

What Factors Influence Poultry Production in Sindhupalchok District of Nepal? A Poultry Farmers Perspective

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Abstract

This study investigates factors influencing the poultry production of poultry farmers in the Sindhupalchowk district by examining the potential disparities in performance among socioeconomic factors, farm inputs, and market access and technology adaptation that navigate poultry production. This study focused on the poultry farmers located in the Sindhupalchowk district of Nepal gathering data from 156 poultry farmers located in the study area. This study augmented the simple regression model and estimates the factors affecting poultry production using an explanatory research technique. The empirical results established a significantly positive relation between farm area, feed used, and energy use, distribution channel with poultry production. The finding gives relevance to the concentration factors that affect poultry production among farmers in the Sindhupalchowk district. The study identified major problems such as the high price of feed, the outbreak of diseases, lack of steady supply of electricity, lack of veterinary care and service facilities, inadequate availability of chickens, and lack of credit which should be mitigated early as possible with an interest to accelerate commercial poultry production in Sindhupalchowk district.

Keywords: Factor influencing; Poultry; Production; Farmers; Sindhupalchowk; Feeds; Market; Technology.

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1. Introduction

Agriculture is the major sector of Nepalese economy; therefore, the development of agriculture sector is key for the development of national economy. Livestock, including poultry is an integral part of the agricultural production system which includes providing manure and high value animal protein such as meat and eggs for the human consumption [1]. The poultry sector helps to level up and industrialize in different parts of the world. Increment in human population, purchasing power and urbanization have been strong drivers of growth [2], therefore, they form an important component of rural livelihoods. With the rapidly growing human populations, demand for high quality food especially protein have increased; improving income levels and standards of living have all created a high demand for chicken products [1].

In similar context, more than 65% of the population depends upon agriculture in Nepal. Contribution of agricultural sector in Gross Domestic product of Nepal is 33%. Among them contribution of livestock sector in total GDP is 26.8% and poultry sub sector within livestock contributes 8% of Agriculture Gross Domestic product (AGDP) and Indigenous poultry is widely prevalent which contributes 55% of total poultry population [3]. In Nepal, Poultry farming has huge scope and opportunities. Poultry business is ranked up by 12.5% every year. In present change in consumption pattern of meat and egg have increased the poultry farming business day by day. In Nepalese community, chicken has become a popular product in poultry which provides low-cost protein in the form of meat and eggs. In both rural and urban areas of Nepal, the number of commercial poultry farms are steadily increasing [4].

Every kind of business are somehow affected by technological advancement these days. Thus, poultry farming has also been interconnected with technological features and advancement recently. Mobile phones and television are the most popular and widely used communication channels among farmers, while computers and the internet are preferred by the more educated. Farmers also use some technology applications, such as short messaging services and phone calls [5]. In this regard, technology may offer a one-of-a-kind opportunity to facilitate agricultural-related technological adoption and access, as well as the provision of market and market price information, weather, transportation, and agricultural techniques [6]. Modern and widely accessible information and communication technologies provide accurate and timely data, allowing informed decisions to be made on how to use resources most productively and efficiently [7]. Furthermore, these technology tools have the ability to not only improve agricultural processes, but also to ensure farm business stability. Information and communication technology can help Nepalese poultry farmers get more agricultural information they need. Agriculture's efficient practices can be assisted by information and communication technologies, which, if used wisely, can become transformative drivers. According to Nwagwu and Soremi, technology have the potential to increase production, productivity, competitiveness, and growth in various aspects of the agricultural sector by increasing access and acquisition of information. Technology helps to expand the number of avenues and platforms available to poultry farmers for obtaining and consuming agricultural information, as well as to facilitate more farmers [5].

This study focused on factors influencing poultry farming by the majority of Nepalese population. Absence of related research in the area was also another challenge of the study that hinders to compare and refer some relevant information. Despite this potentiality, the sector faces a number of challenges that continue to reduce the sector's benefits through low output levels and resulting economic losses. Chicken is said to be suitable for rural areas because it needs few inputs, which rural farmers can easily afford, resulting in a major contribution to food security and poverty reduction. Researchers and industry experts agree that one of the major obstacles to increasing efficiency in poultry farming is a lack of information about the factors influencing production [8]. Farmers should have technical knowledge to run a poultry farm but most of the poultry farmers started this business without being proper trained. Facilities to train up poultry farmers on various aspects of poultry farming are inadequate in the country. They are in many cases not in touch with modern technology to augment production. Inadequate knowledge about poultry diets are the major problem, most of the farmers do not have sufficient knowledge about poultry diets. Ratio of feed varies from starter, grower and finisher of broiler production.

The major problem that the researcher encountered with a number of issues and problems, such as a lack of policy, poor resources, and a lack of skill, as well as good infrastructure, impede the successful implementation of technology in agriculture [9]. Many farmers, especially those in developing countries, consider three major farming challenges: credit that is affordable, market prices that are reasonable, and access to relevant farming information [10]. In the context of Nepal, poultry farming is subject to a variety of conditions and constraints, which has an effect on the sector's production and productivity. Inadequate funds, high input costs, insufficient management abilities, and a lack of market access are examples of such constraints. These factors have a negative effect on poultry production, but demand for poultry products is increasing, while supply cannot keep up with the rising demand. Agricultural extension systems aim to assist farmers by providing actionable knowledge for crop and livestock production, farm management, and marketing [11]. Furthermore, advancement in information and communication technologies allow developing countries to gain access to and use information that can boost productivity in a variety of sectors, including agriculture [12]. Technology enables new and faster methods of distributing and retrieving information, as well as rapid, effective, and global exchanges of information and knowledge.

