



## Health, Employment and Income Interactions of Poultry Industry

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### Abstract

Livestock sector of Indian economy contributing maximum in national income. The demand for poultry products is increasing fast in urban and rural areas. Poultry industry has provided income, employment and nutrition to the rural and urban people. Such industry has backward and forward linkages with high potential of economic growth. The CAGR for per capita state domestic product, eggs production and poultry population is increasing fast in India. There is large inter and intra state disparities observed as far as poultry population, eggs production and per capita income state domestic product is concerned. However, such disparities have grown significantly after globalization period. Now maximum farmers have started using the poultry manure for different crops. Organic crops have positive and multiple benefits on health of people, animals and dairy farming. At present, poultry industry is facing economic, technical, social, marketing, environmental issues and vaccine for poultry birds. Government must provide access to capital, veterinary services including vaccine and competitive market for poultry product. There is need to protect poultry industry from natural calamities. There is need of training for farmers to start poultry industry and get more information, technology and market for products. Such policies will certainly help the growth of poultry industry in India.

**Keywords:** Globalization; CAGR; Employment; Poultry Industry

### Introduction

After liberalization and globalization, there is growth of various industries in India. Due to delicensing policy, many business firms and industries expanded business potentials in various sectors. There is tremendous growth of business and income after privatization of Indian economy. Due to growth of income, the demand for food preference, clothing, education and skills, commercial estate, media habits have changed among people. The influence of western culture increased over the period on people. The nature of farming also changed as per the demand of various products from urban area. Farmers started producing the products, which have high demand with shorter duration time and maximum returns. Livestock related products have demand subject to global and domestic factors. Poultry farming in India, in spite of several con-

straints, has progressed considerably during the last decade [1]. Now, people prefer poultry products to fulfil the gap of nutrition. Therefore rural/backyard poultry farming with improved chicken varieties is slowly gaining popularity as a potential tool to alleviate protein deficit and provides subsidiary income among the rural and tribal people across the country [2]. Backyard poultry make a significant contribution to the livelihoods of poorer households in terms of nutrition. It is also a liquid asset that can be sold quickly to meet any emergency cash needs of poor families. Backyard poultry rearing requires hardly any infrastructure setup. It has very positive impact to improve the socio-economic factors of the socio-economically backward people [3]. Many rural households therefore depend on poultry for regular income, employment and nutritional security. The poultry farming has an income generat-

ing capacity as well as it is very helpful to cover nutritional need of the resource poor farmers with very less input and minimum care [4]. Poultry is a major source of eggs and meat, which have a high nutritional value particularly in the supply of protein. Eggs are also important in the preparation of confectionary and vaccines. The poultry industry further provides employment opportunities for different types of people, thereby serving as a source of income to the people [5]. The price of chicken depends upon the quantity, cost per chicken, transport cost, electricity. The price of chicken products varies between months of the year and determined by a number of driving factors such as demand and supply of chicken products, market day types (holiday versus ordinary market days) and fasting seasons. Demand and supply of chicken products were highly related with religious festivals [6]. In India, poultry products demand is low from August to October. It is considered as slack period for this industry. However, in other months, there is demand for poultry products. Therefore, most of the farmers and traders are earning profit through poultry industry.

Livestock and poultry farming grown fast due to number of reasons in India. An average traditional farmer remains idle for four to six months per year following the tradition bound farming. Lack of gainful employment leads to loss of income and deep rooted poverty. Nutritional deficiencies problem is common among the poor. Protein deficient diet based on cereals and pulses need to be supplemented by animal-based protein sources for which poultry and poultry products are well known [7]. The variable cost in poultry is concerned then it has cost consist of birds, feeds, labor, transportation, marketing, interest on operating capital and electricity. The fixed cost includes depreciation of housing tools and equipment's, machinery, land use and salary. The returns received from sell of birds, eggs and manure. The livestock raising plays valuable roles in human food and health. It is important for nutrition security, livelihood improvement and gender and poverty alleviation. The family members of poultry farm owner are involved in family poultry production. Poultry farm provides employment to family members and others all the years. Various studies shows that family members spent 2 - 4 hours per day for feeding and nurturing family poultry. Poultry meat and eggs are widely available. It is relatively inexpensive and can be important in helping to meet shortfalls in essential nutrients to poor and malnourished people. The common metabolic diseases are mainly associated with deficiencies of criti-

cal dietary minerals, vitamins and amino acids. Such incidence of disease can be reduced by supplying poultry products.

