VEGETABLE PRODUCTION AND MARKETING IN PHEK DISTRICT, NAGALAND

Thesis submitted in partial fulfillment for the Degree of Doctorate of Philosophy in Economics, Nagaland University

Submitted by

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DEDICATED TO ALMIGHTY GOD

&

TO MY BELOVED FAMILY MEMBERS

NAGALAND UNIVERSITY

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CERTIFICATE

This is to Certify that the thesis presented by **Mr. PRAVEEN DUKPA**, bearing Registration **724/2016** on the title, **"Vegetable Production and Marketing in Phek District, Nagaland"** embodies the results of investigation carried out by him under my supervision and guidance.

I certify that this work has not been presented for any degree elsewhere and that the candidate has fulfilled all conditions laid down by the University. I therefore recommend that this thesis may be placed for the award of the Ph.D degree.

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DECLARATION

I, **Mr. PRAVEEN DUKPA,** registration No. **724/2016,** hereby declare that the thesis, "**Vegetable Production and Marketing in Phek District, Nagaland"** is the record of work done by me, that the contents of this thesis did not form basis of the award of any previous degree to me or to the best of my knowledge to anybody else, and that the thesis has not been submitted by me for any research degree in any other university/institute.

This is being submitted to the Nagaland University for the Degree of Doctor of Philosophy in Economics.

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CHAPTER 1

INTRODUCTION

1.1. Vegetables are an indispensable component of the human diet around the globe irrespective of race and religion to live a healthy life. There is no denying of the fact of the nutritional and health benefits of vegetable consumption. Consumption of vegetables provides all the essential nutrients, vitamins, dietary fibers etc. required for a healthy body. Beside the health benefits, production and marketing of vegetables add to food security and income of the people.

India possesses a favourable advantageous climatic condition which results in its production of varieties of vegetables because of which India is the second-largest producer of vegetable in the World at present. As per the National Horticulture Database published by National Horticulture Board, during 2015-16, India produced 169.1 million metric tonnes of vegetables. India produces 14% (146.55 million tons) of the World's vegetables on 15% (8.5 million hectares) of the World area under vegetables. India contributes 14% of the World's vegetable production, with an area of 8.5 million hectares under vegetables, the average productivity of vegetables in India was 17.3 t/ha in 2010-11 (Indian Council of Agricultural Research). In India production of vegetables has increased from 101.2 Million Tonnes to 184.40 Million Tonnes since 2004-05 to 2017-18 (NHB 2018). India produced 185.88 Million MT of vegetables in 2018-19 and is ranked second in the production of vegetables in the world (NHB 2018-19).

The advantage it possesses in the production of vegetables offers India a huge potential for export and revenue generation. During 2018-19, India exported vegetables worth

₹ 5419.48 crores / 777.25 USD Millions (Ministry of Commerce & Industry, Government of India). India is also the second-largest producer of Potato and Cabbage (Sahni, K.R. 2017).

Vegetables occupy an essential component in the Indian Economy. India possesses a suitable agro-climatic condition, which makes it advantageous to produce varieties of vegetables, along with fruits it collectively contributes about 92% of the total horticultural production in India. As per the 2010 FAO, World Agriculture Statistics, India is the World's largest producer of many fresh fruits and vegetables. The history of Indian vegetable progress and development first started with the attempt of the production of temperate vegetable seeds in Quetta (Presently in Pakistan) in 1940, then in Kashmir and Kullu valley of Himachal Pradesh till the second World War which caused the fall in the supplies of seeds from abroad (Nandeshwar, N.S. et all. 2013). In India, vegetables are valuable biological assets, especially genetic resources. They have been vividly described in the Indian scriptures like 'Vedas' and 'Ramayana'. India is rich in biodiversity of vegetables and is the primary/secondary center of origin of many vegetables. Agriculture is the backbone of the Indian Economy, and horticulture is a vital part of it. It has the potential to expand and diversify agriculture and horticulture both in terms of production and consumption.

Over the years the Indian agriculture and horticulture have progressed tremendously in fulfilling the gap between demand and supply. The contribution of agriculture to the Indian economy is immense concerning income, employment, and poverty alleviation. The success and progress of India's agriculture is credited to a series of steps that led to the introduction and development of farm technologies, which increased the productivity

massively in the 70s and 80s, which is often described as the Green Revolution era. The major sources of agricultural growth during this period were the spread of modern crop varieties, intensification of input use and investments leading to an expansion in the irrigated area. In areas where 'Green Revolution' technologies had a major impact, growth has now slowed. New technologies are needed to push out yield frontiers, utilise inputs more efficiently and diversify into more sustainable and higher value cropping patterns (Abrol, I.P.2006).

Agricultural production has to be increased to fulfill the increasing consumption demands due to the growing population; However, Agricultural production depends upon climatic conditions and the proper utilisation of the following: (1) Natural resources (2) Labour (3) Capital (4) Management (Upton, M .1976). As such, the farmers play a very vital role in agricultural production. The production cannot be increased unless the farmers are motivated to produce more by receiving their due share of benefits and profits, at the stage where the workforce in agriculture is rapidly declining. The motivation to the farmers can only come about when they can sell their agricultural produce in a market where they can get their due share and rewards in terms of a better price for their products. Thus, keeping other things constant agricultural marketing becomes an integral part of agricultural production. It is also one of the most critical factors affecting agricultural production. The increase in the production of agricultural output results in a challenge to find a market where the goods can be sold. The markets should be efficient enough to encourage farmers to produce more through incentive and reasonable price, enhancing the share of the farmers, promote competitive competition and fulfill the needs of the consumers. Development and progress in agriculture are regarded as an

improvement of the quality of life at the grassroots level, for which it is known as the People's Sector (Nath, S.T. 2013).

The development and importance of Agricultural Production and Marketing cannot be ignored in both developed and developing countries. Higher yield in production due to adoption of better and suitable mode/method of production alone is not enough unless it is backed by a developed and organised market where the product can be disposed off, where the farmers get their due share of profit for their work. As such, marketing is critical to better performance in agricultural farming itself; therefore, market reforms and marketing system improvement is an integral part of policy and strategy for agricultural development (Acharya, S.S & Agarwal, N.L. 2014).

Markets are essential for economic growth and sustainable development of a given country. In the absence of well-functioning markets, agricultural production can experience several drawbacks (Belay, 2009). An efficient, integrated, and responsive market mechanism is of critical importance for the optimal area of resources in agriculture and in stimulating farmers to increase their output (Andargachew. 1990). A good marketing system is not limited to stimulation of consumption, but it also increases production by seeking additional output.

Agricultural Marketing, which is very crucial for Agricultural Production, has been defined in various ways. Acharya & Agarwal has defined Agricultural Marketing as all those activities which are involved in the supply of farm inputs to the farmers and movement of agricultural products from farms to the consumers (Acharya, S.S & Agarwal, N.L . 2014). Kohls also defined Marketing as, ‘the performance of all business

activities involved in the flow of goods and services from the point of initial agricultural production until they are in the hands of ultimate consumers' (Kohls, L. 1976).

1.2 The Importance of Vegetable Products in International Trade:

In India, the vegetable processing sector has enormous potential for export due to favourable conditions suitable for the production of fruits and vegetables. Fruit and vegetables have a strong export potential in India if necessary steps are taken to remove the constraints in production and marketing. India, due to its conducive favourable agro-climatic condition, is the second-largest producer of vegetable in the World. Agricultural production continues to play a significant economic role in India as in many developing countries, due to dependency on agriculture. India has been increasing the production of fresh fruits and vegetables since 1991. In 1999-00, India's produced 90831 metric tons of vegetables, in 1991-92 it produced 58532 metric tons of vegetables and in 1995-96, it produced 71594 metric tons of vegetable. In 2004-05, 101246 metric tons of vegetables were produced and in 2009-10 India produced 133738 metric tons of vegetables. Over the years, the production of fruits and vegetables has been increasing from 22.3% in 2011-2013 it has increased to 25.9% in 2015-16 (Horticultural Statistics at a Glance 2018). The initiatives taken by the Horticulture Mission for North East and Himalayan States (HMNEH) and the National Horticulture Mission (NHM) in the 11^{th} Plan has given a significant boost to horticulture. It has increased the productivity of horticulture by about 34% between 2004-05 and 2014-15. They have been focusing on micro-irrigation, post-harvest management, raising productivity through density plantation, marketing, etc.

1.3 Agricultural and Vegetable Scenario in Nagaland

Nagaland is the 16th State of Indian Union, with a geographical area of 16579 Sq.kms, out of which 7225 Sq.kms (43.37%) is the cultivable area of the State. The State has a population of 19,78,502 as per 2011 census of India, and 55.2% of the total population are cultivators. The State of Nagaland is bordered by the State of Assam in the west, Myanmar on the east, Arunachal Pradesh, and parts of Assam on the North and Manipur in the south. Nagaland's Economy is primarily based on agriculture. In Nagaland, agriculture is determined by traditional knowledge, cultural, geographical, and socio-economic factors. Unlike other parts of the country, the land of Nagaland, both cultivable and non-cultivatable land is under the ownership of private individuals, villages, clans, and the community. Agriculture is considered as the primary source of livelihood of Nagaland, and it plays an indispensable role in the socio-economic development of the State. Agriculture contributed around 18.1% to the Gross State Domestic Product (GSDP) in 2011-12; it is one of the significant contributors to the Net State Domestic Product and is the largest employer of the workforce in the State. The agriculture sector employs 68% out of the total workforce of the State. The State is abundant in plant diversity and has an enormous number of horticultural crops. The agro-climatic conditions of the State are very favourable that is exceptionally suited for the cultivation of vegetables and horticultural crops. The demand and consumption of vegetables have been increasing due to the understanding of the importance of the nutritional value of vegetables. Though the area under horticultural crops is less than one-fifth of the total cropped area of the State, its share to the total agricultural growth is significantly high (NLSIC, Horticulture. 2016). However significant chunk of the

vegetable requirement of the State is met through imports. As such, there is a great need to identify the problems and prospects and recommend policies and measures to increase the production of vegetable for attaining self-sufficiency as well as a surplus for transforming the State from a consumer State to an export-oriented State which will not only generate higher employment opportunity but also provide nutritional security.

Nagaland even though being an agricultural state, the progress, development, and modernisation of agriculture in Nagaland in comparison to other states of India, has been relatively very slow. The Green Revolution, which significantly impacted the Indian agriculture, had no impact on agriculture in Nagaland. Nagaland being an Agricultural State, but the production and productivity of agriculture are far below the expectations to fulfill the State demand and be self-sufficient. Agricultural development in Nagaland has been greatly hampered due to major factors such as fragmented agricultural fields, absence of modernised machinery and technology, inadequate irrigation facilities and a high percentage of farmers being small and marginal farmers holding a minimal agricultural area. Inspite of all these problems, it has been observed that the agricultural growth rate in the State has been increasing in recent years.

This development has been attributed mostly to the expansion of agricultural research and training facilities, education of the farmers regarding better methods through demonstrations and exhibitions, expansion of area under permanent cultivation, use of inputs like manure and fertilisers, improved seeds, tools and implements, plant protection measures, etc. The State has yet to attain the State of self-sufficiency and bridge the gap that exists between the demand and supply, for which a lot of agricultural goods are being imported even though in recent years, agricultural production is on the rise.

The state government has implemented various extension programs for the development of agriculture, such as crop diversification, organic farming irrigation facilities, marketing facilities, etc.

1.4 Review of Literatures

The reviews are based on the studies carried out by others in terms of vegetable production and marketing. The literature review helps to understand the various studies carried out and their findings, suggestions, and the gap left for further studies.

Abdulai, J et al (2017), studied on; "Performance of Vegetable Production and Marketing in Peri-Urban Kumasi, Ghana" observed that vegetable production and marketing played an important role in providing income and employment for small farmers and traders. Their study investigated the performance of farmers, wholesalers and retailers along the investment channels of three vegetables (spring onions, lettuce and cabbage) in Peri-urban Kumasi. They used two-stage sampling technique comprising of 147 farmers, 30 wholesalers and 40 retailers. Marketing margin analysis and returns on investments were used to assess the performance of the investments. They observed that vegetable production was male dominated. Wholesalers recorded the highest yearly marketing margins for spring onions and cabbage while farmers obtained the highest yearly margins for lettuce. They found that farmers were more efficient in the investments in vegetables than traders. One of the major constrains was the information flow gap, 76% of farmers had no information on market prices of products. They recommended for an efficient policy on market price information system for vegetables to be implemented through farmer associations and weekly radio broadcasts of product prices to all.

Agarwal, B (2010): In his article "Rethinking of Agricultural Production Collectivities", suggested for collective group farming as most farmers were marginal and small farmers. He opined that group collective farming would be much more useful than the traditional individual-oriented approaches. He suggested that the small and marginal farmers have to be organised into groups or cooperatives so that they will have better bargaining power and settle more favourable terms. They could also look for legal aid so that they are not exploited and get insurance as a group rather than as individuals. The group farming could also pool funds together for investment. He further highlighted the importance and advantages of collective joint farming to get loans and credit and manage well in times of short and long term crisis such as inflation, climatic disaster etc. He also highlighted the major problems of group farming .i.e. free-riding for which he suggested that the groups has to be a smaller group with similarities of socio-economic where they know each other. His findings showed that group farming have helped farmers and women both in terms of production and boosted their morals and capabilities, which enabled them to live a decent and dignified life raising their social status.

Aswathareddy, K.P (2001) "Economics of Production and Marketing of Irrigated Potato in Chikkaballapura Taluk of Kolar District, Karnataka" highlighted that the total cost of agriculture of potato was ₹ 8,629.70 per acre. The major cost was spent on seed which accounted for 27.53% of the total cost of cultivation, followed by 17.39% on manures and fertilisers. His study also showed that the marketing cost of the large farmers was more as compared to that of small farmers i.e. ₹ 28.93/q and ₹ 24.43/q.

Balappa, S.R and Hugas, L.B (2003) examined the economics of onion production and its price in the market, selling channels, manufacturer's share in buyer's

rupee, range of price etc., in the state of Karnataka. Stratified random sampling method was used as a tool for data collection in their study and total samples of 150 cultivators were collected for the study. To study the marketing system, six markets were selected- Belgaum, Dharwad, Hubli, Bijapur, Raichur and Gulbarga and from each market, five wholesaler, five commission agents and five retailers were chosen and personally interviewed. The primary data on cultivation and marketing of onion were related to the agricultural year 1999-2000. Out of four channels, channel IV was found not to be popular i.e. popular-consumer channel. The average price of onion production was ₹ 24,000/ha of which flexible cost accounted 90% of the cost indicating that vegetable cultivators used labour intensive technique of cultivation. The average net return of farmer was ₹ 45,429.29/ha (Gross return, 69,828.67/ha). They found that on average, total cost of onion production was ₹ 202.45 per quintal of which charge of cultivation was found to be higher than that of the marketing charge and cost ratio of the profit was 2.08. Of all the markets, the respondents of Raichur district realised top per quintal gross return while on net return it was highest in the district of Gulbarga. The profit price ratio was also found out to be highest in Gulbarga (2.38) and lowest in Belgaum district (1.58). Average marketing cost per quintal was recorded the highest in Gulbarga district. The manufacturer's share in buyer's rupee of onion was almost equal in both channel I and II. Their study showed that among the market mediators, the share of retailers was higher than other market mediators.

Babu et al (2007), studied the knowledge on vegetable marketing of 90 farmers in Ranga Reddy district, Andhra Pradesh, India. Their findings showed that in the study area most of the cultivators have enough knowledge of the methods as 52.22% of

the respondents had average knowledge while 47.78% had a high knowledge in the field. Most of vegetable growers in the area had average planning coordination, high production orientation, low market information source utilization, grading vegetables. Their finding showed small growers have lesser knowledge of marketing while average and large growers have moderate marketing knowledge hence they recommended that some training for the growers in these fields will advance the knowledge of the growers even more and improves the quality in marketing as well. Training on improved marketing practices for the farmers would enhance the methods like grading, packing and storing vegetables.

Baba et al (2010) studied on Marketed surplus and price spread of vegetables in Kashmir Valley for which they selected several vegetables for their study which include cauliflower, cabbage, kale, tomato, brinjal, carrot, turnip, potato cucurbits, etc. Datas were collected from both primary and secondary sources. Multi-stage stratified random sampling technique was used as a tool for the collection of primary data whereby knowledge of cropping methods and marketing of the selected vegetables was collected. It was collected from the districts of Srinagar and Budgam in which 120 prominent farmers were interviewed from six villages. Market intermediaries i.e., 60 respondents were designated for gaining relevant data. They found that the vegetable sector in the valley was commercialized and earned ₹ 125 crore from the sale of vegetables to the nearby regions. Through the distribution it was found that among the different crops vegetables occupy 89 % of total cropped area. This was resulted due to irrigation abilities and better agro-climatic condition. The intensity of cropping was 258% showing that farmers cultivate more than two crops a year. Marketable surplus was more than 92 % of

the total vegetable production per farm. Cauliflower and cabbage showed high quantity of marketed surplus. Higher risk of storing was found in the case of tomato. They observed that one of the determinant factors for market surplus was literacy level as farmers who were educated tend to have more ideas and creativity. Insect-pest was found to be one of the main menaces leading to the loss of productivity. Four selling channels were observed in the study area. Channel I which consist of producers who take to streets as vendors and sold the fresh vegetables openly to the customers. Channel II include retailers who visited daily local mandis to purchase fresh vegetables and incurred cost on transport, packing and other miscellaneous. The net margin of retailers as percent of consumers' rupee was higher in kale. In channel III price spread was higher because of the inclusion of pre-harvest contractors, wholesalers and retailers. Manufacturers got 43.93% in cauliflower and the lowest was found in kale 33.86% as net profit in consumers' rupee. The share of mediators was more than 2% of consumers' rupee in the entire studied vegetables. In channel IV producers suffered all the expenditures as it has transfer the harvest to terminal markets which were usually located remotely. Producers recognized absolute price in tomato followed by brinjal and cauliflower. Channel I was the most efficient market followed by channel II and channel IV. In channel III, net return were lower to the producers and was found out to be less efficient for marketing of all vegetables. They detected that as the number of market intermediaries increases, the producers share in consumers' rupee decreases.

Barakade et al (2011) carried out a study on the economics of onion cultivation, price spread, marketing channels and marketing efficiency of onion in Satara District of Maharashtra. Satara District covers 12.38% of total area in the state and one

among the leading in the production of onion. For data collection, Stratified random sampling technique were used for the selection of villages in the study area. Sample were collected from 20 villages and 180 farmers. The selected respondents were categorized into three groups i.e. small (below 2 ha), medium (2-4 ha) and large (above 4 ha) based on the farmers cultivable land size. The primary data were collected by survey and interview method and data relating to cost, yield, price and expenditure were collected for the year 2010-11. Their study indicated that total variable cost was ₹ 93500.19 (91.09%) and fixed cost of production was ₹ 9136.85 (8.90%) to total cost of production. They found that the main items of cost of cultivation in all farm size were found to be, the rental value of land, bullock charges, hired labour charges, seeds, manures, plant protection and irrigation cost. The net return obtain per hectare was ₹ 49800.41 with gross returns of 152437.45 per hectare. Average yield per hectare was 258.50 quintal. The cost benefit ratio was 1:1.48. The identified marketing channels in the study area were (1) producers-consumer (2) producer-wholesaler-consumer (3) producer-retailer-consumer (4) producer-wholesaler-retailer-consumer. They observed that there was no coordination and incorporation among the farmers and so it was found that the onion growers had no control over the market. Maximum quantity of onion was transacted through channel IV (75.90%) followed by channel II (21.30%), channel III (12.98%) and channel I (2.88%). The total marketing cost for all stages was higher in channel IV which amounted to ₹ 188.45/quintal compared to ₹ 47/quintal in channel I. The high marketing cost incurred by farmers in channel IV was 19.48% to total marketing cost. Producers share in consumer's rupee was highest in channel I (93.06%) and the lowest in channel IV (68.82%). The high share of producer in channel I was the absence of middlemen

between producers and consumers. Low share in channel II, III and IV is because the producers marketed their produce through different market intermediaries who reaped away large amount from consumers' rupee. The net margin of wholesaler was 5.38% of consumers' rupee while the retailers' net margin was worked out as 7.08% in channel III and 6.88 % in channel IV. The marketing margin was highest in channel IV, while it was lowest in absence of fluctuations. The marketing margin was higher in channel I mainly because of higher price realization by the farmers due to reduced marketing cost. Marketing margin was much higher in channel I (13.41) than in channel II (4.61), channel III (4.51) and channel (4.13) which means the higher market margin were pocketed by the market intermediaries resulted in poor marketing efficiency.

Bezabih and Hadera (2007) Studied on the constraints and opportunities of horticulture production and marketing in eastern Ethiopia found that the main reasons for low productivity were low level of enhanced agricultural technologies, hazards related with weather conditions, diseases and pests. They found that the allotment of land per household was decreasing due to the rise in the number of population which in turn was leading to intensive production of crops in a particular area to meet the need of the household. Apart from Bezabih and Hadera, they further found that pest, drought, shortage of fertilizer, and charge of fuel for pumping water as some main constraints of horticulture production in Eastern Ethiopia. Some other problems also included low knowledge in product sorting, grading, packing, and transport which in turn are affecting the quality. Several of those outcomes were also found relevant for other parts of the country like Alamata. Another constrain was that there was no direct sell or connection between the producer and the large buyer that categorized horticulture marketing.

Consumers dealt with mediators who identify vegetables to be purchased, negotiate the price, and purchase and deliver the products.

Bezabih et al (2015) understanding and realizing that vegetables are sources of vitamins, minerals and income, they carried a study to characterise vegetable production and marketing systems at selected sites in Ethiopia. Primary survey techniques and secondary data were used for the study. They found that the average yields were below potential even though the area and demand for vegetable were increasing. They observed that the major constrain affecting production and marketing of vegetables were lack of access to improved variety seeds, high postharvest losses, lack of reliable market information systems, low bargaining power of farmers, low technological know-how for value chain development and upgrading, all indicating critical areas of intervention. They recommended increasing public awareness about the nutritional importance of vegetables which will help both in reducing malnutrition and also income of small household.

Birari et al. (2004) carried out a research in the western part of Maharashtra, India whereby datas were collected from 180 vegetable. Their study was aimed to examine the channels, prices, margins and efficiency of marketing of Cole vegetables (cabbage and cauliflower), they found that the most significant channel was the one that included commission agent, a wholesaler and a retailer in both the primary and terminal markets. During the rabi season the terminal market reached its peak in the sell of cabbage as per the quintal marketing cost (₹ 70.49), during the kharif season (₹ 40.57) it comes down to its lowest in the primary market, the same occurred to that of the cauliflower as the per quintal marketing cost for cauliflower was also highest in the

terminal market during the rabi season (₹ 72.57). For both markets, in the case of cabbage the producers' share in consumer's rupee was more than 50% whereas for cauliflower the primary market for both seasons was greater. It was also found that there was higher profit rate for both the consumers and producers when the mediators were eliminated.

Borthakur and Bhattacharya (1998), in their paper titled, "Trend Analysis of Area, Production and Productivity of Potato in Assam" examined the trends in area, production and productivity of potato for the period 1951-93. They found that the compound growth rates of area, production and productivity of potato were found to be 1.93%, 0.35%and –1.62% respectively during the Period-I, i.e., Pre-Green Revolution period (195152 to 1970-71) but for the Period-II, i.e., Post-Green Revolution period (1971-72 to 1993-94) area, production and productivity growth rates were 5.32%, 7.60%and 2.66% respectively. They also observed that growth rates of productivity were found to be negative during Period-I (1.62%), which became positive and significant during Period-II (2.66%). Higher growth rates of area, production, and productivity during Period-II indicated the Green Revolution in the crops. They suggested using and adopting improved technology, better extension services, etc. in order to increase potato production and productivity or yield per unit.

Chole et al (2003) studied the various marketing network in the sell of brinjal to analyse the price spread in various marketing networks in the State of Maharashtra from the sample which were collected randomly from 100 vegetables cultivators in Panvel tahsil of Raigad district and 5 market functionaries to collect information on marketing, cost and price received by different intermediaries for the year 1999-2000. The selected vegetable cultivators were classified into three groups according

to their land holding size. In their study, marketable surplus was no different to marketed surplus because of its perishable nature, lack of storage and price fluctuation. 0.36 % of total output was used for consumption purpose, 0.07 % as gift and 0.22% were accounted as losses. Their study showed that marketed surplus dropped with rise in farm size. Three marketing channel were identified in the study area. Total production was 162.70 quintal and the actual quantity marketed was 161.64 quintal. Per quintal cost of marketing brinjal by producers was highest in channel II (₹53.33) followed by channel I and channel III. The low cost in channel I was because the producers transacted in large quantity resulting in low transport cost. Among the market intermediaries, commission agents incurred lower cost than wholesalers and retailers in marketing of brinjal. The reason was their non-performance of grading, packing and transport functions. The share of producers share in consumers' rupee was 69.28% while net margin of commission agents was 6.17%; wholesalers, 5.09%; retailers, 23.74% respectively. In their study, marketing cost was found to be highest in channel III and lowest in channel I. Marketing efficiency was found to be high in channel I. High marketing margin of mediators in channel II and channel III caused poor efficiency of marketing of brinjal.

Dastagiri et al. (2013) " Indian Vegetables: Production Trends, Marketing Efficiency and Export Competitiveness," carried out their study on production and export competitiveness and for marketing efficiency covering 20 crops to estimate vegetable area production trends in India as a whole from 2001-10. Their findings showed that India has immense potential for the export of vegetables due to favourable agro-climatic conditions. They used the formulas of Shepherd, Acharya Modified Marketing Efficiency and Compound Annual Growth for measuring the marketing efficiency. They observed

that the marketing efficiency was greatly affected by the various cost such as marketing, labour, transport cost and marketing margin. They recommended that Vegetable production, marketing and processing should be given importance due to its potential to expand and export which could generate revenue.

Debarati Datta and Saxena (2017), in their article, suggested that to transform subsistence farming into commercial farming, the farmers should be provided with transportation facilities which should be cheap and timely. They also recommended that the farmers be trained in the use of human labour, seed/seedling, manures and fertilisers and guide them to grow high-value crops. Their finding showed that cultivation of brinjal was economically profitable with improved variety as compared to indigenous variety. They also observed that the production of Swarna Shyamli and indigenous brinjial showed increasing return to scale and decreasing return to scale for Swarna Prtibha.

Despande (1979) in his study efficiency in fruit marketing did a case study of small farmers in Maharashtra to test the hypothesis to see if there was any difference between the profit and income of small farmers when compared with that of the medium and large farmers with the data collected from 50 framers. The study area was focused in Bhandara district where nine villages were randomly selected for data analysis. The hypothesis was found to be true as the result showed that there was a difference in the profit and income of small farmers with that of the medium and large farmers. The small farmers were always price disadvantaged. The main constraints facing small farmers were lack of capital, inadequate marketable surpluses, lack of business skills and creativity, low knowledge and education, and lack of contact or access with

extension supports, trading skills, education and know-how, and lack of contact/access with extension agencies.

Dastagiri et al (2013): In their study estimated production trends, market efficiency and export competitiveness of vegetables in India and suggest measures to improve production, marketing and exports of Indian vegetables. The study was conducted in India as a whole for production and export competitiveness and for marketing efficiency in the 8 states of India covering 20 crops. The study found that the total area under vegetables cultivation was grown at the rate of 4.12% and production growth rates was 6.48%. Indian vegetables production depicted glorious past and expected a promising future. The most common marketing channel for majority of the crops was Producer-Wholesaler-Retailer-Consumer. Their findings showed that the producer share in consumer rupee was highest in Punjab, Tamil Nadu and Manipur compared to Andhra Pradesh, West Bengal and Rajasthan. It varied from 46% to 74% in Andhra Pradesh, 26% to 60% in West Bengal, 33% to 60% in Rajasthan, 85% to 88% in Manipur 91% to 95% in Tamil Nadu and 100% in Punjab. Their study showed that majority of the horticultural commodity markets were operating efficiently. The highest marketing efficiency was found to be producer to consumer channel. Most of the commodity cases marketing cost, marketing margin, transport cost, labour charges were adversely affecting marketing efficiency and open market price, volume of the produce handled and net price received were increasing marketing efficiency. The trends of fresh vegetables showed that its export quantity increased 18.3% and 22.2%. The results showed that Indian vegetables are huge potential for exports. The results showed that for all vegetables the nominal protection coefficient was less than 1 indicating they are

competitive in the international markets. They suggested that Indian government should give priority to vegetable production, processing and exports and that government policies should promote direct marketing models for efficient horticultural marketing.

El-Dawees et al (1996) analysed the chief problems and constraints faced by the vegetable producers in production and marketing in greenhouse projects Saudi Arabia particularly in Riyadh and Kharj areas. Their results indicated that main problems and constraints were low farm-gate costs, production surpluses in the market, competition of products from traditional farms and imports, price variations, and the middlemen's negotiation and bargaining ability. It was also found out that the problems associated with marketing were higher in greenhouse projects than production problems.

Emana et al (2015) on their paper "Characterization and Assessment of Vegetable Production and Marketing Systems in the Humid Tropics of Ethiopia" stated that vegetables are great sources of vitamins and minerals required for human diet. The vegetable production and marketing are also a source of income for the people. Their study was conducted to enhance vegetable value chain development. The data were collected using participatory primary survey techniques augmented with secondary data. They observed that the area under vegetable cultivation has been increasing over the years because of increasing consumer demand however the average yields were found to be far below potential. Various problems and constrains were observed such as lack of access to improved variety seeds, high post-harvest losses, lack of reliable market information systems, low bargaining power of farmers, low technological know-how for value chain development and upgrading, all indicating critical areas of intervention. They suggested increasing public awareness about the nutritional importance of

vegetables and increasing smallholder household income through production and marketing of vegetables.

Gajanana and Sudha (2004) examined the system of marketing for vegetables and suggested solutions to cope the difficulties and problems faced by the farmers after the harvest of their crops. It was found that when compared to the recommended dose that is 300 gram per person per day as per ICMR recommendations, the per capita availability of vegetables was 174 gram per person per day was found to be very less. The occurrence of low per capita availability of vegetables was an outcome of huge post-harvest losses which included problems related with transportation and marketing. Another problem they found was the involvement of large number of intermediaries which had resulted in exploitation of both the sellers and growers. The growers fetched high price when their products were being sold in innovative and proper channel. The price risk was another main problem faced by the vegetable cultivators. One of the precautionary measures that would improve and help in reducing the post-harvest losses was the involvement of the producer with the processor which would eventually lead to decrease the fluctuation in the price. They found that in Karnataka brinjal growers could fetch a higher price up to ₹ 51.50/q by selling through cooperative when compared with other agencies. It also showed that through feasibility study that barely 10-20 cultivators could supply the requisite materials to a small-scale processing unit with an average area of 0.45 ha under tomato crop per grower. They witnessed that in spite of larger investment, the benefit-cost ratio were greater for processed tomato that was 2.23 as compared to fresh tomato 1.72. They also found that exports of processed vegetables had been growing at the rate of more than 20% per annum, both in quantity and value

terms in 1993-2001 on fresh and processed vegetables. They recommend approaches like cooperative marketing of vegetables, distant market sale, and integrations of production with marketing through processing, preferably on cooperative basis and contract farming to create backward connection with the producers by providing all the inputs which would help to overcome the difficulties of post-harvest management of vegetables.

Gandhi & Namboodiri,(2014) in their paper "Marketing of Fruits and Vegetables in India: A study covering the Ahmedabad, Chennai and Kolkata Markets" examined different aspects of the marketing, focusing on the wholesale markets for fruits and vegetables which had been established to overcome deficiencies and improve the marketing efficiency. They observed that in Ahmedabad the direct contact between commission agents and farmers was very low, 50% for vegetables and 31% for fruits. There were secret bidding and simple transaction was dominant and open auction was rare. The wholesalers acted as commission agents and received consignments directly from producing centers through agents or producers in Chennai. The main reason for inefficiency was the practice of traditional transaction and less usage of open auction. In the small AUS market in Chennai, the farmers sold directly to consumers. The share of farmers in the consumer rupee in Ahmedabad was 41.1% to 69.3% for vegetables and 25.5% to 53.2% for fruits. In the small AUS market in Chennai, where the farmers sold directly to the consumers, the share of farmers was as high as 85% to 95.4% for vegetables. They concluded from their result that if there were few or no middlemen, the farmers' share could be much higher. The high percentage of margin to farmer-consumer price difference indicated large inefficiencies and relatively poor marketing efficiency. They recommended more markets to be brought under regulation and supervision of a

well-represented market committee, promotion and enforcement of open auctions in the markets. The direct participation of farmers to be increased and market infrastructure be improved through storage (go-down) facilities, cold storages, loading and weighing facilities, improvement in the road network, and cold-chain facilities. A lot of focus was to be given for greater transparency and market information.

Gupta and Ram (1979) they carried out the study on "Behaviour of Marketing Margins and Costs of Vegetables in Delhi." by taking a sample of market intermediaries using an econometric model to measure the various effects of consumer price variations on margins and costs. They traced different channels which the vegetables passes before reaching the ultimate consumers to find out the price spread of the vegetables. Their results show that producers received only 38% of the price paid by the consumer and the rest were earned by the middlemen. They recommended setting up of co-operative in producer and consumer level and Government support to increase vegetable market efficiency by providing various facilities such as storage facilities, market information, vegetable processing, etc.

Hanumanaikar et al. (2009), found that 100% of chilly cultivators conveyed the problem in the rise of pests and diseases infections which compelled them to apply additional pesticide doses for their prevention. One main hurdle faced by the farmers was their illiteracy problem, because of which they are unable to read the directions specified by manufacturers on the labels of the product, difficulty in identification of pest and diseases, contamination and inefficacy of the pesticides, mode of application and lack of practical supervision made them to deviate from the optimum use of pesticides. They suggested to start up intensive initiatives such as trainings, field

study, Kissan mela seminars, organising demonstrations by scientists and extension agents, broadcasting and telecasting radio and television programmes on usage of pesticides and hazards of indiscriminate use of them.

Imtiyaz, H., & Soni, P. (2013): The study was carried out in Allahabad District, India to determine the economics of major vegetable and fruits. Twenty five growers for each crop were selected randomly by them covering the major part of Allahabad District. They collected primary data for various cost components on variable and fixed costs using pre-tested, structured schedule and questionnaire by personal interview. Their findings reflected that cost of cultivation amongst tomato, green chili, cauliflower, brinjal, cabbage and guava varied significantly due to variation in fixed and variable cost. The significantly higher net return was found for apple and guava followed by tomato, cabbage, green chilli, Allahabad safeda, brinjal and cauliflower. The significantly higher Benefit – Cost Ratio was found for tomato/apple, guava followed by brinjal/cabbage/Allahabad safed /green chilli and cauliflower. The net profits of the producer were significantly higher for apple guava followed by tomato, green chilli, Allahabad safeda, cauliflower, cabbage and brinjal. They observed net profit of the producer declined significantly with the increase in number of intermediaries in the marketing supply chain.

Jadav et al (2011) studied different approaches of supply chain of potato and their efficiency and constraints faced by vegetable growers of middle Gujarat, with the help of 200 potato growers from ten villages. Their finding showed that out of the total production of potato, the marketable surplus was 91.93% and three fourth of total quantum was dispatched to distant markets, 60% of marketed surplus was moved

through the Producer - Wholesaler – cum – Commission agent - Retailer - Consumer – which was the major marketing channel. High marketing expenditure, rapid price inflation, lack of marketing information and lack of transportation facilities were the major constraints. They recommended the provision of cold storage facilities to the farmers at village level, adequate transport facilities for the movement of vegetables from the places of production to various market centers, dissemination of market information to the farmers, establishment of vegetable co-operative marketing societies and fixation of minimum/maximum prices of vegetables are suggested to improve the efficiency of marketing of potato in the state.

Jane Muthoni et al (2013) carried their study on Potato Production in Kenya: Farming Systems and Production Constraints from three major potato producing districts Bomet, Molo and Meru. Their objectives were 1) to document farmers' practices, key potato production and marketing constraints, 2) to determine farmers' potato cultivar and trait preferences and 3) to assess the prevalence and farmers' management of bacterial wilt. They used a semi-structured questionnaire to 253 individual farmers. Their results showed that the average household farm sizes were less than 2.4 hectares in all the districts. Majority of farmers allocated more than 25% of their farms to potatoes. Potato was produced both for food and cash by 90 % of respondents in all districts. They observed that the major potato production constraint was diseases with bacterial wilt being the most prominent.

Joshi et al. (2006): They observed that in a small farm production system which is labour intensive and predominated by female workers the vegetable production is conducive and profitable since it suits them. They carried out their study in Uttar Pradesh

to find out the diversification and its impact on smallholders. They observed that various constraints such as lack of efficient marketing system, assured markets, seeds banks .etc. were significantly hampering the vegetable production and marketing. They recommended that since vegetable production is profitable, pro-poor and it provides an immense opportunity to the small farm as such steps should be taken to remove the problems in vegetable production and marketing by developing institutional arrangements to strengthen farm-firm linkage and contract farming etc.