Thus, this study aims to address various concerns relating to poultry farming and its interlinkage to technology which includes: How do socio economic factors and farm inputs influence the poultry production? How does technology adaptation and access to market influence poultry production? What are the challenges in poultry production faced by poultry farmers? What could be the managerial strategy for promoting poultry production? Hence, the study was striven to the answers to the following questions, with the objective to determine the factors influencing poultry production among poultry farmers. The importance of this study is to shed light on the factors influencing poultry production, challenges that chicken farmers face and to suggest creative solutions to these challenges in order to maximize prospects for increased production and improved livelihoods.

Further, the study is organized as: section II includes research methodology followed by results in section III, section IV includes discussion, conclusion in section V and finally study ends with recommendation in section VI.

2. Research Methodology

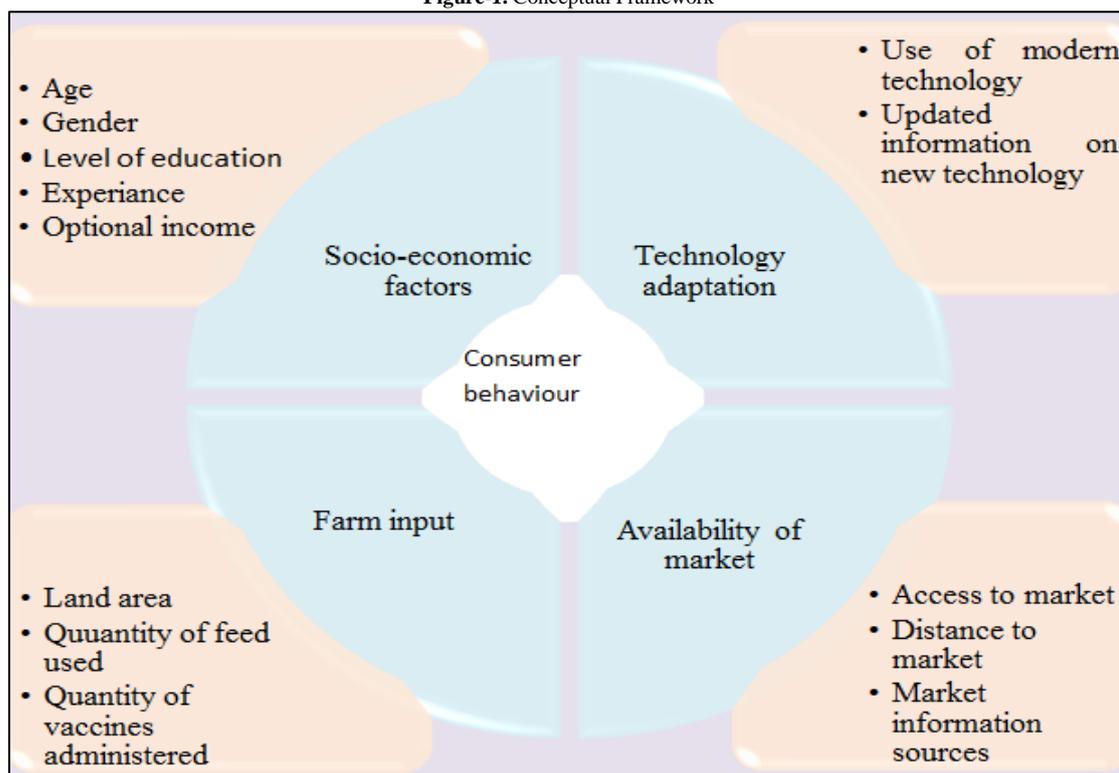
2.1. Conceptual Framework

Beyond the foundational question about the factors influencing poultry production, a considerable number of research studies have explained the key forces behind the production of poultry. Extensive research has been done on the concept of poultry production; however, limited research has been done on factors influencing poultry production. The past researches have dwelt on poultry production in general but have not specifically broken the poultry production into factors influencing poultry production in poultry farming in terms of farm (farm inputs) and farmer factors (socio-economic) factors. The study's conceptual framework depicts that farmers perception on factors influencing production will be considered as independent variables and the output in poultry production will be taken as the dependent variable as shown in figure below.

2.1.1. Farm Inputs

The cost of poultry farm inputs such as land area, quantity of feed used, quantity of vaccine administered, labor used and energy used determine the size of the poultry business that a poultry farmer is able to set up. When the cost of input is high, many poultry farming businessmen will either opt to reduce the size of business or close the business which altogether will result to decrease in poultry output [13]. For poultry business, inputs especially constitute up to 70% of the total cost of production. The poultry farmers have been facing some complex and conflicting problems and these problems include the increase in the price of feeds & raw materials, availability & cost of vaccine, high labor cost and high electricity expenses. Today, the cost of poultry farm input has become the biggest challenge faced by the poultry farmers which has drastically affected the profit margins of many farmers and consequently has altered their expansion programs. The availability of credit facilities and the poultry farm size enhanced the procurement of poultry equipment and materials which significantly influenced the production and supply of poultry product and also helped in the proper utilization of the available resources such as farm land [14].