In urban area, people prefer food with good fat, protein, vitamins and calories. Therefore, most of the families prefer non-vegetarian food at the end of the week, parties and picnic. In order to have healthy and nutritious diet, households prefer hygienic non-vegetarian food. The suppliers of wholesale and retail shops established cold and air conditioner supply chain to provide quality non-vegetarian products at rural and urban areas. Farmers with knowledge started realizing market for chicken, eggs and manure. They established small poultry farms at rural areas. They are supplying the poultry products such as eggs, chickens to the wholesalers and retailers in urban and rural areas. Poultry products provide the greatest potential for bridging the protein availability gap because of the short generation intervals. This also gives poultry the quickest and highest turnover rates when compared to other livestock. Poultry farmers sell the manure to the farm. The poultry industry also plays important role in the development of country's economy. The major objective of this paper is to find the interaction of poultry industry with agricultural crops, transportation industry, employment, human and animal health, productivity, education and growth of income in urban and rural area. Second objective of this paper is to find the bottlenecks in the growth of poultry industry in India. Third objective is to suggest the measures for the growth of poultry industry. The first part of paper explains data sources of poultry products and methodology applied to calculate for growth of industry. Second part of research paper discuss about the growth of poultry industry in various states in India and second last part of paper discuss about the problems faced by the poultry industry. In the last section of paper, we have discussed the policy implication for the growth of the poultry industry in India.

### Data

We have collected secondary data from handbook of statistics, RBI (2020). For poultry population data, we have referred various quinquennial census, as well as livestock census reports of different years. We have referred annual livestock reports of Government of India. We have also refereed state wise reports related to livestock census. We have also done primary survey of few poultry industries in different states. The market for different poultry products is observed within states.

**Economic model for poultry industry**

We have developed economic model for poultry industry. The model is given as follows.

$$IE_s=(A,I,S)----- (1)$$

Sub-sectors in Indian Economy are divided as agriculture, Industry and Services. All sectors are contributing in National Income of India.

$$A=(C_c,A_H,O)----- (2)$$

Agriculture sector mainly consists of different crops, animal husbandry and others. The crops are further divided as food grains and commercial crops.

$$A_h=(p,d,o) ---- (3)$$

Animal husbandry is mainly classified as Poultry, dairy farming and others. They are considered as supplementary activities to agriculture.

$$P_i=(C,E,M)----- (4)$$

The poultry industry is mainly divided as Chicken, eggs and manure. Such products are commercial and sold in the market.

$$\sum_{t=1}^n P_{ce} = \sum_{T=1}^n (S_1.....S_n) ----- (5)$$

The high growth of poultry industry is observed with chicken eggs in different states in India. The growth poultry industry is observed in all state after globalization period.

$$P=f(E,P,H,Y,E)----- (6)$$

The poultry and poultry products are affecting on employment, productivity of people and animals, health, income and education of people.

$$E=(T_{ce},T_m,S_n,H_o,R)----- (7)$$

Employment is generated due to transport of chicken, eggs in rural and urban area. Many shops, hotels, restaurant have high

turnover of business with high employment of people related to poultry industry.

$$P=(c,w)----- (8)$$

Productivity of commercial and food gain crops increases due to poultry manure availability. The workers productivity increases due to availability of eggs and chicken in diet. Such nutritious diet affect positively on educational achievement of children and youths.

$$E=(K,H,Pr)----- (9)$$

Educational achievement among children and youths affects on the knowledge gain, own health and productivity. Educational achievement has large scale indirect effects in society.

$$H=(A,C,A)----- (10)$$

Health effects due to poultry products are observed for adults, children and animals in rural area.

$$Y=(D,C,R,S,Tr)----- (11)$$

Due to poultry farming, per capita income increases of farmers and businessman through dairy farming, crops as food grains and commercial crops, Restaurant and shops and transporters. There are large scale indirect and direct effect in different sectors due to poultry farming. We tried to use this economic model with the help of data of poultry farming.