Joshi (2011) conducted a study to analyse marketed surplus and price spread of brinjal in Western Uttar Pradesh and found out that the poor farmers have greater production per hectare in comparison to the large, small and medium farmers in case of brinjal in the study area. However, the percentage of marketed surplus among all categories of farmers was recorded to be slightly higher for medium farm followed by marginal, big and small farmers. His study further found out that there were three channels for disposing the surplus and producers share in consumer's rupee was maximum where there was less number of intermediaries.

Kamlesh Yadav et al. (2016), In their report on "Role of Technology in Agriculture,' they presented that the production of Bitter Gourd could be increased by making use of better quality of seeds, the use fertilisers and using the availability of the farmyard manure. For quantifying the contribution of the various factors in the production of Bitter Gourd, they used the Cobb Douglas Production function. For the variables, they used land preparation by a tractor in hours, quantities of seed, FYM and fertilisers applied number of hours of irrigation, plant production in terms of number of sprays, hours of wedding and diseases as a dummy variable.

Kiresur and Kumar (1988), studied the impact of regulation on vegetable marketing in India Hubli market, Dharwad district, Karnataka, with the following objectives: (i) To evaluate the price spread and the share of the manufacturers and market mediators in the cost of consumer in various vegetable marketing channels, in regulated and non-regulated markets; (ii) To examine and compare the differences in the wholesale rates of vegetables in regulated and unregulated markets and (iii) To find the problems and constraints met by growers in the current system of marketing of vegetables. Tomato, aubergine (traded in an unregulated market), onion and potato (traded in regulated market) were the four vegetables that were focused. There were two main vegetable selling and marketing channels. Channel I: Production/seller - Commission agent-cum-wholesaler- Retailer - Consumer. The difference in the price-spread and the wholesale price were found to be lower in regulated markets when compared with that of unregulated markets. A moderately higher fraction of growers complained about difficulties confronting the marketing of unregulated vegetables which include crowding of market and the absence of weighing, grading and cheaper carriage facilities, etc. when compared to the regulated markets.

Kohli (2000) in his study on off season vegetable production identified various problems among the vegetable grower in Himachal Pradesh. He found that, unavailability of dependable seeds, lack of proper watering and irrigation facilities, lack of appropriate supply of manures and fertilizers, high cost in packing materials etc., as the main constraints that were faced by the people. He suggested in the expansion and development of production technology, hybrid plants in order to resist invasion of insect

pests and pathogens, acquiring improved packing materials and systematized selling of vegetables different seasons.

Kumar and Arora (1999) studied and analysed the post-harvest management of vegetables where they focused on the ranking, packaging, storage, transportation and the pattern and activities of sales set up by the vegetable growers of Uttar Pradesh hills. It was found that improper handling of vegetables during ranking, packing, selling of the produce and lack of appropriate transportation and storage were some of the main reasons attributed to post-harvest losses in vegetables.

Kumar et al. (2004) in their study investigated the fluctuations in the pattern of vegetables consumption at various levels of rural and urban by different earning groups and topographical areas of India. The elasticity's of vegetables demand in rural and urban areas across income groups and areas were calculated. Long-term outlooks of vegetable demand and production were been obtained. The per capita yearly intake of vegetables had risen from 47 kg in 1983-84 to 76 kg in 1999-00 by 2.9% yearly growth rate. An extensive rise in intake of vegetables had been seen across income groups, regions and areas of both rural and urban region. The intake of other vegetables was expressively greater in the urban India (37.3 kg) when measured with the rural India (33.6 kg). The most dominant vegetable was found to be potato which has been described to be contributing in total intake (24%) followed by onion (12.4%), leafy vegetables (8.4%), tomato (6.8%), brinjal (6.1%), cabbage (3.7%). The poor buyers were found consuming low class of vegetables as they have lower prices, though they get the vegetables easily. The yearly per capita intake of vegetables rose with the rise in income, from 48.34 kg for the underprivileged group of buyers to 88.86 kg for the non-poor high

group of buyers. The growth rate in prices of vegetable was highest in both the urban (9.9%) and rural (9.7%) areas of Hill region. The growth rate was lowest in both the urban (5.9%) and rural (5.8%) areas of the Northeast region. The gap in vegetable prices between rural and urban depicted a decreasing trend, from 34% in 1983 to 32% in 1993 and a sharp decline to a level of 12% in 1999. Their results showed that demand elasticity had been found to be very high for the underprivileged buyers of both urban (0.44) and rural areas (0.44). The high expenditure elasticity of vegetables revealed that the future demand for them would rise with economic progress. This showed that there was a need for high-yielding varieties and better crop management practices, and establishment of interventions to propagate these technologies. They recommended effective post-harvest management of the produce avoiding spoilage.

Kotnala and Dubey (2013), studied on cropping arrangement and production problems of vegetable cultivators in Ramnagar block of Nainital district in Uttarakhand. The study was based on the data collected through primary sources from 60 farmers comprised of three size group's 36 small, 15 medium and 9 large farmers of four villages distributed randomly. Three size groups were selected in proportion to their numbers. The major vegetables namely tomato, green pea, cabbage and brinjal were taken for the study. They found that the main production difficulties faced by sampled farmers were the damage of crops from pest and diseases, followed by insufficient accessibility of workers, expensive price of pesticides.

Lilly (2013) In her research paper marketing of fruits and vegetables in India –an overview highlighted that India with diverse favourable climatic conditions ensured various vegetables and fruits in India, resulted in India as the 2nd

largest producer of fruits and vegetables in the world. She pointed to the fact that the marketing of fruits and vegetables was a risky business due to their perishable nature and seasonal production and lack of storage facilities resulted to loss of 35% - 40%. She also stated that unlike the food grains, the fruits and vegetable markets were not developed and they are congested and unhygienic. She highlighted that the fruits and vegetable production could help increase the income of the producer provided there was a high level of management and improvement in the market infrastructure of storage facilities, transportation, etc. which would help in improving the marketing efficiency.

Maongtoshi and Sinha (2014) on their evaluative study of Agricultural Progress in Nagaland analysed the growth area, production and productivity of different crops in Nagaland by using the compound growth rate function. They used the secondary data for analysing 32 years, i.e. from 1981-82 to 2012-13, and the cropping pattern was estimated for 52 years, i.e. from 1961-62 to 2012-13. In their findings, they observed that the share of area under food grains decreased sharply from 92% to 75%. However, the area under pulses, oilseeds and commercial crops were increasing every year. They observed that agriculture was greatly hampered due to the lack of transporting, marketing and storage facilities in the state. They also pointed out that agriculture lacked behind due to lack of credit facilities and outdated method of cultivation which needed to be modernised to boost production. Lastly, they observed that the production of food grains in the state had shown an upward trend, even when it is below the state requirement.

Marimuthu (2010) in his article, “Constraints in Marketing of Vegetables” highlighted the various problems in the marketing of Vegetables. He

observed that there were multiple constraints such as the involvement of numerous intermediaries in the different marketing channels, which were very exploitative for both producer and the consumer. The imperfect market, the production being scattered, lack of grading, transportation and storage facilities and improper pre and post-market handling which add up to the pre and post-harvest and market losses. He recommended that to double the net returns of the producer, the producer himself should market his product to the consumers avoiding the intermediaries, which will benefit both the producer and the consumers.

Masuku M & Xaba B (2013) remarked that vegetables are not only beneficial for their contribution to the share of agriculture in the economy of Swaziland, but also have a significant probability to compete where there are fewer government regulations and restrictions in the economy. Their study was aimed to identify factors affecting productivity and profitability of vegetable production. A two-stage sampling technique was used to collect data from 100 vegetable farmers. Descriptive and inferential statistics were employed for data analysis. Their results showed that the factors that significantly affected productivity of vegetable farmers were access to credit, selling price, fertilizer quantity, distance to market and gender of the farmer. The selling price of carrot had a positive relationship with the productivity of vegetable farmers, which suggested that when the selling price of carrot increased by one unit, all else equal, the quantity of carrot produced increases by 0.417kg. The determinants of profitability of vegetable production were level of education, land under vegetable production and type of marketing agency. They recommended that policy makers should come up with policies that would improve productivity of vegetable

farmers through the provision of seminars and workshops where farmers would acquire more training on vegetable production which will enable them to increase the average yield of vegetables produced per hectare, hence profitability.

Massomo et al. (2005), studied the difficulties and constraints encountered by the farmers in Tanzania. Field surveys and personal interviews were used to collect data. The disease of black rot was the major problem faced by the cabbage farmers. The occurrence of black rot problem had worsen by incessant cropping due to scarcity of land, cultivation of vulnerable seeds and absence of appropriate disease controlling strategies. Other challenges faced by growers in the controlling of black rot involved problems in the quality of seeds, selling and the adverse impact of intermediaries in cabbage farming.

Mengesha Yayo Negasi (2015) analysed the different aspects of marketing system of vegetable and fruit in Raya Kobo and Harbu woredas, Amhara regional state using different indicators. Both qualitative and quantitative approaches to data collection and analysis were employed. Major findings of the study exhibited that farmer's access to main road and market was very limited due to poor road network and limited transport services. More than 70% of the respondent in both vegetable and fruit production did not have any market information. Lack of genuine and timely market information was observed as critical problem and there by forced them to be exploited and cheated by brokers and other middlemen in the study area. Marketing infrastructures such as non-scientific proper post and pre-harvest handling practices, poor packaging, inefficient transportation and power service were also observed as hindering factor for proper function of the marketing. He suggested that there should be some interventions to

improve the inefficient functioning of vegetable and fruit marketing system and enhance the participation of farmers in vegetable and fruit production. Market infrastructure should be improved through storage (go-down) facilities, cold storages, cold-chain facilities, road network, loading and weighing facilities. Besides, the market integration and efficiency could be improved by making up-to-date market information available to all participants through various means, including good market information systems and various media which facilities the markets. Additionally, to overcome problems in extension services, capital bottlenecks, business skill gap, lack of proper/scientific grading and standards, pre harvest and postharvest loss/wastage, increase access to improved inputs, strengthening credit institutions, defining and setting quality parameters, standards, grades, and establishment of storage and processing facilities are possible options. Strengthening of co-operatives, institutionalizing the marketing system and the commission agents' functioning, provision of education and training, improve transparency of price setting and availing market information are the most promising interventions.

Naik and Arora (1986) studied the marketing pattern and efficiency of Arecanut in market of Siri (primary market) and Nagpur and Kanpur (terminal markets). 50 growers were selected following random selection method of sample. The price efficiency of arecanut selling method was studied with reference to price spread and price correlation. They observed that the marketing efficiency of arecanut could be increased with the establishment of Co-operative (CAMPCO) because they provided the producers with storage facilities, transportation, market information, arrangements for sale, etc., which were much needed by the producer. They

recommended that other States follow suit to establish, improve, and expand co-operatives so that the structural and pricing become efficient in the market.

Nandeshwar et al (2013): In their study on Economics of Production and Marketing of Vegetables in Akola district using the primary data collected in 2008-09 analysed the level of input utilisation and cost of production of vegetable. They came to a conclusion that vegetable production greatly suits the developing countries since it is labour intensive. They also observed the various problems in the vegetable production and marketing such as price fluctuations, pest attacks on vegetables, high cost of inputs, climatic change and pre and post-harvest losses etc. As such, they recommended a reasonable price for seeds and also the government to set up and develop storage facilities and facilities of grading and standardisation so that the farmers get remunerative price.

Narappanavar and Bavur (1998) Their study was based on problems faced in the marketing of potato in Karnataka where they observed that 70% of the farmers lacked storage facilities, 36% farmers had inadequate facilities in the market yard accompanied by insufficient space in the market, faulty system of weight measurement, lack of grading etc. To make potato marketing efficient after observing all the problems they suggested various provisions such as availability of cold storage, grading system, transportation facilities, market information, quick payment etc. which will positively affect the farmers and make the potato marketing efficient.

Ojogho and Alufohai (2009) investigated the effect of price and income changes on Cassava farmers marketed surplus in Oredo and Egor local

Government areas of Edo State, Nigeria with the objective to study the price elasticity of home consumption, income elasticity of marketed surplus and total price elasticity of cassava marketed surplus. Cross-section primary data were collected from 352 cassava farmers through well-structured questionnaire using simple random sampling technique. Structured questionnaires were designed to collect information on intake, total production, marketed surplus, price and income of the farmers. Two Stage Least Square (2SLS) procedures were used to evaluate the data. The results showed that the mean of overall farm production was 38500 tonnes with a standard deviation of 100.8. It was high among the small farmer (57.25) followed by large (54.12) and medium (15.13). The large variation shown by the standard deviation implies that farm levels output are affected by their size categories. The total consumption was 15600 (sd. 36.6) and the total marketed surplus was 22772.75 (sd. 27.17). Their study found that among the different size groups, positive trend was noticed in respect to output, consumption, marketable and marketed surplus. Marketed surplus to marketable surplus decreased as farm size increases. The result also showed that for every unit increase in income of the framers' consumption of cassava increased by 0.206 unit showing that cassava is an inferior commodity. While for every unit increase in price of cassava consumption of cassava decreased by 1.23 units implying that the farmers will have more for market. These decrease in consumption was highest among the large farmer (-1.57) for every unit increase in the price of cassava. Consumption of cassava with every increase in income was high among the large farmers (0.513). The percentage change in consumption per unit percentage change in income was 0.59 which means that increase in income leads to a less than proportionate increase in consumption. This means that farmers will keep a smaller share and make them

available for marketing. Total price elasticity was 1.03 which shows that as rate rises more of cassava will be brought to sell by the farmers.

Patel et al. (2012), conducted a study in Anand district through personal interview whereby a total of 120 respondents from the 12 selected villages were interviewed. The results from the study showed that high price of inputs and inconsistent price performance was the main constraints and problems encountered by the potato cultivators. Rate of the inputs should be lessened and practical supervision should be presented, were the major suggestions offered by the potato growers to boost acceptance rate of potato production knowledge.

Prasad (1993), studied the vegetable marketing in Jamshedpur and Ranchi markets in the plateau region of Bihar state, India, examined the method of sale, prices received by growers and marketing margins. A great level of village sales was observed in Jamshedpur market, whereas co-operative marketing institutions accounted for a high proportion of vegetable marketing in Ranchi market. The estimation of price spread for four major vegetables showed high selling charges and huge price-spread because of high margins indicted by mediators.

Rahane et al. (2000), "Trends in Area, Production and Productivity of Important Fruits and Vegetables in Maharashtra". They carried out their studies on surveyed and non-surveyed fruits and vegetables from the data collected from 1983-84 to 1997-98 and 1994-95 to 1997-98. Their study showed that that in the case of surveyed crops and non-surveyed fruit crops, in spite of significant increase in area and production,

their productivity decreased but in the case of non-surveyed vegetables, productivity did not change in spite of increase or decrease in area.

Rajkumar and Jacob (2010): In their study on Business Models of Vegetable Retailers in India, highlighted the advantages of the organised retailers to the farmers since they pay higher price as compared to the traditional retailers. The organised retailers were also benefited since they were located nearby the farmers theyby saving the time and cost of the famers in transport and in waiting. Moreover, the cost of transport under organised retailer was not borne by the farmers but by the retailers, and the use of electronic scales prevented manipulation resulting in accurate and correcting measurement and returns for the farmers. However they also observed certain major constraints such as fragmented land, small and marginal famers which are scattered, poor transportation, non-availability of cold storage, etc.

Ravekar et al (2015) their study was based on the Cole crops including Cauliflower, Cabbage in tehsil of Kalamnuri and Vasamatnagar in Hingoli District of Marathwada region of Maharashtra in the year 2011-2012. They selected 120 respondents cultivating cauliflower and cabbage grown in Rabi season. Three different types of marketing channels were observed by them, producer-consumer (Channel-I), Producer-Retailer-Consumer (Channel-II) and Producer-Commission agent cum Wholesaler-Retailer-Consumer (Channel-III). Maximum percentage of produce of cauliflower and cabbage was sold through Channel-III. Marketing cost was maximum in Channel-III as compared to other Channels. Producer's share in consumer's rupee was maximum in Channel-I while it was minimum in Channel-III. Their result revealed that frequent power cut of electricity during day time in production of cauliflower and cabbage was the

major constraints. Their research included the size of land holding as an important concept including the variable which led to adopt diversified cropping pattern reduces risk of failure of crops and the respondents with high land holding could earn more money. They also observed that in case of cauliflower growers the highest (68.34%) of respondents were found in the land holding up to 2 ha, 23.33% were in land holding between 2 to 5 ha and 8.33% were in land holding of 5 and above. Similar type of trend was observed in case of cabbage grower. The average cost of cultivation of cauliflower was ₹ 79478.62 and cabbage was ₹ 72462.99, respectively. Per farm yield obtained from cauliflower was. 266.64 qtls and cabbage was 253.05 qtls. The cost return ratio of cauliflower was 1:2.85 and cabbage was 1:2.65.

Ravishankar and Katteppa (2000), their study was based on the constraints of potato farmers in Chikmagalore district of Karnataka and observed that 94.16% farmers faced the problem of technical guidance and training, high cost of fertilizers, non-availability of fertilizers in time, diseases etc. as such they recommended the farmers to take up tuber treatment to avoid occurrence of diseases and use of pesticide and also adopt scientific production technologies and marketing strategies in order to get maximum returns.

Samuel et al (2016), they did a study on Efficiency of Vegetable Marketing in Peri-Urban Areas of Ogun State, Nigeria, using a sample of 120 respondents with the aid of structured questionnaire using multistage sampling procedure. Descriptive statistics, budgetary and marketing efficiency analyses were used to analyse. They found that women dominated in vegetable marketing, they comprised of 78.3% and they had basic education and experience. Credit facilities were lacking and they used

their own savings for their enterprise. They also found that indigenous vegetable marketing was more profitable and efficient where result for net margin was the positive of ₦29,180.05. They recommended that extension trainings should be provided on preservation of indigenous vegetables and also funds should be made available and accessible to reduce loss and spoilage and solve lack of fund which greatly affected marketing efficiency.

Sharma et al. (1995), in their study, "Marketing of vegetables in Himachal Pradesh conducted study on the postharvest losses, transference and selling of major vegetable crops, the causes affecting marketed surplus and examined the difficulties cultivators face in storing, transporting and marketing vegetables. Samples were collected from 60 farmers from Solan and Kandaghat blocks of Solan district, Himachal Pradesh, India. The result showed that the maximum percentage of losses happened during gathering and transportation for tomato and capsicum, whereas gathering and market processes caused major losses for beans and peas. Expensive wooden boxes, time-consuming physical grading, aloof markets, expensive transportation charges, misconducts in the market and absence of market evidence were the main problems faced by cultivators which greatly affected the marketed surplus of the vegetables. There were also problems of malpractices faced by the farmer in the market with no proper information about the market. Going through all the problems they suggested that the problems be solved and resolved in order that the losses be might be reduced and that the production many increase.

Sharma Gaurav,et al. (2011) in their article, "Economic Analysis of Post-harvest Losses in marketing of vegetables in Uttarkhand", where they studied about post-harvest

losses by using multistage cluster sampling of 80 vegetable growers. Their findings found that tomato had the largest/maximum post-harvest loss as compared to other vegetables. They argued that the major reason for the post-harvest loss was due to lack of knowledge about post-harvest management, improper grading, packing, lack of storage and transportation facilities and inappropriate maturity which also led to erratic ripening and poor quality. They recommended that the farmer should be provided training on scientific post-harvest techniques to make vegetable production and marketing efficient and profitable.

Sharan and Singh (2002), "Marketing of Kinnow in Rajasthan", they observed and found that selling of Kinnow directly by the grower to the consumer was more profitable than selling it through the contract and pre harvest contractors. They also observed the major problems affecting the farmers were lack of organisation, storage facilities, support price, rapid price fluctuations during the season and malpractices in the weighting measure.

Shelke (2009) in his study on marketing of major vegetables such as cabbage, beans, spinach, okra and bitter gourd from June 2007-2008 found that the retailers received the largest major share of the consumers' rupees on purchase of vegetables. The retailer's share ranged from 12% to 41%, while the producer's net share ranged from 42% to 57%. He suggested that the farmers/producers should sell their vegetables directly to the consumers market which will increase their share in consumer's rupee to 95.85% from 55.35%.

Singh (1990) Using Cobb-Douglas Production function he carried out his research on the production and marketing of off-season vegetables in Himachal Pradesh to find out the role, cost and benefits and problems in the production and marketing of vegetables. He remarked that even though vegetable production was a risky business because of its perishable nature however he found that vegetable production benefitted the famers in term of employment and income. He also observed that even though the production was favourable because of conducive agro-climatic condition, the main problem arises in the marketing sector. He suggested that the farmers be provided with good quality seeds, supply of pesticide, insecticides and stable irrigation by the State agricultural department to boost productivity.

Singh et al. (1994), studied (i) the production and utilization patterns of the different vegetables grown, (ii) their marketing channels, and then assesses the marketing costs, margins and price spread for various vegetables grown in Himachal Pradesh, India. Their results indicated that vegetable prices were so high that consumption was restricted. Due to inefficient marketing systems, consumer prices do not reflect the producers' income incentives, which were lost on route. They suggested a market regulated rate should be sternly imposed to avoid illegal deductions of different charges.

Singh(2004): "Economics of Production and Marketing of Vegetable in Madhya Pradesh" studied about the complexities involved and identified bottlenecks providing efficient services in the transfer of farm products and inputs from producer to consumer using primary and secondary source of 1997-98 and 2003-04. His findings showed that a large number of farmers were cultivating vegetables to fulfill the urgent

needs of money in their daily life. He also observed that the average land holding was 3.19 Ha which implied that the vegetable productions were being carried out by the small and medium producers with less than five hectares of land. His findings also brought to the notice that there were various constraints in both the production and marketing of vegetables, such as lack of information, credit facilities, poor transportation, and grading standardization and most importantly the lack of storage facilities.

Singbo (2014) in his paper estimated the technical and marketing inefficiency of urban vegetable producers in Benin stated marketing inefficiency as the failure of farmers to achieve better marketing output and it was reflected in lower output price indices. His study proposed a Russell-type measure of inefficiency using a directional distance function that accounts simultaneously for the expansion of outputs and price indices and the contraction of variable inputs. A truncated bootstrap regression was used in the second stage to consistently analyze factors that underlie differences in inefficiency. The first-stage results suggested that vegetable producers are more inefficient with respect to marketing than production. The second-stage results indicated that technical inefficiency was affected by the production environment and private extension services. Marketing inefficiency was affected by the type of marketing arrangements.

Srivastava (1993) examined the economics of vegetable growing around in Patna town, Bihar, India and the marketing and export potential for vegetables. Data for 1989-90 was collected from a sample of 60 marginal and small vegetable growers in four villages (Pahari, Tulsimandi, Kasba and Karmalichak) in the hinterland of Patna town. For all green vegetables, increases in consumer price were largely absorbed by

retailers. The main reason for the low productivity of vegetable crops was the non-availability of quality tested high yielding variety seeds. The need to improve the postharvest handling and processing units for vegetables was emphasized.

Thakur et, al, (1997), investigated the problems of agricultural marketing in the hills. They carried out their study in Kangra and Mandi districts during the agricultural year 1992-93. Both districts were covered under the Indo-German Intensive Agricultural Development Project (IADP). A total of 145 farmers were selected from Kangra and Nurpur block (Kangra district) and Mandi-Sardar and Sundernagar blocks (Mandi district). Eight crops were covered: maize, wheat, rice, tomatoes, cauliflower, cabbage, peas, and radish. The study showed that the farmers were now market-oriented with sufficient marketable and marketed surplus. The supply response was positive for all crops. The small farmers were more responsive in increasing marketed surplus with increased production than the large farmers. The main problem encountered by the farmers was marketing problems.

Vadivelu and Kiran (2013) in their review of Problems and Prospects of Agricultural Marketing in India, they recommended direct marketing as the need of the hour. They found that there were several challenges involved in marketing of agricultural produce. They found that there were limited market information, high illiteracy among farmers, multiple channels of distribution which eats away the returns of each farmers and customers. They remarked that technologies in agriculture were limited to city areas alone. There were numerous loopholes and lack of regulation and organized and controlled marketing. The consciousness on market information in popular changed into determined to be relatively negative in case of farmers compared to the traders for

the reason that accessibility of marketplace records in terms of communication systems was negative in case of farmers. They recommended creating awareness among the farmers through the agricultural extension agencies like the State Department of Agriculture, Krishi Vigyan Kendras so that the marketing information on agriculture commodities were incorporated in the extension services along with production aspects to the farmers.

Yadav, S. (2016) "Problems and Prospects of Agricultural Marketing in India" stated that Agriculture is the backbone of Indian economy as the economic development of India was very much relied upon the agricultural activities. Agriculture provided not only food for the Nation's growing population but also provided opportunities for employment generation, saving, contribution to industrial goods market and earning foreign exchange. They observed agriculture production system in India was characterised by small scale production and seasonality of production and demand and many more.

1.5 STATEMENT OF PROBLEMS

In Nagaland, over 70% of the population is dependent on agriculture. In spite of agriculture being the main occupation of the people, the State still imports a large quantity of food items from other states. The reason being that, despite the favourable condition, the production of vegetables fails to fulfill the demand of the consumers due to the outdated and primitive methods and practices of production and various other factors. During recent times the structural change of workers moving out from the agricultural sector to other sectors is resulting in the decline of the labour force, leading to a fall in agricultural production. This fall in agricultural production leads to a shortage of

agricultural goods, especially of vegetables in the local market of the State. The resulting impact gives rise to the import of vegetables and other agricultural products from other States. Thus, the funds and money instead of circulating in the State are flowing out of the State. It is, therefore, pertinent to properly look into the methods of production and its marketing system, especially of vegetable goods. This will automatically help to identify the problems and potentials of vegetable production and marketing in the State and thereby, necessary steps can be recommended and taken to make the State a State of self-sufficiency in vegetables.

1.6 AREA AND PERIOD OF STUDY

To study the Vegetable Production and Marketing in Nagaland, Phek district has been selected very specifically because the district of Phek in Nagaland is well known, recognised and stand out among all the others for their vegetable production and marketing. The district has the most favourable agro-climatic condition for the production of vegetables as compared to other districts of Nagaland and very little research has been carried out on this topic in the selected district. From this district, three vegetables, viz, Cabbage, Potato, and Beans that are produced and marketed by the farmers are selected as sample vegetables. These vegetables are selected because they are the major Cash Crop Vegetables produced, Marketed and Consumed by all. The primary data for the selected vegetables was collected during 2016-2017.

1.7 OBJECTIVES OF THE STUDY

The primary objective of this research is to carry out an intensive study and findings on the present Vegetable Production and Marketing system in the Phek District of Nagaland. The main objectives of the study are:

1. To study the area under vegetable production.

2. To examine the vegetable production.

3. To evaluate the marketing of vegetables.

4. To study problems in the production and marketing of vegetables.

1.8 HYPOTHESIS

1. There is a relationship between the size of the farm and vegetable production and productivity.

2. There is higher efficiency when there is direct marketing between the producer and the consumer.

1.9 SCOPE OF THE STUDY

The study identifies the problems and prospects of the production and marketing of vegetables in the State, particularly in Phek District. It also suggests ways and means of improving vegetable production and marketing in the State. The policy implications arrived at from the study will become an important tool for the departments in the State Government that are concerned to agriculture.

1.10 RESEARCH METHODOLOGY

1.10.1 Data Collection

The study was carried out through a collection of primary and secondary sources to assess the vegetable production potential and efficiency of the marketing system in Phek District, Nagaland. A pre-tested comprehensive questionnaire, personal interview method, and field survey were used to collect primary data. The secondary data was collected from different sources such as Administrative Reports, Statistical Handbook, Records and Directorate of Agriculture, etc., and various other sources available in the Published and Unpublished forms.

1.10.2 Sample Design

Purposive Random sampling technique has been used for collecting data. Twelve villages (12) from the Phek district, which produces and sells the vegetables, were selected for the study. Out of these twelve (12) villages, twenty-five (25) farmers from each village were selected as a sample population. The district and the villages were selected purposively for the study based on their significant area, production, and marketing. The Respondents (producer/farmers) were classified into marginal (< 1 Ha), small (1-2 Ha), and semi-medium (2-4 Ha) to categories them based on their landholdings.

Table No.1: Crop-Wise Details of Respondents

Crop	District	Village	Sample Size
Cabbage Potato Beans	Phek	1.Enhulumi	25
		2.Kami	25
		3.Lasumi	25
		4.Lekromi	25
		5.Leshmi	25
		6.Mesulumi	25
		7.Pfutseromi	25
		8.Razeba	25
		9.Tsupfume	25
		10.Zapami	25
		11.Zelume	25
		12.Zhavame	25

1.11 DATA ANALYSIS.

The collected data were analysed using mean, standard deviation, correlation, regression, etc. Market Efficiency Method, Benefit –Cost analysis were used.

1. Relationship between Area, Production and Productivity

Linear Function: $Y = a + bX$

2. Marketing side

A) Marketable surplus

Estimated as

MS= P-C

Where,

MS = Marketable Surplus

P= Total Production

C=Total Requirements (Self-consumption, gifts and payments in kinds etc.)

B) Marketed Surplus is estimated as

Md.S = MS- Post Harvest losses (at farm)

Where,

Md.S = Marketed surplus

MS= Marketable Surplus

C) Marketing Cost

The Total Cost incurred on the marketing of selected crops by various intermediaries involved in moving the commodity from the producer till it reaches the final consumer is estimated as

C= C_p+C_{mi}+ …… +….C_{mn}

Where,

C= Total marketing cost (Rs/q)

Cp= Marketing cost borne by the producer (Rs/q)

C_{mi} = Marketing cost of ith Middlemen (Rs/q)

D) Producers' Share

Producer's share is expressed as percentage of the price received by the producer to retail price. The producers' share in consumer's rupee is calculated as

PS= (PR÷PC) x 100

Where,

PS = Producers' share in consumer rupee (Rs/q)

PR= Price received by producer (Rs/q)

PC= Price paid by Consumer (Rs/q)

E) Price Spread

It is the difference of the two prices, i.e., the price paid by the final consumer and the price received by the ultimate producer. It is calculated as follows:

PS= PC- PR

Where,

PS= Price spread (Rs/q)

PC= Price paid by the final consumer (Rs/q)

PR= Price received by the ultimate producer (Rs/q)

F) Producers' Net Price

The Net Price received by the farmers is estimated as the difference in gross price received and the sum of marketing cost incurred, including post- harvest loss at different stages of handling the produce. The marketing loss of the produce is calculated as gross price received by the farmers, wholesalers and retailers as it would have been realised as return if there were no losses. The Producers' Net price is expressed mathematically as

$$NP_P = GP_P - \{C_P + (ML_P \text{ x } GP_P)\}$$

$$or$$

$$NP_P = \{GP_P\} - \{C_P\} - \{ML_P \text{ x } GP_P\}$$

Where

NP_P = Net Price received by the producers (Rs/q)

GP_P = Gross Price received by the producer (Rs/q)

C_P = Marketing cost incurred by the producers (Rs/q)

ML_P = marketing losses (Rs/q)

3. Marketing efficiency: Marketing efficiency is essentially the degree of market performance. Efficient marketing system ensures an increase in farm production, increasing the level of real income and consumer satisfaction with a low possible cost. The following methods were applied to determine marketing efficiency:

1. Conventional Method: According to this method, marketing efficiency is determined by the ratio of value-added to total marketing cost.

$$\text{CMME} = \frac{Value\ added}{total\ marketing\ cost}$$

Where

CMME= Conventional Method Marketing Efficiency

Value added= (Consumer price- Net price received by producer)

2. Shepherd's Method (1965): The ratio of price paid by the consumer's to total marketing cost may be used as a measure of marketing efficiency.

$$\text{CM} = \frac{V}{I} - 1$$

Where

ME = Marketing Efficiency Index

V= Price paid by consumer (value of goods purchased)

I = Total marketing cost (cost + margins)

3. Acharya-Agarwal modified method (2001): According to Acharya- Agarwal marketing measures should include the total marketing cost, Net marketing margins, price received by farmer and price paid by the consumers.

$$\text{ME} = \frac{NP_P}{MC+MM} - 1$$

Where,

ME = Marketing Efficiency

NP_P= Net price received by the producer (Rs/q)

$MC =$ Marketing cost

$MM =$ Marketing margin

4. Cost Benefit Analysis

5. Garret Ranking Technique:

Per cent position = $\frac{100(R_{ij}-0.5)}{N_j}$

Where,

R_{ij}= Rank given for ith factor by the jth individual.

N_j= Number of factors ranked by the jth individual

1.12: Chapterisation

Chapter 1: Introduction: This chapter provides the detail of the study, which includes the introduction, review of literature, statement of the problem, area and period of study, objective, importance of the study, hypothesis and methodology.

Chapter 2: Socio- Economic Profile: This chapter explains in detail the socio economic profile of Phek district, the villages under the study and of the sample population.

Chapter 3: Analysis of Vegetable Farm size, Production and Productivity: This chapter discusses in detail the farm size, production and productivity of vegetables, cabbage, beans and potato. The relationship between vegetable farm size and production taking the data of both primary and secondary data of India, Nagaland, Phek district and of the Sample area has been analysed to prove the first hypothesis.

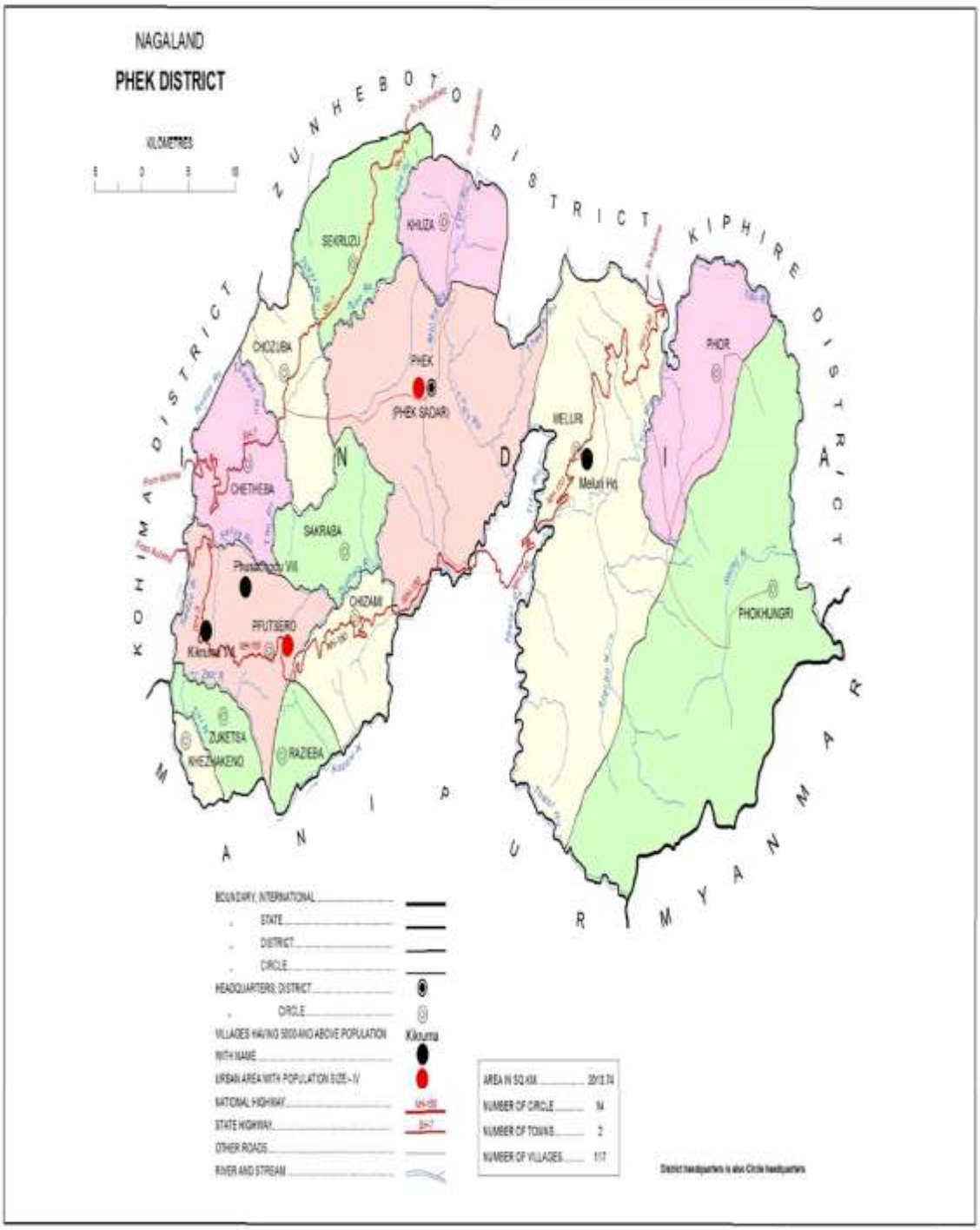
Chapter 4: Marketing and Market efficiency of Vegetables: This chapter discusses the various marketing channel and their efficiency of the sample vegetables under study. The various marketing channel and their efficiency has been analysed to prove the second hypothesis along with cost benefit ratio and Garret ranking to find out the various problem in the production and marketing of vegetables.

