1
	No	2
4. <i>Do you have a mobile phone?</i>	Yes	1
	No	2
5. <i>How many kilometers do you travel to get your health care?</i>	.....	1
6. <i>How many times did you participate bag meeting last year?</i>	.....

ANNEX 2. Questionnaire Covid-19 impact on households- 2021

The confidentiality of the research information will be kept strictly in accordance with the provisions of Articles 4, 5 and 6 of the Law of Mongolia “On Privacy” and will be used only for the purpose of summarizing the results of the research.

Information of Participants

* Required

1. Email *

2. Surname *

3. Name *

4. Aimag, soum and district *

5. Please select a group of participants * *Mark only one.*

Apartment	Ger District	Herder	Farmer	Vegetable rower
-----------	--------------	--------	--------	-----------------

6. Profession *

7. Contact number *.....

8. E-mail address *.....

9. Age *.....

10. Gender *.....

11. Educational background * *Mark only one oval.*

- Undergraduate and higher
- Technical and vocational training
- High-school education
- Incomplete
- Uneducated

12. How many members in your family? *

13. Vulnerability assessment of the study participants * *Check all that apply.*

- Disabled Single mom
- Single dad
- Taking care after disabled
- Others

14. *Income of the 2019, which is a year before COVID appeared (by year) * Check all that apply.*

Salary	Non-permanent work	Private farming	Pension	Child allowance	Rent	Income from livestock or meat sales	Income from milk or dairy product sales	Other
Income from the sale of hides and skins	Income from wool and cashmere sales	Income from sales of potatoes and vegetables	Other sales revenue (except fruits, trees, plants)	Food voucher	Income from saving interest	Income as a foreign transaction from overseas	Income from parents or relatives (support)	

15. 2019 Income (by year) *

Write the amount in the order of the previous question. For example, if a salary or pension is selected, write 800,000 400,000. When you read it, you understand that the salary is 800,000 and the pension is 400,000.....

16. COVID-19 period, or 2020 income (per year) * Check all that apply

Salary	Non-permanent work	Private farming	Pension	Child allowance	Rent	Income from livestock or meat sales	Income from milk or dairy product sales	Other
Income from the sale of hides and skins	Income from wool and cashmere sales	Income from sales of potatoes and vegetables	Other sales revenue (except fruits, trees, plants)	Food voucher	Income from saving interest	Income as a foreign transaction from overseas	Income from parents or relatives (support)	

17. 2020 Income (by year) * Write the amount in the order of the previous question. For example, if a salary or pension is selected, write 800,000 400,000. When you read it, you understand that the salary is 800,000 and the pension is 400,000.

Measures taken before and during COVID-19

18. What measures was needed to be taken due to COVID-19? * Check all that apply

Sold the livestock	Sold the land or property	Used savings money	Borrowed items from store	Took loan from Banks or Savings and Credit Cooperatives	Other
Worked additionally in multiple jobs	Borrowed money from relatives and friends	Moved to another province / location	Reduced food consumption	Started to eat less	

19. If you took a loan in 2019, what kind of loan did you get? * Check all that apply.

Herder loans	Pension loan	Salary loans	Savings loan	Consumption	loan Mortgage	Business loan	Savings and Credit Cooperative Societies	Others	No loan
--------------	--------------	--------------	--------------	-------------	---------------	---------------	--	--------	---------

20. What was the 2019 loan spent on?

For living expenses	Bought livestock	For tuition fee	To build a house	Buy grass and fodder	For celebration purpose	Buy vegetable seeds	Others
---------------------	------------------	-----------------	------------------	----------------------	-------------------------	---------------------	--------

21. What kind of loan did you get in 2020 if get any? Check all that apply.

Herder loans	Pension loan	Salary loans	Savings loan	Consumption	loan Mortgage	Business loan	Savings and Credit Cooperative Societies	Others	No loan
--------------	--------------	--------------	--------------	-------------	---------------	---------------	--	--------	---------

22. What was the 2020 loan spent on?

For living expenses	Bought livestock	For tuition fee	To build a house	Buy grass and fodder	For celebration purpose	Buy vegetable seeds	Others
---------------------	------------------	-----------------	------------------	----------------------	-------------------------	---------------------	--------

23. If you didn't get any loan, please indicate the reason * Check all that apply.

	2019	2020
Did not meet the loan requirements		

There was no need to get loan		
Couldn't find any loan		
Other		

24. Which of the following measures taken by the government during the COVID-19 period was more significant? * 1 is less, 5 is high.