**Methodology**

An annual compound growth method is found more suitable for poultry products and per capita state domestic product. Such compound growth rate is explained as follows

$$\sum Y_{it} = a \times b^t ----- (12)$$

Here Summation  $Y_{it}$  means the estimated income of  $i^{th}$  state for  $t$  period. We have considered the period from 1996-97 to 2018-19. We have used such formula to estimate growth for poultry population and eggs production for state and country. Similarly,  $a$  and  $b$  in equation (1) is considered as parameters and it is to be estimated. We can re-frame above equation in log form.

$$\text{Log}(Y_{it}) = \text{Log}(a) + \text{Log}(b) + \text{Log}(u_{it}) \text{-----} (13)$$

We can see here that log is taken for estimated per capita income of states over the period. The compound growth rate ( $\Gamma$ ) can be estimated by the identity given in the following equation.

$$(b-1) * (100) = \Gamma \text{-----} (14)$$

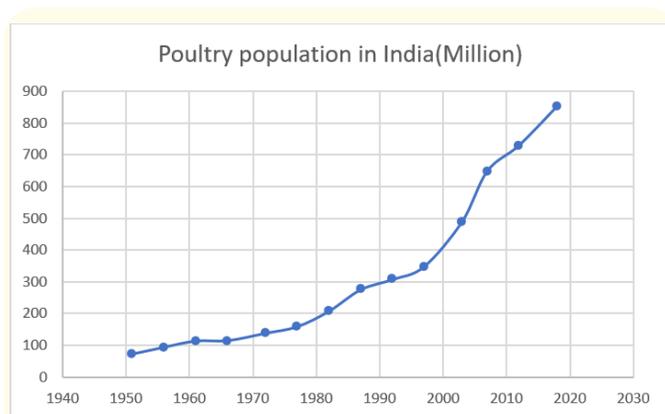
The  $\Gamma$  in above equation explains calculated compound growth for 2004-05 to 2018-19 data series of eggs production and per capita state domestic product, 1996-97 to 2018-19 data. We have further explained in percent and for each state in India. We can further derive the parameter of per capita state domestic product as follows.

$$\hat{B} = \text{Anti log}(b) \text{-----}(15)$$

Above formula provides the percent of growth rate. Such growth is presented for growth of per capita state domestic product and eggs production as per state.

### Poultry industry after independence

After independence, there is continuous growth of poultry population in India.



**Figure 1:** The growth of poultry population in India (Million).  
Source: Various Livestock reports.

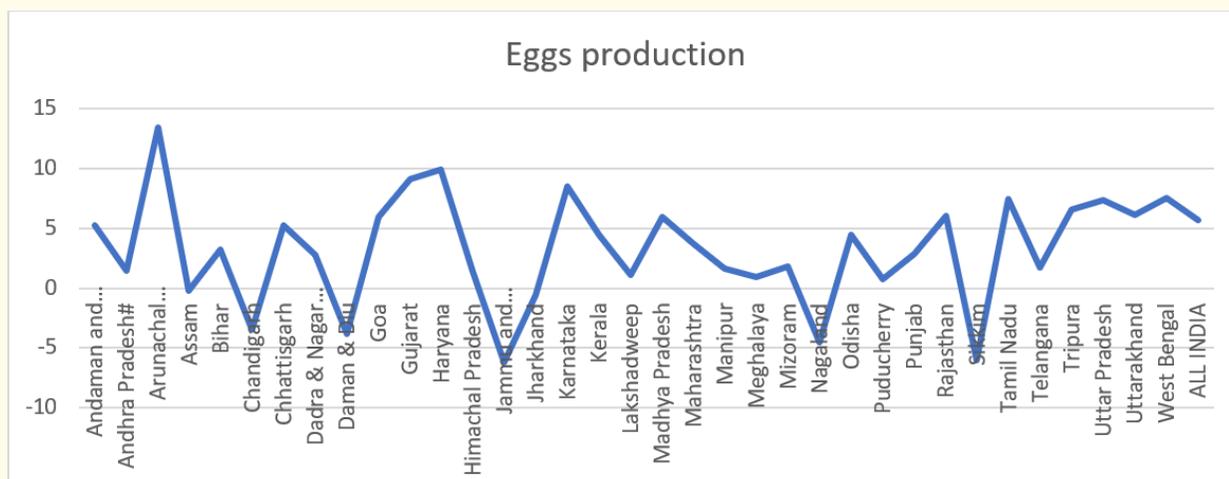
The growth in poultry population is observed because of government flexible policy towards this sector, low growth of agriculture crops, urbanization, rising income in urban area, migration, technology, loan availability and transportation. From above figure, we can see that after 2010, there is very high growth of poultry population in India. However, the growth of poultry population is not uniform across the states.