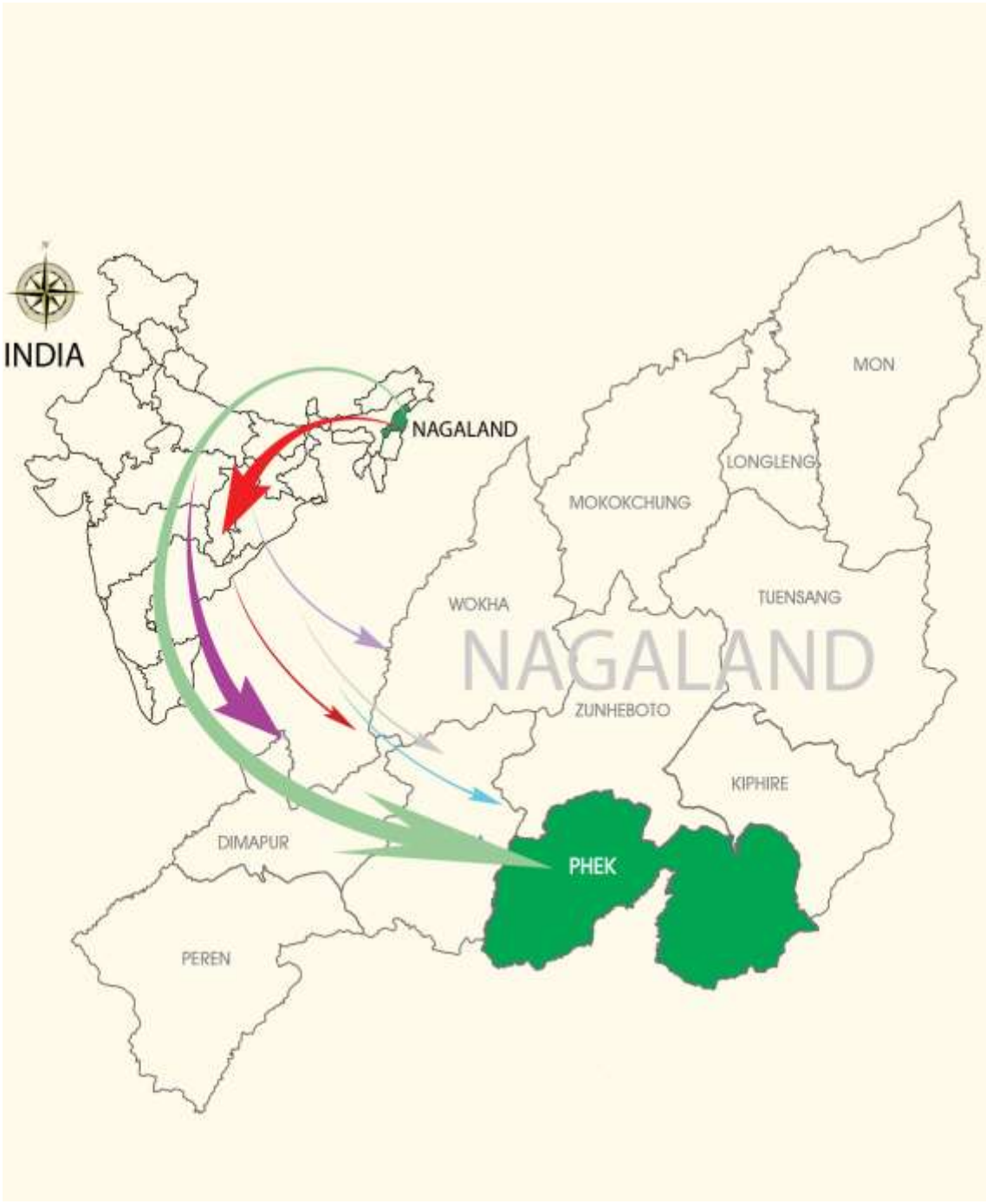
Chapter 5: Summary and Conclusion: This chapter summarizes all the findings and makes policy implications and recommendations based on the study.

CHAPTER 2

SOCIO ECONOMIC PROFILE

MAP OF PHEK DISTRICT, NAGALAND




INDIA
NAGALAND
MON
LONGLENG
MOKOKCHUNG
WOKHA
TUENSANG
NAGALAND
ZUNHEBOTO
KIPHIRE
DIMAPUR
PHEK
PEREN

2.1. BRIEF INTRODUCTION OF THE STATE, NAGALAND

Nagaland is a state located in the North-Eastern part of India, which was inaugurated on the 1st December 1963 as the Sixteenth State of the Indian Union. The State covers an area of 16,579 Sq.km and lies between 25060 and 27040 latitude North of Equator and between the longitudinal lines 930200 and 950150 East. The State is surrounded and bordered by the State of Assam in the East, Arunachal Pradesh on the west, Manipur on the South, and an international boundary Myanmar on the East. The State of Nagaland is mountainous, and the altitude varies between 194 meters and 3048 meters above sea level.

The population of Nagaland was 1978502 as per the 2011 census, of which 71.14% of the population lives in rural areas and only 28.86% in urban areas. The State has a very moderate minimal population density of 119 per sq.km. There are twelve districts in the State which are; Kohima, Dimapur, Kiphire, Longleng, Mokochung, Mon, Noklak, Peren, Phek, Tuensang, Wokha, and Zunheboto.

2.2.1 BRIEF INTRODUCTION OF PHEK DISTRICT

Phek is a hilly district rich in flora and fauna, which lies in the South-Eastern part of Nagaland, bordered by Myanmar in the east, Kohima district in the west. Zunheboto and Tuensang districts in the north, the state of Manipur in the south. It is lies between 940 11′ & 950 East Longitudes and 25028′ & 260 North Latitudes. The district covers an area of 2026 sq.km that is 12.22% of the total geographical area of Nagaland. It is the 2nd biggest district in Nagaland.

Table No 2: Geographical Features of Nagaland

Geographical Features of Nagaland	
Area	16,579 Sq.Km
Location	Lies between 2506° and 2704° latitude North of Equator and between the longitudinal lines 93020°and 95015°
Climate	Between 16°C to 31°C during summer with a minimum of 4°C to 24°C during winter
Rainfall	2000mm - 2500mm per year
Soil	Sandy loam and sandy clay loam with the PH ranging from 4.5-6.0
Major peak	Samarati, Japfu, Pauna
Major rivers	Doyang, Dhansiri, Dikhu, Tizu, Milak and Zungki
Boundary	Assam on North and west, Manipur on the south, Arunachal Pradesh on the North East and shares an international boundary with Myanmar on the East

Source: Statistical Handbook of Nagaland.

The word Phek comes from the word "Phekrekedz" which means "Watch Tower" (District Census Handbook, Phek). Phek is the eighth district of Nagaland which is situated 145 km away from the State capital Kohima. The district is inhabited by Chakesang and Pochury tribes. Till 1973 Phek was one of the sub-divisions under Kohima district. The Government of Nagaland approved Phek to be a separate and full- fledged district vide Notification No. APA 15/12/71 (HQ) dated 19th December 1973 (Brief Industrial Profile of Phek District, Nagaland State).

Khezhakenoma, which falls under one of the administrative circles of Phek district, is believed to be the dispersing place for further migration of the Lotha, Sema, Chakhesang, and Rengma

Table No.3: Demographic Features of Nagaland and Phek District 2011

Particulars	Nagaland	Phek
Total Population	1978502	163418
Male	10,24,649	83,743
Female	953853	79,675
Literacy	1342434	105893
Male	723957	57926
Female	618477	47967
Sex Ratio	931	951
Density of Population	119	81
Total work participation	974122	151350
Cultivators	420379	44069
Agricultural Labourers	22571	1311
Workers in Household Industries	9525	609
Other Workers	288704	17656

Source: Primary Census Abstract, Nagaland, 2011.Statistical Handbook of Nagaland.

Tribe as such it holds historical importance. Till 1946, the Chakhesang people, inhabitants of Phek district, were known as the Eastern Angami, and it was only after August 1946 that they came to be recognised by a separate name called 'Chakhesang'

denoting a separate tribe. The word "Chakhesang" is an amalgamation of the names of three sub-tribes - "cha" from "Chokri", "khe" from "Khezha (Kuzha)" and "Sang" from "Sangtam (Pochury)"(Directorate of Census Operations Nagaland). There are at least three main linguistic groups in the district, namely, Chokri, Khezha and Pochury. The medium of communication among the people is mainly Tenyidie, Nagamese and English.

2.2.2 Topography: The topography of the Phek district has a gentle slope to a high hill. The district has a very favourable climatic condition, which is ideally suited for horticulture, floriculture and other plantation crops which the district is famous for the different types of fruits and vegetables cultivation in the State. Phek District is also richly endowed with varieties of medicinal plants having high value in the international market. Numbers of perennial streams flow through the district, some of the major rivers that flow through the district are Sekizu, Laniye Tizu Rivers and three important lakes are Shilloi, Chida and Dzudu.

2.2.3 Administrative set up: There are 15(fifteen) administrative centers governing the whole of Phek district. Deputy Commissioner is the head of the administrative set-up in whole of the district and is posted at Phek, the district headquarters. Deputy Commissioner in Phek District HQ, ADC Hqs in Pfutsero , SDC Hqs in Meluri, Chizami, Chozuba , EAC Hqs in Sekruzu, Phokhungri, Sakraba, Khezhakeno, Chethaba, Khuza and Border magistrate in Zuketsa. Administratively, the district is divided into five R.D. Blocks Kikruma, Pfutsero, Sekruzu, Phek and Meluri.

Table No. 4: General overview of Phek District (As Per 2011 Census)

Existence of the State	21st December 1973
District Headquarter	Phek
Distance from state capital	123 km
Geographical area (In sq.km)	2,026 (Ranks 2nd in state and 494th in India)
Number of Sub-Division/Towns/Villages in the District	Sub-Division (14), Towns (2), Villages (117)
Number of Rural Development Blocks(RD Blocks)	5
Total Population	1,63,418 Males= 83,743 Females=79,675
Total Number of Households	Normal (36,556), Institution (59), Houseless (24)
Population Growth Rate (2001-2011)	10.27
Forest Cover (2017)	80.16% of total Geographical Area
Percentage of Urban/Rural population	15.04 (Urban), 84.96 (Rural)
Population Density	81 (Person per sq. Km.)
Sex Ratio	951 (Females per 1000 Males)
Child Ratio (Age Group 0-6 Years)	913 (Females per 1000 Males)
Literates	1,05,893 (Persons), 57,926 (Males), 47,967 (Females)
Literacy Rate (In % Age)	78.05% 83.66%(Males) 72.21% (Females)
Number of Total Workers	80,277 41,556 (Males), 38,721 (Females)

Sources: Govt. Official Records.

2.2.4 Demography of Phek District

Phek district has a population of 163,294 as per 2011 census, of which 83,684 are males and 79,610 females, with a sex ratio of 951 females for every 1000 males, which is above the National average of 940. The density of Phek district is 81 people per sq.km.

2.2.5 Urban Population in Phek District

Out of the total population of 163,294 according to 2011 census, only 15.07% lives in urban regions of district. In total 24,605 people lives in urban areas of which males are 13,230 and females are 11,375. Sex Ratio in urban region of Phek district is 860 as per 2011 census data. Similarly, child sex ratio in Phek district was 966 in 2011 census. Child population (0-6) in urban region was 3,387 of which males and females were 1,723 and 1,664.

2.2.6 Rural Population in Phek District

As per 2011 census, 84.93% population of Phek districts lives in rural areas of the district. The total Phek district population living in rural areas is 138,689, of which males and females are 70,454 and 68,235, respectively. In rural areas of Phek district, sex ratio is 969 females per 1000 males. Child population in the age 0-6 is 24,151 in rural areas of which males were 12,654 and females were 11,497. The child population comprises 17.96% of the total rural population of Phek district.

2.2.7 Phek District Literacy Rate

Phek District has a high literacy rate of 78.05%, which is above the National average of 70.04% with a total literate population of 150,893 of which male and female were 57,926 and 47,967 respectively. The literacy rate of male is 83.66%, and female is 72.21%. Literacy rate in rural areas of Phek district is 77.39% as per census data 2011.

2.2.8 Rainfall and Climate

The district enjoys a cold, humid subtropical climate, where the winter is cold, and summer is mild and warm. Monsoon sets in by the last week of May and retreats by the end of September. It receives an annual average rainfall between 1500.5 mm to 1527 mm. The month of June and July receives the maximum rainfall with an average of 270.6mm.

The winters are cold, January, and February are the coldest months when the night temperature comes down to around 0ºC. In summer it is warm but not to a great extent it is moderately warm. Even during summer, the temperature does not rise beyond 32ºC, and the average summer temperature is 27ºC.

2.2.9 Culture & Traditions

The Chakhesangs and Pochuriys, who resides in Phek District, are known for their rich cultures and traditions. There are varieties of traditional attires and ornaments wore by these two tribes. They have melodies folk songs and the lively folk dances which have their significance and meaning. The people are expert craftsman and excel in making pots, baskets, sculptures and furniture. The society is patrimonial, but women enjoy a high status in their families and in society. The customary laws are unwritten but practiced by all villages. These laws are binding to members of the society and were passed on from generation to generation by word of mouth. The elderly people of the village decide and passed judgment on disputes and matters concerning the village .Some of the significant festivals of the district are Ebuchüketonye, Enonye, Erünye, Kaputenye, Nazhu, Satakhu, Sükrünye, Tsükhenye, Yemshe and Yikhenyeeserving the rich culture and to promote eco-tourism (Phek District, District of Nagaland).

2.2.10 Flora and Fauna

A good number of wild animals and birds are found in abundance in the district due to restriction on hunting imposed by the village councils. There are wild animals and birds like Himalayan Black Bear, Sambar, Barking Deer, Wild Boar, Monkey, Civet Cat, Jungle Cat, Pangolin, Porcupine, Mole, Slow Loris, Fruit Bat and birds like; Red Jungle Fowl, Kalij Hheasant, Hill Myna, Green Pigeon, Emerald Dove, Spotted Dove, Bulbul, Koel, Owl, Spotted Owlet, Royal Pigeon, Hoopoe, Black Drongo and Tailor Bird. The natural forest in Phek district is a storehouse of beautiful orchids, medicinal plants, and different hill bamboo species which are of traditional importance to the local people.

2.2.11 Forest Cover

The district of Phek is blessed with evergreen sub-tropical and temperate coniferous forest which supports a variety of flora and fauna. About 70% of the land is covered with a thick evergreen forest. The forest type of the district varies from Northern Montane Wet Temperate forest to Northern Sub Tropical Pine forest. The area is also abundant with bamboos and canes as well as broom grasses. These types of forests are found on the higher reaches of the tallest mountains in Nagaland above 2000 meters in Japfü, Saramati, Satoi and Chentang ranges. The species are typically evergreen with Quercus, Michelia, Magnolia, Prunus, Schima, Alnus and Betula. The wet temperate forest found in Phek consists of lauraceous forest, lower and upper elevation oak forests of the eastern Himalaya types.

2.2.12 Economy

Agricultural activities pre-dominates the district economy. The primary farming system in the district is ‘jhum cultivation’, commonly known as shifting cultivation, practiced

along with terrace cultivation on the hilly areas where mixed cropping pattern is followed during kharif season. Rice is the dominant crop, followed by maize, yam, cabbage, potato, beans, pulses and varieties of vegetable crops. In recent years, cultivation of horticultural crops; vegetables, fruits and flowers and cash crops have gained ground. The total area under horticulture was 1,533 hectares in 2001. The top five vegetable crops, acreage wise the largest was potato, followed by leafy vegetables and colocassia, chowchow, tapioca and others. In terms of production, the potato was the highest followed by chilli, leafy vegetables, chowchow and tapioca. The highest yield per hectare was chowchow, followed by potato, colocassia, tree tomato and peas.

2.2.13 Horticulture in Phek

The Geographical and climatic condition of the Phek suits well for the production of the horticultural crops and they can be grown as cash crops. The major fruit crops of the district is passion fruit, Kiwi, Guava, Lemon, Papaya and Banana etc., however Potato, Cabbage, Tomato, Tapioca, Colacassia, leafy vegetable etc. are the main vegetable crops of the district.

2.2.14 Geography

Phek district is a mountainous region, it lies in the South-East of Nagaland and is bounded by Burma (Myanmar) in the east, Manipur state in the south, Kohima district on the west, and Zunheboto district on the north. About 70% of the land is covered with a thick evergreen forest. Zanibu is the highest mountain, which is about 8000ft above sea-level. It extends in latitudes between 25°30'20"N to 25°5'45"N and longitude between 94°11'25"N to 94°54'35" E. The altitude ranges from 400 meters at Tizü river bed (below Avangkhu village near the border of Myanmar) to 3040 meters above sea level at Mollen

peak. The District has an area of 2026 sq.km. representing 12.22% of the total area of the state of Nagaland (16,579 Sq.km.). In terms of area, the district occupies the second place among the eleven districts of the state. There are 117 villages in Phek District. Most of the villages are generally located in the hilltops. The villages are further divided under fourteen administrative circles as follows - Chetheba under which there are ten villages, Chizami under which there are six villages, Chozaba which has seven villages, Khezhakene (two villages), Khuza (seven villages), Meluri (thirteen villages), Pfutsero (seven villages), Phek Sadar (fifteen villages), Phokhungri (eleven villages), Phor (ten villages), Razieba (five villages), Sakraba (ten villages),Sekruzu (nine villages) and Zuketsa(five villages).

Table No.5: Number of Villages under each circle in Phek District

Administrative Divisions.

Sl. No	Name of the Sub-District/Division	Number of villages
1	Chetheba	9
2	Chizami	6
3	Chozuba	8
4	Khezakheno	2
5	Khuza	7
6	Meluri	13
7	Pfutsero	7
8	Phek Sadar	9
9	Phokhungri	11
10	Phor	10
11	Razieba	5
12	Sakraba	10
13	Sekruzu	9
14	Zuketsa	5
Total		117

Sources: State Government Official District Record.

Table No. 6: Population and Literacy Rate of Phek District according to 2011 census.

Census	Total Population			
	Male	Female	Total	Sex-ratio
2011	83,743	79,675	1,63,418 (7th Rank)	951
Urban	13,214	11,361	24,575	860
Rural	70,529	68,314	138,843	969
Child Population (0-6 years)	14,505	13,247	27,752	----
Population (7 years and above)	69,238	66,428	1,35,666	-----
Density per.sq.km	----------	----------	81	------
Literacy Rate (Percentage)	83.66 %	72.21%	78.05%	

Source: Statistical Handbook, Govt. of Nagaland

Table No. 7: Occupational Structure in Phek District according to 2011 census.

Occupation	Phek District		
	Male	Female	Total
(i) Total workers (main and marginal Workers)	41,556	38,721	80,277
(ii) Total Non-Workers	42,187	40,954	83,141
(iii) Cultivators	19,982	24,087	44,069
(iv) Agricultural Labourers	692	619	1,311
(v) Workers in household industry	303	306	609
(vi) Other Workers	13,405	4,251	17,656
(vii) Main Workers	34,382	29,263	63,645
(viii) Marginal Workers	7,174	9,458	16,632

Source: Statistical Handbook, Govt. of Nagaland

2.3 SOCIO-ECONOMIC PROFILE OF THE SAMPLE VILLAGES

This section describes the demographic and socio-economic characters and features of the sampled population. The sample villages are from Phek district. Twelve villages have been taken for the study. The demographic profile and various descriptions of the sample village and of the farmers has been shown in Table No.8, 9, 10, 11 and 12.

1. Enhulumi: Enhulumi is one of the villages under the Phek district, which has been selected for the study as a sample village. It is a village under the Chizami Circle of Phek district. The nearest town from the village is Pfutsero town which is just 7 km away, and the district headquarter is 60 km away from the village. The village has 230 households with a population of 1014, of which 497 are males, while 517 are females as per Population Census 2011 and VDB record of the village. Male population comprises 48%, while the females comprise 51%. The children in the age group of 0-6 comprises of 14.10%. The literacy rate of the village is 75.8% with a total literate population of 770. The number of male literate in the village is 406 and 364 females. Occupationally 276 were cultivators, 1 was agricultural labour and 78 were engaged in other activities. From the sample of 25 farmers from the village, the average age of the head of the family was 48.96. The average family size was 6, from the 25 farmers (producers) only one was found to be illiterate and the majority of the farmers studied between primary to high school, 7 farmers had studied till class 12 and none with a degree. Income wise from the 25 farmers under the sample all the farmer's income was above ₹ 75000/- annually from cultivation.

2. Kami: The village of Kami is under the Pfutsero Circle of Phek district. It is situated just about 7 km away from sub-district headquarter Pfutsero and 76 km away from

district headquarter Phek. The village has a household of 247 families comprising of the 1239 total population of the village, where males are 621 and 618 females in the village and the children in the age group of 0-6 years accounts to 8.23% of the total population of village. The literacy rate of the village shows a very favourable literacy rate of 87.01% male literate accounts to 553 and 525 females. In the official record as per 2011 census in the village 198 were cultivators, 4 agricultural labour and 116 engaged in other activities. From the sample of 25 farmers taken from the village the average age of the head of the family was 51.04 with the average family size as 5. Educationally none of the farmers were illiterate, and most of them (21) had education till high school. Economically 23 farmers' income was over ₹ 75000/- annually with four farmers' income above ₹ 100000/-.

3. Lasumi: Lasumi village is located 36 km away from the district headquarter Phek and 18 km away from Subdivision Pfutsero. It is under Pfutsero circle/Teshil it is in the border of the Phek District and Senapati District. Senapati District Paomata is South towards this place. It is near to the Manipur State Border. The village has a household of 216 with a population of 1048, and the male population is 522 and female is 526, which shows a higher female sex ratio. The children (0-6 years) comprises of 13.93% of the population. The literacy rate of the village is 69.66%, where males are 378 and 352 females Occupationally 419 people were cultivators, two agricultural workers and 65 were engaged in other activities. In the sample farmers, the average age of the farmers was 42.68, with an average family size of 5. None of the selected 25 farmers was illiterate as such all of them were literate and some holding bachelor degree which shows

a high literacy in the village. All the 25 farmers except one were found to be having annual income below ₹ 75000/-.

4. Lekromi: The village of Lekromi is under Pfutsero Tehsil/circle in Phek District. It is located 29 km towards west from district headquarters Phek. Lekromi village has a total population of 950 with a household of 229. The male population comprises of 453 and female 497. The child population consists of 14.84%. The literacy rate of Lekromi village was 46.84%. The average age of the head of the selected 25 farmers was 49.4, with an average family size of 5. Only one farmer was illiterate with 23 farmers who had studied upto high school and one with a degree. All the farmers selected for the study except one received an annual income above ₹ 75000/-.

5. Leshemi: Leshemi village is located in Zuketsa Tehsil of Phek district. It is situated just 1 km away from sub-district headquarter Zuketsa and 85 km away from district headquarter Phek. The village has a total population of 1877 people, male 968 and female 909 with 353 households. Pfutsero town is the nearest town to Leshemi, which is approximately 14 km away. The total number of a literate person in the village is 1477. The number of cultivators was 669, 2 as agricultural labour and 225 were engaged in other activities as per the 2011 census. From the 25 farmers selected for the study the average age of the head of the family was 49.4 years and the average size of the family was found to be 5. All the 25 farmers selected from the village were literate, and 88% of the farmers receive an annual income over ₹ 75000/-

6. Mesulumi: Mesulumi village is under the Pfutsero Tehsil/circle. It is located 21 km towards South from district headquarters Phek and 7 km away from Pfutsero. Mesulumi

is one of the biggest villages with a family household of 508. It has a total population of 2,037, comprising of 1042 males and 995 females. The literacy rate of the village is 54.57%, 695 males and 564 females, 16.30% of the population in the village falls in the age group of 0-6 years. Occupation wise 217 people were cultivators, 10 were agricultural Labourers, and 197 were engaged in other activities. The average age of the 25 farmers was 48.8 years, with an average family size of 6; all the farmers selected for the study were literate. All the farmers selected for the study from the village except one received an annual income over ₹75000/-.

7. Pfutseromi village: Pfutseromi village is the biggest village among the sample villages in terms of population with a total population of 3378. The village is under the Pfutsero Tehsil of Phek district. It is situated 3 km away from sub-district headquarter Pfutsero and 75 km away from district headquarter Phek. The village has a household of 618 as per 2011 census there were 1745 males and 1633 females and the children (0-6 years) comprised of 11.69% of the village population. The number of literate population in the village was 2468, 1309 males and 1159 females. The occupational structure showed that there were 1104 cultivators, 3 agricultural Labourers and 369 engaged in other activities. The average age of the farmer taken for the study was found to be 49.28, with an average family size of 4. All the farmers selected for the study were literate, which shows a very positive view of the village. The income of all the farmers was above ₹ 75000/-annually.

8. Razeba: Razeba is one of the places selected for the study under Phek district, Nagaland. Razeba has a household of 172 with a total population of 780 as per 2011 census, where the male population comprised of 407 and 37 females. The number of literate population in Razeba is 504,302 males and 202 females. Under the occupational

structure, 205 people are cultivators, 6 are agricultural Labourers, and 146 are engaged in other occupation. From the sample selected farmers in Razeba, the average age was 49.84, only one farmer was found to be illiterate the rest 24 farmers were literate. 23 farmers income annual was found to be over ₹ 75000/-.

9. Tsupufme: The village of Tsupfume which falls under Razieba Tehsil of Phek district in Nagaland is situated 2 km away from sub-district headquarters Razieba and 79 km away from district headquarter Phek. The village has a household of 260 and a population of 1070, the village has 570 males and 500 females, and children comprise of 18.79 %. The number of a literate person in the village is 655.Occupationally 403 were cultivators, 2 agricultural Labourers, and 79 engaged in other works. The average age of the farmers selected from the study is 53.68 years, and the average family size is 5, all the farmers selected for the study were literate, 80% of the farmers received an annual income of more than ₹ 75000/-

10. Zapami: The village of Zapami comes under Pfutsero Tehsil in Phek District, India. It is located 33km towards west from District headquarters Phek. The village has a population of 1308, with family household of 232. The village comprises of 682 males and 626 females and 11.39% of the population in the age group of 0-6 years. The number of literate population in the village is 976; male comprises of 448 and female 528. In the village 454 were cultivators, 27 agricultural labour and 63 involved in other professions. From the 25 farmers selected the average age of the farmer was 49.48 with an average family size of 5. Like most of the sample villages even in this village all the

farmers under the study were educated or literate, and 68% of the farmer's income annually was above ₹ 75000/- and only 3% of the farmer's income was below ₹ 75000/-

11. Zelume: Zelume village is located in Razieba Tehsil of Phek district in Nagaland. It is situated 9 km away from sub-district headquarter Razieba and 79 km away from district headquarter Phek. It has a total population of 1,076 peoples. There are 236 houses in Zelume village. Pfutsero is the nearest town to Zelume, which is 15 km away. The village has a male population of 552 and 524 females. The number of literate population in the village is 565 with 325 males and 240 females. Occupationally there are 349 cultivators, 4 agricultural Labourers and 87 who are engaged in other professions. The average age of the 25 farmers selected for the study was 48.84 years with an average family size of 5. All the 25 farmers from the village had some education as such none of the farmer under the study was illiterate, 76% of the farmers' income was above ₹ 75000/- annually, with 12 % of farmers receiving below ₹ 75000/-.

12. Zhavame: Zhavame is one of the biggest villages in Phek district, and the Village comes under Pfutsero Tehsil. It is located 30 km towards South from District headquarters Phek, 5 km away from sub-district headquarter Razieba and 79 km away from district headquarter Phek. The village is also recognised as the “Vegetable Village” due to its production of vegetables. The village has a total household of 236 and a total population of 3208 where 1642 are males, and 1566 are females. The number of a literate person in the village is 1791, 1037 males and 754 females. There are 1,104 cultivators in the village 9 agricultural Labourers and 146 engaged in other occupations. The average age of the farmers selected from the village was 53.48 and an average family size of 5.

All the farmers selected from this Village were literate. 76% of the farmers received an annual income of above ₹ 75000/-, and 20% received annual income above ₹ 100000/-, and only 4% received an annual income below ₹ 75000/-.

Table No.8: Profile of the Sample Villages under Study in Phek District.

Phek District, Nagaland. Villages Under the Study	Category						
	Total Household	Total Population			Literacy		
		Male	Female	Total	Male	Female	Total
1. Enhulumi	230	497	517	1,014	406	364	770 (75.9%)
2. Kami	247	621	618	1,239	553	525	1,078 (87.01%)
3. Lasumi	216	522	526	1,048	378	352	730 (69.66%)
4. Lekromi	229	453	497	950	232	213	445 (46.84%)
5. Leshmi	353	968	909	1,877	770	707	1,477 (78.69%)
6. Mesulumi	508	1,042	995	2,037	695	564	1,259 (54.57%)
7. Pfutseromi	618	1,745	1,633	3,378	1,309	1,159	2,468 (73.06%)
8. Razeba	172	407	373	780	302	202	504 (64.62%)
9. Tsupfume	260	570	500	1,070	363	292	655 (61.21%)
10. Zapami	232	682	626	1,308	448	528	976 (74.62%)
11. Zelume	236	552	524	1,076	325	240	565 (52.51%)
12. Zhavame	637	1,642	1,566	3,208	1,037	754	1,791

Sources: Field Survey 2016-2017

Table No. 9: Occupational Structure of the Sample Villages.

Phek District, Nagaland Villages Under the Study	Category								
	Cultivators			Agricultural Labourers			Other Workers		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
1.Enhulumi	156	144	300	1	-	1	60	18	78
2.Kami	69	129	198	1	3	4	87	29	116
3.Lasumi	180	239	419	1		2	51	14	65
4.Lekromi	143	237	380	0	0	0	62	22	84
5.Leshmi	310	359	669	1	1	2	132	93	225
6.Mesulumi	245	371	616	6	4	10	147	40	187
7.Pfutseromi	452	552	1104	3	-	3	218	151	369
8.Razeba	90	125	215	5	1	6	105	41	146
9.Tsupfume	173	230	403	1	1	2	62	17	79
10.Zapami	217	237	454	15	12	27	36	27	63
11.Zelume	192	157	349	3	1	4	72	15	87
12.Zhavame	427	632	1,104	4	5	9	119	27	146

Sources: District Census Handbook Phek 2011

Table No. 10: Population of the Sample Village with Average Age and Size of the Family

Phek District, Nagaland Villages Under the Study	Population		Average age of the Head of the family	Average size of the family
	M	F		
1.Enhulumi	15	10	48.96	6.00
2.Kami	20	5	51.04	5.00
3.Lasumi	16	9	42.68	5.00
4.Lekromi	14	11	49.4	5.00
5.Leshmi	19	6	49.68	5.00
6.Mesulumi	14	11	48.8	6.00
7.Pfutseromi	16	9	49.28	4.00
8.Razeba	21	4	49.84	6.00
9.Tsupfume	20	5	53.68	5.00
10.Zapami	17	8	49.48	5.00
11.Zelume	16	9	48.84	6.00
12.Zhavame	17	8	53.48	5.00
Total	205	95	49.59	5.25

Source: Field Survey 2016-2017

Table No.11: Educational Status of the Sample Population

Name of the Villages	Educational Qualification				
	Illiterate	Below HSLC	Higher Secondary	Degree	Total
1.Enhulumi	1	17	7	0	25
2.Kami	0	21	1	3	25
3.Lasumi	0	20	2	3	25
4.Lekromi	1	23	0	1	25
5.Leshmi	0	19	2	4	25
6.Mesulumi	0	20	1	4	25
7.Pfutseromi	0	18	1	6	25
8.Razeba	1	19	1	4	25
9.Tsupfume	0	23	1	1	25
10.Zapami	0	15	6	4	25
11.Zelume	0	17	7	1	25
12.Zhavame	0	17	2	6	25
Total	3 (1%)	229 (76.33%)	31 (10.33%)	37 (12.33%)	300

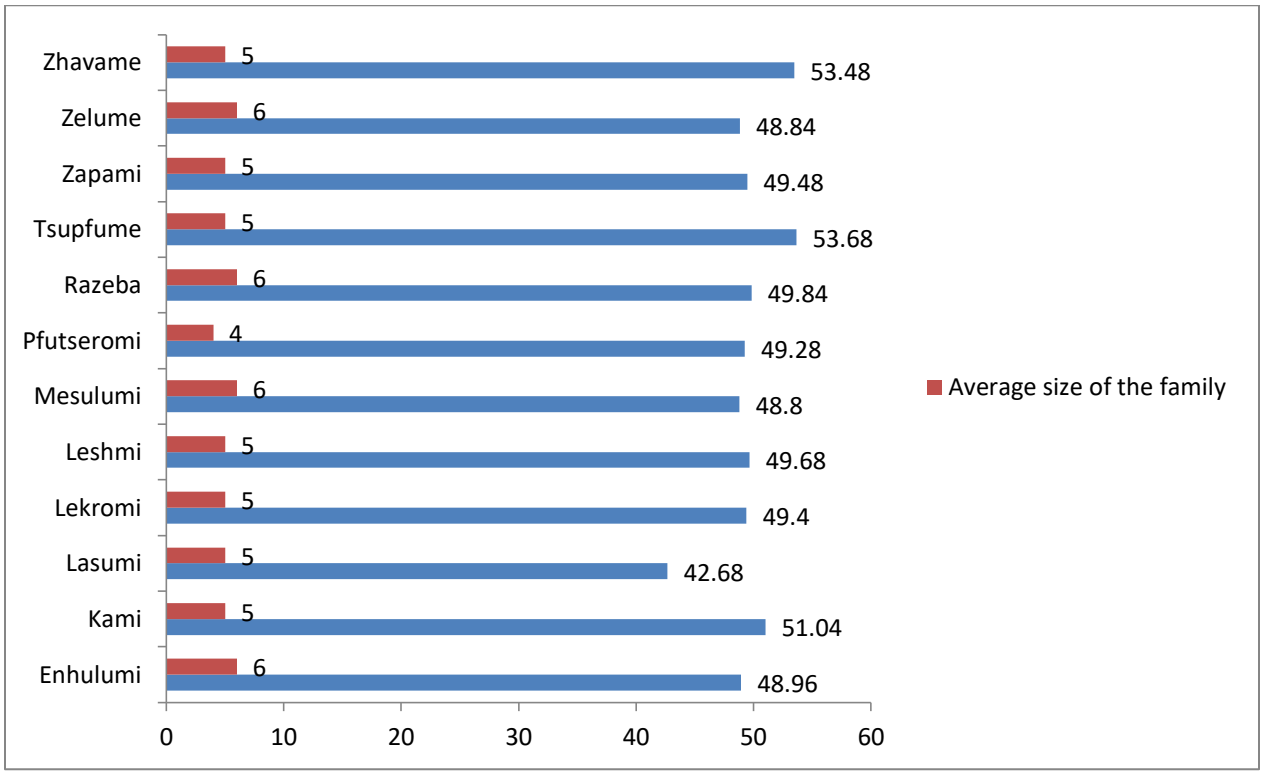
Source: Field Survey 2016-2017

Table No. 12. Income Distribution of the Sample Population in ₹ annually (Yearly)