	1	2	3	4	5
Increase amount of child money					
Food vouchers					
Increase amount of social welfare benefits					
Electricity bill was recovered fully by government					
Deferred loan repayment					
Concessional loans were issued					
Tax and SIP discounts					
Distributed 300 thousand MNT to each					
1 million MNT was given to the elderly					
It didn't help					

25. What food was interrupted during COVID-19? * 1 was completely interrupted, 2 were severely interrupted, 3 were slightly interrupted, 4 were normal, and 5 were increased supply. Check all that apply.

	1	2	3	4	5		1	2	3	4	5
Meat						Milk					
Onions						Cabbage					
Carrot						Potato					
Flour						Sugar					
White rice						Vegetable oil					
Egg						Fruit (apple)					

26. In your opinion, why the food item was interrupted? *

27. What food prices have risen the most during COVID? * 1 increased a lot, 2 increased a little, 3 did not change, 4 decreased in price, and 5 did not know. Check all that apply.

	1	2	3	4	5		1	2	3	4	5
Meat						Milk					
Onions						Cabbage					
Carrot						Potato					
Flour						Sugar					
White rice						Vegetable oil					
Egg						Fruit (apple)					

28. Why do you think food prices have risen during the COVID-19? *

29. Where did you get your food from and in what amount in 2019?

	5%	10%	20%	30%	50%	100%
Aimag center						
Soum center						
Ulaanbaatar						
Prepared by ourselves						
Other						

30. Where did you get your food from and in what amount in 2020? * Check all that apply

	5%	10%	20%	30%	50%	100%
Aimag center						
Soum center						
Ulaanbaatar						
Prepared by ourselves						
Other						

31. If purchases changed in 2019 and 2020, what are the reasons? *

32. What are the main problems in your household's livelihood?

	Before COVID-19	During COVID-19
Food shortage		
Unemployment		
low income		
Debt		
Tuition fees		
Deterioration of children's education		
Deteriorating health		
Alcoholism		

33. Negative things that happened to your family during COVID-19 * Write things not mentioned above

34. Positive things that happened to your family during COVID-19 * Write things not mentioned above.

35. What measures need to be taken to improve food supply during COVID-19? *

36. Which of these risks is most likely to contribute to a shortage or increase in the price of food you consume? * 1 has minimal effect and 5 has maximum effect. Mark only one oval per row

	1	2	3	4	5
Risks associated with the supply off raw materials					
Production risks					
Risk of transportation and storage					
Sales and market risks					
Risk related to law, rules and regulations					

37. What other food problems did you have during Covid-19 period? *

38. Current number of livestock in the household

- 1)Horse.....
- 2)Cattle
- 3)Sheep.....
- 4)Goat
- 5)Camel

39. Number of livestock sold and consumed domestically (sold live + slaughtered = number of livestock sold) (For own use + gift = number of animals used for own use)

	2019 sold	2019 consumed	2020 sold	2020 consumed
1) Horse.....				
2) Cattle				
3) Sheep.....				
4) Goat				
5) Camel				

40. These are the pre-Covid-19 (2019) and during the Covid-19 (2020) questions. Changes in meat sales: Why were livestock and meat sold?