Figure-1. Conceptual Framework



2.1.2. Social-Economic Characteristics

Different authors have identified a number of factors influencing productivity in poultry production and point out that inefficiency in production can result from socio-economic, demographic or environmental factors. In view of this, Ali [15] notes that farm specific efficiency can be influenced by farmer's characteristics (socioeconomic factors) which impact on the managerial skills of the farmer. The socio-economic characteristics include: the age of the farmer, his/her level of education, number of years of farming experience, gender, engagement in other income generating activities other than farming activities and access to credit [16]. The study identified age and level of education influencing efficiency and also identified that the younger farmers were more efficient than their older counterparts [17]. Farming experience enhanced farmer's knowledge and information and high skills in farming techniques and management. Farming experience enabled a farmer to adapt climatic changes, new agricultural practices and ability to spread risk. Thus, younger age group farmers with more years of experience and education is found to be more dynamic and therefore are more willing to adopt new technology practice. Furthermore, a farmer's access to credit also increases his efficiency's ability because farmers who have access to credit can be able to increase their level of production and benefits from cost advantage that are associated with economies of large scale production.

2.1.3. Technology Adaptation

Technology adaptation remains one of the greatest problems faced by poultry farmers where many farmers have inadequate technological knowledge on how to improve the productivity of their poultry production. Education level influences farmer's access to information as well as their ability to understand technical aspects of innovation which largely affected production decision. Farmers change of technology use are usually influenced by need based and location specific technical training programs. Factors that triggered adoption of new technologies comprise of young and educated farmers, higher income level, risk orientation and decision making ability of farmers. Factors limited adoption of technology included conservative old farmers, illiterate, weak belief on ensure high yield of new technology etc. The previous study revealed that young and educated farmers tend to be more flexible in their

decisions to adopt new ideas and technologies more rapidly. Thus, technology adaptation includes training of new technology and skill on poultry management [18].

2.1.4. Availability to Market

The availability of markets, distance to market and adequate market information encourage farmers to produce goods that are demanded and hence boost their confidence that there exists a ready market. Poultry farmers also prefer to invest in poultry farming where there is availability of markets and adequate information. Several studies stated that distance to the market negatively influences both the decision to participate in markets and the proportion of output sold. Thus, the variable transport costs per unit of distance increases with the potential marketable load size [19]. For farmers in very remote rural areas, geographic isolation through distance creates a wedge between farm gate and market prices. The buying price of the major poultry input products are determined by the availability of the markets. The poultry industry also suffers from poor organization and marketing due to little effort on the side of government focus on the provision of information in order to facilitate the smooth flow of the poultry products from farmers to the consumers. Due to unavailability of adequate market, poultry farmers are experiencing the issue of low prices of poultry product which has affected poultry farming due to lack of market [20].

2.2. The Model

A production function expresses the relationship between an organization’s inputs and its outputs. It indicates, in either mathematical or graphical form, what outputs can be obtained from various amounts and combinations of factor inputs. In particular it shows the maximum possible amount of output that can be produced per unit of time with all combinations of factor inputs, given the current factor endowments and the state of available technology. Unique production functions can be constructed for every production technology [21]. Alternatively, a production function can be defined as the specification of the minimum input requirements needed to produce designated quantities of output, given available technology. This is just a reformulation of the definition above. The relationship is non-monetary, that is, it only relates physical inputs to physical outputs such that prices and costs are not considered [22]. The production function as an equation in its most general mathematical form can be expressed as:

$$Q = f(X_1, X_2, X_3, \dots, X_n) \dots\dots\dots(1)$$

Where, Q= quantity of output, Xi= factor inputs (such as land size under poultry farming, labor, vaccines used, energy utilized, capital, capital, any raw materials used, technology applied and management practices)

There are several ways of specifying a technology production function. One is as Cobb-Douglas production function:

$$Q = aX_1^b X_2^c \dots\dots\dots X_n^c \dots\dots\dots(2)$$

Where a, b and c are parameters that are determined empirically.

A production function is through a transcendental production function form [23]: in this way a production form can be expressed as:

$$Q = aX_1^b X_2^c e^{dX_1 + fX_2 + \dots\dots\dots + fX_n} \dots\dots\dots(3)$$

Where, e is the natural logarithmic base, b and c are partial coefficients of X1 and X2, respectively; d and f are trans-parameters measuring the variability of b and c in response to changes in production scale and input substitution (complementarily). If d and f are zero, then the equation becomes a Cobb-Douglas production function. For non-zero trans-parameters the Cobb-Douglas special case is rejected because, in this case, the equation is non-linear and characterized by variable marginal products short-run input elasticity and the marginal rate of technical substitution and so equation (2.3) can still be estimated by a conventional regression method because its natural logarithmic version is linear in the parameters as indicated below [21].

$$\ln Q = \ln a + b \ln X_1 + c \ln X_2 + dX_1 + fX_2 + \dots\dots\dots + fX_n \dots\dots\dots(4)$$

The most defense transcendental production function from Cobb-Douglas is Transcendental which shows up three stages of production. In this way marginal product (MP) and production elasticity equations are presented as follows:

$$Mp = [b/X_1 + d] Q_i$$

$$Ep = b + dX$$

2.3. Empirical Framework

A multiple regression was used to ascertain variables influencing poultry production among poultry farmers in Sindupalchowk district. In empirical studies, most researchers use multiple regression analysis because it is uncommon to have only one independent variable (predictor) to predict a social phenomenon. According to Jeon [24], the relationship between a dependent variable and a set of independent variables allows them to model statistically. Marill [25], points out that when the outcome of interest is associated with more than one predictor variable, linear regression may be inappropriate; multiple regression models allow the investigator to account for all of these potentially important factors in one model.

$$Y = \beta_0 + \beta_1 x_{i1} + \dots + \beta_n x_{in} \dots\dots\dots(5)$$

Where,

Y = dependent variable, β_0 = regression constant, $\beta_1 - \beta_n$ = coefficient of x, which is the contribution of each independent variable and $x_1 - x_n$ = independent variables.