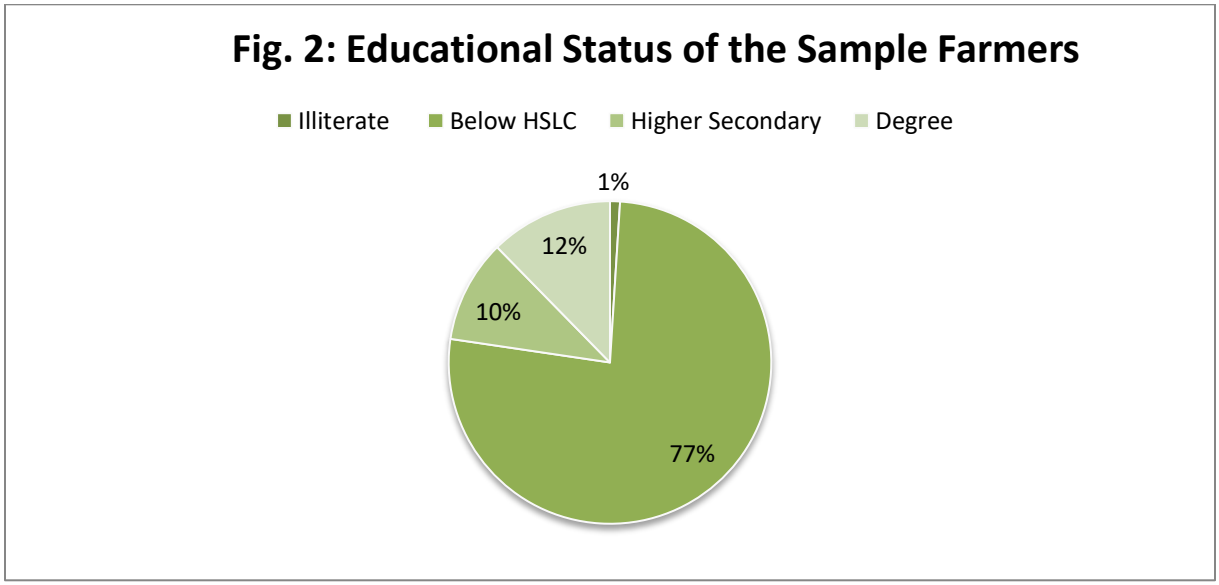
Phek District, Nagaland Villages Under the Study	Below ₹ 75000	₹ 75000 - ₹ 99999	Above 1lakh ₹ 100000
1.Enhulumi	0 (0%)	23 (92%)	2 (8%)
2.Kami	2 (8%)	19 (76%)	4 (16%)
3.Lasumi	1 (4%)	20 (80%)	4 (16%)
4.Lekromi	1 (4%)	20 (80%)	4 (16%)
5.Leshmi	1(4%)	22 (88%)	2 (8%)
6.Mesulumi	1(4%)	23 (92%)	1 (4%)
7.Pfutseromi	0 (0%)	15 (60%)	10 (40%)
8.Razeba	2 (8%)	12 (48%)	11 (44%)
9.Tsupfume	4 (16%)	20 (80%)	1 (4%)
10.Zapami	3 (12%)	17 (68%)	5 (20%)
11.Zelume	3 (12%)	19 (76%)	3 (12%)
12.Zhavame	1 (4%)	19 (76%)	5 (20%)
Total	19 (6.33%)	229 (76.33%)	52 (17.33%)

Source: Field Survey 2016-2017

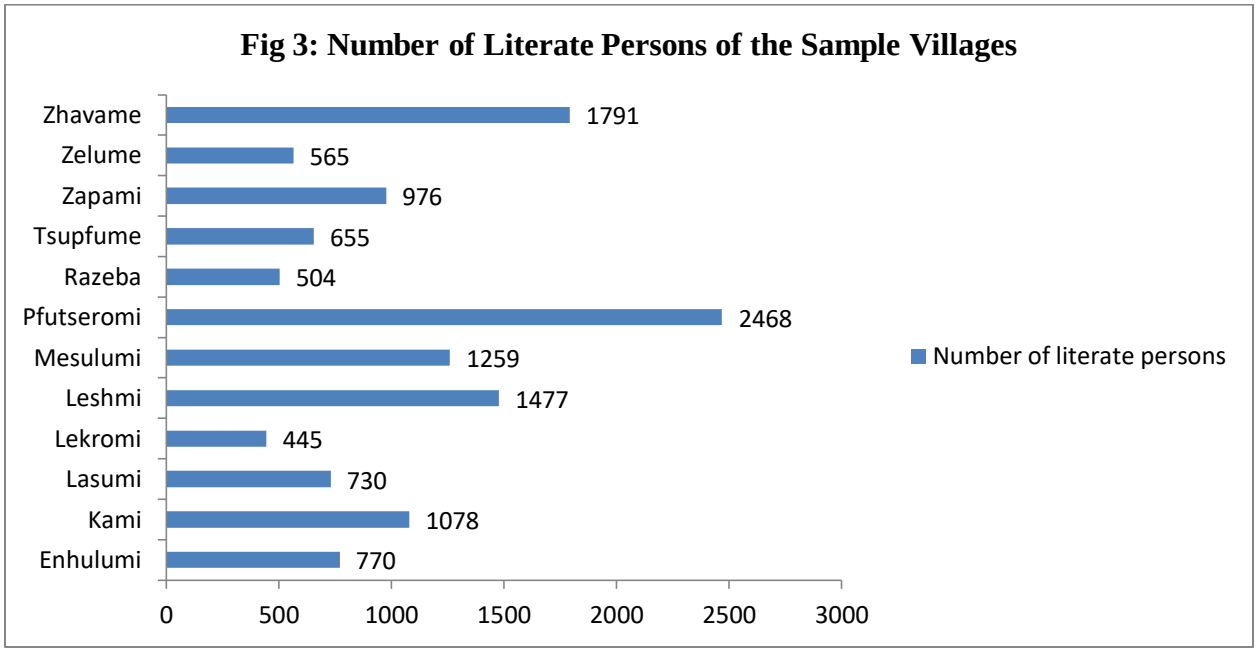
Fig .1: Average Age of the Farmer and the Average Size of the Family



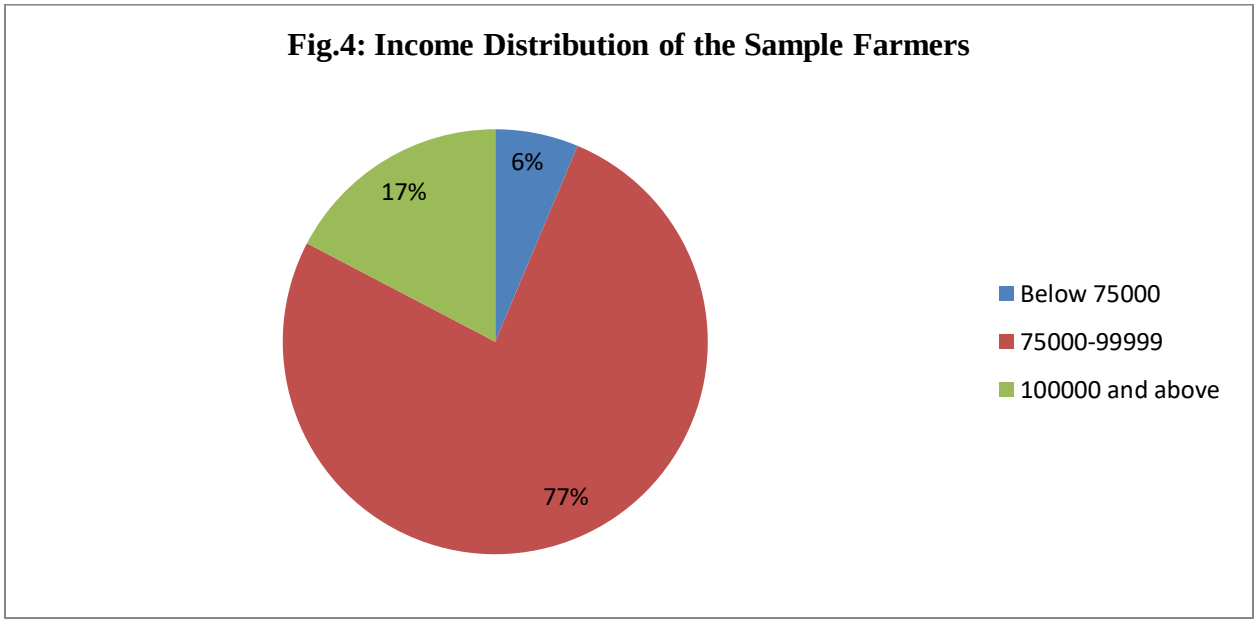
Source: Field Survey 2016-2017



Source: Field Survey 2016-2017



Source: Field Survey 2016-2017



Source: Field Survey 2016-2017

Twelve villages were taken for the study from the Phek district, the villages were purposively chosen based on Production and Marketing of Vegetables. Among the twelve village Pfutseromi village has the largest population (3378) followed by Zhavame Village which has a total population of 3208 and Lekromi has the least population with total population 950. Zhavame has the highest number of household, it has 637 household followed by Pfutseromi with a total household of 618. Razeba has the least number of household it has only 172 households.

In terms of Literacy the Pfutseromi village has the highest number of literate person, the village has 2468 literate persons followed by the village of Zhavame with 1791 literate person. In terms of percentage the village of Kami has the highest literacy rate of 87.01% followed by Leshmi with 78.69%. Table no 10 and fig 1, shows the overall average age of the farmers' taken collectively from the 12 villages which was 49.59 years and he average family size of all the farmers under study was found to be 5.25. In the table no.11, we see that only 1% of the farmers were illiterate which shows a high literacy rate of the district. It was observed that majority of the farmers i.e. 76.33% of the farmers had studied between primary to High School, 10.33% had studied between high school to HSSLC and 12.33% farmers had studied between HSSLC to graduate level.

Only 6.33% of the farmers received an annual income below ₹ 75000 which is shown in table no 12 and fig 4.where 76.33% which is the majority of the farmers received an annual income between ₹ 75000-100000 and 17.33% farmers received an annual income above ₹ 100000, which shows that most of the farmers are getting good returns from agricultural sector.

The district of Phek has road connectivity to all the villages with both pucca and kaccha road. The State government along with the district administration has ensured that all the villages were connected with roadways. In all the twelve sample village there were proper road connectivity however the road within the village were kaccha road maintained by the village council. The roads are maintained using the various funds which the village council receives from time to time from the central and the state government.

The State Government of Nagaland along with the Phek district administration has ensured electrification to each and every villages and town under Phek district, as such in all the sample villages there was 100% electrification in the entire household. The household were required a nominal fee monthly for the usage of electricity. In all the sample village there were village street light supplied and donated by the electrical department and some individuals.

In the sample village 90% (270 Household) were semi pucca house made of wood and 10% (30 Household) of were pucca house made of bricks. With regard to sanitation each household had their own proper toilets which were either pucca and kaccha based on their house. In every village there were also community toilets constructed which were pucca made by the village council from various funds they received. Every sample village was free from open defection which depicts the high sanitation standard of the village. Every sample village under the study had community water tank which supplied water to the community. The sample village also had ponds and streams through which the people fetched clean drinking water.

From the sample study of farmers 88% (264 farmers) were fully dependent on agriculture and vegetable production as their primary occupation. Only 12% (36 farmers) were indulged in other activities besides vegetable production, with 7 of them employed in government sector and 29 employed in private sector such as teaching, driver. Thus majority of the sample population were fully dependent on vegetable production as their main source of income to sustain their life and to look after their family.

CHAPTER 3

ANALYSIS OF VEGETABLE FARM SIZE, PRODUCTION AND PRODUCTIVITY

This chapter discusses and analyses the relationship between the size of the farm and production and productivity of Cabbage, Beans, Potato and Vegetable to prove the first hypothesis.

3.1 Farm Size Distribution:

The size of the farm of the farmers has been divided into five categories which are as below

1. Marginal Farmers = Below 1 Hectare (0-1)
2. Small Farmers = 1-2 Hectare
3. Semi- Medium farmers = 2 – 4 Hectare
4. Medium Farmers = 4 -10 Hectare
5. Large farmers = 10 Hectare and above.

In the survey of the area under study, almost all the farmers come under marginal, small and semi-medium farmers.

3.1.1 Potato Farm size in the Study area from 12 villages

Table No.13 and fig.5 shows the category of Potato farmers which has been categorised based on their field size from the Study area, i.e. from the twelve villages from Phek district, Nagaland taking 25 farmers from each village which accounts to 300 farmers in total.

It can be seen in table No.13 and fig.5 that 82.67% of the Potato farmers are in the category of marginal farmers having a farm size below 1 Ha. They are the majority of the farmers which was found during the field survey, which depicts that many of the farmers have a land size of not even 1 Ha. Only 16%, i.e., 48 farmers in total were found to have a field size above 1 Ha but less than 2 Ha. A mere 1.33% of the farmers had a field size of above 2 Ha but less than 4 Ha. In the survey it was found that only four farmers had a field size just above 2 Ha but none with 3 Ha. From the survey, it was noticed that only a few hardly any farmers had a farm size above 2 Ha. None of the farmers in the study had a farm size above 4 Ha.

Table No. 13: Category/ Division of Potato Farmers

Size of the Holding	Total area (in Ha)	Total number of farmers	Percentage of the farmers
Marginal (0Ha-1Ha)	124 Ha	248	82.67 %
Small (1Ha-2Ha)	57.5 Ha	48	16 %
Semi-medium (2Ha-4Ha)	8 Ha	4	1.33 %
Medium (4Ha-10Ha)	0	0	0
Large 10 Ha and above	0	0	0
Total	189.5 Ha	300	100 %

Source: Field Survey 2016-17

Fig.5: Percentage of the Potato Farmers Based on their Field Size

Sources: Field Survey 2016-2017

3.1.2 Number of Potato farmers according to the different Farm Size of the twelve Villages under the study in Phek District, Nagaland.

It can be noticed in the table No.14 and fig.6, that in all the twelve villages under the study that the number of marginal farmers are majority except in Zhavame and Razeba where the number of small farmers is slightly more than the marginal farmers. Zhavame village which is also known as Vegetable village has 14 farmers .i.e.56% of farmers under the small farmers and 3 farmers .i.e.12% of farmers fall in the category of semi-medium farmers, and 8 farmers .i.e. 32% are under marginal farmers. Razeba has 13 farmers .i.e. 52% of the farmers had a field size between 1-2 Ha which falls under the category of small farmers and 48% .i.e. 12 farmers are under the category of marginal farmers. Only Zhavame and Leshmi have farmers who have field size above 2 Ha, which comes under the semi-medium farmers. Zhavame has 3 farmers, i.e. 12%, and Leshmi has 1 farmer, i.e. 4% of the farmers. Enhulumi and Lasumi are the two only villages where all the farmers have potato field size under 1 Ha which puts them under the category of marginal farmers. Marginal farmers comprised of 82.67%, small farmer comprised of 16% and only 1.33% of farmers are semi-medium farmers.

Table No. 14: Distribution of Potato farmers according to farm size holdings

Sl. No	Name of Villages	Distribution of farmers according to farm size holdings			
		Marginal farmers (0Ha-1Ha)	Small farmers (1Ha-2Ha)	Semi-medium farmers (2Ha-4Ha)	Total number of farmers
1	Enhulumi	25 (100%)	0	0	25
2	Kami	23 (92%)	2 (8%)	0	25
3	Lasumi	25 (100%)	0	0	25
4	Lekromi	20 (80%)	5 (20%)	0	25
5	Leshmi	23 (92%)	1 (4%)	1 (4%)	25
6	Mesulumi	19 (76%)	6 (24%)	0	25
7	Pfutseromi	23 (92%)	2 (8%)	0	25
8	Razeba	12 (48%)	13 (52%)	0	25
9	Tsupfume	22 (88%)	3 (12%)	0	25
10	Zapami	24 (96%)	1 (4%)	0	25
11	Zelume	24 (96%)	1 (4%)	0	25
12	Zhavame	8 (32%)	14 (56%)	3 (12%)	25
13	Total	248(82.67 %)	48 (16 %)	4 (1.33 %)	300

Source: Field Survey 2016-2017

3.1.3 Total Area of Potato farm size of the villages under the study

Table No.15 and fig.7, presents the different field size being cultivated by the potato farmers in the villages under the study. The total area under potato cultivation is found to be 189.5 Ha from the 12 different villages under the study, out of which 124 Ha is cultivated by the marginal farmers (below 1 Ha), 57.5 Ha is cultivated by the farmers under small farmers (1 Ha -2Ha), and 8 Ha is cultivated by the semi-medium farmers i.e. by the farmers having a field size of 2 Ha – 4 Ha. In terms of percentage, 65.44% of areas fall under the marginal farmers which are the majority of the farmers depicting the scenario of the farmers where they have a land size below 1 Ha. 30.34% of the total area under potato cultivation are being cultivated by the farmers who have a field size of above 1 Ha but less than 2 Ha, they fall in the category of small farmers. Only 4.22% of the area under potato cultivation area cultivated by the farmers who have a field size of above 2 Ha but less than 4 Ha as such they are semi-medium farmers.

Enhulumi and Lasumi are the two villages with least area under potato cultivation, both the villages cultivate potato only in a total area of 12.5 Ha. Both the village has some similarities as such the farmers in the two villages comes under the marginal farmers cultivating in an area of less than 1 Ha.

Four Villages i.e. Kami, Pfutseromi, Zapami and Zelume has an equal area under cultivation i.e. 13.5 Ha respectively. All these four villages have both marginal farmers and small farmers. Kami and Pfutseromi both has 11.5 Ha cultivated by small farmers and 2 Ha each cultivated by small farmers , whereas both Zapami and Zelume has 12 Ha each cultivated by the marginal farmers and 1.5 Ha each cultivated by small farmers cultivating in a land above 1 Ha but less than 2 Ha. In the mentioned four villages none

of the farmers were cultivating in an area above 2 Ha, all the farmers in the four villages were marginal and small farmers.

Leshmi and Zhavame are the only two villages which have farmers cultivating in an area over 2 Ha, i.e. by the semi-medium farmers. Leshmi has 2 Ha cultivated by semi-medium farmers, and Zhavame has 6 Ha area under potato cultivation cultivated by semi-medium farmers. Only Leshmi and Zhavame villages have the marginal farmers, small farmers and semi-medium farmers.

The largest area under potato cultivation is from Zhavame village. The village in total cultivates potato in an area of 28.5 Ha i.e. 15.03% out of the 12 villages. The village has marginal farmers who cultivate potato in an area less than 1 Ha, small farmers cultivating in an area above Ha but less than 2 Ha and semi-medium farmers who cultivates in an area above 2 Ha but less than 4 Ha. Zhavame village has more small farmers as compared to marginal farmers; it has an area of 18.5 Ha cultivated by small farmers and just 4 Ha which is the least area under the cultivation by the marginal farmers and 6 Ha area is under the cultivation of semi-medium farmers. It is a village which has the least marginal farmers and also the only village which has 6 Ha the highest under the semi-medium farmers, those farmers who cultivates in an area above 2 Ha but less than 4 Ha.

Razeba has the second largest area under potato cultivation, and it has 20.5 Ha, i.e. 10.82% of the twelve villages under the study. It has only 6 Ha area potato cultivation under marginal farmers, the major junk of an area, i.e. 14.5 Ha under the cultivation of small farmers. It is the only village besides Zhavame village which has more small farmers than marginal farmers from the study of twelve villages.

Table No.15: Area of Potato farm under Cultivation in the study Area

Sl.No	Name of Villages	Marginal farmers (0Ha-1Ha)	Small farmers (1Ha-2Ha)	Semi-medium farmers (2Ha-4Ha)	Total in Ha	Percentage
1	Enhulumi	12.5	0	0	12.5	6.60%
2	Kami	11.5	2	0	13.5	7.12%
3	Lasumi	12.5	0	0	12.5	6.60%
4	Lekromi	10	5.5	0	15.5	8.18%
5	Leshmi	11.5	1.5	2	15	7.92%
6	Mesulumi	9.5	7	0	16.5	8.71%
7	Pfutseromi	11.5	2	0	13.5	7.12%
8	Razeba	6	14.5	0	20.5	10.82%
9	Tsupfume	11	3.5	0	14.5	7.65%
10	Zapami	12	1.5	0	13.5	7.12%
11	Zelume	12	1.5	0	13.5	7.12%
12	Zhavame	4	18.5	6	28.5	15.04%
13	Total	124 Ha	57.5 Ha	8 Ha	189.5 Ha	100%

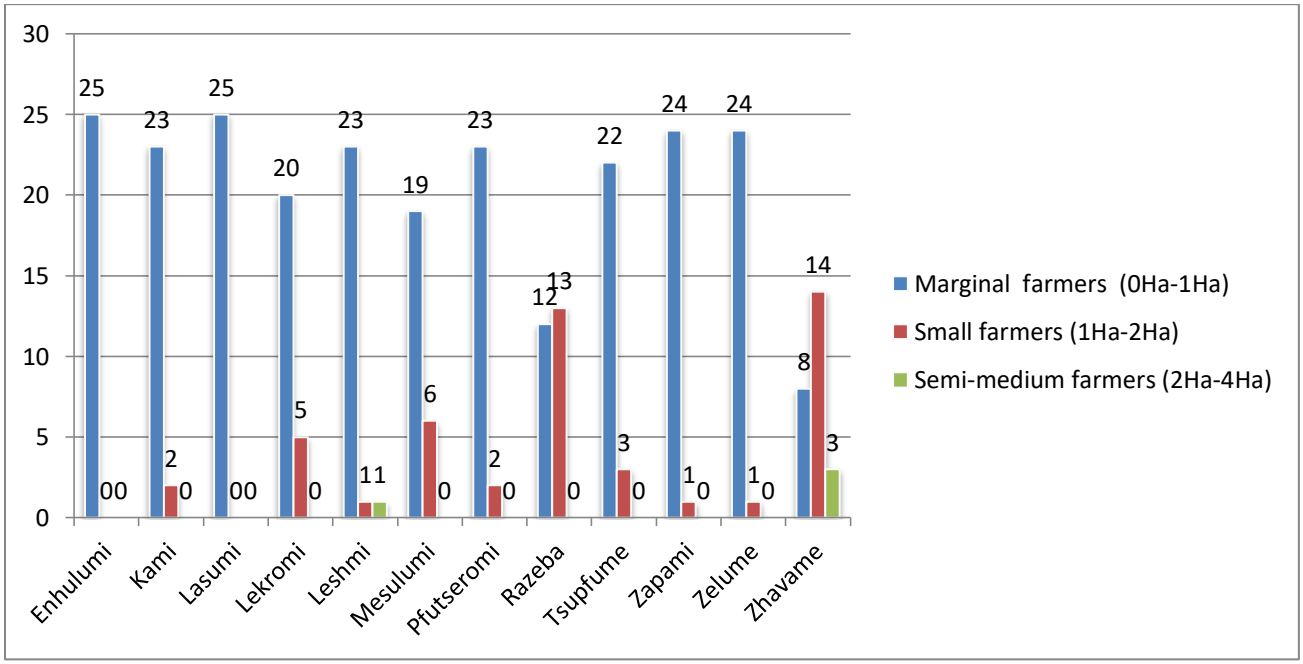
Source: Field survey 2016-2017

Table No.16: Potato Farm Size in the Study Area from 12 Villages

Size of the Holding	Total area (in Ha)	Percentage
Marginal (0Ha-1Ha)	124	65.44%
Small (1Ha-2Ha)	57.5	30.34%
Semi-medium (2Ha-4Ha)	8	4.22%
Total	189.5	100%

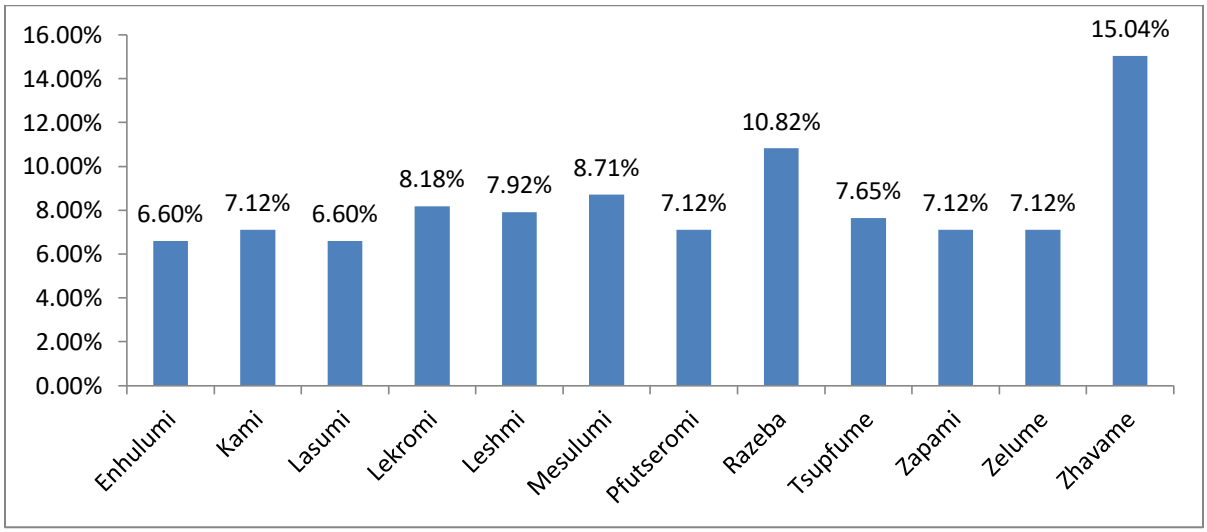
Source: Field Survey 2016-2017

Fig.6: Distribution of Potato Farmers according to Farm Size Holdings

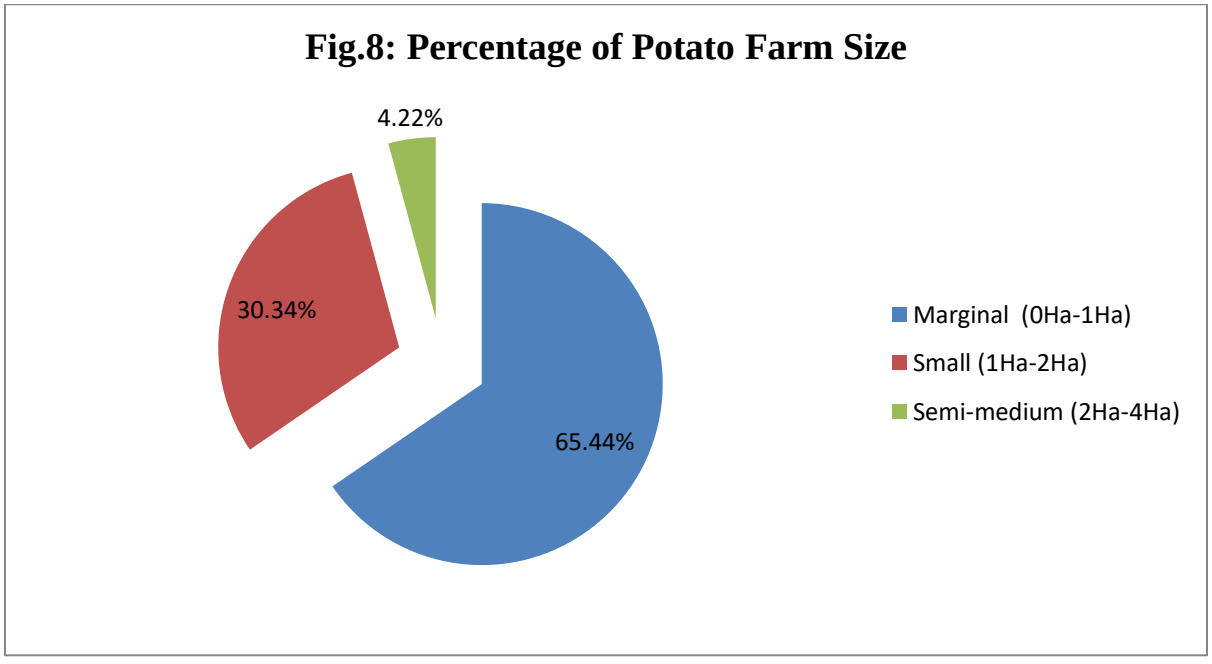


Source: Field survey 2016-2017

Fig.7: Area of Potato Farm under Cultivation in the Study Area



Source: Field Survey 2016-2017



Source: Field survey 2016-2017

3.1.4. Cabbage Farm Size in the Study Area from 12 Villages

Table No.17 and Fig.9, shows the distribution of cabbage farmer based on field size as categorised that were found during the study of the selected twelve villages under the study. The field size has been categories into five categories which are as follows:

1. Marginal Farmers = Below 1 Hectare (0-1)
2. Small Farmers = 1-2 Hectare
3. Semi- Medium farmers = 2 – 4 Hectare
4. Medium Farmers = 4 -10 Hectare
5. Large Farmers = 10 Hectare and above.

From the study of twelve villages who were cultivating cabbage, 300 cabbage farmers were taken into study, taking 25 farmers each from the twelve villages. It can be seen in the table. No 17 and Fig.9, that 85.67% of cabbage farmers are marginal farmers who cultivate cabbage in an area less than 1 Ha. The marginal farmers in total had 128.5 Ha, they are the dominant group of farmers who cultivates cabbage in an area less than 1 Ha. Small farmers who cultivates in an area of 1 Ha and less than 2 Ha comprised of 12.67% of farmers who in total had 39.5 Ha during the study. Only 1.67% of farmers were semi-medium farmers who in total had just 10 Ha cultivating in an area of 2 Ha and less than 4 Ha. In a total of 300 cabbage farmers/cultivators from 12 villages under the study from Phek District, Nagaland they cultivated cabbage in 178 Ha, 128 Ha by the marginal framers, 39.5 Ha by the small farmers and 10 Ha by the semi-medium farmers, none of the farmers were medium and large farmers cultivating in an area above 4 Ha. The

cabbage cultivation in the study area is dominated by the large number of marginal farmers which was observed during the study.

Table.No.17: Distribution of Cabbage Farmers based on Farm Size in the Study Area

Size of the Holding	Total area (in Ha)	Total number of farmers	Percentage of the farmers
Marginal (0Ha-1Ha)	128.5	257	85.67%
Small (1Ha-2Ha)	39.5	38	12.67%
Semi-medium (2Ha-4Ha)	10	5	1.67%
Medium (4Ha-10Ha)	0	0	0
Large 10 Ha and above	0	0	0
Total	178	300	100%

Source: field survey 2016-2017

3.1.5 Number of Cabbage farmers according to the different Farm Size of the twelve Villages under the study in Phek District, Nagaland

Table No.18 and the Fig.10 shows the distribution of 300 cabbage farmers from twelve villages in Phek District, Nagaland. From the study of twelve villages, it was found that only three categories of farmers were in cabbage cultivation, i.e. marginal farmers (0Ha -1 Ha), small farmers (1 Ha – 2Ha) and semi-medium farmers (2 Ha- 4Ha).

It can be seen clearly in table No.18, that four villages, namely Enhulumi, Kami, Lasumi and Tsupfume have only marginal farmers who are cultivating in an area less than 1 Ha. Lekromi, Leshimi and Zelume are the three villages which has 24 farmers under marginal farmer and just one farmer under small farmer cultivating in 1Ha and less than 2 Ha.

Pfutseromi and Zapami have 23 farmers under marginal farmers, i.e. 92% of farmers in the two villages were marginal farmers and two farmers comprising of 20% farmers under the category of Small farmers.

Mesulumi is the only village which has 21 farmers under marginal farmers and four farmers under small farmer, i.e. 84% of cabbage farmers as marginal farmers and 16% as small farmers cultivating in an area of 1 Ha and less than 2 Ha.

Razeba and Zhavame are the only two villages which have all the three categories of farmers-marginal farmers, small farmers and semi-medium Farmers. Razeba has 12 each farmers under marginal farmer and small farmers which is 48 % each farmers cultivating in an area less than 1 Ha and in an area of 1 Ha but less than 2 Ha. It has 4% of farmers under the semi-medium category.

Zhavame is the only village which has more small category of farmers than marginal farmers. It also has a semi-medium category of farmers. It has 15 farmers, i.e. 60% of farmers in the village as small cabbage farmers cultivating in an area of 1 Ha but less than 2 Ha, six farmers, i.e. 24% framers as marginal farmers and four farmers, i.e. 16% under the category of semi-medium farmers cultivating in an area between 2Ha to 4Ha.

Altogether 257 farmers were marginal farmers who comprised of 85.67%, 38 farmers as small farmers which is 12.67% and five farmers, i.e. 1.67% as semi-medium farmers.

Table No. 18: Distribution of farmers according to farm size holdings

Sl. No	Name of Villages	Distribution of farmers according to farm size holdings			
		Marginal farmers (0Ha-1Ha)	Small farmers (1Ha-2Ha)	Semi-medium farmers (2Ha-4Ha)	Total number of farmers
1	Enhulumi	25 (100%)	0	0	25
2	Kami	25 (100%)	0	0	25
3	Lasumi	25 (100%)	0	0	25
4	Lekromi	24 (96%)	1 (4%)	0	25
5	Leshmi	24 (96%)	1 (4%)	0	25
6	Mesulumi	21 (84%)	4 (16%)	0	25
7	Pfutseromi	23 (92%)	2 (8%)	0	25
8	Razeba	12 (48%)	12 (48%)	1 (4%)	25
9	Tsupfume	25 (100%)	0	0	25
10	Zapami	23 (92%)	2 (8%)	0	25
11	Zelume	24 (96%)	1 (4%)	0	25
12	Zhavame	6 (24%)	15 (60%)	4 (16%)	25
13	Total	257(85.67%)	38 (12.67%)	5 (1.67%)	300

Source: Field Survey 2016-2017

3.1.6. Total Area of Cabbage field size of the villages under the study

Table No.19 and fig.11 shows the different area of cultivation from the twelve villages under the study from Phek District, Nagaland. Altogether from the twelve villages, the total area of cabbage cultivation was 178 Ha, 128.5 Ha from the marginal farmers, 39.5 Ha under the smaller farmers and 10 Ha from the semi- medium farmers. In terms of percentage, it is 72.19% by the marginal farmers, 22.19% by the small farmers and 5.62% by semi- medium farmers.

Enhulumi, Kami, Lasumi, Tsupfume have only marginal farmers each having just 12.5 Ha which comprised of 7.02% each in the overall area of cultivation from the study area. Lekromi, Leshmi, and Zelume each had 7.30% of the cabbage cultivation area, each of these three villages had 12 Ha from the marginal farmers and 1 Ha each from small farmers. Pfutseromi and Zapami had 12 Ha each cultivated by the marginal farmers. Pfutseromi has 2 Ha under the cultivation from small farmers whereas Zapami has 2.5 Ha area under cultivation by the small farmers. Pfutseromi total area under cabbage cultivation was 7.58% whereas Zapami has 7.87%. Mesulumi has in total of 10.5 Ha cultivated by marginal farmers, 4.5 Ha by the small farmer and in total they cultivated an area of 15 Ha which is 8.43%.

Razeba has the 2nd largest area under cabbage cultivation, and it cultivates an area of 20.5 Ha, i.e. 11.52 % from the twelve villages. 6 Ha area is cultivated by the marginal farmers, 12.5 Ha by the small farmers and 2 Ha is cultivated by the semi-medium farmers.

Zhavame has the highest area under cabbage cultivation, and it cultivates a total area of 26 Ha, which is 14.61%. It has the least among all the twelve an area cultivated by the

marginal farmers, the marginal cultivates just 3 Ha, the semi-medium farmers cultivates more than the marginal farmer, the semi-medium farmer cultivates an area of 8 Ha and the highest area, i.e. 15 Ha is cultivated by the small farmers between the field size of 1 Ha – 2 Ha.

Table No.19: Total Area of Cabbage Field Size of the Villages under the Study

Sl.No	Name of Villages	Marginal farmers (0Ha-1Ha)	Small farmers (1Ha-2Ha)	Semi-medium farmers (2Ha-4Ha)	Total in Ha	Percentage
1	Enhulumi	12.5	0	0	12.5	7.02%
2	Kami	12.5	0	0	12.5	7.02%
3	Lasumi	12.5	0	0	12.5	7.02%
4	Lekromi	12	1	0	13	7.30%
5	Leshmi	12	1	0	13	7.30%
6	Mesulumi	10.5	4.5	0	15	8.43%
7	Pfutseromi	11.5	2	0	13.5	7.58%
8	Razeba	6	12.5	2	20.5	11.52%
9	Tsupfume	12.5	0	0	12.5	7.02%
10	Zapami	11.5	2.5	0	14	7.87%
11	Zelume	12	1	0	13	7.30%
12	Zhavame	3	15	8	26	14.61%
13	Total	128.5 Ha (72.19%)	39.5 Ha (22.19%)	10 Ha (5.62%)	178 Ha (100%)	100%

Source: Field survey 2016-2017

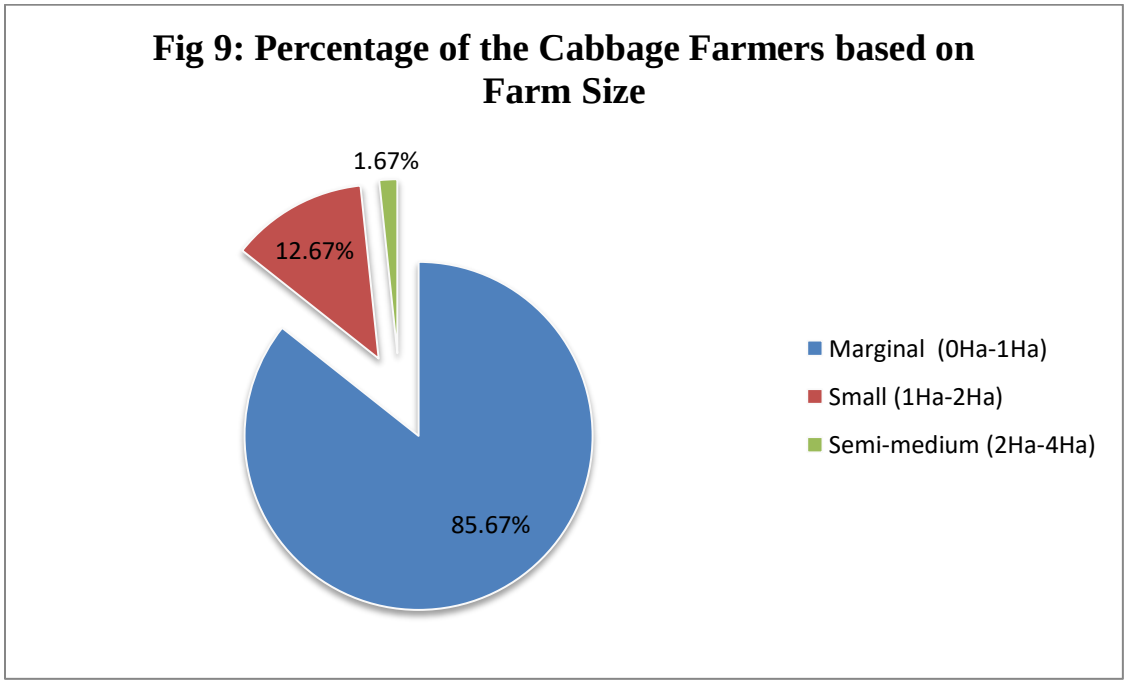
3.1.7 Size of Land Holdings of Cabbage farmers from the study area

Table No.20 and fig.12, shows the size of land holdings of cabbage farmers, where it can be noticed that the total area under cabbage cultivation was 178 Ha. There are three category of farm size noticed where the area under marginal farm size comprises collectively of 128.5 Ha i.e. 72.19% followed by small farm size with 39.5 Ha i.e. 22.19% and the least area of cultivation which falls under semi-medium, they cultivate an area of 10 Ha i.e., 5.6%.