	In 2019, before COVID-19	In 2020, during the COVID-19		In 2019, before COVID-19	In 2020, during the COVID-19
There will be a dzud			For household needs		
Cashmere prices are low			For weddings and celebrations		
For tuition fees			Travel and leisure		

To get or fix the house			To buy food		
To buy car or motorcycle			Other		
For Health and related treatment					

41. Where did you sell livestock and meat? Please answer related to before Covid-19 period (2019) Check all that apply.

	5%	10%	20%	30%	50%	100%
Aimag center						
Soum center						
From khoton						
Meat factories						
Khuchit shonkhor						
Emeelt						
Other place in UB						
Other						

42. Where did you sell livestock and meat? Please answer related to during Covid-19 period (2020) Check all that apply.

	5%	10%	20%	30%	50%	100%
Aimag center						
Soum center						
From khoton						
Meat factories						
Khuchit shonkhor						
Emeelt						
Other place in UB						
Other						

43. What are the barriers to selling livestock and meat during the Covid-19 period?

44. These questions will be asked before (2019) and after (2020). If sold live, divide the total price by the live weight and find the price of 1 kg. If sold at different prices, write at the average price.

Price Per kg	The price of meat sold in 2019 Spring	2019 Summer	2019 Autumn	2019 Winter	The price of meat sold in 2020 Spring	2020 Summer	2020 Autumn	2020 Winter
Beef								
Horse meet								
Mutton								
Goat meat								

45. Expenditure on livestock (MNT)

Cost item	2019	2020
Hay cost		
Fodder cost		
Veterinary cost		
Transportation cost		
Assistant herder and assistant milk man cost		
Other cost		
Total livestock cost		

46. Income: If your household sell milk please fill the table. Where and how much **milk** was sold in **2019**?

	5%	10%	20%	30%	50%	100%
Aimag center						
Soum center						
From home						
Milk factory in UB						
Other place in UB						
Other						

47. Where and how much milk was sold in **2020**?

	5%	10%	20%	30%	50%	100%
Aimag center						
Soum center						
From home						
Milk factory in UB						
Other place in UB						
Other						

48. What are the barriers to selling milk during the Covid-19 period?

49. What was the price of milk per liter?

Price Per liter	2019 Spring	2019 Summer	2019 Autumn	2019 Winter	2020 Spring	2020 Summer	2020 Autumn	2020 Winter
Beef								
Horse meet								
Mutton								
Goat meat								

50. What are the challenges of another dairy business during the Covid-19 period? For example, availability of fodder, manpower, etc
.....

51. If you grow potatoes and vegetables, fill in this section.

What vegetables did you grow? (yes, no)

	2019	2020	2021
Onions			
Cabbage			
Carrot			
Potato			
Cucumbers			
Other			

45. Area sown in 2019 (hectares) and harvested (tons) Write the area and yield in the order in which the previous question was selected. For example, if onions and carrots are selected, write 15 7, 10 3. Reading this, it is understood that Carrots were planted on 15 hectares and harvested 3 tons, and Onions were planted on 10 hectares and harvested 3 tons.
.....
.....

46. Area sown in 2020 (hectares) and harvested (tons) Write the area and yield in the order in which the previous question was selected. For example, if onions and carrots are selected, write 15 7, 10 3. Reading this, it is understood that Carrots were planted on 15 hectares and harvested 3 tons, and Onions were planted on 10 hectares and harvested 3 tons.
.....

47. Write reason for the change size of the sown area between 2019 and Write the area and yield in the order in which the previous question was selected. For example, if onions and carrots are selected, write 15 7, 10 3. Reading this, it is understood that Carrots were planted on 15 hectares and harvested 3 tons, and Onions were planted on 10 hectares and harvested 3 tons.
.....

48. Write reason for the change size of the sown area between 2019 and Write the area and yield in

the order in which the previous question was selected. For example, if onions and carrots are selected, write 15 7, 10 3. Reading this, it is understood that Carrots were planted on 15 hectares and harvested 3 tons, and Onions were planted on 10 hectares and harvested 3 tons.....