Now, for our study quantitative analysis takes the form of multiple regression analysis to test the relationship between the dependent variable (the output in terms of volume of sales in kilograms produced) and the independent

variables, inputs used (Quantity of feeds, labor hours expended, quantity of vaccines administered, quantity of energy. The relationship between output of the poultry farm and socio-economic characteristics was established by running regression analyses given as:

$$U = \delta_0 + \delta_1 Z_1 + \delta_2 Z_2 + \delta_3 Z_3 + \delta_4 Z_4 + \delta_5 Z_5 + \delta_6 Z_6 + \delta_7 Z_7 \dots\dots\dots(6)$$

Where: Z_1 = represents the age of the poultry farmer, Z_2 = represents the level of education, Z_3 = represents the number of years of poultry farming experience, Z_4 = engagement of the poultry farmer in other income generating activities other than poultry farming, Z_5 = access to credit, Z_6 = adaptation to technology, Z_7 = distribution channel. The δ is were the scalar parameters to be estimated.

Thus, above socioeconomic activities were included in the model to determine their possible influence on the poultry production efficiencies of the poultry farmers. The variables used for the study have been identified and defined. However, the variables given below may not be the only variable used in the study and necessary variables are taken as per the essential of the study. The detail description of variables is given in table 1. In order to obtain an answer to all the research question presented in the previous section of this research work, the following hypotheses were framed:

- H_1 : There is significant association between cost of farm input and poultry production.
- H_2 : There is significant association between socio-economic factors and poultry production.
- H_3 : There is significant association between technology adaptation and poultry production.
- H_4 : There is significant association between availability of market and poultry production.

The definition, measurement and priori signs of the variables are illustrated in Table below:

Table-1. Definition of Independent Variables

Variables	Description Value	Value	Expected Sign
Farm Input			
Land area	Land area under poultry farming	In Square feet	+
Feed used	Quantity of poultry feeds in kilograms used	In kilograms	+
Vaccines administered	Vaccines administered in poultry farming	1=if yes, 0= otherwise	+
Labor used	Quantity of labor used	1= if yes, 0= otherwise	+
Energy used	Energy used in poultry farming	1= if yes, 0= otherwise	+
Socio-Economic Factors			
Age	Age of the farmer	In years	+
Gender	Gender of the farmer	1=if yes, 0=otherwise	±
Level of education	Level of education	1= Above SEE, 0=otherwise	+
Experience	Number of years of poultry farming experience	In years	+
Engagement in other Activities	Income generating activities other than poultry farming	1= if yes, 0=otherwise	±
Access to Credit	Accessed financial credit for poultry farming	1= if yes, 0= otherwise	+
Technology Adaptation			
Use of New Technology	Use of new technology	1=Yes, 0 =No	±
Updated Information on New Technology	Updated with information on new technology	1=if yes , 0=otherwise	±
Availability to Market			
Distribution Channel	Distribution channel to poultry farmers	1= if yes, 0=otherwise	+
Distance to Market	Distance between poultry farmers and market	1= 1-10 km, 0= more than 10 km	±
Market Information Sources	Information source related to poultry farming and management	1=if yes, 0= otherwise	+

2.4. Study Area and Population

The study area chosen for the study is Sindupalchowk district that lies in province no. 3 of Nepal. The geographic coordinates of Sindupalchowk are: latitudes 27°45'59.99 N and longitudes 85°41'59.99" E and is located at a mean elevation of about 7080 meters (23,230 ft.) above sea level. Sindupalchowk is hilly district [26]. This district covers an area of 2542 km² (981 sq. mi) and has a population of 2, 87,818. The district is bordered by Kathmandu and Rasuwa district on the West, China on the North, Kavrepalanchowk on the South and Dolakha on the East. Majority of the population include Tamang, Newar, Sherpa, Yolmo, Danuwar and Thami caste groups who speak Nepali language and Tamang language [27]. The district headquarter is in Chautara. The district consists of 12 municipalities, out of which three are urban municipalities and nine are rural municipalities [28].

2.5. Sampling Technique and Sample Size

For the sampling method, convenient sampling is used as it is one of the appropriate techniques for analysis and data presentation [29]. This sampling method involves participants from wherever you can find respondents and typically wherever is convenient and it is simple and ease to research [30]. Data is collected from local people to understand specific issues or manage opinions as it is more helpful in sample selection for the subject area of our study. The following explains how the Finite Population Correction Factor (FPC) is used to adjust a variance estimate when sampling without replacement [31]. The following formula for the sample size n :

$$n = N * X / (X + N - 1)$$

Where, $X = Z_{\alpha/2}^2 * p * (1-p) / MOE^2$ and $Z_{\alpha/2}$ is the critical value of the Normal distribution at $\alpha/2$ (e.g. for a confidence level of 95%, α is 0.05 and the critical value is 1.96), MOE is the margin of error, p is the sample proportion, and N is the population size. A Finite Population Correction has been applied to the sample size formula. Based on the formula the sample size would be 182 households for 95 percent confidence interval and 5 percent margin of error with the known population. Perry [32], explained that in qualitative research optimal sample size should be at least 350 for a structured interview. Many other studies including Mudombi [33] explained that 5 percent of the population has been regarded as a sufficiently sample size for survey research. From the entire survey we could able to capture of total 156 poultry farmers residing in Sindupalchowk district.