No.	States	Poultry population (In million) 2012	Poultry population (In million) 2019	% Change
1	Tamil Nadu	117.3	120.8	2.92
2	Andhra Pradesh	80.6	107.9	33.85
3	Telangana	80.8	80	-0.93
4	West Bengal	52.8	77.3	46.34
5	Maharashtra	77.8	74.3	46.34
6	Karnataka	53.4	59.5	11.33
7	Assam	27.2	46.7	71.63
8	Haryana	42.8	46.3	8.11
9	Kerala	24.3	29.8	22.61
10	Odisha	19.9	27.4	37.95

**Table 1:** Poultry Population, 2012 and 2019 of Major States.

Source: Basic animal husbandry and Fisheries statistics 2019.

Above table shows the growth of poultry population from 2012 to 2019 in major states. Andhra Pradesh had 33.85 percent change in poultry population during this period (80.6 to 107.9 million). Assam had 27.2 million poultry population in 2012. In 2019, it was observed as 46.7 million. The growth in poultry population was 71.63 percent from 2012 to 2019. The negative growth rate in poultry population was observed in Telangana state. It was 80.8 million in 2012 but in 2019, it was observed as 80 million. The growth was 0.9 percent less over the period. With the growth of poultry population, the growth of eggs production is also assumed across states.

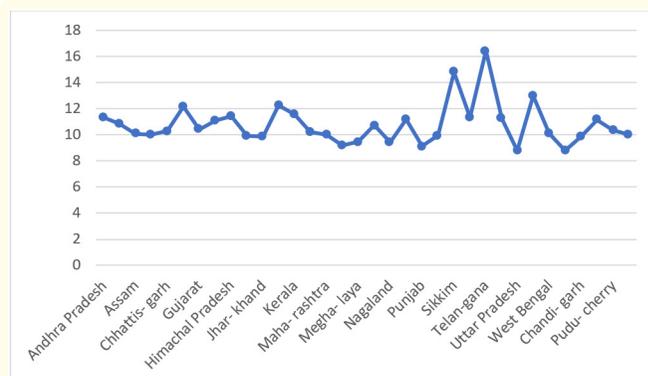


**Graph 1:** The growth of Eggs production in states (CAGR) (2004-05 to 2018-19).

Source: Handbook of Statistics, RBI (2020).

In Arunachal Pradesh, the growth of eggs production was (13.41 percent) very high during in 2004-05 to 2018-19. Gujarat (9.08 percent), Haryana (9.84 percent), and Karnataka (8.47 per cent), Tamil nadu (7.46 per cent), West Bengal (7.54 per cent), Uttar Pradesh (7.32 per cent), follow it. There was negative growth in eggs production in states such as Jammu and Kashmir (-6.16 per cent), Sikkim (-6.06 per cent), Nagaland (-4.55 per cent). All India, the growth of eggs production was observed as 5.66 percent from 2004-05 to 2018-19. It is difficult to conclude that the growth of poultry population leads to growth of eggs production. Farmers grow chicken and sell to wholesalers and retailers. Secondly, there are few farmers, which only sell eggs. Therefore, it is difficult to conclude that as poultry population increases, there is growth of the eggs production in different states. However, as people’s income increases, they buy more of chicken and eggs. We can see that the growth of per capita state domestic product also grown from 1997 until 2018-19.