Table No. 20: Size of Land Holdings of Cabbage farmers

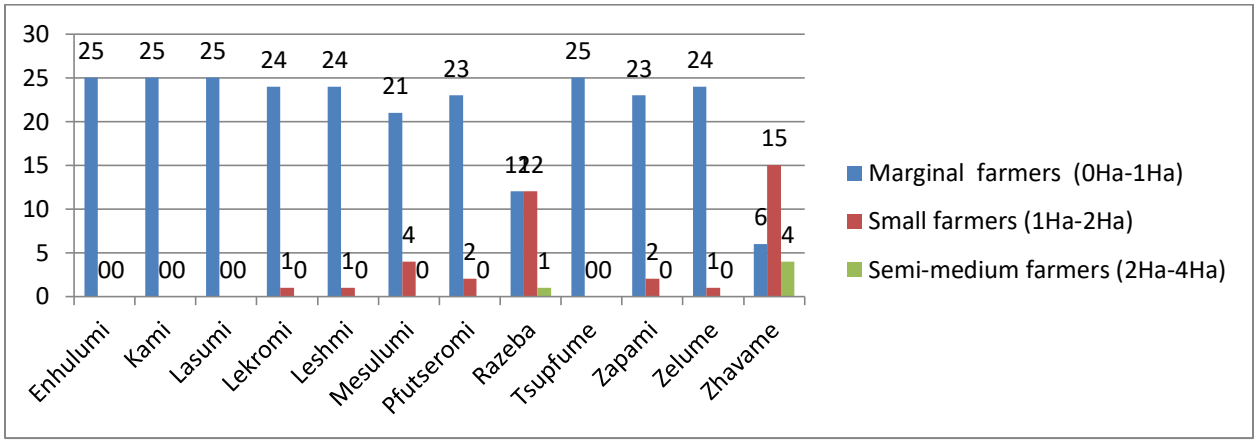
Size of the Holding	Total area (in Ha)	Percentage
Marginal (0Ha-1Ha)	128.5	72.19%
Small (1Ha-2Ha)	39.5	22.19%
Semi-medium (2Ha-4Ha)	10	5.62%
Total	178	100%

Sources: Field Survey 2016-2017



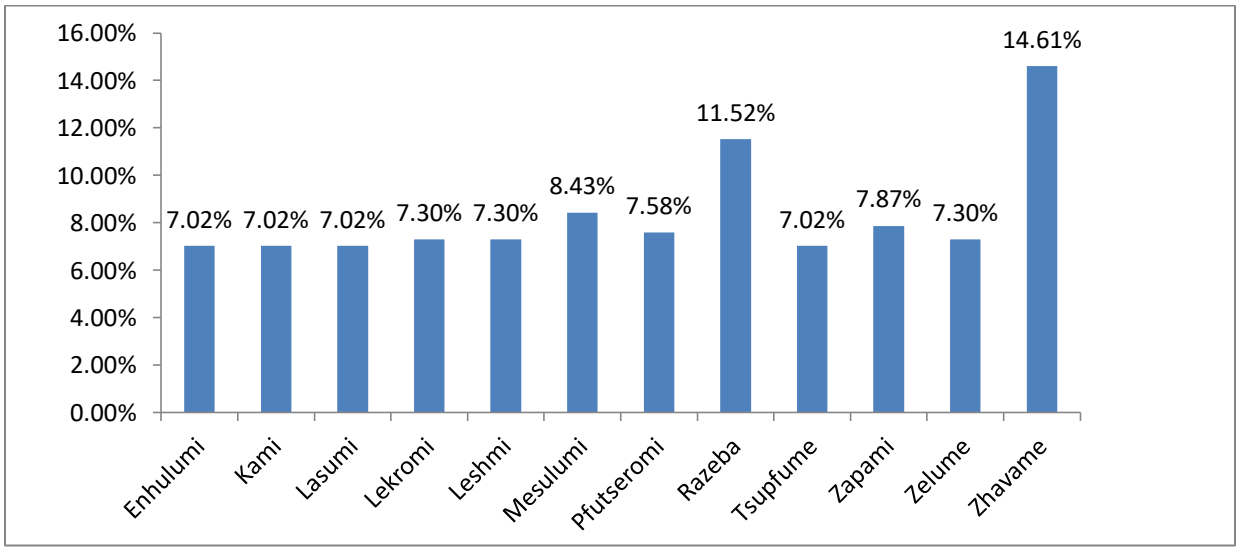
Sources: Field Survey 2016-2017

Fig .10: Distribution of Cabbage Farmers according to Farm Size Holdings

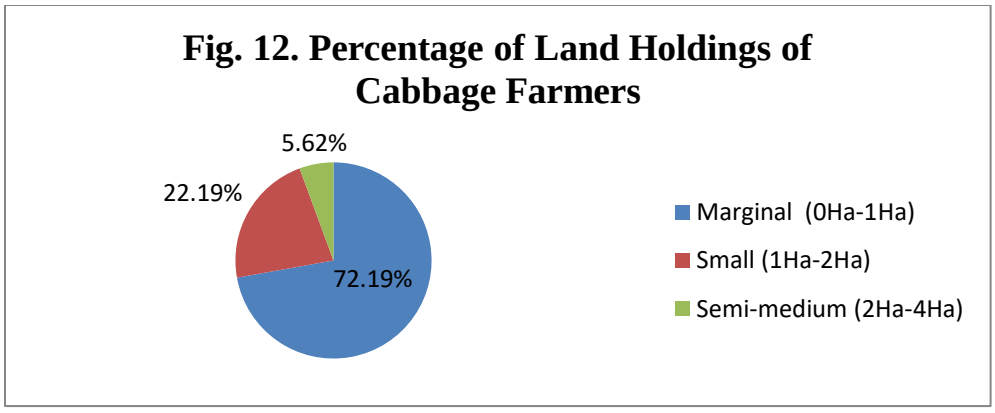


Sources: Field Survey 2016-2017

Fig 11: Total Area of Cabbage Field Size of the Villages under the Study



Sources: Field Survey 2016-2017



Sources: Field Survey 2016-2017

3.1.8 Beans Farm Size in the Study Area from 12 Villages

Table No.21 and fig.13 shows the farm size of the beans cultivators in Phek District, Nagaland where it can be clearly seen as shown in the table all the farmers under the study of twelve villages are marginal beans cultivators cultivating in an area below 1 Ha. None of the farmers in the study area cultivated beans in an area over 1 Ha.

Table No.21: Beans Farm size in the Study area from 12 villages

Size of the Holding	Total area (in Ha)	Total number of farmers	Percentage of the farmers
Marginal (0Ha-1Ha)	150	300	100%
Small (1Ha-2Ha)	0	0	0
Semi-medium (2Ha-4Ha)	0	0	0
Medium (4Ha-10Ha)	0	0	0
Large 10 Ha and above	0	0	0
Total	150	300	100%

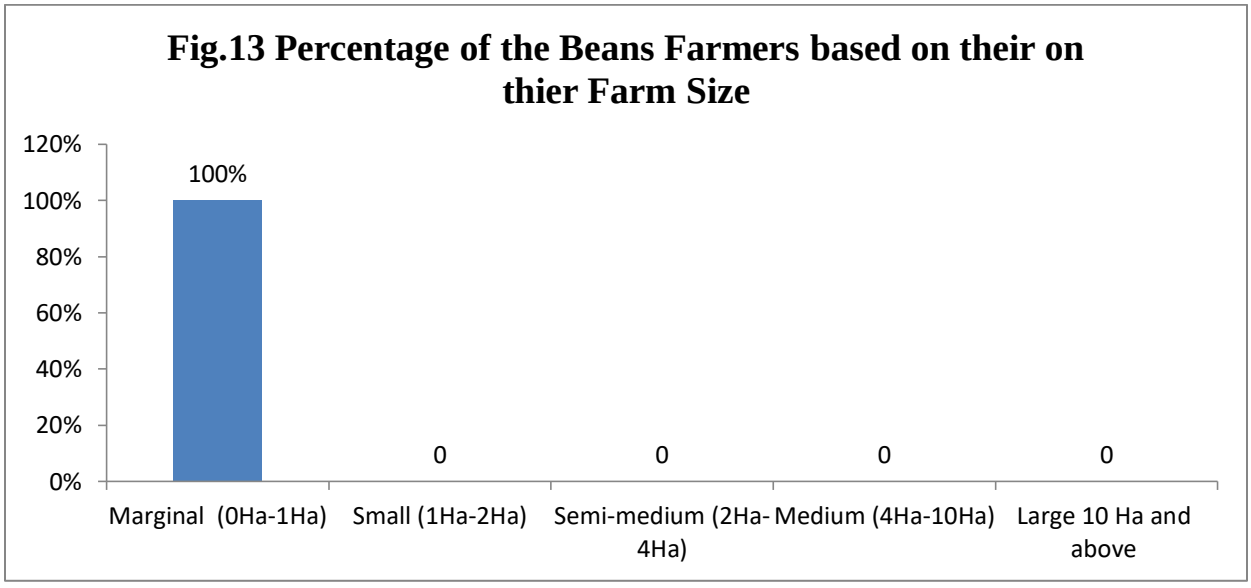
Source: Field Survey 2016-2017

3.1.9 Number of Beans Farmers according to Different Farm Size

Table No.22 and fig.14 show the number of beans farmers based on their field size and category. It is interesting to note that in all the twelve villages all the 300 farmers, 25 farmers from each village were all marginal farmers, none of the villages had a single farmer who had 1Ha and above. All the farmers cultivate beans in an area below 1 Ha.

3.1.10 Total Area of beans field size of the villages under the study

Table No.23 and fig 15, shows the total area of field size of all the twelve villages under the study. It shows a very peculiar finding where all the farmers are marginal farmers cultivating in an area less than 1 Ha and every village under the study cultivates beans in 12.5 Ha each. All together they cultivate beans in 150 Ha with each village contributing 12.5 Ha, i.e. 8.33%.



Sources: Field Survey 2016-2017

Table No. 22: Distribution of Beans Farmers according to Farm Size Holdings

Sl.No	Name of Villages	Distribution of farmers according to farm size holdings			
		Marginal farmers (0Ha-1Ha)	Small farmers (1Ha-2Ha)	Semi-medium farmers (2Ha-4Ha)	Total number of farmers
1	Enhulumi	25	0	0	25
2	Kami	25	0	0	25
3	Lasumi	25	0	0	25
4	Lekromi	25	0	0	25
5	Leshmi	25	0	0	25
6	Mesulumi	25	0	0	25
7	Pfutseromi	25	0	0	25
8	Razeba	25	0	0	25
9	Tsupfume	25	0	0	25
10	Zapami	25	0	0	25
11	Zelume	25	0	0	25
12	Zhavame	25	0	0	25
13	Total	300	0	0	300

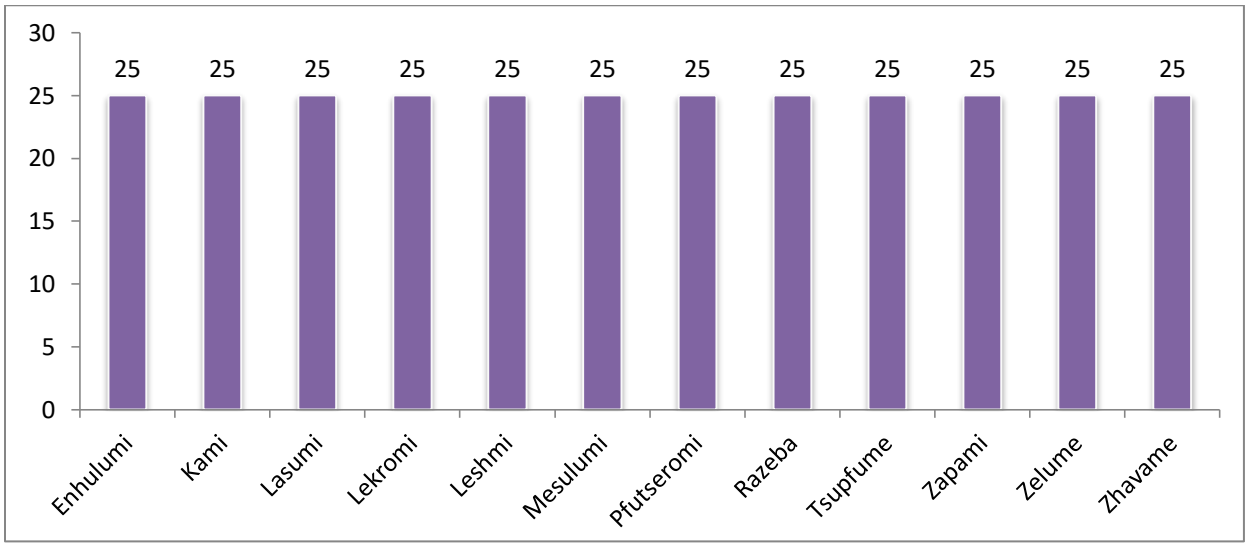
Source: Field Survey 2016-2017

Table No.23: Total Area of Beans Field Size of the Villages under the Study

Sl. No	Name of Villages	Marginal farmers (0Ha-1Ha)	Small farmers (1Ha-2Ha)	Semi-medium farmers (2Ha-4Ha)	Total in Ha	Percentage
1	Enhulumi	12.5	0	0	12.5	8.33%
2	Kami	12.5	0	0	12.5	8.33%
3	Lasumi	12.5	0	0	12.5	8.33%
4	Lekromi	12.5	0	0	12.5	8.33%
5	Leshmi	12.5	0	0	12.5	8.33%
6	Mesulumi	12.5	0	0	12.5	8.33%
7	Pfutseromi	12.5	0	0	12.5	8.33%
8	Razeba	12.5	0	0	12.5	8.33%
9	Tsupfume	12.5	0	0	12.5	8.33%
10	Zapami	12.5	0	0	12.5	8.33%
11	Zelume	12.5	0	0	12.5	8.33%
12	Zhavame	12.5	0	0	12.5	8.33%
13	Total	150	0	0	150	100%

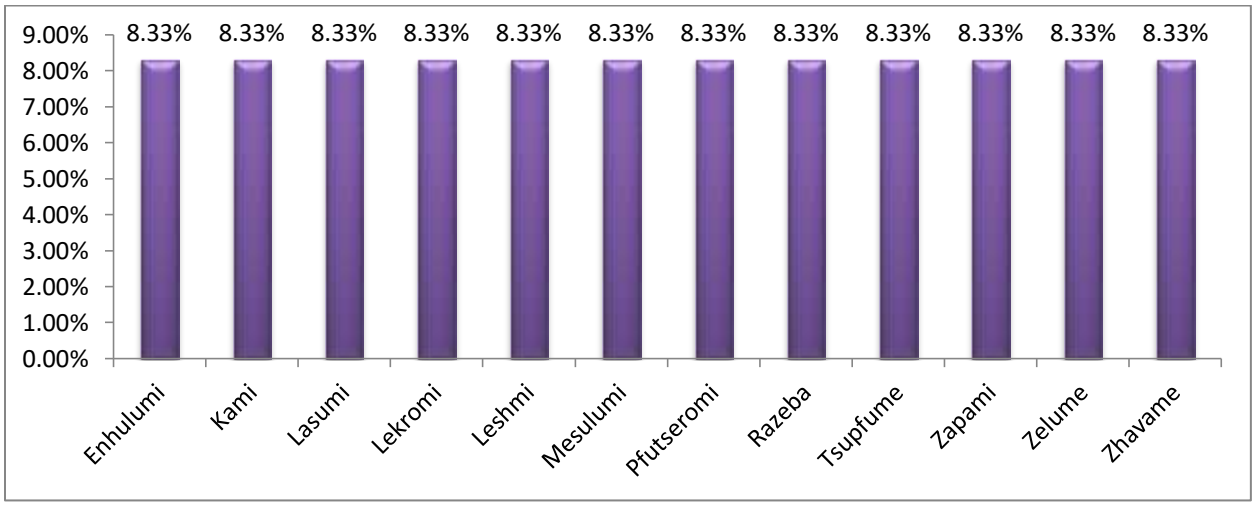
Source: Field Survey 2016-2017

Fig.14: Distribution of Beans Farmers according to Farm Size Holdings



Sources: Field Survey 2016-2017

Fig15. Total Area of Beans Field Size of the Villages under the Study



Source: Field Survey 2016-2017

3.2 India Vegetable Production, Area and Productivity

Table No.24 and Fig16. shows India vegetable production, area and productivity from the Year 2001-02 to 2017-18. We see an increasing trend of increase in the area of vegetable production from 2004-05 till 2017-18. We can also notice an increasing trend of an increase in production and productivity except in 2001-02, 2002-03 and in 2015-16.

We see that the production of vegetables in India has been increasing with time. It is clear from the given years that India vegetable area has increased from 6156 Ha in 2001-02 to 10259 Ha in 2017-18. With the increase in area size, the production has increased many times fold from 88622 MT in 2001-02 to 184394 in 2017-18. The productivity ranges from 13-17 Mt/Ha, and the correlation between the area size and the production is (r = 0.99) 0.99, which shows a very high degree of positive correlation between the area and the production. The co-efficient of correlation between the area and production is significant which shows that as the size of area under vegetable production increases, the Production of vegetable also increases. The co-efficient of determinants on r^2 value shows that 98% of the variation in production is explained by the field size X, the regression values of field size (Y) on production (X) gave us.

Y= a + bx, Y= -51696.667 + 22.790X

The result shows that the regression co-efficient byx is 22.790. This explains that a unit change in Field Size will lead a change in production by 22.790. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%.

The correlation between the area size and the productivity is (r = 0.92), which shows a very high degree of positive correlation between the area and the productivity. The co-efficient of correlation between the area and productivity is significant which shows that

as the size of area under vegetable production increases, the productivity of vegetable also increases. The co-efficient of determinants on r^2 value shows that 85% of the variation in productivity is explained by the field size X, the regression values of field size (Y) on productivity(X) gave us.

Y= a+bx, Y= 9.4441 + 0.001X

The result shows that the regression co-efficient byx is 0.001. This explains that a unit change in field size will lead a change in production by 0.001. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis which states that bigger the size of the field higher is the production and productivity has been proved, with regard to Indian Vegetable production area, production and productivity.*

3.3 Nagaland Vegetable Production, Area and Productivity

The production size (area), production and productivity of vegetables in Nagaland from 2010-11 to 2017-18 is shown in the table No.25 and fig.17. It has been noticed that from the year 2010-11 to 2017-18, there has been a gradual increase in the area as well as in the production and productivity of vegetables in Nagaland with time. From a mere 10.7 Ha in 2010-11 the area cultivated has increased to 46.21 Ha, with the expansion of the area in cultivation, the production jumped to 561.6 Mt in 2017-18 from 79.4 Mt in 2010-11. In the year 2010-11, the area under total Nagaland vegetable cultivation was just a mere of 10.7 Ha which has increased subsequently to 33 Ha in the year 2011-12 to 38.6 Ha in 2013-14 and to 38.55 Ha in 2014-15 and then after to 43.53 Ha in 2015-16 except for the year 2012-13 as this year shows a decrease from 33Ha in 2011-12 to 26 Ha in 2012-13. Though the area under cultivation has increased subsequently, it is also to be

noted that there was also a slight decrease from 47.17 Ha in 2016-17 to 46.21 Ha in 2017-18. With the expansion of area under cultivation, the production has been increasing from 79.4 Mt in 2010-11 to 222.6 Mt in 2011-12 and also from 492.4 Mt in 2013-14 to 492.37 Mt in 2014-15 and then from 494.61 in 2015-16 to 564.62 Mt in 2016-17.

The year 2012-13 witnessed a greater fall in the production from 222.6 Mt in 2011-12 to 207.7 Mt in its following year. Also the year 2013-14 achieved the highest in its production from 207.7 Mt in the year 2012-13 to straight 492.4 Mt in its following year in 2013-14, but there was also a sizeable decline in production from 564.62 Mt in 2016-17 to 561.6 Mt in its following year 2017-18.

The increase in area and production has a direct link with its productivity. The productivity was just 7.42 when the area under cultivation was 10.7 Ha and the production was 79.4 Mt. There was a leap in productivity to 12.15 in 2017-18 with an increase in production to 561.6 Mt as a result of increase in area cultivated to 46.21 Ha. The year 2014-15 witnessed the highest productivity of 12.77 with the area of 38.55 Ha and production of 492.37 Mt. The year 2011-12 and 2015-16 shows the fall in its productivity with 6.74 under the area 33 Ha and productivity of 11.36 under the area 43.53 Ha with its production of 494.61 Mt. respectively.

It is observed that from the year 2010-11 to 2017-18, in the state of Nagaland the vegetable production, area and productivity has shown a gradual increase with time which can be seen in the table and fig 17. The overall correlation between the area under vegetable cultivation and production of vegetables in Nagaland shows a positive relationship with $r = 0.94$, which shows a high degree of a positive correlation between

area and production of vegetables in Nagaland. The co-efficient of correlation between the area and productivity is significant, which shows that as the size of the area under vegetable production increases, the production of vegetable also increases. The co-efficient of determinants on r^2 value shows that 88% of the variation in production is explained by the field size X, the regression values of field size (Y) on production (X) gave us.

Y= a+bx, Y= -16.057 + 14.533 X

The result shows that the regression co-efficient byx is 14.533. This explains that a unit change in field size will lead to a change in production by 14.533. The p-value of 'byx' 0.0004, which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. The overall correlation between the area under vegetable cultivation and productivity of vegetables in Nagaland shows a positive relationship with r = 0.76, which shows a high degree of a positive correlation between area and productivity of vegetables in Nagaland. The co-efficient of correlation between the area and productivity is significant, which shows that as the size of the area under vegetable production increases, the productivity of vegetable also increases. The co-efficient of determinants on r^2 value shows that 57% of the variation in productivity is explained by the field size X, the regression values of field size (Y) on productivity (X) gave us.

Y= a+bx, Y= 4.790 + 0.158 X

The result shows that the regression co-efficient byx is 0.158. This explains that a unit change in field size will lead to a change in productivity by 0.158 The p-value of 'byx' 0.03, which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis which states that bigger the size of the field higher is the*

production and productivity has been proved with regard to vegetable farm size, production and productivity in Nagaland.

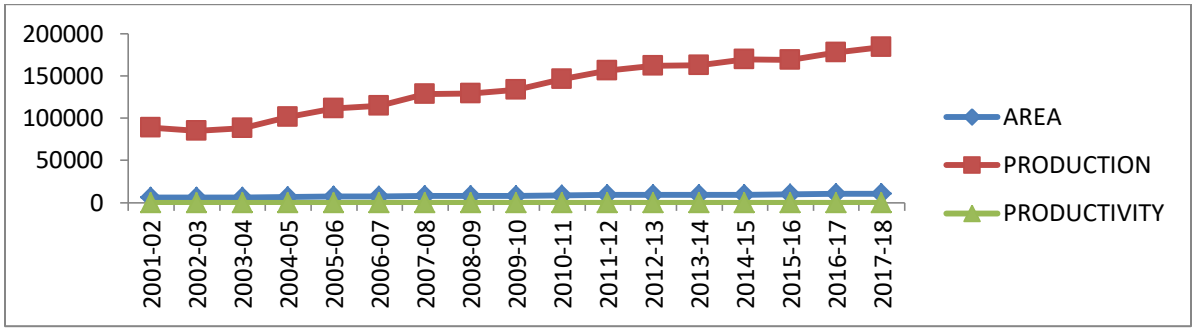
Table No. 24: Vegetable Production, Area and Productivity of India from 2001-02 to 2017-18

India Vegetable Production, Area and Productivity from 2001 to 2017-18
Area in '000Ha
Production in '000MT
Productivity: MT/Hectare

Year	Area	Production	Productivity
2001-02	6156	88622	14.39603639
2002-03	6092	84815	13.92235719
2003-04	6082	88334	14.52384084
2004-05	6744	101246	15.01275208
2005-06	7213	111399	15.44419798
2006-07	7581	114993	15.16857934
2007-08	7848	128449	16.3670999
2008-09	7981	129077	16.17303596
2009-10	7985	133738	16.74865373
2010-11	8495	146554	17.25179517
2011-12	8989	156325	17.39069974
2012-13	9205	162187	17.61944595
2013-14	9396	162897	17.33684547
2014-15	9542	169478	17.76126598
2015-16	10106	169064	16.72907184
2016-17	10238	178172	17.4030084
2017-18	10259	184394	17.9738766

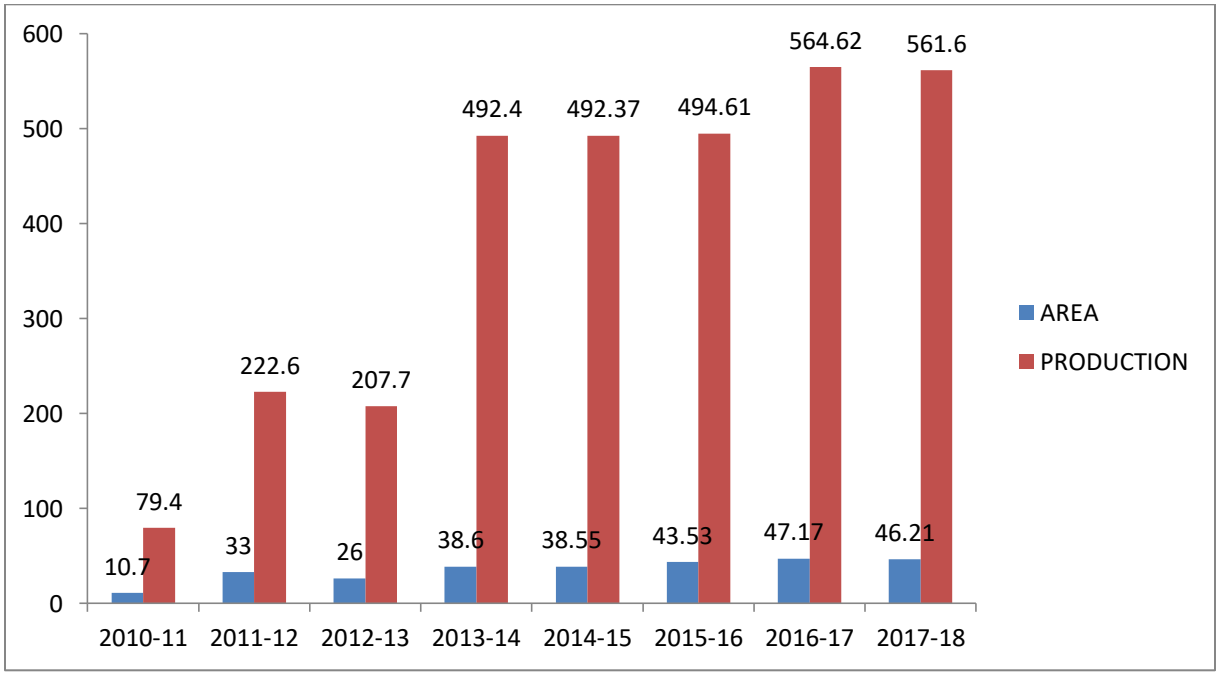
Source: Ministry of Agriculture & Farmers' Welfare Department of Agriculture, Cooperation & Farmers' Welfare Horticulture Statistics Division 2018.

Fig.16: India's Vegetable Production, Area and Productivity from 2001-02 to 2017-18



Source: Ministry of Agriculture & Farmers' Welfare Department of Agriculture, Cooperation & Farmers' Welfare Horticulture Statistics Division 2018.

Fig.17: Nagaland Vegetable Production, Area and Productivity from 2010-11 to 2017-18



Source: Ministry of Agriculture and Farmer's Welfare Department of Agriculture, cooperation Farmers Welfare Horticulture Statistics Division 2018.

Table No.25: Nagaland Vegetable Production, Area and Productivity from 2010-11 to 2017-18

Area in '000Ha"

Production in '000MT'

Productivity: MT/Hectare

Year	Area	Production	Productivity
2010-11	10.7	79.4	7.420560748
2011-12	33	222.6	6.745454545
2012-13	26	207.7	7.988461538
2013-14	38.6	492.4	12.75647668
2014-15	38.55	492.37	12.77224384
2015-16	43.53	494.61	11.36250861
2016-17	47.17	564.62	11.96989612
2017-18	46.21	561.6	12.15321359

Source: Ministry of Agriculture and Farmer' Welfare Department of Agriculture, cooperation, Farmers Welfare Horticulture Statistics Division 2018.

3.4 Relationship between Area and Production of the Sample Vegetables under Study

In order to verify the first hypothesis, the relationship between the size of the field and the production and productivity of the three vegetables which are under the study have been analysed. The analysis has been based on the data collected from both Primary and Secondary.

3.4.1 Relationship between Area and Production of Cabbage in India

In order to understand the relationship and the correlation between the size of the area under cabbage cultivation and the production, productivity of cabbage in India, secondary data were extracted from Ministry of Agriculture & Farmers' Welfare Department of Agriculture, Cooperation & Farmers' Welfare Horticulture Statistics Division, the data relates to the period from 2001-02 to 2017-2018 which is shown in table 26 and Fig 18.

The area under cabbage cultivation in India since 2001-02 has been a decline and a gradual increase. From 2001-02 till 2014-15 there has been an increase and contraction in the size of the area under cabbage cultivation in India. From 2014-15 to 2017-18 there has been a gradual increase in the size of an area under cabbage cultivation. From 258.1 Ha in 2001-02, it increased to 400 Ha in 2013-14, which is also the largest area under cabbage cultivation. However, from 400 Ha in 2013-14, it declined to 385.6 Ha in 2014-15 after which we notice a gradual increase in the area under cabbage cultivation in India with 398.5 Ha in 2017-18. The least area under cabbage cultivation was in the year 2006-07 where India cultivated cabbage only in 249 Ha.

The production of cabbage in India from 2001-02 to 2017-18 has witnessed both an increase and decline in production of cabbage, which might be due to the variation in the

area of cabbage cultivation. The production of cabbage was 5678.2 Mt in 2001-02 which in 2017-18 increased to 9037.3 Mt. The least production of cabbage in India was in 2002-03 where the production of cabbage fell to 5392 Mt from the previous year of 5678.2 Mt. In the year 2013-14 India witnessed its highest production of cabbage i.e.9039 Mt, the same year when the area under cabbage cultivation was at its peak where 400 Ha area was cultivated.

The overall correlation between the area under cabbage cultivation and production of cabbage in India since 2001-02 shows a positive relationship with r = 0.99, which shows a very high degree of a positive correlation between area and production of cabbage in India.

The co-efficient of correlation between the area and production is significant, which shows that as the size of the area under cabbage production increases, the production of cabbage also increases. The co-efficient of determinants on r^2 value shows that 98% of the variation in production is explained by the field size X, the regression values of field size (Y) on production (X) gave us.

Y= a+bx, Y= -74.966+ 22.441X

The result shows that the regression co-efficient byx is 22.441. This explains that a unit change in field size will lead to a change in production by 22.441. The p-value of 'byx' is 5.14E-16 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis which states that bigger the size of the field higher is the production has been proved with regard to cabbage farm size and production in India*

3.4.2 Relationship between Cabbage Field Size, Production and Productivity in Nagaland

To know the relationship between the size of an area under cabbage cultivation and production of cabbage in Nagaland, the secondary data was collected from Statistical Handbook of Nagaland, from the year 2008-09 to 2017-18 which is show in the table No.27 and fig.19

From the table it is very clear that from 2008-09 to 2014-15 there has been an increase in the area under cabbage cultivation every year, during which the productivity ranged from 8 Mt/Ha to 20 Mt/ha , 20 Mt/Ha being the highest recorded so far which was in the year 2013-14 and 2014-15. There was a massive increase in the area of cultivation from 2012-12 to 2013-14, from 2000 Ha it jumped right to 8100 Ha in 2013-14. However, from 2015-16, there was a slight decline in the area of production from 8198 Ha in 2014-15 it declined to 7909 in 2015-16. There has also being a decline in productivity/yield since 2015-16 till date. From 20.00 in 2014-15 the productivity had declined to 17.04 in 2017-18. However the overall correlation between the area under vegetable cultivation and production of vegetables in Nagaland since 20008-09 to 2017-18 shows a positive relation with r = 0.99, which shows a very high degree of a positive correlation between area and production of cabbage in Nagaland. The co-efficient of correlation between the area and production is significant, which shows that as the size of the area under cabbage production increases, the production of cabbage also increases. The co-efficient of determinants on r^2 value shows that 99% of the variation in production is explained by the field size X, the regression values of field size (Y) on Production (X) gave us.

Y= a+bx, Y= -18909.952 + 21.450 X

The result shows that the regression co-efficient byx is 21.450. This explains that a unit change in field size will lead to a change in production by 21.450. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%.

The overall correlation between the area under cabbage cultivation and productivity of cabbage in Nagaland since 20008-09 to 2017-18 shows a positive relation with r = 0.99, which shows a very high degree of a positive correlation between area and productivity of cabbage in Nagaland.

The co-efficient of correlation between the area and productivity is significant, which shows that as the size of the area under cabbage production increases, the productivity of cabbage also increases. The co-efficient of determinants on r^2 value shows that 99% of the variation in production is explained by the field size X, the regression values of field size (Y) on productivity (X) gave us.

Y= a+bx, Y= 6.522+ 0.002X

The result shows that the regression co-efficient byx is 0.002. This explains that a unit change in field size will lead to a change in Productivity by 0.002. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis which states that bigger the size of the field higher is the production and productivity has been proved in Nagaland with regard to cabbage farm size, production and productivity.*

3.4.3 Relationship between Cabbage Field Size, Production and Productivity in Phek District, Nagaland

In order to find out the relationship between the area of cabbage cultivation and its impact on the production and productivity in Phek District, Nagaland, secondary data was collected from the Statistical Handbook of Nagaland, the data about the cabbage area, production and productivity in Phek district relates to the year from 2008-09 to 2017-18, which is shown in the table No.28 and Fig 20.

In Phek district, Nagaland the area under cabbage cultivation since 2008-09 to 2011-12 was same and constant which was 500 Ha which can be seen in the table No.28, inspite of the area under cabbage cultivation was constant during the year between 2008-09 to 2011-12 the production declined in 2009-10 from 5000 Mt in 2008-09 to 4000 Mt in 2009-10, after which the production gradually kept on increasing till 2017-18. It is only from 2012-13 that the area under cabbage cultivation in Phek District, Nagaland started to increase from 500 Ha from 2008-09 till 2011-12 it had reached to 1313 Ha in 2017-18. The production of cabbage from 2010-11 has noticed a constant increase year after year. The productivity, however, has fluctuated in years to years, the lowest being 8 Mt/Ha in 2009-10 and the highest, i.e. 21.99 Mt/Ha in 2017-18.

The overall correlation between the area under cabbage cultivation and production of cabbage in Phek District, Nagaland shows a positive relation with $r = 0.96$, which shows a high degree of a positive correlation between area and production of cabbage in Phek district, Nagaland from the data since 2008-09 to 2017-18. The co-efficient of correlation between the area and production is significant, which shows that as the size of the area under cabbage production increases, the production of cabbage also increases. The co-

efficient of determinants on r^2 value shows that 93% of the variation in production is explained by the field size X, the regression values of field size (Y) on Production (X) gave us.

Y= a+bx, Y= -6978.440 + 22.328X

The result shows that the regression co-efficient byx is 22.328. This explains that a unit change in field size will lead to a change in production by 22.328. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%.