2.6. Research Instrument, Data Collection, and Analysis

Structure questionnaire with interview was the main research instrument used in this study. A structure questionnaire has been developed and devised to conduct survey on factors influencing poultry production for data collection. Interview was conducted among the poultry farmers of Sindupalchowk district and Quantitative data was extracted through interview. Primary data from questionnaire survey have been collected. The researchers have linked questionnaire in order to meet the various objectives mentioned above in the study. The formulated structured questionnaires are maintained in kobo toolbox for data collection. Two types of data analysis, namely descriptive and inferential statistics, were used for analyzing the data. Information collected from the field survey and secondary sources were coded and tabulated on Statistical Package for Social Science (STATA) and Microsoft Excel. For data analysis, software such as STATA and MS- Excel was used, and for data entry and tabulation, Microsoft Excel was used respectively.

3. Results and Discussion

This section includes the detail description of socio-demographic facts which includes explanation of demographic characteristics of the respondents, followed by factors including poultry production on farm input and technology adaptation. It is then deals with availability of markets, challenges related to poultry production, and suggestions to overcome the hurdles. At last part of analysis, we perform regression result – that includes various market and estimations.

3.1. Socio-Demographic Characteristics of the Respondent

Socio-demographic characteristics not only plays a vital role in research as it narrates the attributes and character of the respondents [34], it also provides a clear picture of the possible respond mindset [35]. Thus, this study observed with the discussion of different socio-demographic characteristics of respondents like age, sex, education level, work experience, marital status, and income generating activities of poultry farmers in Sindhupalchok district. Result indicates that the selected sample was broadly representative of the population – the poultry farmers in the study area.

Table-2.

	Number	Percentage
Age		
Below 30	24	15.38
31-40	92	58.97
41-50	26	16.67
Above 50	14	8.98
Sex		
Male	123	78.84
Female	33	21.16
Education Level		
Illiterate	39	25
Up to Grade 10	60	38.46
Intermediate	36	23.07
Bachelor's	15	9.61
Master's	1	0.65
Members in Household		
One	1795	10.89
Two	35	60.89
Three	9	22.43
Four or Five		5.76
Years of Involvement in Poultry Farming		
Below 3 years	47	30.12
3 to 5 years	74	47.43
6 to 9 years	22	14.10
10 years and above	13	8.33
Secondary Income Source		
Yes	124	79.48
No	32	20.52
Access to Credit		
Yes	139	89
Traders/ contractors	73	46.79
Saving	26	16.67
Cooperatives	25	16.03
Bank loan	13	8.33
Relatives	2	1.28

It is observed that there are more male numbers of poultry farmers on the basis of gender. The study reveals that maximum number of respondents were from the age group 36-41. Regarding the educational background, there is the increment level of education in poultry farmers which helps on influencing adopting new technology in poultry production. Ngeno [36], also stated that a poultry farmer's level of education and experience has a significant and positive impact on their efficiency. In comparison to their less educated counterparts, farmers with more years of experience and education were found to be more dynamic and thus more willing to adopt new technology practices, resulting in lower inefficiencies. The study reveals that 48% poultry farmers have working experience or engaged in poultry farming for 3 to 5 years. According to Nhemachema and Hassan [37], farming experience improved a farmer's knowledge and information as well as high skills in farming techniques and management, which improved the farmer's technical efficiency. A farmer's farming experience also allows him or her to adapt to climatic change, new agricultural practices, and the spread of risk. More number of poultry farmers have other income generating activities than poultry farming. The study shows that 79% farmers have income generating activities other than poultry farming, that clearly indicates that 21% poultry farmers are totally dependent upon poultry production to run their households. As talking about access to credit, mostly poultry farmers seem to be consulted with poultry traders or contractors for credit access. Poultry farmers revealed that it is easy and no complex process to access credit from them. The study shows that 89% respondents access credit from institution. 46.79% respondents access credit from poultry traders or contractors which is seen as easy access for credit to poultry farmers. However, very few poultry farmers (1.28%) ask financial help or loan from relatives. According to Oji and Chukwuma [38], who conducted a study on the technical efficiency of small-scale poultry egg production in Imo State, Nigeria, discovered that a farmer's ability to be efficient is also enhanced by access to credit. Farmers who had access to credit were found to be more efficient than those who did not have access to credit. This could be because those who used credit were able to increase their output and take advantage of the cost savings that come with large-scale production.

3.2. Farm Inputs

As Ogolla [8] states that the cost of input determines the size of poultry business. When cost are high, farmers will either reduce the size of their operation, or shut it down entirely, resulting in lower output [39]. To analyze the

farm output, the land area, feed used, vaccines administered, labor used, and energy used area considered. Similar variables are used in this study to determine farm inputs.

Table-3.

Variables	Number	Percentage
<i>Land area under poultry farming</i>		
Less than 100 sq. feet	19	12.17
100-500 sq. feet	103	66
500-1000 sq. feet	28	17.95
Above 1000 sq. feet	6	3.85
<i>Quantity of feeds used</i>		
Below 50 kg	31	19.87
50-100 kg	61	39.10
100-150 kg	46	29.48
Above 150 kg	18	11.53
<i>Vaccine Administered Status</i>		
Yes	141	90
No	15	10
<i>Labor used in Farm</i>		
Hires	13	8.33
Do not hire	143	91.67

Land Area under Poultry Farming intends to study and analyze the factors influencing poultry productions among poultry farmers made by respondents on the basis of land area under poultry farming. This study showcased that majority of the farmers (66%) had farmland in between 100-500 sq. feet whereas, only 3.85 % farmers owns land above 1000 sq. feet. Similarly, it was found that 39.10% farmers used feeds from 50-100 kg in their farms. Only 11.53% used feeds above 150 kg and 19.87% used feeds below 50 kg. On the similar note, almost all of the farmers i.e. 90% had used vaccines in their poultry. It was found that only 91.67% does not hire any labor for their farm that means they work themselves or take help of their family members.