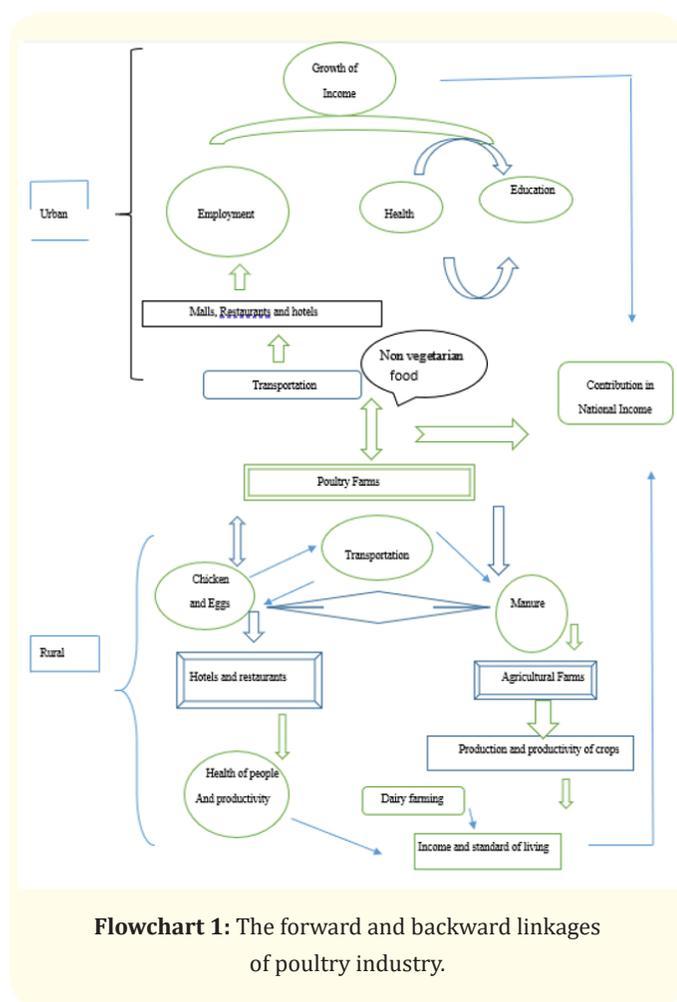
The per capita state domestic product (at current prices) for all India is 10 per cent. We calculated the CAGR from 1996-97 to 2018-19. As far as different states are concerned then the CAGR for Telangana is very (16 percent) high. After Sikkim (15 percent), Uttarakhand (13 per cent) is observed as second in terms of growth



**Figure 2:** The growth of poultry population in India (Million).

Source: Various Livestock reports.

rate. The Goa, Karnataka and Kerala (12 per cent) have high growth rate of per capita state domestic product. The states such as Odisha, Mizoram have 11 per cent growth per capita SDP. The lowest growth is observed for states such as Manipur, Meghalaya, Nagaland, Uttar Pradesh, Andaman and Nicobar islands (9 per cent). Due to high per capita state domestic product, there is high demand for the poultry products in country. The poultry farming is also growing fast in country. Farmers have opened the poultry farms and started poultry farming business as a commercial activity.



Above flowchart, shows that there are forward linkages of poultry farming and they are mainly observed in urban area. There are many trucks and tempos carry chicken and eggs from the poultry farms. There is supply chain of poultry products such as chicken and eggs to various shops, restaurants and malls. Many traders are involved as small business persons related to poultry products. They get employment and earn good income. Due to non-vegetarian food, the health of people improve in the urban area. Poultry products provide good source of protein and other vitamins at lower price. The health improvement leads to more productivity and educational achievement among children. It further contributes to the growth of the regular income of people and economic de-