49. The amount of harvest sold in 2019 and 2020

	2019						2020					
	5%	10%	20%	30%	50%	100%	5%	10%	20%	30%	50%	100%
Onions												
Cabbage												
Carrot												
Potato												
Cucumbers												
Other												

50. Price of vegetables

	2019	2020
Onions		
Cabbage		
Carrot		
Potato		
Cucumbers		

51. Where did you sold the vegetables in 2019 and 2020?

	2019						2020					
	5%	10%	20%	30%	50%	100%	5%	10%	20%	30%	50%	100%
In aimag center wholesale												
In Aimag center by retail												
In Soum center wholesale												
In Soum center wholesale												
From vegetable garden												
Wholesale in UB												
Retail in UB												
Other												

52. Whom to sold your vegetables in 2019 and 2020?

	2019						2020					
	5%	10%	20%	30%	50%	100%	5%	10%	20%	30%	50%	100%
Factories												
Mediator sellers												
Shops												
Restaurants												
Users												
Government agencies												
Other												

53. Expenditures related to potato and vegetable growing in 2019 and 2020.

Cost item	2019	2020
Pesticides		
Weed control		
Onion seeds		

Cabbage seeds		
Carrot seeds		
Potato seeds		
Cucumber seed		
Fertilizer costs		
Plowing and tillage costs		
Cost of spare parts and tools		
Labour costs		
Shipping costs		
Storage costs		
Other cost		
Total cost		

54. The main challenge for your business: Before and during COVID-19 (1 minor problem, 5 major problems, 0 irrelevant)

	2019					2020				
	1	2	3	4	5	1	2	3	4	5
Vehicle shortages and its prices										
Gasoline shortages and its prices										
Warehouse shortages and its prices										
Labor shortages and wages										
Lack of packaging and its price										
Laws and regulations										
Quarantine										
Bureaucracy										
Lack of information										
Lack of cash										
Lack of equipment and its prices										
Lack of spare parts and its prices										
There are no buyer										
There are a lot of depreciation										

55. Raw Material Supply Risk: The following questions must be completed only by herders and farmers. Occurrence Probability (H) 1-very low occurrence, 2-low occurrence, 3-normal occurrence, 4-high occurrence, 5-very high occurrence

	1	2	3	4	5
Natural disaster (dzud, drought, storm)					
Infectious diseases of animals					
Lack of raw materials					
Commodity price fluctuations					
Poor or no access to vet services / lack of vaccines					
Increased fuel costs					
Unable to access finance					

56. Severity after occurrence (S) 1-very low occurrence, 2-low occurrence, 3-normal occurrence, 4-high occurrence, 5-very high occurrence. Check all that apply.

	1	2	3	4	5
Natural disaster (dzud, drought, storm)					
Infectious diseases of animals					
Lack of raw materials					
Commodity price fluctuations					
Poor or no access to vet services / lack of vaccines					
Increased fuel costs					
Unable to access finance					

57. Likelihood detection (D) 1-very low occurrence, 2-low occurrence, 3-normal occurrence, 4-high

occurrence, 5-very high occurrence. Check all that apply.

	1	2	3	4	5
Natural disaster (dzud, drought, storm)					
Infectious diseases of animals					
Lack of raw materials					
Commodity price fluctuations					
Poor or no access to vet services / lack of vaccines					
Increased fuel costs					
Unable to access finance					

58. Ability to control and compensate (C) 1-very low occurrence, 2-low occurrence, 3-normal occurrence, 4-high occurrence, 5-very high occurrence. Check all that apply.

	1	2	3	4	5
Natural disaster (dzud, drought, storm)					
Infectious diseases of animals					
Lack of raw materials					
Commodity price fluctuations					
Poor or no access to vet services / lack of vaccines					
Increased fuel costs					
Unable to access finance					

59. Production and Operating Risk: The following questions must be completed only by herders and farmers.

Occurrence Probability (H) 1-very low occurrence, 2-low occurrence, 3-normal occurrence, 4-high occurrence, 5-very high occurrence. Check all that apply.

	1	2	3	4	5
Increased production costs					
Loss of production technology and product quality					
Labor shortages					
Production interruptions and failures					
Increased cost of raw materials					
Lack of raw materials and interruptions					
Unable to access finance					
Lack of working capital					

60. Severity after occurrence (S) 1-very low occurrence, 2-low occurrence, 3-normal occurrence, 4-high occurrence, 5-very high occurrence. Check all that apply.