3.3. Technology Adaptation

Technology adaptation is the extreme confrontation for the adopters because it is proportionally depends on the psychological, demographic and income of the adopters. Farmers' perceptions of whether the actual use of technology is up to them because of the availability of resources and previous experience. Portsmouth [40] mentioned that adoption of technology has become one of the biggest problems for poultry traders and farmers too. In this study, we discuss different technology adoption related study of respondents that includes acceptance or use of modern technology, update information, and new technology related poultry farming.

The use or acceptance of new technology research has been study with 156 respondents, that shows only 19 (12%) respondents are using new technology service in their poultry farming where a mass number of 137 (88%) respondents haven't used any new technology in their poultry farming. The new or modern technologies in poultry farming are categorized into different sectors of techniques viz. modern automatic chicken/hen feeder, modern automatic water supply, computer data or financial entry, modern egg holder, modern wastage system and CCTV camera. But accordingly to the study it shows that only 1.28% respondents use modern automatic water supply techniques, 5.77% respondents' used computer data or financial entry techniques and 9.62% respondents used CCTV camera techniques for poultry farming in Sindupalchowk district. This also indicated that majority of farmers are not updated with technology used in poultry farming as similar is depicted in this study that 66.67% are not updated with technology used in poultry farming. But those who get information, majority i.e. 28.21% get it through social media platforms. Devkota, *et al.* [41], found that farmers' access to information and ability to understand technical aspects of innovations is influenced by their educational level, which has a significant impact on production decisions. As majority of our farmers were educated up to grade 10 that might be the reason behind slow adoption of technology in the farm. Jackman, *et al.* [42], mentioned that conservative old farmers, illiterate, weak belief on ensure high yield of new technology etc. limits to technology adaptation. But, in our context, it is observed farmers are already adopting such technology.

3.4. Availability to Market

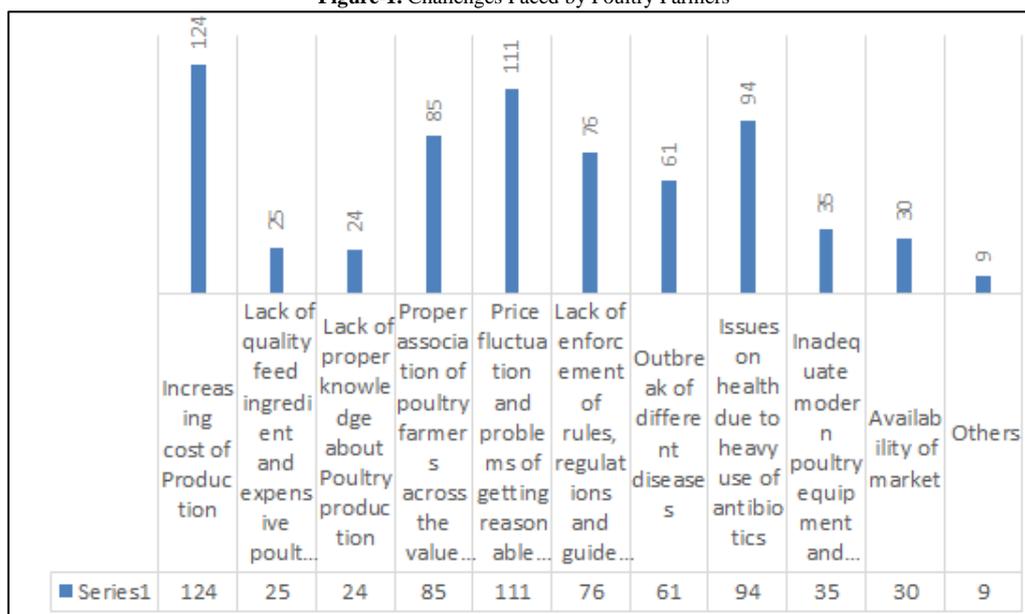
Availability of market and market information encourage farmers to produce goods that are in demand, thereby increasing their confidence that a ready market exists. Poultry farmers, likely any other business, prefer to invest in poultry farming where there is sufficient information exists [19]. To understand the status of farmers at Sindhupalchok district, this study absorbed with the discussion of different availability to market related study represented like access to market, distance to market, and market information sources. The availability of markets, distance to market and adequate market information encourages farmers to produce goods that are demanded and hence boost their confidence that there exists a ready market. Poultry farmers also prefer to invest in poultry farming where there is availability of markets and adequate information exist. Several studies stated that distance to the market negatively influences both the decision to participate in markets and the proportion of output sold [43]. Thus, the variable transport costs per unit of distance increases with the potential marketable load size. For farmers in very

remote rural areas, geographic isolation through distance creates a wedge between farm gate and market prices. The buying price of the major poultry input products are determined by the availability of the markets. The poultry industry also suffers from poor organization and marketing due to little effort on the side of government focus on the provision of information in order to facilitate the smooth flow of the poultry products from farmers to the consumers. Due to unavailability of adequate market, poultry farmers are experiencing the issue of low prices of poultry product which has affected poultry farming due to lack of market [44]. As talking about access to market all the farmers have availability to purchase inputs from different places like Khadichaur, Barahabise, Sukute, Kothe, Balefhi and Banepa. It is also seen that few farmers intend to buy inputs from long distance although local markets are nearer to them due to various reasons like price comparison, traders marketing, lack of quality chicken and feeds and others. Talking about market information sources the distribution channel of poultry farmers is already in place i.e. 63% responds the distribution channel is effective whereas 2% responded it's not effective at all. Distance to market helps us to know about distance between farmer's farm and market which is directly proportionate to poultry production. The study shows that 59% respondents have distance to market less than 10 km. which is helpful for farmers where only 1% distance to market is above 30 km. Therefore, Local market must be raised efficiently and properly in order to increase poultry production.