The overall correlation between the area under cabbage cultivation and productivity of cabbage in Phek District, Nagaland shows a positive relation with r = 0.90, which shows a high degree of a positive correlation between area and Productivity of cabbage in Phek district, Nagaland from the data since 2008-09 to 2017-18. The co-efficient of correlation between the area and productivity is significant, which shows that as the size of the area under cabbage production increases, the productivity of cabbage also increases. The co-efficient of determinants on r^2 value shows that 81% of the variation in productivity is explained by the field size X, the regression values of field size (Y) on Productivity (X) gave us.

Y= a+bx, Y= 3.800+0.010X

The result shows that the regression co-efficient byx is 0.010. This explains that a unit change in field size will lead to a change in productivity by 0.010. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis which states that the bigger the size of the field higher is the production and productivity has been proved with regard to Cabbage farm size, production and productivity in Phek district*.

3.4.4 Relationship between Area, Production and Productivity of Cabbage in the Study Area

To find the relationship between area, production and productivity of cabbage in the study area i.e. from the Phek district, Nagaland, the study was carried out in twelve villages the data are shown in the table No.29 and Fig.21. The data has been collected from the field survey using personal interview method and a pre-tested questionnaire in 2016-17. The total area cultivated was 177.55 Ha with over-all Production of 25557.85 quintal in total from the 12 villages under the Phek District, Nagaland.

Zhavame has the highest area under cabbage cultivation as well the highest production, with a total area of 26 Ha and production of 5453 quintal. On the other hand Kami village has the lowest cabbage production 1071.9 quintal with an area of 12.5 Ha. It is worth mentioning that there are four (4) Villages i.e. Enhulumi, Kami, Lasumi and Tsupfume covers an equal cultivatable area of 12.5 Ha respectively, however the production of cabbage are different. The reason can be partially because of the number of workers employed and more or less on the location of the village with slight differences in the climatic condition and soil differences.

Razeba ranks second in the area and production with total area of 20.05 Ha and production of 3743.5 quintal. The findings also depicts the cultivatable area differences between Zhavame and Razeba of just 5.95 Ha The superiority of Zhavame village in cabbage production for which it has been righty given tag as the , " Vegetable Village".

From the findings it has also been observed that with the increase in the size of cultivation the production is increasing which can be seen in productivity. The overall

correlation between the area under cabbage cultivation and production of cabbage in the study area shows a positive relation with r = 0.92, which shows a high degree of positive correlation between area and production of cabbage in Phek district from the study of the twelve village. The co-efficient of correlation between the area and production is significant which shows that as the size of area under cabbage production increases, the production of cabbage also increases. The co-efficient of determinants on r^2 value shows that 86% of the variation in production is explained by the field size X, the regression values of field size (Y) on Production (X) gave us.

Y= a+bx, Y= -71.006 + 263.924X

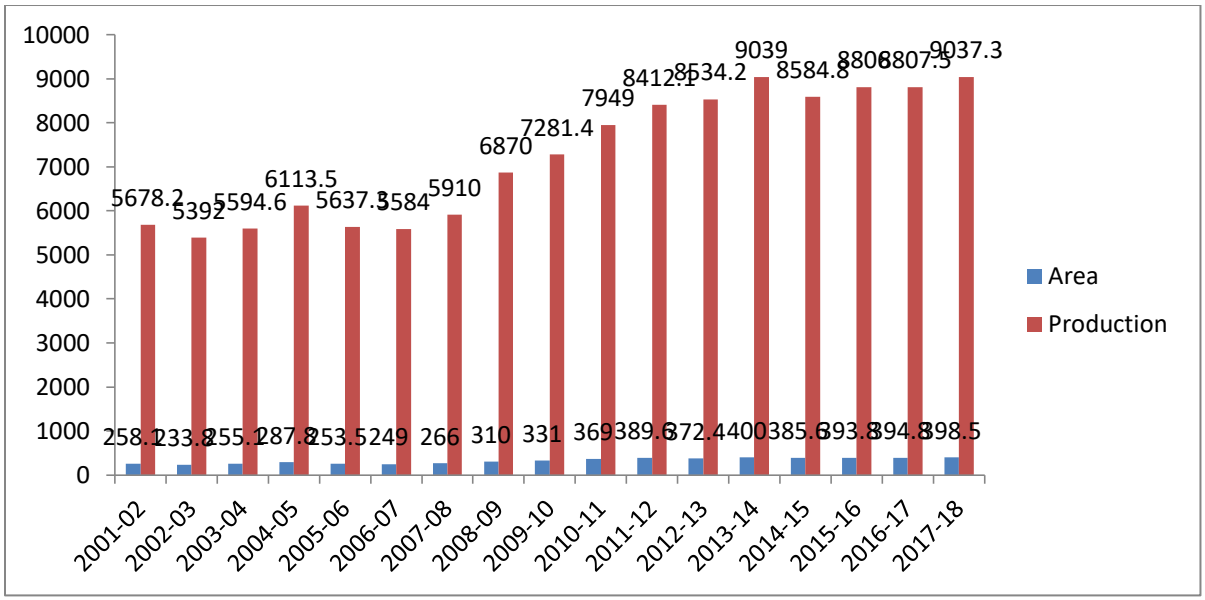
The result shows that the regression co-efficient byx is 263.924. This explains that a unit change in field size will lead a change in production by 263.924. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%.

The overall correlation between the area under cabbage cultivation and productivity of cabbage in study area Phek District, Nagaland shows a positive relation with r = 0.86, which shows positive correlation between area and productivity of cabbage in Phek district from the study of the twelve village. The co-efficient of correlation between the area and productivity is significant which shows that as the size of area under cabbage production increases, the productivity of cabbage also increases. The co-efficient of determinants on r^2 value shows that 74% of the variation in productivity is explained by the field size X, the regression values of field size (Y) on productivity (X) gave us.

Y= a+bx, Y= 20.760 + 7.775 X

The result shows that the regression co-efficient byx is 7.775. This explains that a unit change in field size will lead a change in productivity by 7.775. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis which states that bigger the size of the farm size higher is the production and productivity has been proved with regard to cabbage farm size, production and productivity in the study area.*

Fig 18: India's Cabbage Production, Area and Productivity from 2001-02 to 2017-18



Source: Ministry of Agriculture & Farmers' Welfare Department of Agriculture, Cooperation & Farmers' Welfare Horticulture Statistics Division 2011

Table No.26: India's Cabbage Production, Area and Productivity from 2001 to 2017-18

Area in '000Ha

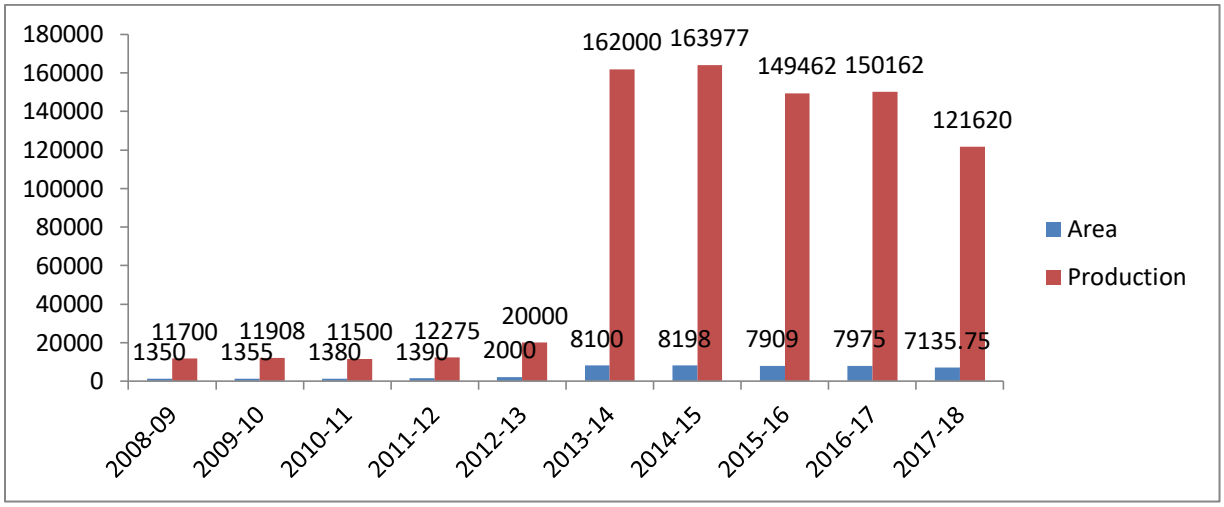
Production in '000MT

Productivity: MT/Hectare

Year	Area	Production	Productivity
2001-02	258.1	5678.2	22
2002-03	233.8	5392	23.0624
2003-04	255.1	5594.6	21.931
2004-05	287.8	6113.5	21.2422
2005-06	253.5	5637.3	22.2379
2006-07	249	5584	22.4257
2007-08	266	5910	22.218
2008-09	310	6870	22.1613
2009-10	331	7281.4	21.9982
2010-11	369	7949	21.542
2011-12	389.6	8412.1	21.5916
2012-13	372.4	8534.2	22.9168
2013-14	400	9039	22.5975
2014-15	385.6	8584.8	22.2635
2015-16	393.8	8806	22.3616
2016-17	394.8	8807.5	22.3088
2017-18	398.5	9037.3	22.6783

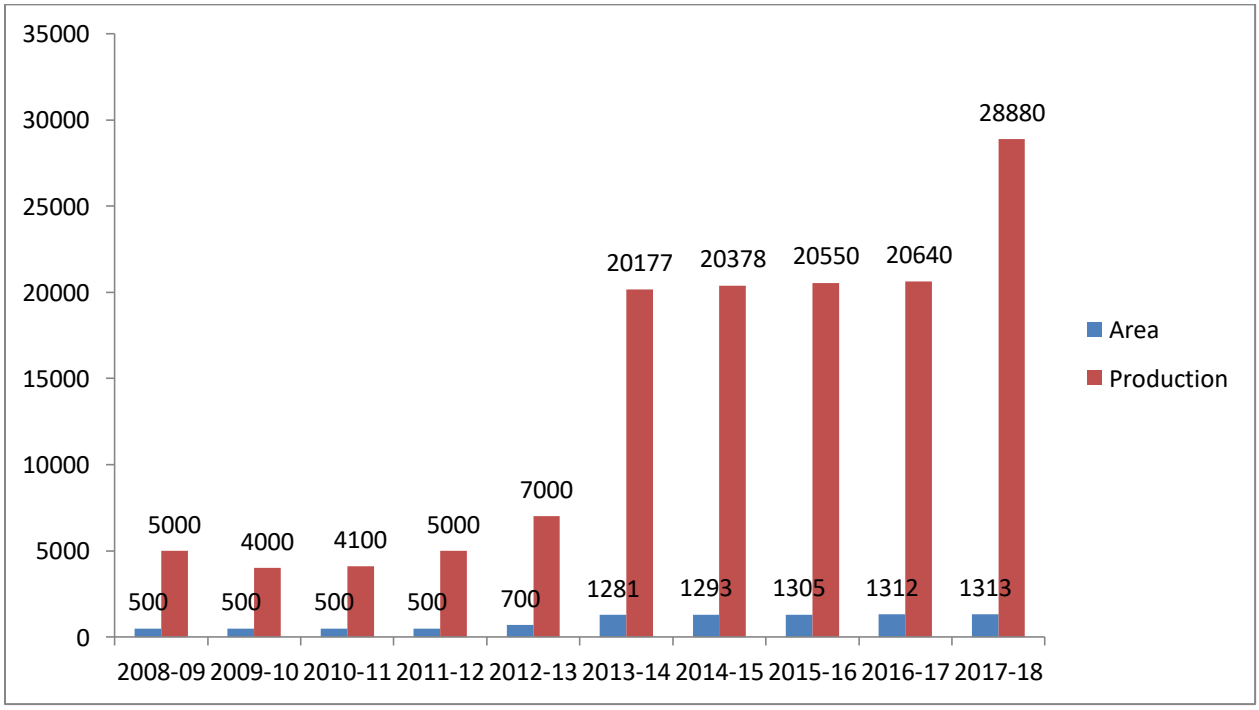
Source: Ministry of Agriculture & Farmers' Welfare Department of Agriculture, Cooperation & Farmers' Welfare Horticulture Statistics Division 2018.

Fig 19: Nagaland Cabbage Production, Area and Productivity from 2008-09 to 2017-18



Source: Statistical Handbook of Nagaland

Fig.20: Area, Production and Productivity of Cabbage in Phek District, Nagaland



Source: Statistical Handbook of Nagaland

Table No.27: Nagaland Cabbage Production, Area and Productivity from 2008-09 to 2017-18

CABBAGE
Area in '000Ha
P- Production in '000MT
Y- Yield/Ha (Productivity)

Nagaland Cabbage Production			
Year	Area	Production	Productivity
2008-09	1350	11700	8.666667
2009-10	1355	11908	8.788192
2010-11	1380	11500	8.333333
2011-12	1390	12275	8.830935
2012-13	2000	20000	10
2013-14	8100	162000	20
2014-15	8198	163977	20.00207
2015-16	7909	149462	18.89771
2016-17	7975	150162	18.82909
2017-18	7135.75	121620	17.04376

Source: Statistical Handbook of Nagaland

Table No.28: Area, Production and Productivity of Cabbage in Phek District, Nagaland

Area in '000 Ha'
P- Production in 000MT

Area, Production and Productivity in Phek District, Nagaland			
Year	Area	Production	Productivity
2008-09	500	5000	10
2009-10	500	4000	8
2010-11	500	4100	8.2
2011-12	500	5000	10
2012-13	700	7000	10
2013-14	1281	20177	15.75098
2014-15	1293	20378	15.76025
2015-16	1305	20550	15.74713
2016-17	1312	20640	15.73171
2017-18	1313	28880	21.99543

Source: Statistical Handbook of Nagaland

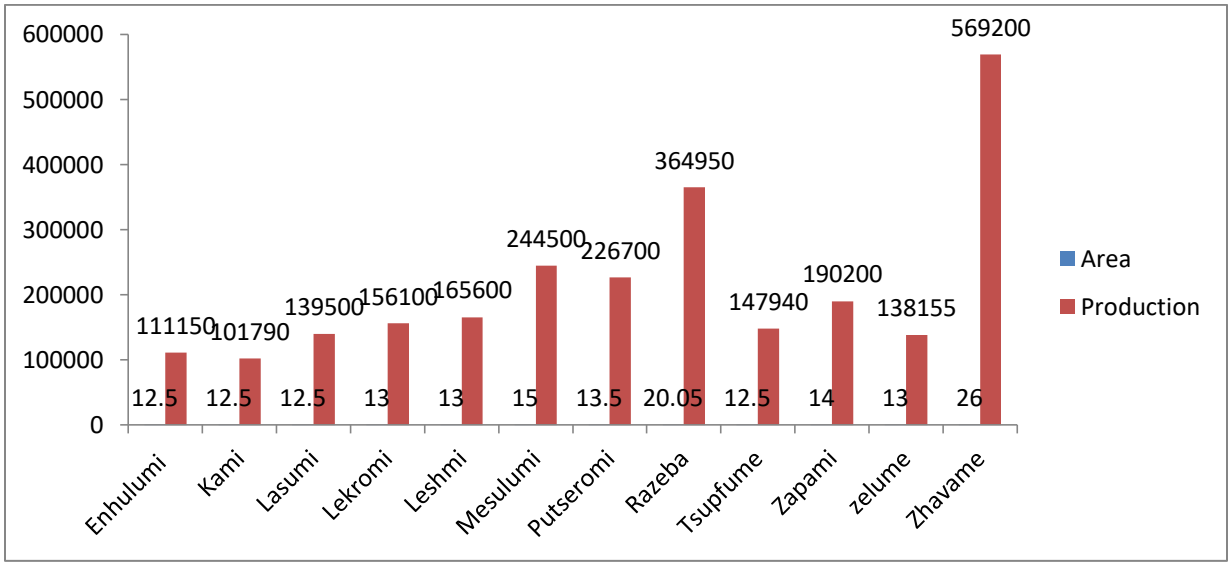
Table No.29: Area, Production and Productivity of Cabbage from the Study Area in Phek District

Area in Ha
Production in Quintal
Productivity: Quintal/Hectare

PHEK DISTRICT,NAGALAND CABBAGE			
Village	Area in Ha	Production in Quintal	Productivity
Enhulumi	12.5	1126.5	90.12
Kami	12.5	1071.9	85.75
Lasumi	12.5	1435	114.80
Lekromi	13	1590	122.31
Leshmi	13	1641	126.23
Mesulumi	15	2415	161.00
Pfutseromi	13.5	2169	160.67
Razeba	20.05	3743.5	186.71
Tsupfume	12.5	1530.4	122.43
Zapami	14	1901	135.79
Zelume	13	1481.55	113.97
Zhavame	26	5453	209.73
TOTAL	177.55	25557.85	1629.50

Source: Field Survey 2016-17

Fig.21: Area, Production and Productivity of Cabbage from the Study Area in Phek District



Source: Field Survey 2016-17

3.5 Relationship between Area, Production and Productivity of Beans

To understand the relationship and the impact of size of an area under beans cultivation and the production and productivity in Nagaland and in Phek District, secondary data has been collected from the Statistical Handbook which relates to the year from 2008-09 to 2017-18 which is shown in the Table No.30

3.5.1 Area, Production and Productivity of Beans in Nagaland and Phek District.

The area, production and productivity of beans from 2008-09 to 2017-18 is shown of both Nagaland and Phek District is shown in the table No.30. The trend from 2008-09 to 2015-2016 in Nagaland district shows a gradual increase in area of cultivation of beans from 2140 Ha in 2008-09 it increased to 2150 Ha in 2009-10 which further increased to 2360 Ha in 2015-16 which was the largest area under beans cultivation in Nagaland. The

area under beans cultivation from 2016-17 noticed a marginal decline to 2350 Ha from 2360 Ha in 2015-16 which further declined to 2330 Ha in 2017-18 as such in recent times from 2016-17 there has been a decline in the size of the field of beans cultivation in Nagaland.

In terms of production of beans in Nagaland since 2008-09 to 2017-18 there has been a decline and an increase and further decline in the production as such there has not been a period of constant decline nor a period of constant increase. From 2010-11 to 2015-16 there has been a constant increase in production of beans from 2680 Mt to 3210 Mt in 2015-16, which is also the year where the production of beans in Nagaland was at its peak since 2008-09. From 2016-17 the production declined to 3190 Mt which remained the same in 2017-18. The productivity remains more or less constant ranging from 1.2 Mt/Ha – 1.3 Mt/Ha. The overall correlation between the area under beans cultivation and production of beans in Nagaland shows a positive relation with r = 0.88, which shows degree of positive correlation between area and production of beans in Nagaland. The co-efficient of correlation between the area and productivity is significant which shows that as the size of area under beans production increases, the production of beans also increases. The co-efficient of determinants on r^2 value shows that 78% of the variation in production is explained by the field size X, the regression values of field size (Y) on production (X) gave us.

Y= a+bx, Y= -1751.922 + 2.099X

The result shows that the regression co-efficient byx is 2.099. This explains that a unit change in field size will lead a change in production by 2.099. The p-value of 'byx' is 0.001 which is less than 0.05. Therefore, the regression co-efficient is significant at

5%. *Thus, the hypothesis which states that bigger the farm size higher is the production and productivity has been proved.*

3.5.2 Area, Production and Productivity of Beans in Phek District

The area, production and productivity of beans in Phek District, Nagaland is shown in table no.31 and fig 22. The data in the table is extracted from the Statistical handbook of Nagaland. The table shows the area and production of beans in Phek district, Nagaland since 2008-09 to 2017-18.

There has been a constant increase in the size of an area under beans cultivation in Phek district, year after year. From 260 Ha in 2008-09 it has increased to 440 Ha in 2015-16 which has remained the same till 2017-18 i.e. 320 Ha. The area under beans cultivation remained constant in 2009-10, 2010-11 which was 270 Ha and since 2015-16 till 2017-18 the area under beans cultivation has same the same i.e. 320 Ha.

The production of beans in Phek District has been increasing since 2010-11 after a decline in 2009-10. The production of beans which was 360 Mt in 2008-09 declined in the following year to 340Mt in 2009-10, after which the production remained constant in 2010-11. It is only from 2011-12 the production of beans started to increase till 2015-16 to 440 Mt which has remained constant till 2017-18. The productivity ranged from 1.2 to 1.3 which is more or less as that of the productivity of Nagaland.

The overall correlation between the area under beans cultivation and production of beans in Phek District shows a positive relation with $r = 0.96$, which shows a high degree of positive correlation between area and production of beans in Phek District.

The co-efficient of correlation between the area and productivity is significant which shows that as the size of area under beans production increases, the productivity of beans also increases. The co-efficient of determinants on r^2 value shows that 92% of the variation in production is explained by the field size X, the regression values of field size (Y) on production (X) gave us.

Y= a+bx, Y= -122.893 + 1.748X

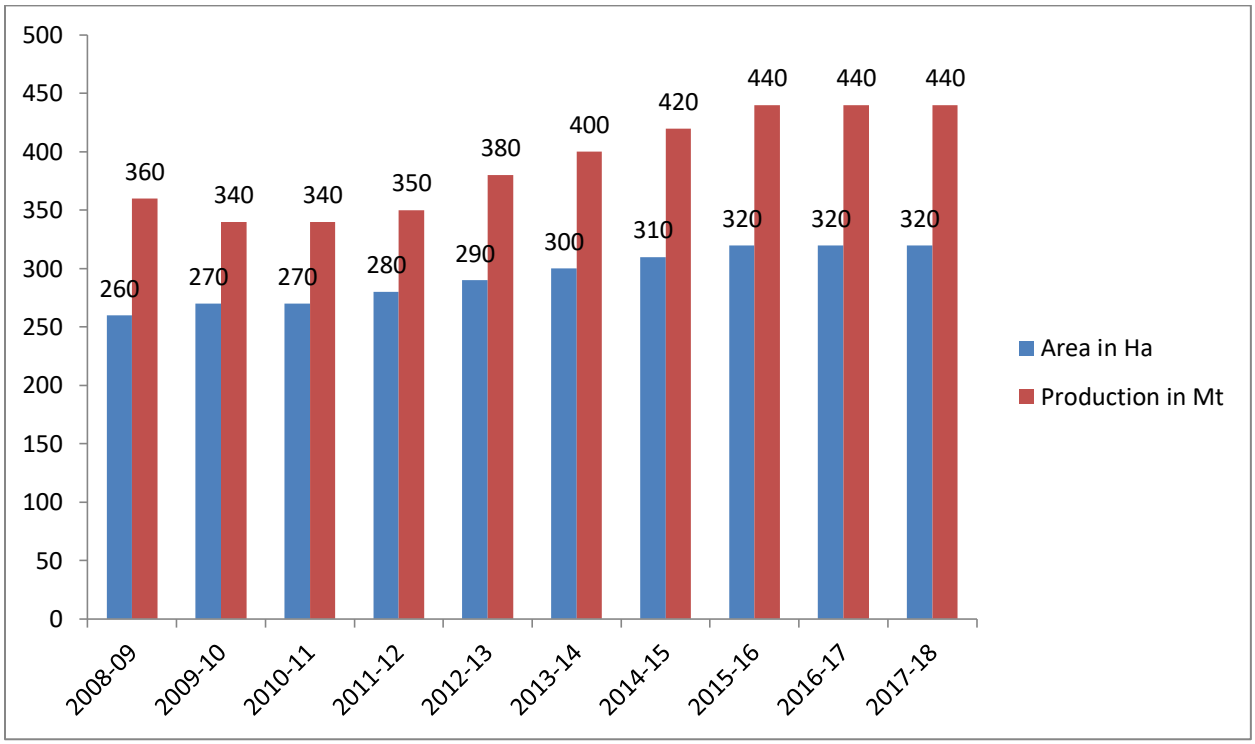
The result shows that the regression co-efficient byx is 1.748. This explains that a unit change in Field Size will lead a change in production by 1.748. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, therefore the hypothesis which states that bigger the farm size higher is the production and productivity has been proved.*

3.5.3 Area, Production and Productivity of Beans in the Study Area.

From the study of the 12 villages under study all the village had a field size of less than 1 ha which falls under the category of marginal farmers which is shown in table No. 33 and fig 24. The total production of beans was 289.76 quintal from an area of 150 Ha. Comparatively Mesulumi produces the highest production of beans with 41.40 quintal with productivity of 3.31, followed by Zhavame producing 33.35 quintal with a productivity of 2.66. The third highest production comes from the Kami village which has an equal area of beans cultivation i.e. 12.5 ha from 25 farmers and producing it with a productivity of 2.18. The least production of beans is from Leshmi, Lekromi and Enhulumi with 15.98 quintal, 17.10 quintal and 19.65 quintal respectively. These are the three villages which had production less than 20.00 quintal.

It is important to note that all the farmers in the 12 village cultivated beans in less than 1 Ha, as such no estimation of correlation could be made between the area and production. However the correlation from the secondary sources in both Nagaland and Phek district point towards a positive correlation between the area and the production fulfilling the first hypothesis that there is a positive relation between area size and production.

Fig.22: Area, Production and Productivity of Beans in Phek District, Nagaland



Source: Statistical Handbook of Nagaland

Table No.30: Area, Production and Productivity of Beans in Nagaland and Phek District.

BEANS
Area in '000Ha
P- Production in '000MT
Y- Yield/Ha (Productivity)

Year	Phek			Nagaland		
	Area	Production	Productivity	Area	Production	Productivity
2008-09	260	360	1.384615385	2140	2990	1.397196262
2009-10	270	340	1.259259259	2150	2680	1.246511628
2010-11	270	340	1.259259259	2150	2680	1.246511628
2011-12	280	350	1.25	2190	2730	1.246575342
2012-13	290	380	1.310344828	2270	2980	1.31277533
2013-14	300	400	1.333333333	2320	3080	1.327586207
2014-15	310	420	1.35483871	2330	3160	1.356223176
2015-16	320	440	1.375	2360	3210	1.360169492
2016-17	320	440	1.375	2350	3190	1.357446809
2017-18	320	440	1.375	2330	3190	1.369098712

Source: Statistical Handbook of Nagaland 2018

Table No.31: Area, Production and Productivity of Beans in Phek District, Nagaland

BEANS
Area in '000Ha
P- Production in '000MT
Y- Yield/Ha (Productivity)

Year	PHEK		
	Area	Production	Productivity
2008-09	260	360	1.384615385
2009-10	270	340	1.259259259
2010-11	270	340	1.259259259
2011-12	280	350	1.25
2012-13	290	380	1.310344828
2013-14	300	400	1.333333333
2014-15	310	420	1.35483871
2015-16	320	440	1.375
2016-17	320	440	1.375
2017-18	320	440	1.375

Source: Statistical Handbook of Nagaland

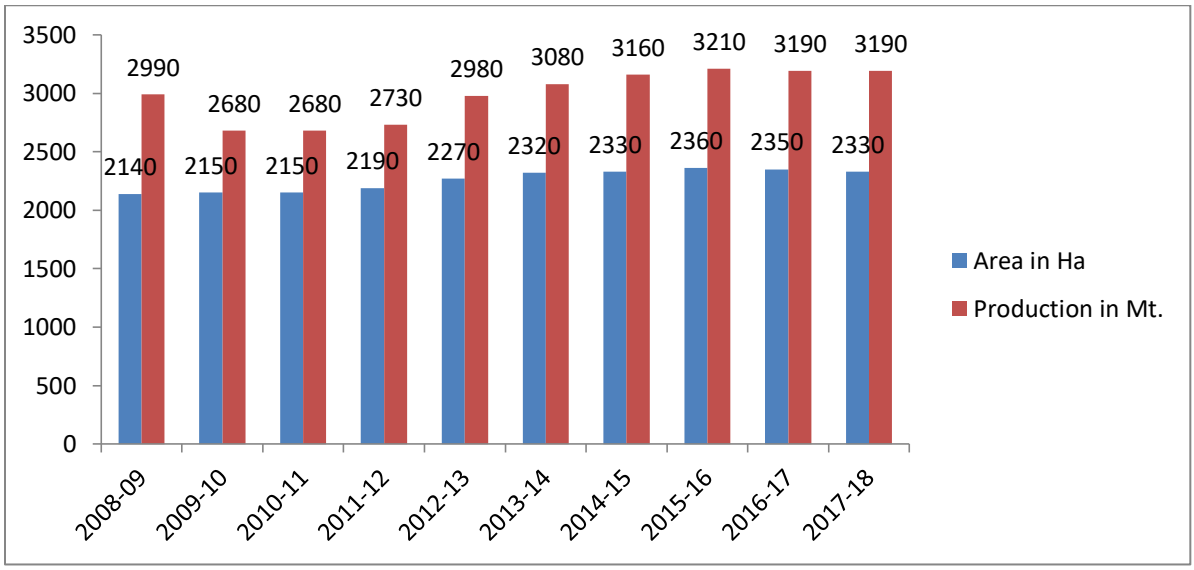
Table No.32: Area, Production and Productivity of Beans in Nagaland

BEANS
Area in '000Ha
P- Production in '000MT
Y- Yield/Ha (Productivity)

Year	NAGALAND		
	Area	Production	Productivity
2008-09	2140	2990	1.397196262
2009-10	2150	2680	1.246511628
2010-11	2150	2680	1.246511628
2011-12	2190	2730	1.246575342
2012-13	2270	2980	1.31277533
2013-14	2320	3080	1.327586207
2014-15	2330	3160	1.356223176
2015-16	2360	3210	1.360169492
2016-17	2350	3190	1.357446809
2017-18	2330	3190	1.369098712

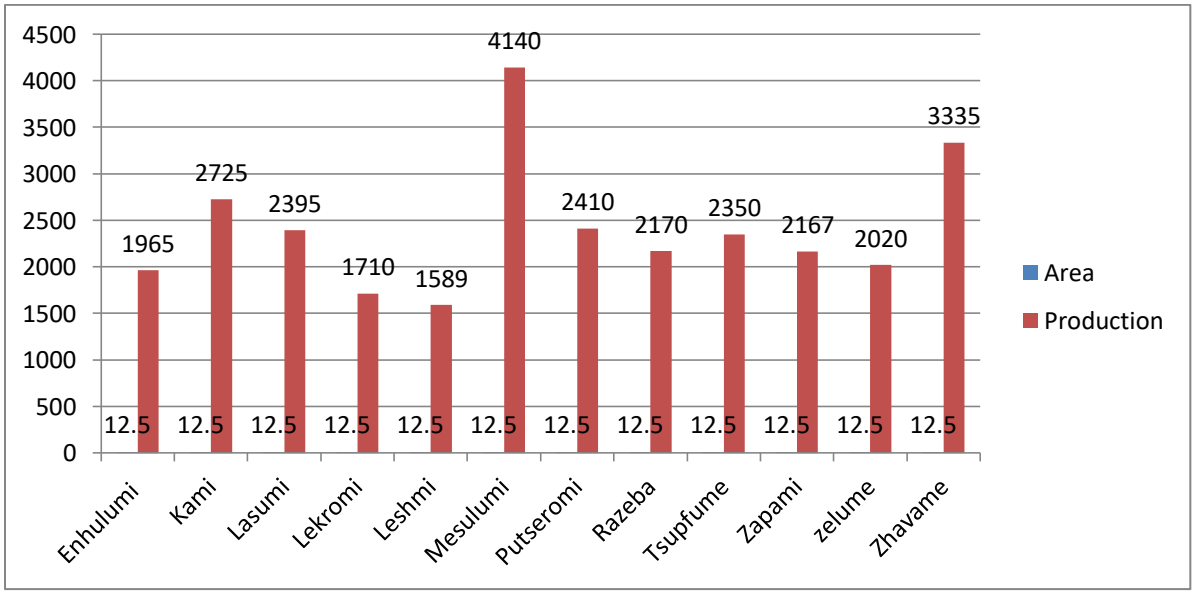
Source: Statistical Handbook of Nagaland

Fig 23: Area, Production and Productivity of Beans in Nagaland



Source: Statistical Handbook of Nagaland

Fig.24: Area, Production and Productivity of Beans of the Area under Study in Phek District



Source: Field Survey 2016-17

Table No.33: The Area, Production and Productivity of Beans of the Area under Study in Phek District

Area in '000Ha

Production in '000MT

Productivity: MT/Hectare

PHEK DISTRICT,NAGALAND			
Village	Area in Ha	Production in Quintal	Productivity
Enhulumi	12.5	19.65	1.572
Kami	12.5	27.25	2.18
Lasumi	12.5	23.95	1.916
Lekromi	12.5	17.10	1.368
Leshmi	12.5	15.89	1.2712
Mesulumi	12.5	41.40	3.312
Pfutseromi	12.5	24.10	1.928
Razeba	12.5	21.70	1.736
Tsupfume	12.5	23.50	1.88
Zapami	12.5	21.67	1.7336
Zelume	12.5	20.20	1.616
Zhavame	12.5	33.35	2.668
TOTAL	150	289.76	23.1808

Source: Field Survey 2016-17

3.6 Relationship between Area, Production and Productivity of Potato.

With the rapid population growth and modernisation the area of cultivation is rapid declining however the demand for potato keeps on increasing to fulfill the growing population, as such it is pertinent to find out what relation exist between the size of field on production and productivity of potato..

3.6.1 India's Potato Area, Production and Productivity.

To find out the relationship between the area under potato cultivation and it production, the data from 2001-02 to 2017-18 has been taken out from the Ministry of Agriculture & Farmers' Welfare Department of Agriculture, Cooperation & Farmers' Welfare Horticulture Statistics Division 2018 which is shown in the Table No.34 and fig.25.

It can be noticed that from 2001-02 to 2016-17, there has been gradual increase in size of are under potato cultivation from 1259.5 Ha in 2001-02 it has increased to 2179.3 Ha in 2016-17. However there has been a marginal decline in the area in 2017-18 from 2016-17, it was 2179.3 Ha it went to 2141.7 Ha in 2017-18. With regarding to production, there can be seen both a decline and increase at different times of the year. From 2015-16 till 2017-18 there has been a gradual increase in production and productivity. The productivity of potato from 2001-02 to 2017-18 in India ranges from 16.41 Mt/Ha to 23.96 Mt/Ha , which was the highest in 2017-18.

The overall correlation between the area under potato cultivation and production of potato in India from 2001-02 to 2017-18 in India shows a positive relation with $r = 0.95$, which shows a degree of positive correlation between area and production of potato in India from 2001-02 to 2017-18. The co-efficient of correlation between the area and production is significant which shows that as the size of area under potato production

increases, the production of potato also increases. The co-efficient of determinants on r^2 value shows that 90% of the variation in production is explained by the field size X, the regression values of field size (Y) on Production (X) gave us.

Y= a+bx, Y= -17412.641 + 30.230X

The result shows that the regression co-efficient byx is 30.230. This explains that a unit change in Field Size will lead a change in production by 30.230. The p-value of 'byx' is 0.0001 which is less than 0.05.Therefore, the regression co-efficient is significant at 5%.

The overall correlation between the area under potato cultivation and productivity of potato in India from 2001-02 to 2017-18 in India shows a positive relation with r = 0.72, which shows a degree of positive correlation between area and productivity of potato in India from 2001-02 to 2017-18. The co-efficient of correlation between the area and productivity is significant which shows that as the size of area under potato production increases, the productivity of potato also increases. The co-efficient of determinants on r^2 value shows that 52% of the variation in production is explained by the field size X, the regression values of field size (Y) on productivity (X) gave us.

Y= a+bx, Y= 10.256 + 0.006X

The result shows that the regression co-efficient byx is 0.006. This explains that a unit change in Field Size will lead a change in productivity by 0.006. The p-value of 'byx' is 0.001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis which states that bigger the size of the field higher is the production and productivity has been proved with regard to potato in India.*

3.6.2 Nagaland Potato Farm Size, Production and Productivity

To understand the relationship between size of Potato field under cultivation and the production in Nagaland, the Secondary data has been extracted from Ministry of Agriculture & Farmers' Welfare Department of Agriculture, Cooperation & Farmers' Welfare Horticulture Statistics Division, the data is from 2012-12 to 2017-18 which is shown in table No.35 and Fig.26. The data shows an increasing trend in the area of potato cultivation in Nagaland. From 3.8 Ha in 2012-13, it increased to 4.92 Ha in 2017-18 thought the increase has been a slow, gradual increase. In terms of production, it has been noticed a big leap from 32 Mt in 2012-13 to 65.02 Mt in 2017-18.

The overall correlation between the area under potato cultivation and production of potato in Nagaland from 2012-13 to 2017-18 shows a positive relation with r = 0.99, which shows a very high degree of positive correlation between area and production of potato in Nagaland from 20012-13 to 2017-18. The co-efficient of correlation between the area and production is significant, which shows that as the size of the area under potato production increases, the production of potato also increases. The co-efficient of determinants on r^2 value shows that 98% of the variation in production is explained by the field size X, the regression values of field size (Y) on Production (X) gave us.

Y= a+bx, Y= -84.662 + 30.842 X

The result shows that the regression co-efficient byx is 30.842. This explains that a unit change in field size will lead a change in production by 30.842. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%.