	1	2	3	4	5
Increased production costs					
Loss of production technology and product quality					
Labor shortages					
Production interruptions and failures					
Increased cost of raw materials					
Lack of raw materials and interruptions					
Unable to access finance					
Lack of working capital					

61. Likelihood detection (D) 1-very low occurrence, 2-low occurrence, 3-normal occurrence, 4-high occurrence, 5-very high occurrence. Check all that apply.

	1	2	3	4	5
Increased production costs					
Loss of production technology and product quality					
Labor shortages					
Production interruptions and failures					
Increased cost of raw materials					
Lack of raw materials and interruptions					
Unable to access finance					
Lack of working capital					

62. Ability to control and compensate (C) 1-very low occurrence, 2-low occurrence, 3-normal occurrence, 4-high occurrence, 5-very high occurrence. Check all that apply.

	1	2	3	4	5
Increased production costs					
Loss of production technology and product quality					
Labor shortages					
Production interruptions and failures					
Increased cost of raw materials					
Lack of raw materials and interruptions					
Unable to access finance					
Lack of working capital					

LIST OF PUBLICATIONS



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Registry number: DEENK/107/2023.PL
Subject: PhD Publication List

Candidate: Gombodorj Ganchimeg
Doctoral School: Károly Ihrig Doctoral School of Management and Business
MTMT ID: 10067573

List of publications related to the dissertation

Articles, studies (5)

1. **Ganchimeg, G.**: Exploring livelihood strategies of herder households in Mongolia: income-based approach.
Apstract. 15 (3-4), 109-115, 2022. ISSN: 1789-221X.
DOI: <http://dx.doi.org/10.19041/APSTRACT/2021/3-4/13>
2. **Ganchimeg, G.**, Pető, K.: Impact of the mining and agriculture sector on the Mongolian economy.
Oradea Journal of Business and Economics. 7 (1), 74-85, 2022. ISSN: 2501-1596.
DOI: <http://dx.doi.org/10.47535/1991ojbe139>
3. **Ganchimeg, G.**, Pető, K.: What Type of Households in Mongolia Are Most Hit by COVID-19?
Sustainability. 14 (6), 1-20, 2022. ISSN: 2071-1050.
DOI: <http://dx.doi.org/10.3390/su14063557>
IF: 3.889 (2021)
4. **Ganchimeg, G.**, Erdenechuluun, T.: Does export support household income in Mongolia?
SEA: Practical Application of Science. 8 (22), 43-48, 2020. EISSN: 2360-2554.
5. **Ganchimeg, G.**, Van Ophem, J., Nyam-Ochir, G.: Financial literacy and pension planning of Mongolian herders.
The Annals of the University of Oradea. Economic Sciences. 28 (2), 137-149, 2019. ISSN: 1222-569X.

Conference presentations (2)

6. **Ganchimeg, G.**, Gurjav, E.: Livelihood strategies of Mongolian herder households.
In: Challenges and changes under the shadow of COVID-19 : conference proceedings, Ed.: Róbert Magda, Dhanashree Katekhaye, Szent István Egyetem, Gödöllő, 102-111, 2020.
ISBN: 9789632699301
7. **Ganchimeg, G.**, Nyam-Ochir, G.: Pension planning of herders Mongolia.
In: VI. AGRIMBA-AVA Congress : Program and abstracts, The International MBA Network of AGRIMBA, Ulanbator, 54-57, 2019.