3.5. Challenges in Poultry Production

Challenges in poultry productions defines the several difficulties and struggles faced during the period of production [45]. From this study it was found that most of the farmers are facing the problem of increased cost of production which might have been resulted due to inflation. Cost of maize determines the cost of poultry feed whereas plastics costs determines the price of poultry equipment's. Another great challenges for poultry farmers in production is price fluctuation. Proper association of poultry farmers across the value chain supply, issues on health due to heavy use of antibiotics, lack of enforcement of rules, regulations and guidelines and outbreak of different diseases are the major challenges faced during poultry production where lack of quality feed ingredients and expensive poultry feeds, lack of proper knowledge about poultry production, inadequate modern poultry equipment and adoption and availability of market are some other challenges faced during the poultry production. The study stated that occurrence of challenges arises sometimes with great loss.

Figure-1. Challenges Faced by Poultry Farmers



3.6. Management Strategies for Promoting Poultry Production

We can adopt different management strategies which can upgrade poultry production in upcoming days. Different strategical points were created to view the point from poultry farmers where most of the respondents have stated preplacement preparation, easy access to financial credit and infrastructure and logistic support [42]. Other management strategical views are clean poultry production system, modern communication facilities, technical training and assistance, mortality check and managing diseases and feed management. Similarly, local market empowerment, facility of cold storage to prevent chicken for future meat consumption could be some of the strategies. According to study for implementing management strategies different institutions are responsible for solutions i.e. poultry traders, government, poultry farmers and stakeholders [46]. This study depicted that poultry traders are mostly responsible for the further solutions because poultry traders are the first concern with whom poultry farmers deal with. Secondly, it shows that stakeholders are responsible for solutions. Government also plays a vital role in solving the problems of farmers by implementing different enforcement and rules regarding poultry production. And finally poultry farmers themselves are also responsible for the solutions.

3.7. Inferential Analysis

This section deals with inferential analysis where we analyzed summary statistics, correlation among the variables, regression and the post estimation test and Collin test was also performed in order to encounter problem of multi-collinearity. Inferential statistics use a random sample of data taken from a population for describing and making inferences about the population and valuable when the examination of entire population is not valuable or convenient [47]. Both pre-estimation test (specification error, goodness of fit and other diagnostic test) and post-estimation test (multicollinearity and Heteroscedasticity) were performed. Under *pre-estimation* specification error is done to find out whether the variable or assumptions of statistical model is correct or not. Similarly, goodness of fit is a statistical hypothesis test to see how well sample data *fit* a distribution from a population with a normal distribution. Our test revealed that all the variables are suitable for further analysis. Similarly, under post-estimation test we perform multicollinearity and heteroscedasticity and found mean VIF is 2.37 (while is less than 10) indicates that there is no multicollinearity in our data set. But our results indicate the problem of heteroscedasticity. Hence, we performed robust standard error test to correct the mentioned problem. Below highlighted table 4 explains the final regression result drawn.

Table-4.

Linear regression						
					Number of obs =	156
					F(12, 143) =	927.08
					Prob > F =	0.0000
					R-squared =	0.7462
					Root MSE =	.57144

poultry_production~N	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	

farm_area	.0011169	.0003667	3.05	0.003	.0003921	.0018417
feeds_used_ln	.461714	.1240018	3.72	0.000	.2166005	.7068274
vaccine	.2505414	.2732715	0.92	0.361	-.2896323	.790715
labor_use	-.0108008	.1068992	-0.10	0.920	-.2221075	.200506
energy_use	.6190299	.3252433	1.90	0.059	-.0238759	1.261936
age	-.0041893	.0053894	-0.78	0.438	-.0148426	.006464
education	.0305945	.1100757	0.28	0.781	-.1869912	.2481802
experience	.0083059	.0118785	0.70	0.486	-.0151742	.031786
income	.0004885	.1077755	0.00	0.996	-.2125505	.2135274
access_credit	-.203737	.1606112	-1.27	0.207	-.521216	.113742
technology_influence	.0293226	.1332382	0.22	0.826	-.2340482	.2926934
distribution_channel	1.40477	.31218	4.50	0.000	.7876866	2.021854
_cons	1.362714	.3176558	4.29	0.000	.7348067	1.990622

From the F-statistics value, the model is fit as (prob>f=0.0000). Similarly, $R^2 = 0.7462$ that indicate 74% of the poultry production is explained by this model. The regression results shows that 4 variables named farm area, feeds used, energy used and distribution channel are statistically significant. That means increase in farm area by 1 square feet leads to increase in poultry production by 0.001 kg. Similarly, if feeds used increase by 1 kg. leads to increase in poultry production by 0.461 kg. If energy used increased by 1 unit production of chicken increases by 0.61 kg respectively. In our analysis distribution channel shows positive relationship with chicken production. We observed one unit of distribution channel (coverage 1 more kilometer) enhances production by 1.40 kg.