velopment of the urban area. In Rural area, there are forward and backward linkages to the poultry industry. There are many trucks, tempos are supplying the chicks and their food as well as they are carrying the chicken and eggs. There are many hotels and restaurants are providing non-vegetarian food and eggs related items. Many people are selling poultry related products in each village. Such supply chain of poultry products improves the health of the people in the rural area. The health and nutrition related issues are solved in the rural area. Therefore, Productivity of the people improve because of poultry products. The poultry manure is useful to various crops. The manure quantity and characteristics are mainly influenced by the number and types of species, age, diet and health of the birds, climate and water availability. After excretion, the manure must be stored in a location where rainfall does not affects. The manure should not get mix with materials such as straw, wood shavings. The good quality manure has more demand for commercial crops. Farmer buy manure from different wholesalers and retailers. Such manure to commercial crops increase the profit from agriculture for farmers. Income improvement reduces the poverty among people. The farmers those provide the manure to grass get more benefit from dairy farming. Such grass is very useful to cows and sheep's. Farmers earn high regular income through dairy farming. Now everybody has understood the drawbacks of the chemical farming. Chemical fertilisers are responsible for the decline in number of earthworms, insects, birds, butterfly, honeybees. They are important part of environment. Most of the species depend on each other as a food. Human beings are also depends on nature for food security. But decline in honeybees, butterfly, earthworms and other insects are affecting on food security. Only way out from chemical fertilisers is organic fertilisers and improve crop productivity and production. Farmers want to switch to organic farming. There is more demand for poultry manure in the rural area. Farmers are not getting manure on time due to less stock availability.

**Current problems with poultry industry**

Poultry industry has economic, social and natural, marketing, technical and vaccine related problems. Few issues are discussed as follows.

**Economical problem**

The farmers are very poor, and the capital is not available for poultry farming. Banks do not give capital due to lack of collateral

with farmers. Farmers often find it difficult to take loan from local sources. The high price of feed is main issue with poultry farming. The prices of the different types of feed is continuously increasing. There is processing, transport cost of different types of feed. As the quality of feed increases, the prices also increase. It is difficult for farmers to buy quality feed due to low profit from sale of chicken. It is found that there is lot of seasonality and fluctuation of prices in poultry products. The demand is continuously fluctuate because of various religions and restrictions for non-vegetarian food, climate is different in different states, inter and intra individual preferences for poultry products differ.

### Social and natural issues

Most of the poultry farms are located far from the villages. Farmers cannot keep continuous monitoring at isolated places. The dogs, Tiger, birds often attack on the poultry farms. During wild animals attack and entry in poultry farm causes the great loss to the farmers. Due to poultry chicken, there is always outbreak of various diseases. The poultry fecal is a major cause of infections. The nitrogen, methane and other gases found at various poultry sites. Overall atmosphere with poultry farm is not hygienic. If the farmer is not taking proper care of all such hygienic conditions, then it leads to outbreak of various diseases. Environmental pollution is observed at poultry sites. Many gases are released in the atmosphere. An air get polluted duo to such gases. Secondly, the manure and other waste easily flows with water in rivers, wells and canals. Analysis shows that poultry wastes used as farmyard manure, burnt and buried in a pit, sundried, burnt, and given freely to interested farm workers had inverse significant relationship to constraints while dumping of poultry wastes around the farm [8]. The waste pollutes the surround land, and it has adverse impact on crop production.

### Marketing problems

Prices of poultry products do not grow subsequently. There are substitutes available to chicken as fish and meat. Therefore, people want all poultry products at lower prices. Income of the people does not grow in short period. In long terms, the market may grow with supply of poultry products rather than prices of poultry products. Eggs and chicken prices do not grow and if grows, people

quit their consumption. They required cold storage, but they are not well developed in country. Therefore, such commodities cannot be stored for long period. Poultry products are supplied as per demand and at lower price. Farmers do not have direct access to market for poultry products. They cannot sell chicken and eggs to consumers in urban and rural area. There is separate supply chain exists for poultry products for consumers and exports.

### Technical problem

All the poultry farms lack basic facilities as roof, water supply facility, food storage and parking facilities. Natural calamities often occur at various sites. The cyclones, earthquakes, droughts, excess rain. For poultry farming, government does not provide any educational training. Those farmers wants to start the poultry farming depends upon their own educational and capital investment. There is no training facilities to such farmers and businesses. It adversely effects on the output and quality of the chicken. As the chicks delivered to poultry farm owners, they do not take proper care of the chicks. The food, water, medicines are not delivered on time. The lot of chicken has very poor quality. Therefore, it effects on the price and return of chicken. They end of huge losses.