The overall correlation between the area under potato cultivation and productivity of potato in Nagaland from 2012-13 to 2017-18 shows a positive relation with r = 0.99,

which shows a very high degree of positive correlation between area and productivity of potato in Nagaland from 20012-13 to 2017-18. The co-efficient of correlation between the area and productivity is significant, which shows that as the size of the area under potato production increases, the productivity of potato also increases. The co-efficient of determinants on r^2 value shows that 96% of the variation in production is explained by the field size X, the regression values of field size (Y) on productivity (X) gave us.

Y= a+bx, Y= -8.911+ 4.600X

The result shows that the regression co-efficient byx is 4.600. This explains that a unit change in field size will lead a change in productivity by 4.600. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis which states that bigger the size of the field higher is the production and productivity has been proved.*

3.6.3 Phek District, Nagaland Potato Farm Size Area, Production and Productivity

To find out the relationship between the size of the field under which potato is cultivated in Phek district and its production, the data from the Year 2012-2014 to 2017-18 is extracted from Statistical Handbook of Nagaland is shown in table No.36 and Fig 27.

The data reveals a gradual increase in both area and production of potato in Phek district, Nagaland from 2013-14 to 2017-18. From 1280 Ha it has increased its area under cultivation of potato to 1390 Ha by 2017-18. The production has increased from 12890 Mt in 2013-14 to 13930 Mt, however, the productivity is more or less constant between 10.2 Mt/Ha - 10.27 Mt/Ha.

The overall correlation between the area under potato cultivation and production of potato in Phek District, Nagaland from 20013-14 to 2017-18 Nagaland shows a positive relation with r = 0.95, which shows a very high degree of positive correlation between area and production of potato in Phek District, Nagaland from 2012-13 to 2017-18. The co-efficient of correlation between the area and production is significant, which shows that as the size of the area under potato production increases, the production of potato also increases. The co-efficient of determinants on r^2 value shows that 90% of the variation in production is explained by the field size X, the regression values of field size (Y) on Production (X) gave us.

Y= a+bx, Y= 27.0640+ 0.09713X

The result shows that the regression co-efficient byx is 0.09713. This explains that a unit change in field size will lead a change in production by 0.09713. The p-value of 'byx' is 0.012 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%.

Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis which states that bigger the size of the field higher is the production and productivity has been proved.*

3.6.4 Potato Farm Size Area, Production and Productivity in the Study Area.

The farm area, production and productivity of potato from the study area of 12 villages under Phek district, Nagaland is shown in the table No.37 and fig 28.

From the field study it was observed that Zhavame with the total area of 28.5 Ha has the highest production of potato,i.e237.30 quintal out of the overall total production of 1048.16 quintal of potato. The second highest production of potato was from Lekromi village, i.e. 147.80 quintal with the total area of 15.5 Ha and productivity of 9.54

quintal/Ha. Razeba has the production of 110.75 quintal with the 2nd highest total area, i.e. 20.5 Ha, and it was also found that Leshmi village has the potato production of 87.00 quintal with a the productivity of 5.80 quintal/Ha, with the least total area of 15 Ha. The fifth highest production of potato is from Zapami village with 79.50 quintal and yield of 5.89 quintal/Ha, followed by Tsupfume village with the production of 74.40 quintal from the cultivated area of 14.5 Ha. Pfutseromi village has the total production of 65.28 quintal with13.5 Ha area yield of 4.84 quintal/Ha and Mesulumi village has the total production of 63.21 quintal with a cultivated area of 16.5 Ha. Kami village has a total production of 58.95 quintal from 13.5 Ha. Lasumi village has the total production of 40.45 quintal it has the least area cultivated same as Enhulumi village, i.e. 12.5 Ha with a yield of 3.23 quintal/Ha. Zelume village has the production of 40.32 quintal with an area of 13.5 Ha however it has the least productivity among the 12 villages under the study, and it has a yield of 2.98 quintal/Ha. From the survey it was found that out of the 12 villages under study the total production was 1048.16 quintal. Zhavame village has the highest production of potato with 237.30 quintal, whereas Lekromi has the highest productivity with 9.53 quintal/Ha, and the least production is from Zelume village with an area of 13.5 Ha and also yielding the least productivity among the villages.

The overall correlation between the area under potato cultivation and production of potato in Phek District, Nagaland shows a positive relation with r = 0.89, which shows a degree of positive correlation between area and production of potato in Phek district from the study of the twelve villages. The co-efficient of correlation between the area and productivity is significant, which shows that as the size of the area under cabbage production increases, the production of cabbage also increases. The co-efficient of

determinants on r^2 value shows that 80% of the variation in production is explained by the field size X, the regression values of field size (Y) on production (X) gave us.

Y= a+bx, Y= -87.579 + 11.077 X

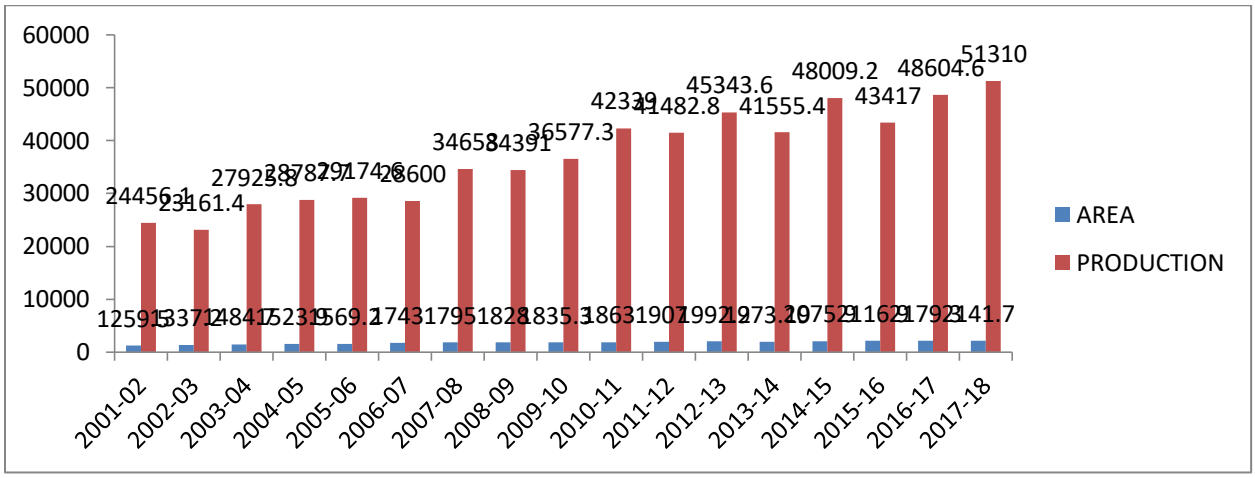
The result shows that the regression co-efficient byx is 11.077. This explains that a unit change in field size will lead to a change in production by 11.077. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%.

The overall correlation between the area under potato cultivation and productivity of potato in Phek District, Nagaland shows a positive relation with r = 0.47, which shows a degree of positive correlation between area and productivity of potato in Phek district from the study of the twelve villages. The co-efficient of correlation between the area and productivity is significant, which shows that as the size of the area under cabbage production increases, the productivity of cabbage also increases. The co-efficient of determinants on r^2 value shows that 22% of the variation in production is explained by the field size X, the regression values of field size (Y) on productivity (X) gave us.

Y= a+bx, Y= 1.574 + 5.008 X

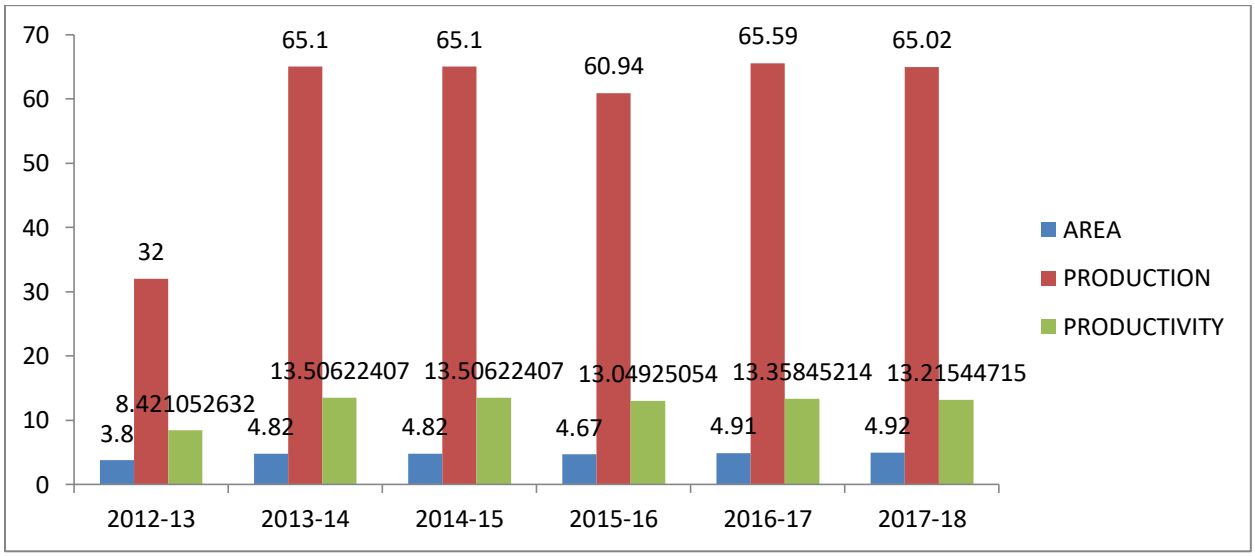
The result shows that the regression co-efficient byx is 5.008. This explains that a unit change in field size will lead to a change in productivity by 5.008. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis which states that bigger the size of the field higher is the production and productivity has been proved.*

Fig.25: **India's Potato Production, Area and Productivity from 2001-02 to 2017-18**



Source: Ministry of Agriculture & Farmers' Welfare Department of Agriculture, Cooperation & Farmers' Welfare Horticulture Statistics Division 2018

Fig.26: Nagaland Potato Production, Area and Productivity from 2012-13 to 2017-18



Source: Ministry of Agriculture & Farmers' Welfare Department of Agriculture, Cooperation & Farmers' Welfare Horticulture Statistics Division 2014-2018

Table No.34: India's Potato Production, Area and Productivity from 2001-02 to 2017-18

Area in '000Ha
Production in '000MT
Productivity: MT/Hectare

Year	Area	Production	Productivity
2001-02	1259.5	24456.1	19.4173
2002-03	1337.2	23161.4	17.3208
2003-04	1484.7	27925.8	18.8091
2004-05	1523.9	28787.7	18.8908
2005-06	1569.2	29174.6	18.592
2006-07	1743	28600	16.4085
2007-08	1795	34658	19.3081
2008-09	1828	34391	18.8135
2009-10	1835.3	36577.3	19.9299
2010-11	1863	42339	22.7262
2011-12	1907	41482.8	21.7529
2012-13	1992.2	45343.6	22.7606
2013-14	1973.19	41555.4	21.06
2014-15	2075.9	48009.2	23.1269
2015-16	2116.9	43417	20.5097
2016-17	2179.3	48604.6	22.3028
2017-18	2141.7	51310	23.9576

Source: Ministry of Agriculture & Farmers' Welfare Department of Agriculture, Cooperation & Farmers' Welfare Horticulture Statistics Division 2018

Table No.35: Nagaland Potato Production, Area and Productivity from 2012-13 to 2017-18

Area in '000Ha
Production in '000MT
Productivity: MT/Hectare

Year	Area	Production	Productivity
2012-13	3.8	32	8.421
2013-14	4.82	65.1	13.51
2014-15	4.82	65.1	13.51
2015-16	4.67	60.94	13.05
2016-17	4.91	65.59	13.36
2017-18	4.92	65.02	13.22

Source: Ministry of Agriculture & Farmers' Welfare Department of Agriculture, Cooperation & Farmers' Welfare Horticulture Statistics Division 2014-20

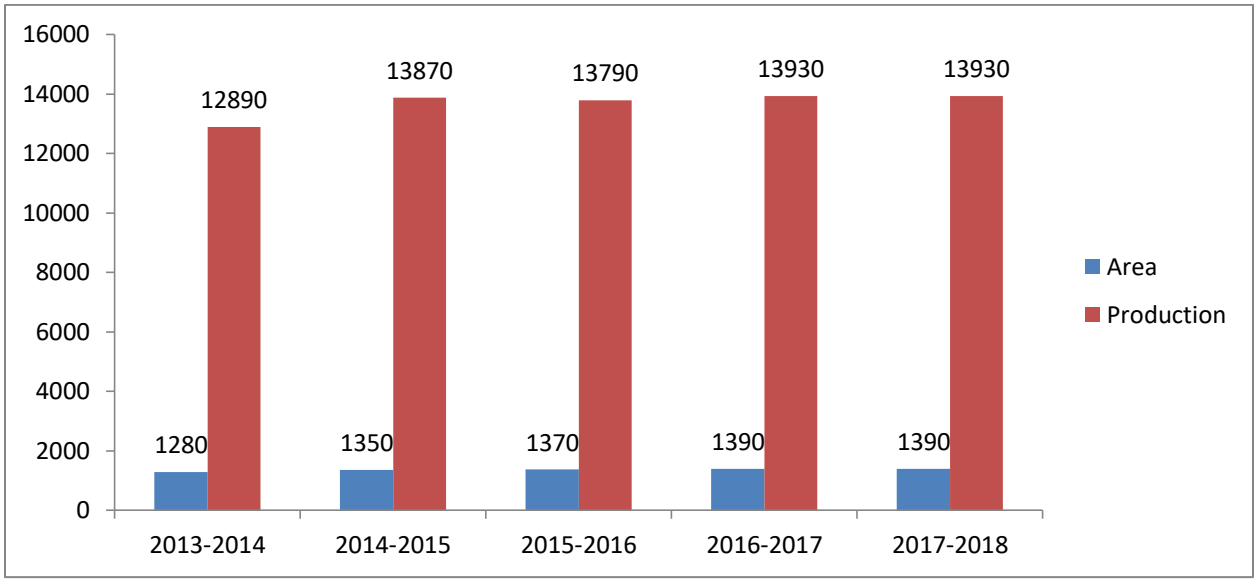
Table No.36*:* Phek District, Nagaland Potato Production, Area and Productivity from 2013-14 to 2017-18

POTATO
Area in Ha
P- Production in Mt
Y- Yield/Ha (Productivity)

Year	Phek		
	Area	production	Yield
2013-2014	1280	12890	10.07
2014-2015	1350	13870	10.27
2015-2016	1370	13790	10.06
2016-2017	1390	13930	10.02
2017-2018	1390	13930	10.02

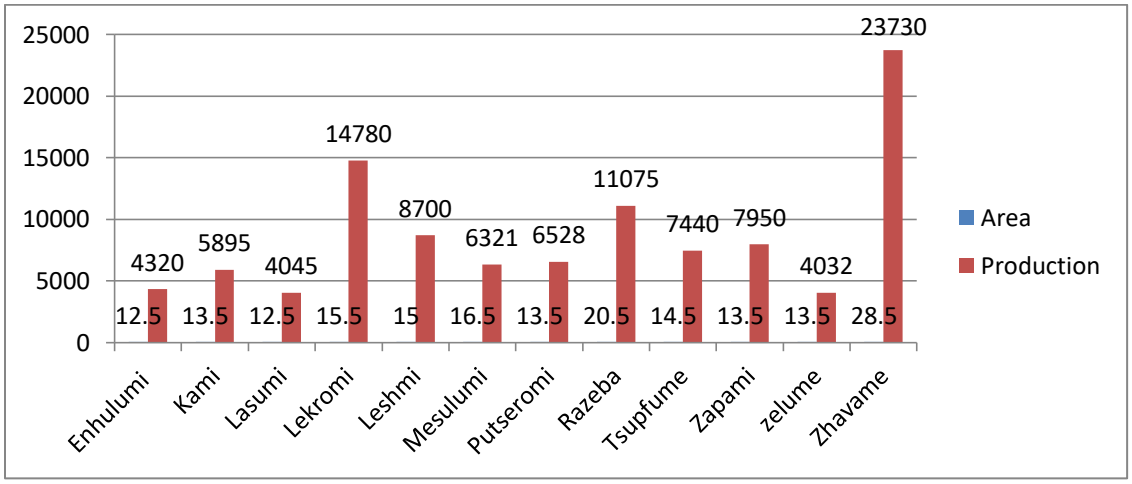
Source: Statistical Handbook of Nagaland

Fig.27: Phek District, Nagaland Potato Production, Area and Productivity from 2013-14 to 2017-18



Source: Statistical Handbook of Nagaland

Fig.28: Area, Production and Productivity of Potato of the Area under Study in Phek District



Source: Field Survey 2016-17

Table No.37: Area, Production and Productivity of Potato of the Area under Study in Phek District

Area in '000Ha
Production in '000MT
Productivity: MT/Hectare

PHEK DISTRICT,NAGALAND			
POTATO			
Village	Area in Ha	Production in Quintal	Productivity
Enhulumi	12.5	43.20	3.46
Kami	13.5	58.95	4.37
Lasumi	12.5	40.45	3.24
Lekromi	15.5	147.80	9.54
Leshmi	15	87.00	5.80
Mesulumi	16.5	63.21	3.83
Pfutseromi	13.5	65.28	4.84
Razeba	20.5	110.75	5.40
Tsupfume	14.5	74.40	5.13
Zapami	13.5	79.50	5.89
Zelume	13.5	40.32	2.99
Zhavame	28.5	237.30	8.33
TOTAL	189.5	1048.16	62.796

Source: Field Survey 2016-17

All the three vegetables under study show a significant positive correlation between farm size, production and productivity, thus proving the first hypothesis that there is a relationship between farm size, production and productivity.

CHAPTER 4

MARKETING AND MARKET EFFICIENCY OF VEGETABLES

This chapter discusses how the marketing of vegetables is carried out in Phek District Nagaland. The marketable surplus and marketed surplus has been calculated. The various marketing channels, the cost involved in the transfer of vegetable from the Producer to the ultimate Consumer, the price spread, the net margin of the producer and intermediaries and ultimately, the efficiency of marketing channels are analysed and discussed in this chapter to analyse and to verify the second hypothesis, The various production and marketing constrains, Benefit- Cost have also been discussed.

4.1 Marketing is as critical to better performance in agriculture as farming itself (Saxena, H.M 2004) Production has to be backed and supported by effective marketing to promote production by encouraging the producer through their due share and also the consumers being satisfied with what they pay for in return. The marketing of vegetables is highly complicated due to its perishable and bulkiness, and many intermediaries being involved in the transaction due to the location differences between the producer and the consumers as such cost varies from channel to channel, and ultimately the price varies to a great extent. The direct transfer from the producer to consumer is hassle free which is the shortest channel, however there are other channels which involves intermediaries such as the wholesaler/agents, retails where the marketing margin , and price spread sets in.

The marketing of agricultural products begins at the farm when the farmer harvests his products. The product when it is harvested cannot usually go directly to the consumers. Firstly, it is likely to be located some distance from the place of production. Secondly,

storage is required to adjust supply to meet demand. Thirdly, a product when it has been harvested is rarely in a form acceptable to consumers. Therefore, it must be sorted, cleared and processed in various ways and must be presented to the Consumer in an acceptable quality and quantities for sale. Finally, the farmer expects payment when his produce leaves his possession, and hence some financial arrangements must be made to cover all the various stages until the retailer sells the products to the final consumer.

Agricultural marketing involves essentially the buying and selling of agricultural produces. This definition of agricultural marketing may be accepted in olden days, when the village economy was more or less self-sufficient, when the marketing of agricultural produce presented no difficulty, as the farmer sold his produce directly to the consumer on a cash or barter basis, but, in modem times, marketing of agricultural produce has to undergo a series of transfers or exchanges from one hand to another before finally reaches the consumer. An agricultural marketing system is defined in broadest terms, as physical and institutional set up to perform all activities involved in the flow of products and services from the point of initial agricultural production until they are in the hands of ultimate consumers. It includes assembling, handling, storage, transport, processing, wholesaling, retailing and export of agricultural commodities as well as accompanying support services such as market information, the establishment of grades and standards, commodity trade, financing and price risk management and the institutions involved in performing the above functions.

Olukosi and Isitor (1990) defined agricultural marketing as the performance of all activities which direct the flow of goods and services to the consumer from the producers (farmers) in order to accomplish the producer's objectives. Many people consider

marketing as equivalent to selling or transferring the product to another person for a price. Selling is central on the micro concept of marketing but it is only part of it. According to Olukosi and Isitor (1990), marketing includes packaging, storage, transportation, pricing, financing, risk bearing and even product design. They also observed that agricultural marketing involves all those physical, legal and economic services, which are necessary to make products from the farm available to the consumers. Thus creating of form, place, time, and possession utilities is derived from agricultural marketing.

Kohls (1985) stated that agricultural marketing is the performance of all business activities involved in the flow of goods and services from the point of initial agricultural production until they are in the hands of the ultimate consumer. From this definition it can be seen that groups with varying interest will view marketing differently. Consumers will be interested in purchasing what they can at lowest possible cost and farmers it might be assumed, will be interested in obtaining the highest possible returns from sale of their products. The major reason why Kohl's definition is so relevant to agricultural sector is because it can be used to determine which business activities can be properly regarded as a neutral element by the farmer and this is worthy of his serious consideration.

There are several complexities involved in agricultural marketing as agricultural produce includes the element of risk like perishability, and it again depends on the type of produce. If agriculture produce happens to be a seasonal one, it involves another kind of risk. Likewise, there are several risk elements involved in agricultural marketing. The pricing of the product depends on factors like seasonality and perishability, and it

depends on the demand and supply also, all these are interwoven and ultimately make a profound impact on agricultural marketing.

4.2 MARKETABLE SURPLUS AND MARKETED SURPLUS

Going by the definition marketable surplus means the surplus with the farmers which can be sold after the requirements of the farmers for consumption, for seed, for payment etc. are met. On the other hand marketed surplus means the actual quantity of the produce which is sold by the farmers which might be more or less or equal to the marketable surplus. Theoretically the two words are often used interchangeably. The marketable surplus and marketed surplus depends on the vegetables to vegetables. For instance some vegetables are mostly cultivated for commercial as such their marketable surplus is higher than those vegetables which are cultivated for both consumption and commercial purpose. The marketable and marketed surplus of vegetables from the study area is shown in table No.38.

Each vegetable has different marketable and marketed surplus which can be observed in table No.38. The total production of cabbage from the study area in Phek district from the twelve villages was 25557.89 quintal. The marketable surplus of cabbage after meeting the consumption and other purpose accounts to 24828.50 quintal, which is 97.15%. The marketable surplus of cabbage is comparatively higher than the other vegetables because it is cultivated mostly for commercial purpose by the farmers. Moreover, unlike other vegetables, the cabbage need not be kept for next year plantation, and also the cabbage cannot be stored for long that is why the marketable surplus of the cabbage is higher comparative to beans and potato. The marketed surplus accounts to 94.55%, i.e. 24164.00 quintal there is a difference of 2.60% between marketable and marketed surplus as a

result of wastage and spoilage during the process of packing, handling, transportation etc. due to lack of storage facilities and transportation facilities and infrastructure.

Table No. 38. Marketable surplus and marketed surplus in Phek district, Nagaland

Particulars	Cabbage	Beans	Potato
Total production (in Quintal)	25557.85 (100%)	289.76 (100%)	1048.16 (100%)
Marketable Surplus (in Quintal)	24828.50 (97.15%)	162.87 (56.21%)	810.65 (77.34%)
Marketed surplus (in Quintal)	24164.00 (94.55%)	141.76 (48.92%)	717.02 (68.41%)
Total differences Marketable surplus- Marketed Surplus	664.50 (2.60%)	21.11 (7.92%)	93.62 (8.93%)

Source: Field survey 2016-17

(The figures in parenthesis are in percentage with regard to total production)

The total production of beans taken collectively from twelve villages under study from Phek district, Nagaland was 289.76 quintal. After meeting the consumption, offerings, and keeping seedlings for the next year plantation the marketable surplus left with the farmer was 162.87 quintal. The marketable surplus of beans is comparatively less than other vegetables because beans is cultivated by the farmers with the primary objective of consumption, unlike other vegetables. Whatever is left behind after the requirement by the farmers, they are sold off, which accounts for 56.21% (162.87

quintal) as marketable surplus. The actual quantity which was sold was 141.76 quintal, i.e. 48.92% the differences exist between the marketable and marketed surplus since some quantity were not sold off and some were given to others before it reached the market.

Potato is cultivated both for consumption and for commercial purpose because potato from Phek district is well known for the taste and their organic cultivation. The total production of potato from the twelve villages from Phek district was 1048.16 quintal. Out of the total production, the marketable surplus after keeping for consumption and sapling was 810.65 quintal, which is 77.34% of the total production. The potato which were actually sold in the market i.e. marketed surplus was 717.02 quintal, which accounts for 68.41% of the total production. The difference between the marketable and marketed surplus was 93.62 quintal. The difference is due to potatoes being spoiled before being sold in the market due to lack of storage facilities since the goods were stored in a storeroom without any proper storage facilities. The goods were also spoiled during transportation as the goods are transported roughly in a mini truck and vehicles without proper boxes. The potato were simply packed in bags and lastly some quantities of potato were also given to friends and well-wishers before it reached the market.

4.3 MARKETING CHANNELS

Agricultural commodities are produced by various cultivators on their farm and mostly in rural areas, but the produce is consumed by people throughout the state located at various places. The path followed by these commodities till they reach the final consumer is known as marketing channels. The length of channels varies from commodity to

commodity and also depends on the quantity to be moved the nature and degree of specialisation in production. Marketing channels are the routes through which agricultural products move from producer to consumers. It is imperative to know and study the various marketing channel that are at play in the vegetable marketing. The multiple marketing channels determine the marketing margin, price spread and the marking efficiency. The marketing channels involve various intermediaries such as the wholesalers, retailers who supplies the product by purchasing from the producer in the rural area and sells it to the ultimate consumers based in various urban areas. The various multiple marketing channels involved in the study area and for different vegetables are discussed under:

A) Cabbage:

In the marketing of cabbage in the study area from twelve villages in Phek district, three significant marketing channels were observed, they are as follows:

Channel I: Producer - Consumer

Channel II: Producer - Retailers (Village Traders/Street Vendors) - Consumer

Channel III: Producer - Wholesaler (Village Traders/Agent) – Retailers – Consumer

In the marketing of cabbage from Phek district, three important channels were found to be existence. Channel I, in which there is direct marketing between the producer and the consumers. In this channel, either the consumers directly purchase from the fields of the farmers or the consumers purchases it from the village wayside streets where the farmers sell the cabbage. In the channel I no middlemen is involved in the sell and purchase of the cabbage. In the channel II, there are the retailers who act as an intermediary between the producer and the consumer. The retailers are the village traders, and street vendors who

purchase from the producer and sells it to the consumers either in the village marketing shed and some even take it to other urban areas such as in Pfutsero, Kohima etc. and sells it to the consumers.

In channel III there is an addition of intermediaries, i.e. the wholesaler, they are also known as agents and are the village traders. The wholesaler purchases the cabbage from the producers and takes it to urban areas such as in Kohima, Dimapur etc. and sells it to the retailers who in turn sell it to the consumers. In the study, channel III is most complicated but plays a vital role in the marketing of cabbage.

B) Beans :

In the marketing of beans in the study area only two marketing channels were observed, which are as follows.

Channel I: Producer – Consumer.

Channel II: Producer – Retailers – Consumer

The marketing of beans is quite different from the marketing of potato and cabbage. In the case of marketing of beans, the direct transition i.e. channel I from the producer to consumer played a very highly significant role followed by some percentage of marketing involving the role of intermediaries by the retailers. Unlike marketing of potato and cabbage, in the marketing of beans, the role of wholesaler, and channel III was absent.

C) Potato:

In the study from twelve villages in Phek district, Nagaland, three significant marketing channels were observed which plays an essential role in the marketing of potato

Channel I: Producer - Consumer

Cannel II: Producer – Retailers (Village Traders /street vendors) -Consumer

Channel III: Producer – Wholesaler (Village Trader/ agents) - Retailers – Consumer

In the marketing of potato, three prominent channels were observed. Firstly there is direct marketing, i.e. from the producer to the consumer without the involvement of any intermediaries, which is the shortest and direct channel. Secondly, there is channel II, where the village traders/street vendors come into the play as a chain and a linkage between the producer and the consumer. The village trader/street vendors purchases from the producer, and they ultimately sell it to the consumers playing the role of a retailer.

Lastly, there is a critical channel III, which involves more intermediaries and more complicated procedure. In channel III, the village traders who are also known as agents play the role of wholesaler who directly purchases the potato from the producers and supplies it to the retailers in Kohima, Dimapur and other places who in turn delivers it to the ultimate consumers.

4.4 DISPOSAL PATTERN OF VEGETABLES THROUGH DIFFERENT MARKETING CHANNELS:

The disposal pattern shows how the goods (vegetables) are being disposed of through various channels. Different vegetables follow different channels through which they are disposed off from the producers. The collective disposal pattern of cabbage, beans and potato are discussed in the following.

A) Disposal Pattern of Cabbage:

Cabbage which is one of the principal cash crops which is being produced and marketed in Phek district, Nagaland is being disposed under three channels which is shown in table No.39 and fig.29. In general the district is well known for its healthy organic

cabbage. It was observed that there are three channels through which the cabbage in the study area, i.e. Phek district of Nagaland is being disposed off namely channel I (Producer-Consumer), channel II (Producer- Retailer- Consumer) and channel III (Producer-Wholesaler-Retailer-Consumer).

It is very observant that channel III is very dominating in the disposal of cabbage in the study area. Channel III alone disposes off 98.01% of the total marketed surplus. Channel III disposes of 23682 quintal of cabbage in the given year. It depicts a significant role played by the wholesaler and retailer in the disposal of cabbage from producer to consumer. In channel III the wholesalers are the agents and the village traders who purchase cabbage from the producer and sells it in urban and other areas to the retailers. Channel II disposes off 1.23% of the product, i.e. 185 quintals. In channel II, the farmers sells it to the retailers in the village and in urban areas who in turn sell to the consumers. Channel I which has no intermediaries disposes off the least amount of Cabbage which signifies the importance of intermediaries in the disposal in cabbage in the study Area. In the channel I there is a direct transaction between the producer and the consumer, however, in the disposal pattern of cabbage in the study are only 0.77% of cabbage were disposed of through this channel.

Table No.39: Disposal pattern of cabbage through the different marketing channels collectively taken from the twelve villages: (in Quintal)

Study Area Phek District, Nagaland			
Marketing Channels	Channel	Quantity Sold(in Quintal)	In %
Producer-Consumer	I	185	0.77%
Producer- (Village Traders/Vendors) Retailers	II	297	1.23%
Producer-(village Traders/agent)Wholesaler – Consumer)	III	23682	98.01%
Total		24164	100.00%

Sources: Field Survey 2016-2017
Figures in parenthesis are in percentage to total.

B) Disposal Pattern of Beans :

In the study area, the disposal pattern of beans was found to be different, unlike other vegetables. The different disposable pattern of beans can be seen in table No.40 and Fig.30. As can be observed that there are only two channels through which the beans was disposed off, i.e. channel I (Producer-Consumer) and channel II (Producer- Retailer – Consumer). Unlike other vegetables, the channel I is very dominated, and a significant proportion of the beans is disposed directly to the consumer from the producer. In the study area, 81.27% of the output, i.e. 115.21 quintal of beans is being disposed of through channel I. The rest of the product, i.e. 18.73% (26.55 quintal) of beans are disposed of through the intermediaries through the involvement of the retailer, they are the village

traders and vendors who sell it in neighbouring towns, urban areas and even in village marketing sheds. In the study area in the marketing of beans, unlike other vegetables under the study channel III was found to be non-existent which might be due to lesser production and farming of beans, unlike potato and cabbage.

Table No.40: Disposal pattern of beans through the different marketing channels collectively taken from the twelve villages: (in Quintal)

Study Area Phek District, Nagaland			
Marketing Channels	Channel	Quantity Sold (in Quintal)	In %
Producer-Consumer	I	115.21	81.27%
Producer- (Village Traders/Vendors) Retailers	II	26.55	18.73%
Producer-(village Traders/agent)Wholesaler – Consumer	III	0	0
Total		141.76	100.00%

Sources: Field Survey 2016-2017

Figures in parenthesis is in percentage to total

C) Disposal Pattern of Potato :

The disposal pattern of potato through the different marketing channels collectively taken from the twelve villages is shown in table No.41and in Fig: 31: As can be seen in the table and the fig, all the three channels play a vital role in the marketing of potato in the

study area i.e. Phek district of Nagaland. Through channel I, 182.72 quintal were disposed directly from the producer to the consumer, which is 25.48%; in comparison to the other two channels of marketing, this marketing channel disposes of the least quantity of production. Channel II plays an important role which disposes of 246.81 quintal, i.e. 34.42%. In channel II, some of the village traders/vendors play the role of the middleman by being the retailer. They purchase from the producer directly and transport it to the town and nearby areas and even in the village marketing shed, they play an essential linkage between the producer and the consumers. All the transportation cost are bored by the retailers in the process of transfer of goods from the producer to the ultimate consumers in channel II. Channel III disposes off the highest percentage of production, i.e., 40.10%, which depicts its stronghold and the involvement of wholesalers (village traders/agents), retailers play an essential part of the potato marketing in the Phek District. Chanel III disposes of the highest share of production. The channel dispose of 287.50 quintal of potato. Potato is purchased by the wholesalers who are also known as agents/village traders who then takes it to the major town and other districts and parts of the state and sells it to the retailers and then to the ultimate consumers. The wholesalers play a vital and pivotal role in the marketing of potato.