4. Discussion

Farm inputs dissection with different categories like land area, quantity of feed used, quantity of vaccine administered, labor used, and energy used [8]. However, while every producer may try to maximize profits, not all of them will be successful. Because of differences in inefficiencies, some farmers produce more output with the same inputs and technology while others produce less. Land area is supposed to have impact on poultry farming. This is because land fragmentation makes poultry farmers in the study area inefficient by reducing the benefits of c Adaptation of the technology have become one of the biggest problems for poultry traders and poultry farmers too [48]. However, it was stated by many poultry farmers that use of new technology in poultry farming may lead to progress in poultry production but due to various circumstances and knowledge regarding problems they are unable to accept it [42]. Thus, farmers are encouraged to produce goods that are in demanded in the market

Several challenges confronting farmers result in a decrease in chicken productivity in a household, which has an impact on the farmer's food security [49]. Poultry production is the subject of challenges to different poultry farmers. There arose multiple challenges during the time of production. Increasing cost of production is the most vulnerable challenges faced by most of the poultry farmers regarding poultry production. Cost of production includes the different commodities required during the time of production for e.g., poultry feed cost, chicks cost, transportation

charge, miscellaneous charges and others. Increasing cost of production leads business to the less profit and high risk. Price fluctuation and problems of getting reasonable price is another rising challenges for the poultry farmers [50]. Accordingly, broiler farmers revealed that rate of broiler chicken is deflating time to time and rate of chicken and poultry feed is rising. Issues on health due to heavy use of antibiotics is another challenge seen during poultry production, excessive use of antibiotics to poultry leads to affected in consumers' health and poultry too. Proper association of poultry farmers across the value or supply chain, outbreak of different diseases, lack enforcement of rules, regulations and guidelines.

However, there are important areas that need further research. The research is limited to one district only and also don't cover all the places of Sindupalchowk due to different external reasons, and it is based on one-year data. As a result, the study is spatially and temporally confined in order to make it more representative in terms of region and time horizon. Despite these limitations, the research findings provide a solid foundation for appropriate actions in the subject region. It was discovered that a variety of factors influence poultry production in Sindupalchowk, district. As a result, it is suggested that more research be done on other factors such as feed quality and chicks. A similar study could be conducted in other areas of Sindupalchowk district like Melamchi, Bhotekoshi municipality which was left due to the pandemic and other neighboring districts like Kavrepalanchowk, Dolakha. Research into the possibility of establishing a feed processing plant in the region will go a long way toward alleviating the high cost of feeds that farmers are currently bearing.

5. Conclusions and Recommendations

Present study discussed about factors influencing poultry production among poultry farmers in Sindupalchowk district. The study in a nutshell portrayed that individual small-scale poultry farmer were unable to benefit from economies of scale that would allow them to reduce their production costs due to the small size and fragmented nature of their plots. Socioeconomic factors such as the farmer's age, level of education, experience in poultry farming, and access to credit, as well as new and innovative technologies and the market, influenced the study area's poultry farming positively. However, it was shown that engaging in other income-generating activities besides poultry farming had an adverse influence on poultry farming. As per the result generated from the study 96% farmers have faced challenges during the poultry production whereas only 4% farmers stated that they have not faced any challenges during the poultry production. Therefore, we can minimize or improve the challenges or problems faced during poultry production through the different suggestions mentioned below:

1. **Design proper HRD planning for poultry farmers:** The management or design of human resources (HR) is an important aspect of farm performance. Use this tool to learn about the components of a strong HR plan, read case studies, and complete exercises to assist you in developing and implementing one for your farm. The most reliable way to achieve a business goal is to plan ahead. They have short and long-term business plans that are both clear and flexible, and they keep track of them on a regular basis. 69.23% participants unfolded that designing proper HRD planning can improve the upcoming challenges.

2. **Easy access to loan facility from institution source:** Finance is the main source of business. Agricultural credit is critical to the growth of the agricultural sector. It can be used to meet a variety of needs and is crucial to agricultural success. Loan facility can be obtained through different mediums like agriculture cooperatives, agricultural bank, traders contract and many more. Farmers should be able to obtain loans without having to go through the lengthy process that banks require. It should be simple to obtain a loan. Farmers must provide loan at less interest and different subsidy activities provided by governmental or non-governmental institution may lead increment in poultry production. 56.41% responds recommended that easy access to loan facility from institution source.

3. **Professional training facility to poultry farmers:** Training is crucial for establishing capacity and strengthening a business's economic position by fostering a scientific mindset, increasing knowledge status, and raising awareness of the sector's current state across the country and around the world [39]. Professional training facility must be given to poultry farmers is suggested by 29.49% respondents.

4. **Adoption of modern technology:** For the sake of developing skilled human resources for the poultry industry, a low-cost intensive or semi-intensive poultry technology should be implemented. Farmers should be able to provide the necessary inputs solely from their own resources in these types of projects. 31.41% respondents suggested that adopting of new technology will improve in poultry production.

5. **Develop security situation:** 71.79% participants suggested developing security situation should be developed in poultry production so that risk can be minimized. For the security situation best suitable source is insurance which is lack in their environment. Poultry traders can also develop different schemes to develop security situation.

6. **Arrange workshop, seminars and live demonstration for relevant poultry farmers:** The relevant authority should have organized a workshop, seminar, or live demonstration to provide farmers with the most up-to-date information on poultry and marketing. 49.36% respondents recommended for arranging workshop, seminars and live demonstration through different platforms for relevant poultry farmers.

7. **Active involvement of Government (Favorable rules and regulations):** Government can play the vital role in implanting favorable rules and regulations for the benefits of poultry production. Controlling inflation and subsidizing in allocated resources in poultry production government has measure role. 62.18% respondents suggested active involvement of government can improve in poultry production.

8. **Proper logistic management and price guarantee:** Logistic management and price guarantee are the most critical and visible components of the farmed animal production system. 84.62% respondents suggested managing logistic system and guarantee in price can improve and maximize the profit in poultry production.

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