### Inadequate medicines/vaccine

Most of the chicks fall ill due to high temperature, moisture and hygiene at poultry farms. They required continuous medicines, doses and vaccines. However, at rural area, the doctors are inadequate and proper vaccine is not given on time. Therefore, the chicks do not grow in quality and lacks proper weights, size, and shape. It adversely effects on the profitability from the poultry farming. Access to trained veterinarian services can substantially improve diagnostic capability, treatment, and prescribed poultry antibiotic use [9]. The major problems in family poultry production included diseases, inadequate supply of vaccines and medicine, shortage of feed and lack of appropriate housing facilities [10].

### Policy implications

The poultry industry is growing fast without much support of government in India. Government must provide subsidy to establish poultry sheds. Farmers must get easy loans at lower interest

rate from banks and other financial institutions to establish poultry business in rural areas. Water is very important aspect for the poultry farms. Now poultry farms found near dams and canals. In drought prone area, there are many difficulties to set up and continue poultry farming. Government must support for water storage, electricity and poultry feed. Government must intervene in poultry products market and must help farmers through competitive market. Majority of the poultry farmers do not adopt latest technology for poultry farming. The knowledge and training aspects of latest poultry related technology is important [11]. Majority of poultry business operators have low-level of formal education in disciplines [12]. Therefore, poultry farmers need training in all aspects of production and management namely feeding, breeding, housing, health and entrepreneurship. Farmers should be assisted by the government through subsidies to ensure that they buy poultry feeds at a lower price and this will make overall prices of their products to be low to compete favorably in the market [13]. Scaling up of improved strains is based on adaptive trials conducted by extension agencies for location specificity and feasibility [14]. Many farmers cultivate commercial crops and earn the major source of income. Intervention by government in poultry farming can generate supplementary income to farmers. Vaccination for poultry industry play important role in quality of chicken and eggs. Vaccinations had the largest positive impact on flock performances [15]. The presence of avian influenza in wild water birds and the frequency of direct or indirect contact between reservoir birds and poultry are risk components that enable transmission from wild birds to poultry [16]. Various diseases and infections are prevalent at different points to chicken in rural areas. Government must give direction to each gram panchayat in rural areas to sanitize poultry farm areas. For individual farmer, it is very expensive to control infection and diseases in their areas. Government must have strict policies related various type of pollution. Most of the poultry farms responsible for air, water and soil pollution. There must be particular guidelines for poultry related wastewater flowing into rivers and wells. Every poultry unit must operate under standard operating procedures. Poultry farm owner must purify the wastewater and send into canals, wells and rivers. It will help to keep water and soil resources clean. Government must promote more export from poultry industry. The standard operating procedures will help to export more poultry products and earn more foreign

exchange from this sector. It will also promote employment opportunities at rural and urban areas.

An inefficiency in poultry farming can be reduced by the involvement of younger folks. The right combination of broilers with layers and cockerel will further enhance profit efficiency in poultry production [17]. Despite many constraints, including high mortality from diseases and poor nutrition, significant improvements can be achieved through well-designed development programs that endow the different actors dealing with village poultry with the necessary knowledge, skills and resources. Beyond this need for substantial improvement in human and institutional capacity building, planners and policy makers should be sensitized to recognize the significance and potentials of village poultry production. The entire poultry value chain required special attention in the areas of research extension and developments to propel it to international standards. Special attention should be put on developing the national animal feeds industry using the supply chain approach. Alternative sources of poultry feedstuffs should be identified, evaluated and commercialized. Poultry farmers should be encouraged to form production and marketing farmer groups or cooperatives. Efforts should be taken to ensure safety standards of poultry meat for human consumption. Experts from the government, research institutes, universities, NGOs and other relevant sectors need to work in a collaborative manner in order to allow sustainable production and fight challenges jointly whenever they arise. As government funding is very limited or nil, poultry industries need to come forward either to establish their research facilities or to provide funds to universities and research institutes in order to undertake research works of national and international importance [18,19]. All the policies will certainly help to the growth of poultry industries and the export of poultry products.

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