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List of other publications

Books (13)

8. Erdenechuluun, T., Gantulga, T., **Ganchimeg, G.**, Bodisaikhan, K., Temuulen, E.: BNKAU-d makh, makhан бүтээгдэхүүн экспортох: Mongol улсын бизнес эрхлэгчид, үйлдвэрлэгчдэд зориулсан тсогтс гарын авлага. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bonn, 57 p., 2022.
9. Heijman, W., szerk. Orosoo, R., Nyambat, L.; ford. Suvdaa, J., **Ganchimeg, G.**, Nyamaa, N., Erdenechuluun, T.: Kheregleenii makro ediin zasag = Applied makroecomics. 2nd edition, Munkhiin useg, Ulanbator, 125p p., 2021. ISBN: 9789919245450
10. Szerk. Ulziisaikhan, B.; ford. Khasherdene, B., Byambagerel, Y., **Ganchimeg, G.**, Odontungalag, B., Ölziisaikhan, B.: Manlajjal = Leadership. Suun suvd, Ulanbator, 218 p., 2021. (HBR's 10 Must Reads) ISBN: 9789919968625
11. Szerk. Ulziisaikhan, B.; ford. Khashbat, N., **Ganchimeg, G.**: Erkh medel, нөлөө, yatgakh chadvar = Power, influence and persuasion. Suunsuud, Ulanbator, 164p p., 2020. (Harward Business Review 10 must reads series) ISBN: 9789919209995
12. Mangaa, E., **Ganchimeg, G.**, Chimedtseren, T.: Menejmentiin үндес. 2nd edition, Tsogtprint, Ulanbator, 114 p., 2019. ISBN: 9789997880468
13. Lafley, A., Martin, R. L., szerk. Ulziisaikhan, B.; ford. **Ganchimeg, G.**: Yalakhyn tölөө toglo: Biznyesiin stratyegiin гарын авлага = Playing to win. Suunsuud, Ulanbator, 239p p., 2019. (Harvard business review) ISBN: 9789919202743
14. Ganzorig, G., **Ganchimeg, G.**: Mongol улсын khөдөө ај akhuin garaltai бүтээгдэхүүний экспорт, импорт: үне tseniin сүлжеег уялдakh ni. Publishing house of the Mongolian University of Science and Technology, Ulanbator, 202 p., 2018. (Technical series document ; 1.) ISBN: 9789997818881
15. Lkhamsuren, N., **Ganchimeg, G.**: Fyermyeriin ај akhuin myenjejmvent. Ordpress, Ulanbator, 536 p., 2017. ISBN: 9789997806437
16. Chuluunbaatar, D., Annor, F. C., **Ganchimeg, G.**: Mongolia: A review of the agricultural research and extension system. Food and Agriculture Organization of the United Nations, Rome, 101 p., 2017. ISBN: 9789251095454
17. **Ganchimeg, G.**, Ganbayar, B.: Menejmentiin үндес. 2nd edition, Tsogt print, Ulanbator, 135p p., 2015. ISBN: 9789996280610
18. Ford. Batzolboo, B., Ganzorig, G., **Ganchimeg, G.**, Erdenechuluun, T., Anudafi, E., Temuulen, E.: Ruralinvest Khicheel 1.: Oron nutgiin khöröngө oruulaltyn kheregtseeg oroltsoony argaar todorkhoilokh ni = Rural invest module 1. Participatory identification of local investment priorities. RuralInvest, Ulanbator, 45 p., 2015.



19. Ford. Ganzorig, G., **Ganchimeg, G.**, Lkhagvadorj, D., Suvdaa, J., Munkhbat, J., Amar, U., Baasansuren, S., Tserendavaa, T., Anudari, E., Erdenesuren, Y.: Ruralinvest Khicheel 2.: Töslin khuraangui bolovsruulakh, ashiglakh ni = Rural invest module 2. Preparing and using project profiles. RuralInvest, Ulanbator, 39 p., 2015.
20. Ford. Ganzorig, G., **Ganchimeg, G.**, Lkhagvadorj, D., Suvdaa, J., Munkhbat, J., Amar, U., Baasansuren, S., Tserendavaa, T., Anudari, E., Erdenesuren, Y.: Ruralinvest Khicheel 3.: Delgerengüi tölös bolovsruulakh, shinjlekh = Rural invest module 3. Detailed project formulation and analysis. RuralInvest, Ulanbator, 91 p., 2015.

Articles, studies (4)

21. **Ganchimeg, G.**, Ganbayar, B.: Ulsyn ekstyeinshin, innovatsyn üilchilgeeg saijruulakh bolomj. *Menežer*. 12 (23), 34-40, 2014.
22. **Ganchimeg, G.**: Energy consumption and household wealthy: case of herder households in Mongolia. *Mongolian Journal of agricultural sciences*. 11 (2), 103-109, 2013. ISSN: 2310-6212. DOI: <https://doi.org/10.5564/mjas.v11i2.229>
23. **Ganchimeg, G.**, Havrland, B.: Economic analysis of household energy consumption: the case of herders in Mongolia. *Agricultura Tropica et Subtropica*. 44 (4), 197-203, 2011. EISSN: 1801-0571.
24. **Ganchimeg, G.**: Pilot privatization. In: Social sector privatization : Changes, reforms and privatization of education sector of Mongolia / Ganchimeg Gombodorj, J. Sunjidmaa, D. Borolzoi, Ts. Bulgan, Open Society Foundation, Ulanbator, 55-93, 2004. ISBN: 992903252

Conference presentations (2)

25. **Ganchimeg, G.**, Mazancove, J.: How to improve competitiveness of public extension service in Mongolia? *Agricultura Tropica et Subtropica*. 46 (4), 132, 2015. ISSN: 0231-5742. DOI: <http://dx.doi.org/10.2478/ats-2013-0024>





26. Anudari, E., Ingrid, F., **Ganchimeg, G.**, Mazancove, J.: Cooperative extension for rural development.
In: 3rd International conference - 2014 Natural resources and agricultural economics, [s.n.], Ulanbator, 129-130, 2014.

Total IF of journals (all publications): 3,889

Total IF of journals (publications related to the dissertation): 3,889

The Candidate's publication data submitted to the iDEa Tudóstér have been validated by DEENK on the basis of Web of Science, Scopus and Journal Citation Report (Impact Factor) databases.

12 April, 2023



ACKNOWLEDGEMENT

First, I would like to express my sincere gratitude to my supervisor, Prof. Dr Károly Pető, who guided and supervised me throughout my PhD study. Special thanks to Dr Harangi-Rákos Monika, who always helped and supported me whenever I needed support.

I also express my gratitude to the management team and lecturers of Karoly Ihrig, Doctoral School of Management and Business, University of Debrecen.

I want to thank my friends in Debrecen, Buya, Peter, dr. Csapóné dr.Riskó Tünde and Dr Csapó Zsolt, Dr Nábrádi András, my classmates at the University of Debrecen, colleagues of the department of Institute of Rural Development, Tourism and Sports Management, and friends who shared my happiness during my stay in Hungary. The hospitality and friendliness of all of you did not make anyone away from home feel bored. I want to thank the Board of Trustees of the Tempus Public Foundation Stipendium Hungaricum. Without the scholarship, it will not be easy to study and spend an incredible period of my life in Hungary. Studying in Hungary opens pursuing advanced education at an excellent higher education institution ranked 2nd in Hungary, learning about this beautiful country's culture and customs and making lifetime friendships.

Last but not least, I would like to thank my beloved family. I want to thank my beloved husband and three sons, who have continuously supported me in my academic work from home.

ABBREVIATION

CRM	Citizen representative meetings
DFID	Department for International Development
FAO	Food and Agriculture Organization of United Nations
GoM	Government of Mongolia
HH	Herder households
MCGA	Mongolian Customs General Administration
MMCG	Mongolian Marketing Consulting Group
MNT	Mongolian National Tugriks (currency)
MPCE	Monthly per capita consumption expenditure
NGO	Non-Profit Organization
NSO	National Statistics Office of Mongolia
SDC	Swiss Agency for Development Cooperation
SDG	Sustainable Development Goal of United Nations
SL	Sustainable Livelihood
SLA	Sustainable Livelihood Approach
SLF	Sustainable Livelihood Framework
SU	Sheep unit
UK	The United Kingdom,
USA	The United States
WB	World Bank
WoS	Web of Science