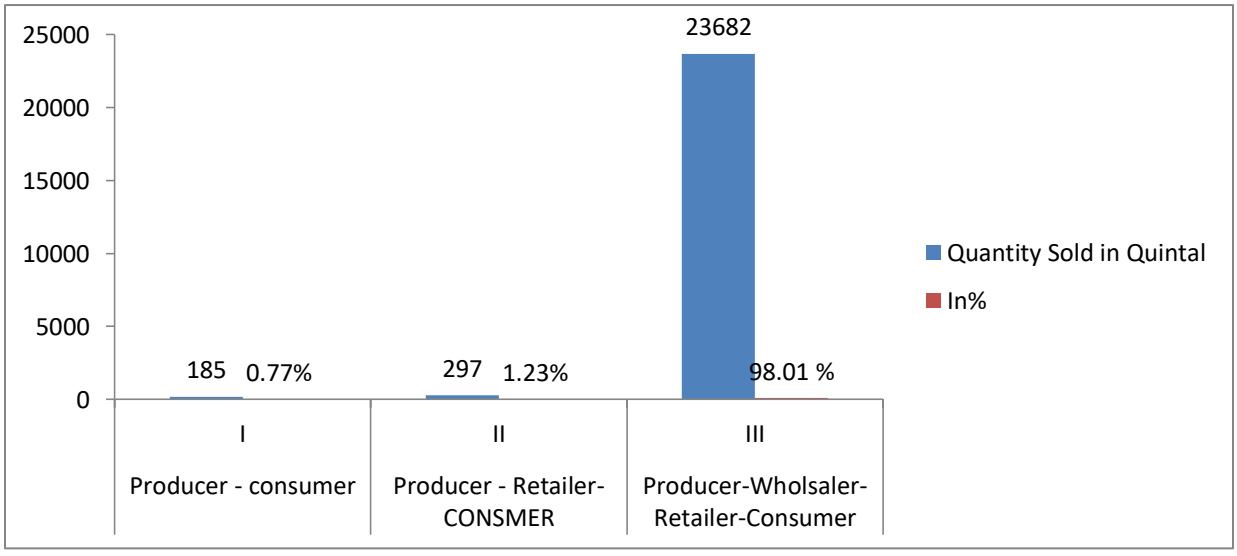
Table No.41: Disposal pattern of Potato through the different marketing Channels collectively taken from the twelve villages: (in Quintal)

Study Area Phek District, Nagaland			
Marketing Channels	Channel	Quantity Sold	In %
Producer – Consumer	I	182.72	25.48 %
Producer-(Village Traders/Vendors) Retailers	II	246.81	34.42 %
Producer-(village Traders/agent)Wholesaler – Consumer	III	287.50	40.10 %
Total		717.03	100.00%

Source: Field Survey 2016-2017

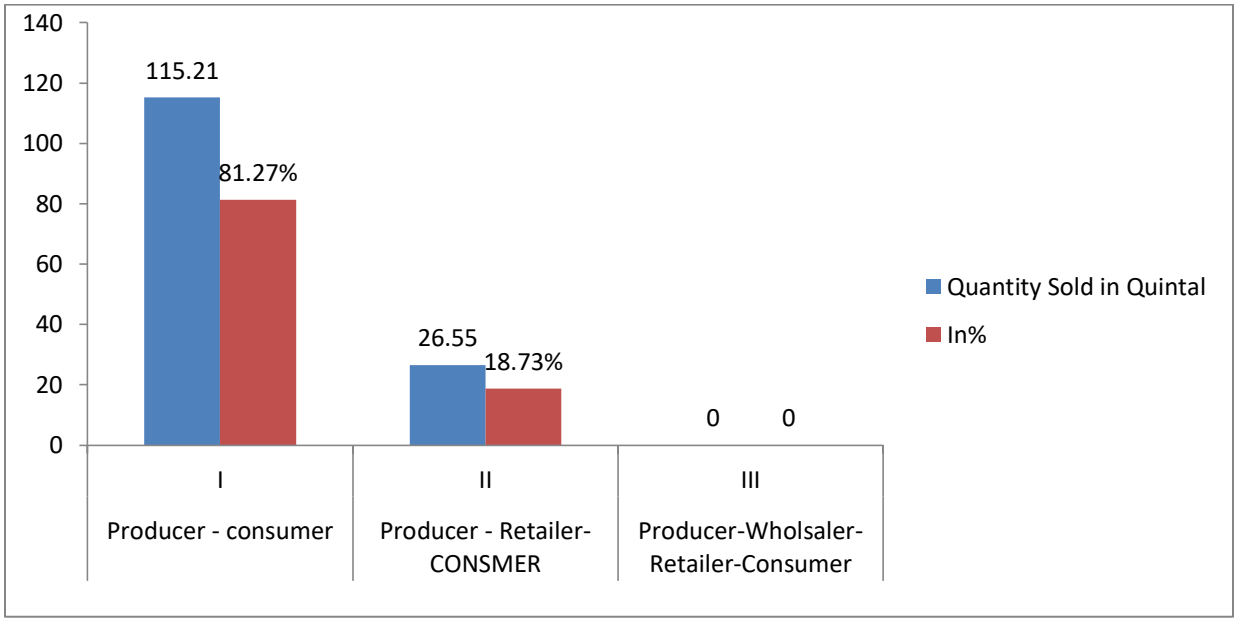
Figures in parenthesis is in percentage to total

Fig.29. Disposal of Cabbage through Different Marketing Channels



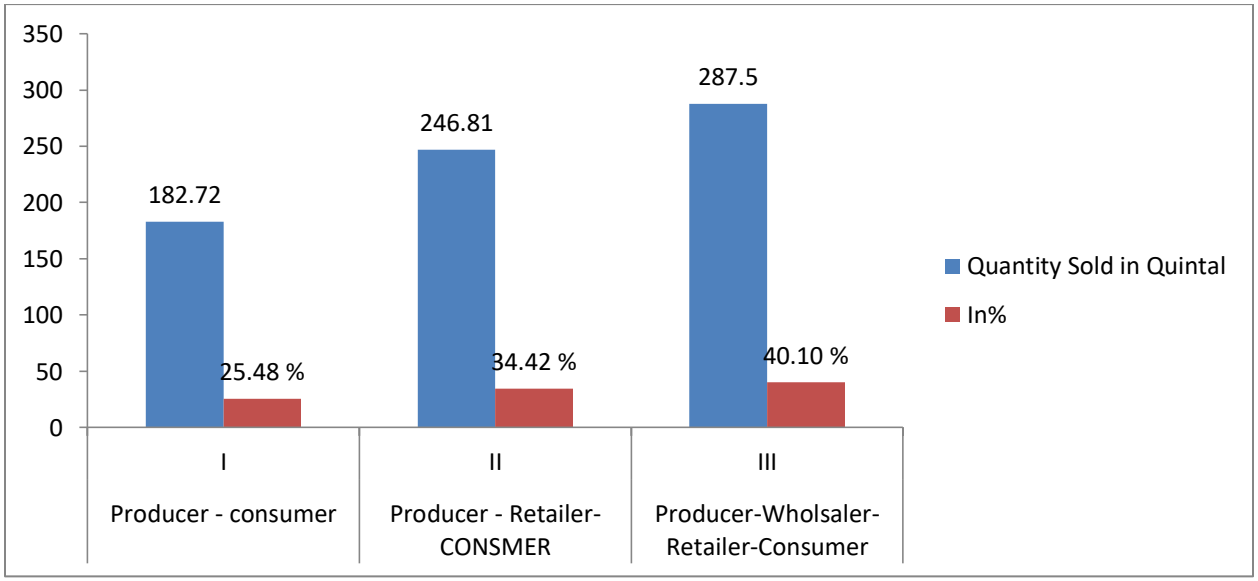
Source: Field Survey 2016-2017

Fig.30. Disposal of Beans through Different Marketing Channels



Source: Field Survey 2016-2017

Fig.31. Disposal of Potato through Different Marketing Channels



Source: Field Survey 2016-2017

4.5 MARKETING COST OF VEGETABLES, MARKETING MARGIN AND PRICE SPREAD

The marketing cost covers all the cost incurred by the producer and intermediaries in different marketing channels in the marketing of vegetables. The transportation cost, loss during transportation, weightage and other charges are all taken as marketing cost in the marketing of vegetables.

The marketing cost, marketing margin differs from channel to channel due to the involvement of intermediaries. It is assumed that the more the intermediaries involved, the higher will be the marketing cost and the marketing margin and a higher price spread. Marketing margin depicts the marking efficiency and inefficiency; it includes various costs of intermediaries and the profits of intermediaries earned in the process of transfer of good from the producer to the consumer. The higher and larger marketing margin indicates higher marketing inefficiency and vice versa. The marketing cost of all the vegetable under study was found that the channel I had the lowest cost since the farmers sold their produce directly to the consumers without the involvement of any middle man and intermediaries, followed by channel II and the highest marketing cost was found to be in the case of channel III due to the main factor of involving many intermediaries.

Price spread depicts the difference in the price paid by the consumer and the price received by the producer. The study of price spread covers not only the price variations but also the cost involved in the movement of goods from the producer to the consumers and the margins of the various middlemen and intermediaries. The larger the number of intermediary higher the value of gross margin, higher the value of gross margin the price spread will be higher, and higher the value of price spread it depicts the lower marketing

efficiency since the producer share is being reduced. The price spread and the efficiency vary from channel to channel, and it differs from vegetable to vegetable.

A) Cabbage

The marketing cost, marketing margin, price spread of cabbage in the study area is discussed channel-wise under various channels, to see the differences in different channels. The marketing cost, marketing margin, price spread of cabbage in channel-I from the study area is shown in table No.42.

The marketing cost, marketing margin, price spread of cabbage under various channel are shown in the table No.45 and 46.

In the Table No.42, we can see that in channel I under the marketing of cabbage in the study area, i.e., Phek district, Nagaland, there is a direct transaction between the producer and the consumer without the involvement of any intermediaries. There is no price gap between the consumer and the produce. All the cost of marketing is bored by the producer. The marketing cost of the producer involves the cost of labor employed and the cost of marketing. The total cost of marketing of the producer was 7.10% of the consumer rupee. The producer receives a net profit of 92.90% of the consumer rupee after the deduction of the marketing cost of the Producer.

In channel II, which is shown in table No.43, there is an involvement of an intermediary, i.e. the Retailer. They are the village trader and vegetable vendors who purchase cabbage from the producers and sells it to the consumer either in the nearby town of Pfutsero, Phek, Dimapur, Kohima, etc. the retailers purchase the cabbage @6/per kg. They bear the transportation cost, marketing losses, market fees, miscellaneous cost. The Producer

bears the labour cost and the marketing cost, which amounts to 5.69% of the consumer rupee. The retailers bear the total marketing cost of 18.06% of the consumer rupee. The cost is inflated due to labour cost and transportation cost, which is 8.08% and 6.73% of the consumer rupee, respectively. The overall total cost of both the producer and retailer is 23.75%. The producer receives a net margin of 54.13%, and the retailers receive a net margin profit of 21.94% of the consumer rupee and the price spread from the initial price and the final price paid by the consumer is 40% of the consumer rupee due to the involvement of intermediaries and the cost of marketing involved.

The marketing of cabbage in channel III which is in table No.44, the Wholesaler and Retailers plays the role of intermediaries between the producer and the ultimate consumer. The cabbage is initially bought by the wholesalers (village traders/agents) from the producer @5/kg. The producer bears the cost of labour for packing and the cost of packing bags, which is 3.44% of the consumer rupee. The wholesalers bears the cost of transporting (the goods are transported to other districts such as Kohima, Dimapur, etc.), which amounts to 12.67%, which greatly inflates the price of the marketing cost and the price of the cabbage. The total marketing cost of the wholesaler amounts to 14.94% of the consumer rupee, and the wholesaler sells the goods to the retailers @12/per kg. the retailers in turns bear another round of transportation cost, marketing losses due to spoilage and peeling off the outer layer of cabbage and the marketing taxes and miscellaneous and the total cost of the retailers amounts to 6.89% of consumer rupee and the retailers ultimately sells the cabbage to the consumer @15/per kg which result in the ultimate price spread of 66.67% of the consumer rupees

Table No.42: Marketing Cost, Marketing Margin, Price Spread of Cabbage in Channel-I

Particulars	Study Area(Phek District, Nagaland)	Producers share in consumer rupee (%)
Producer's (farmer's) level		
Sale Price	129500	100.00
	Marketing Cost	
Labour cost	5500	4.25
Packing cost/Packing bags/sacks	3700	2.86
Total marketing cost of Producer (farmer)	9200	7.10
Net Price received by Producer (farmer)	120300	92.90
Consumer Price	129500	100.00

Source: Field Survey 2016-17
Sale Price 18500 × 7 (Rs/kg) = 129500

Table No.43: Marketing Cost, Marketing Margin, Price Spread of Cabbage in Channel-II

Particulars	Study Area(Phek District, Nagaland)	Producers share in consumer rupee (%)
Producer's Level		
Sale Price	178200	60.00
Marketing Cost of Producer		
Transportation cost	-	-
Labour Cost	11000	3.70
Packing bag cost/sacks	5900	1.99
Total Marketing Cost of Producer (A)	16900	5.69
Net Price received by Producer	161300	54.13
Retailer's level		
Purchase price/sale price of Producer	178200	60.00
Marketing Cost of retailer		
Transportation cost	20000	6.73
Labour cost	24000	8.08
Packing cost/plastic bags	1500	0.15
Market Fee/taxes	4000	1.35
Miscellaneous Cost	950	0.32
Marketing Losses	3200	1.08
Total Marketing cost of Retailer (B)	53650	18.06
Net Margin of Retailer	65150	21.94
Total Marketing cost (A+B)	70550	23.75
Consumer Price	297000	100.00
Price spread	118800	40.00

Source: Field Survey 2016-2017
Sale price of Producer=29700×6(Rs/kg)= 178200
Sale price of Retailer=29700×10(Rs/kg)= 863835

Table No.44: Marketing Cost, Marketing Margin, Price Spread of Cabbage in Channel-III

Particulars	Study area (Phek District)	Producers share in consumer rupee (%)
Producer's level		
Sale Price	11841000	33.33
Marketing cost of Producer		
Labour Cost	750000	2.11
Packing cost/bags/sacks	473640	1.33
Total Marketing Cost of Producer (A)	1223640	3.44
Net Price received by Producer	10617360	29.89
Wholesaler's Level		
Purchase price/sale price of Producer	11841000	33.33
Marketing Cost of Wholesaler		
Transportation cost	4500000	12.67
Packing cost	20000	0.06
Labour cost	80000	0.23
Miscellaneous cost	20000	0.06
Marketing losses	450000	1.27

Market fee/taxes	236820	0.67
Total Marketing cost of Wholesaler (B)	5306820	14.94
Net margin of Wholesaler	11270580	31.73
Retailer's level		
Purchase price/sale price of Wholesaler	28418400	80.00
Marketing cost of Retailer		
Transportation cost	259315	0.73
Packing Bags(plastics)	87820	0.25
Market fee/taxes	21318	0.60
Miscellaneous cost	40055	0.11
Marketing losses	1847196	5.20
Total Marketing cost of Retailers(C)	2447524	6.89
Net margin of Retailers	4657076	13.11
Total Marketing cost (A+B+C)	8977984	25.27
Consumer's Price	35523000	100.00
Price spread	23682000	66.67

Source: Field Survey 2016-2017
Sale price of Producer 2368200x5 (Rs/kg)= 11841000
Sale price of Wholesalers 2368200x 12 (Rs/kg) = 28418400
Sale price of Retailers 22368200x 15 (Rs/kg) = 35523000

It is noticeable that as the marketing channel and intermediaries increases the marketing cost increase from 7.10% of consumer rupee in channel I to 23.75% of consumer rupee in channel II and 25.27% of consumer rupee in channel III. The net margin of the Producer declines as marketing channel increases. In channel I, the producer received net margin profit of 92.90% of the consumer rupee, and in channel II, the producer received a net margin of 54.31% of the consumer rupee and the rest is taken away by the intermediary. In channel III the net profit of producer further declines to 28.89%; the greater margin is shared by the intermediaries, which depicts that as marketing channel increases, the market becomes less effective, the marketing cost increases, the producer net profit declines and the price spread increases widely.

Table No 45: Overview of Marketing Cost met by Intermediaries in Cabbage Marketing

Intermediaries	Study Area Phek District, Nagaland		
	Channel I	Channel II	Channel III
Producer	9200 (100.00)	16900 (23.95)	1223640 (13.63)
Retailer	-	53650 (76.05)	2447524 (27.26)
Wholesaler	-	-	5306820 (59.11)
Total cost	9200 (100.0)	70550 (100.00)	8977984 (100.00)

Source: Field survey: 2016-17
Figure in parenthesis is in percentage to the total cost.

Table No.46: Overview of Per Quintal Price Spread and Returns of Cabbage

(Rs/total quantity sold)

Intermediaries	Study Area Phek District, Nagaland		
	Channel I	Channel II	Channel III
Net Price received by Producer	120300 (92.90)	161300 (54.31)	10617360 (28.89)
Net margin of Retailer	-	65150 (21.94)	4657076 (13.11)
Net margin of Wholesaler	-	-	11270580 (31.73)
Cost of marketing	9200 (7.10)	70550 (23.75)	8977984 (25.27)
Consumer price	129500 (100.00)	297000 (100.00)	35523000 (100.00)

Source: Field Survey 2016-2017
Figure in parenthesis is in percentage to the consumer price

B) Beans:

The marketing of beans is unique and different in the study area since the marketing of beans, unlike potato and cabbage, had only two channels, i.e. channel I and channel II. The marketing cost, marketing margin, price spread, net prices of the intermediaries are shown in table No.47 and 48. The overview of the marketing cost

of intermediaries in the marketing of beans in various channels and the overview of per quintal price spread and returns of beans is presented in table No.49 and 50.

In channel I, in the marketing of beans, there are no intermediaries involved as such, there is a direct connection between the Consumer and the Producer. All the cost of marketing is bored by the Producer, which involves the cost of packing and labour cost, which is 1.01% of the consumer rupee. The Producers receives a massive 98.99% of the Consumer rupee, and there is no price spread due to the absence of intermediaries which is shown in table No.47.

In channel II the retailers acts as the bridge between the producer and the consumer, which is shown in table No.48. In channel II, the producers sells the beans to the retailers who are the village traders and vendors, who in turn carries the beans to nearby towns to sell and even in village marketing shed. With the introduction of retailer, the net profit of the producer declines to 71.11%, and the remaining profit goes to the retailer. As seen in table 24 and 25, we notice a drastic change in channel I and channel II, with the introduction of intermediaries the cost of marketing also increases from 1.01% to 6.81%, the net margin of the producer declines and the price spreads by 28.89% in channel II, which all depicts that with the increase in marketing channel with the introduction of intermediaries the market becomes less efficient.

Table .No.47: Marketing Cost, Marketing Margin, Price Spread of Beans in Channel-I

Particulars	Study Area(Phek District, Nagaland)	Producers share in consumer rupee (%)
Producer's (farmer's)level		
Sale Price	403235	100.00
Marketing Cost		
Labour cost	3200	0.79
Packing cost/Packing bags/sacks	870	0.22
Total marketing cost of Producer (farmer)	4070	1.01
Net Price received by Producer (farmer)	399165	98.99
Consumer Price	403235	100.00

Source: Field Survey 2016-17

Sale Price 11521 × 35 (Rs/kg) = 403235

Table No 48: Marketing Cost, Marketing Margin, Price Spread of Beans in Channel-II

Particulars	Study Area(Phek District, Nagaland)	Producers share in consumer rupee (%)
Producer's Level		
Sale Price	84960	71.11
Marketing Cost of Producer		
Transportation cost	0	0
Labour Cost	600	0.50
Packing bag cost/sacks	340	0.28
Total Marketing Cost of Producer (A)	940	0.72
Net Price received by Producer	84020	70.32
Retailer's level		
Purchase price/sale price of Producer	84960	71.11
Marketing Cost of Retailer		
Transportation cost	3000	2.51
Labour cost	1600	1.34
Packing cost/plastic bags	1300	1.09
Market Fee/taxes	500	0.42
Miscellaneous Cost	200	0.17
Marketing Losses	600	0.50
Total Marketing cost of Retailer (B)	7200	6.03
Net Margin of Retailer	27315	22.86
Total Marketing cost (A+B)	8140	6.81
Consumer Price	119475	100.00
Price spread	34515	28.89

Source: Field Survey 2016-2017
Sale price of Producer=2655× 32 (Rs/kg)= 84960
Sale price of Retailer=2655×45 (Rs/kg)= 119475

Table No.49: Overview of Marketing Cost met by Intermediaries in Beans Marketing (Rs/total quantity sold)

Intermediaries	Study Area Phek District, Nagaland	
	Channel I	Channel II
Producer	4070 (100.00)	940 (11.55)
Retailer	-	7200 (88.45)
Total cost	4070 (100.00)	8140 (100.00)

Source: Field Survey: 2016-17
Figure in parenthesis is in percentage to the total cost.

Table No.50: Overview of Per Quintal Price Spread and Returns of Beans (Rs/total quantity sold)

Intermediaries	Study Area Phek District, Nagaland	
	Channel I	Channel II
Net Price received by Producer	399165 (98.99)	84020 (71.11)
Net margin of Retailer	-	27315 (22.86)
Cost of marketing	4070 (1.01)	8140 (6.81)
Consumer Price	403235 (100.00)	119475 (100.00)

Source: Field Survey 2016-2017
Figure in parenthesis is in percentage to the consumer price

C) Potato

The Marketing Cost, Marketing Margin, Price Spread of potato in the study area is discussed channel-wise, to see the differences in different channels. The marketing cost, marketing margin, price spread of potato in channel-I from the study area is shown in table No.51. We can see the marketing cost, marketing margin and the price spread in channel I. In the channel I the Producer directly sells the potato to the Consumer, there are no intermediaries. The Producer sells the potato directly either from his own house or from his field and even from the village marketing shed. The entire cost is bored by the Producer, and the Producer need not share his net margin to anyone since there are no intermediaries between the Producer and the Consumer. In the findings, it was observed that there was no transportation cost since the Producer sells his good from his place (farm/village/house). The cost incurred by the Producer was from labour cost and packing bags cost. The Producer hired the labourers to carry and pack the potato in the sack. The cost incurred by the Producer on labour was ₹ 10500, i.e. 1.92% of the consumer price % and the cost incurred in the purchase of packing bags/sacks amounted to ₹ 3650, i.e. 0.67% of the consumer rupee. The total cost of marketing amounted to ₹ 14150. The collective net price received by the Producer is ₹ 534010, which is sale price (18272 × 30) – marketing cost, which is 97.41% of the producer share in consumer price.

Channel II is shown in table No.52, which shows the marketing cost, marketing margin, price spread after the involvement of retailers who are also the village traders. As presented in table 5.2.2 which shows that in channel II with the participation of retailers which acts as the middle man between the producer and the consumer, the marketing

cost, marketing margin, price spreads sees a drastic change from channel I. In channel II the producer sells the goods (potato) to the retailers (village traders/vendor) who in turn sells the potato to the consumers by taking them to nearby towns bearing all the transportation cost, market fee and losses. The producer sale price is ₹ 617025/- (24681@25 per kg), which is 71.43% of the consumer rupee. In channel II it was observed that the marketing cost of the producer increases which is mainly due to the

higher disposal and involvement of more labour and more bags/sacks for packing the potato to be transported.

Table No.51: Marketing Cost, Marketing Margin, Price Spread of Potato in Channel-I

Particulars	Study Area(Phek District, Nagaland)	Producers share in consumer rupee (%)
Producer's (farmer's)level		
Sale Price	548160	100.00
Marketing Cost		
Labour cost	10500	1.92
Packing cost/Packing bags/sacks	3650	0.67
Total marketing cost of Producer (farmer)	14150	2.58
Net Price received by Producer (farmer)	534010	97.41
Consumer Price	548160	100.00

Source: Field survey 2016-17
Sale Price 18272 × 30 (Rs/kg) = 548160

The marketing cost of producer in Channel II was ₹ 79940/- (.i.e. 9.25% of the consumer rupees). The net price received by the farmers was ₹ 537085/- (i.e. 62.17% of consumer rupee) which has greatly decreased from the channel I, the retailers received the remaining 20.08% as profit.

The lesser net price received by the producer, and higher net marketing margin to the intermediaries indicates the less efficiency of the marketing system. In channel II, the transport cost, market fee/taxes are all bore by the retailers, the overall cost of marketing of the retailers is ₹ 73395/- (i.e. 8.50% consumer rupee) the transportation cost adds up the total cost of production which is 5.11% of the consumer rupee. In spite of the high marketing cost the retailers still manage to get a net margin of 20.08% of consumer rupees by selling the potato at ₹ 35 per kg. The price spread is from the purchase of the product by the retailer and sale by the retailers to consumers which differs by 28.57% of the consumer rupee.

Channel III, in channel III, the wholesalers (Agents /village traders) plays its role as an intermediary and linkage between the Producer, Retailer and the Consumer. The marketing cost, Marketing margin, price spread in channel III is shown in table.No.53

In channel III, there are two intermediaries involved in the marketing of potato, i.e. Wholesaler and Retailer. In this channel, the Producer gathers his produces and packs them in a gunny bag and sells it to the Wholesaler @ of ₹ 22/kg (28750 X 22= 632500). The wholesalers' inturns purchases it from the producer and bear all the cost in the transportation of potato from Phek district to other districts of the state mainly to Kohima

and Dimapur district. In the process, the wholesalers bear the taxes and even the marketing losses due to spoilage due to rain and others in the process of transportation.

Table No.52: Marketing Cost, Marketing Margin, Price Spread of Potato in Channel-II

Particulars	Study Area(Phek District, Nagaland)	Producers share in consumer rupee (%)
Producer's Level		
Sale Price	617025	71.43
Marketing Cost of Producer		
Transportation cost	0	0
Labour Cost	75000	8.68
Packing bag cost/sacks	4940	0.5
Total Marketing Cost of Producer (A)	79940	9.25
Net Price received by Producer	537085	62.17
Retailer's level		
Purchase price/sale price of Producer	617025	71.43
Marketing Cost of Retailer		
Transportation cost	44100	5.11
Labour cost	5000	0.58

Packing cost/plastic bags	3050	0.35
Market Fee/taxes	2850	0.33
Miscellaneous Cost	1290	0.15
Marketing Losses	17105	1.98
Total Marketing cost of Retailer (B)	73395	8.50
Net Margin of Retailer	173415	20.08
Total Marketing cost (A+B)	153335	17.75
Consumer Price	863835	100.00
Price spread	246810	28.57

Source: Field survey 2016-2017
Sale price of Producer=24681×25(Rs/kg)= 617025
Sale price of Retailer=24681×35(Rs/kg)= 863835

In channel III, the producer sale price is 48.89% of the consumer rupees, which in comparison to channel I and channel II has greatly declined. The cost of marketing of the producers also increases to 7.02% of the consumer rupees and the net margin received by the producer is 41.87% the remaining are earned by the intermediary which indicates the inefficiency of marketing. In channel III the wholesaler spends a high cost in the transportation, the wholesaler spends 6.48% of the consumer rupee which in all is the highest cost involved resulting in the total cost of wholesaler to 8.71% of the consumer rupees. The net price received by the wholesaler subtracting their cost in purchase and the cost involved in marketing generates a profit of 20.18% of the consumer rupee by selling the potato to the retailers in Kohima and Dimapur @ of ₹35/per kg.

The retailers, on the other hand, purchases the potato from the wholesalers and transport it to their shops bearing the transportation cost, marketing losses, market fee etc. The total marketing cost of retailers was 3.30% of the consumer rupee. The net margin of the retailers amounted to 18.92% of the consumer rupee.

Table No.53: Marketing Cost, Marketing Margin, Price Spread of Potato in Channel-III

Particulars	Study area (Phek District)	Producers share in consumer rupee (%)
Producer's level		
Sale Price	632500	48.89
Marketing cost of Producer		
Labour Cost	85000	6.57
Packing cost/bags/sacks	5760	0.45
Total Marketing Cost of Producer (A)	90760	7.02
Net Price received by Producer	541740	41.87
Wholesaler's Level		
Purchase price/sale price of Producer	632500	48.89
Marketing Cost of Wholesaler		
Transportation cost	84000	6.49
Packing cost	2000	0.15
Labour cost	2500	0.19
Miscellaneous cost	1200	0.09
Marketing losses	4000	0.31
Market fee/taxes	19000	1.47
Total Marketing cost of Wholesaler (B)	112700	8.71
Net margin of Wholesaler	261050	20.18
Retailer's level		
Purchase price/sale price of Wholesaler	1006250	77.78
Marketing cost of Retailer		
Transportation cost	15000	1.16
Packing Bags(plastics)	3450	0.27
Market fee/taxes	12000	0.93
Miscellaneous cost	1000	0.08

Marketing losses	11300	0.87
Total Marketing cost of Retailers(C)	42750	3.30
Net margin of Retailers	244750	18.92
Total Marketing cost (A+B+C)	246210	19.03
Consumer's Price	1293750	100.00
Price spread	661250	51.11

Source: Field Survey 2016-2017
Sale price of Producer 28750 x22 (Rs/kg)= 632500
Sale price of wholesalers 28750 x 35 (Rs/kg) = 1006250
Sale price of Retailers 28750 x 45 (Rs/kg) = 1293750

The overview of the marketing cost of intermediaries in the potato marketing in various channels and the overview of per quintal price spread and returns of potato is presented in table No.54 and 55. It was observed that as the marketing channels increase the intermediaries also increases from just producer and consumer, the retailers and the wholesalers comes into play, which also leads to an increase in marketing cost. In channel I the total marketing cost was ₹ 14150, which increased to ₹ 153335 in channel II and further increased to ₹ 246210 in channel III. The producers' shares declines as marketing channel increased from 97.42% of consumer rupee in channel I it declined to 62.17% and 41.87% in channel II and channel III, and the net margin (profit) of the intermediaries increases resulting in a huge price gap between the producer and the consumer which signifies that as marketing channel and intermediaries increase the market becomes less efficient.

Table No 54. Overview of Marketing Cost met by Intermediaries in Potato Marketing

Intermediaries	Study Area Phek District, Nagaland		
	Channel I	Channel II	Channel III
Producer	14150 (100.00)	79940 (52.13)	90760 (36.86)
Retailer	-	73395 (47.87)	42750 (17.36)
Wholesaler	-	-	112700 (45.77)
Total cost	14150 (100.00)	153335 (100.00)	246210 (100.00)

Source: Field Survey: 2016-17
Figure in parenthesis is in percentage to the total cost.

Table No.55: Overview of Per Quintal Price Spread and Returns of Potato

(Rs/total quantity sold)

Intermediaries	Study Area Phek District, Nagaland		
	Channel I	Channel II	Channel III
Net Price received by Producer	533980 (97.42)	537085 (62.17)	541740 (41.87)
Net margin of Retailer	-	173415 (20.08)	244750 (18.92)
Net margin of Wholesaler	-	-	261050 (20.18)
Cost of marketing	14150 (2.58)	153335 (17.75)	246210 (19.03)
Consumer Price	548130 (100.00)	863835 (100.00)	1293750 (100.00)

Source: Field Survey 2016-2017
Figure in parenthesis is in percentage to the consumer price

4.6 Marketing Efficiency

Marketing efficiency is essentially the degree of market performance. An efficient marketing system ensures an increase in farm production, increasing the level of real income, and consumer satisfaction with a low possible cost.

Marketing efficiency is essential to know the degree of market performance. It is defined as having the following two major components:

1. The effectiveness with which a marketing service would be performed and

2. The effect on the cost and the method of delivering the service on production and consumption. These are the most important because the satisfaction of the consumers at the lowest possible cost must go hand in hand with the maintenance of a high volume of farm output.

The following methods were applied to determine marketing efficiency:

1. Conventional Method: According to this Method, marketing efficiency is determined by the ratio of value-added to the total marketing cost.

$$CM = \frac{Value\ added}{total\ marketing\ cost}$$

Where

CM= Conventional Method

Value added= (Consumer Price- Net Price received by the Producer)

2. Shepherd's Method (1965): The ratio of price paid by the Consumer to total marketing cost is used as a measure of marketing efficiency.

   CM= $\frac{V}{I}$ – 1

   Where

   ME = Marketing efficiency Index

   V= Price paid by Consumer

   I = Total marketing cost

3. Acharya- Agarwal modified Method (2001): according to Acharya- Agarwal marketing measures include the total marketing cost, net marketing margins, price received by the farmer, and Price paid by the consumers.

   ME= $\frac{NP_P}{MC+MM}$

   Where,

   ME = Marketing Efficiency

   NP_P= Net Price received by the Producer (Rs/q)

   $MC =$ Marketing cost

   $MM =$ Marketing margin

A) Cabbage

The marketing efficiency of cabbage marketing under various channels has been measured with the help of Conventional Method, Shepherds method and Acharya-Agarwal Method which has been shown in table No.56

As per the calculation, it was found that the Conventional Method gave the marketing efficiency to channel I 1.00, channel II 1.92, and channel III 2.77; according to Conventional Method, channel III is the most efficient marketing. However, the Shepherd and Achary –Agaryal Method shows a different result.

Shepherd method marketing efficiency index in channel I is 13.08, channel II 3.21, and channel III 2.96. Acharya-Agarwal Method shows the marketing efficiency index in channel I is 13.08, channel II 1.19, and channel III 0.43, by a huge margin, the two methods clearly indicates that channel I is the most efficient, Marketing system since there are no intermediaries involved and that the cost of production is less and the net margin of producer is high. As the marketing channel increases the cost of marketing also increases, resulting in the decline of producers net margin which is pocketed by the intermediaries, there is also a high price spread as a result through findings and through the use of three methods of marking efficiency it is found that the channel I is the most efficient which also proves our hypothesis that there is higher efficiency when there is direct marketing between the producer and the consumer.

Table No.56: Marketing Efficiency Index of Cabbage under Different Marketing Channel using three Different Methods: (Rs/Total quantity sold)

Particulars	Study Area, Phek District, Nagaland		
	Channel I	Channel II	Channel III
Producers Net Price	120,300	161300	10617360
Marketing Cost	9200	70550	8977984
Marketing Margin	-	65150	13718104
Value added by Marketing system	9200	135700	24905640
Consumer Price	129500	297000	35523000
MARKETING EFFICIENCY			
Conventional method	1.00	1.92	2.77
Shepherd's Method	13.08	3.21	2.96
Acharya – Agarwal Method	13.08	1.19	0.43

Source: As per findings based on field survey 2016-2017

B) Beans

In the marketing of beans in the study area, there were only two channels involved in the marketing of beans. The efficiency of marketing channel under various methods is shown in table No.57.

The Conventional Method gave an efficiency index of 1.00 for Channel I and 4.36 for channel II. However, Under the Shepherd method, the efficiency index was 98.07 for channel I and 13.68 for channel II. The Acharaya- Agarwal method gave an efficiency index of 98.07 to channel I and 2.37. The method shows that higher the percentage

number higher is the efficiency as such both the methods indicate that there is higher efficiency in channel I where there is direct marketing between the producer and the consumer and that there is lesser efficiency when there is the involvement of intermediaries. Thus, proving the hypothesis that there is higher marketing efficiency when there is direct marketing between the producer and the consumers.

Table No.57: Marketing Efficiency Index of Beans under different Marketing Channel using three different Methods: (Rs/Total Quantity Sold)

Particulars	Study Area, Phek District, Nagaland	
	Channel I	Channel II
Producers Net Price	399165	84020
Marketing Cost	4070	8140
Marketing Margin	-	27315
Value added by Marketing system	4070	35455
Consumer Price	403235	119475
MARKETING EFFICIENCY		
Conventional method	1.00	4.36
Shepherd's Method	98.07	13.68
Acharya – Agarwal Method	98.07	2.37

Sources: As per findings based on field survey 2016-2017

C) Potato

To find out the most efficient channel and to prove the hypothesis that the market is more efficient when there is direct transaction/marketing between the producer and the consumers in the potato marketing channels, three methods were used namely Conventional method, Shepherds method and Acharya-Agarwal methods were used which is shown in table No.58. From the calculation and measurement using different methods, under the conventional Method, the marketing efficiency of potato in channel I was 1.00, 2.13 in channel II, and 3.05 in channel III.

Whereas Shepherd methods found that the marketing efficiency index ratio in channel I was 37.74, channel II was 4.63 and channel III 4.25. Similarly, Under Acharya-Agarwal Method, the marketing efficiency was 37.74 in channel I, 1.64 in channel II, and 0.72 in channel III.

The results derived from the methods of Shepherd and Acharya and Agarwal strongly indicates that Channel I is the most efficient channel in the marketing of potato because of the absence of intermediaries, less marketing cost, and more net margin to the producers in the Channel I. However, Conventional methods shows otherwise. The net price received by the Producer in channel I was 97.42 and just 41.87% of the consumer price in channel III, which substantiate the index given by Shepherd method and Acharya-Agarwal Method and which furthers proves the hypothesis that there is higher marketing efficiency when there are no intermediaries involved and that there is higher efficiency when there is direct marketing between the producers and the consumers.

Table No 58: Marketing Efficiency Index of Potato under different Marketing Channel using three different Methods: (Rs/Total quantity sold)

Particulars	Study Area, Phek District, Nagaland		
	Channel I	Channel II	Channel III
Producers Net Price	533980	537085	541740
Marketing Cost	14150	153335	246210
Marketing Margin	0.00	173415	505800
Value added by Marketing system	14150	326750	752010
Consumer Price	548130	326750	752010
MARKETING EFFICIENCY			
Conventional method	1.00	2.13	3.05
Shepherd's Method	37.74	4.63	4.25
Acharya – Agarwal Method	37.74	1.64	0.72

Source: As per findings based on field survey 2016-2017

4.7 COST AND REVENUE

It is essential to find out whether the production of vegetables (Cabbage, Beans and Potato) benefits farmers or not for which Cost Benefit Analysis is used to find out.

The income generated by the farmers by selling the vegetables through various channels are given in the table No.59, it shows the various income generated by the farmers

producing cabbage, beans and potato through various channels. Only the income of the farmers are taken into account. The total revenue of the farmers cultivation cabbage was ₹ 12148700 from the 300 sample farmers from twelve villages in Phek district, Nagaland. The farmers cultivating cabbage received ₹ 1298500 from channel I, ₹178200 from channel II and 11841000 from the channel III. In channel I the farmers directly receives the amount from the consumers and in channel II the farmers receives the amount from the retailers and in the Channel III the farmers receives the amount from the wholesaler.

In the study there was no channel III in the marketing of beans as such the farmers cultivating beans receives revenue only from channel I and channel II i.e. from the consumers and from the retailers. The total revenue received by the farmers cultivating beans was ₹ 488195, ₹40325 from channel I and ₹84960 from channel II.

The total revenue received by the farmer producing and marketing potato in the study area was ₹ 1797685 from the three channels through which the potato are sold by the farmers. In potato cultivation the farmers receives revenue from the consumer directly and also from the retailer and wholesaler. The amount received from consumer was ₹548160/-, from retailer the potato cultivating farmers received ₹617025/- and ₹ 632500/- from the wholesaler.

Table No.59: Total Revenue of the Farmers through Various Channels:

Vegetables Sold in Various Channel (in Rs)	Cabbage	Beans	Potato
Channel I	1298500	403235	548160
Channel II	178200	84960	617025
Channel III	11841000	0	632500
Total	12148700	488195	1797685

Sources: Field Survey 2016-2017.

The Total expenditure of the farmers cultivating cabbage, beans and potato is shown in Table No.60: The expenditure of the farmers includes all the cost involved in the production and marketing of vegetables. In the production of vegetables especially of cabbage the farmers have to purchase all the cabbage seeds directly from the market unlike potato and beans which the framers can use their own saplings and seeds which they have preserved. The cost also arises from the hiring of labourers both during cultivation and while harvesting. The farmers also spend amount in the purchase of packing bags which are meant to pack the vegetables. The farmers also have to take care with regard to food, lunch while hiring the works as such they have expenditure over food and lunch provided to the workers and various other miscellaneous cost are involved

As seen in Table 60, the cabbage farmers spend ₹ 524650/- in the purchase of cabbage seeds from the market. These seeds are imported seeds which the farmers purchase due to its good quality. The farmers cultivating beans and potato spends relatively lesser in the purchase of seeds and sapling because they use their own left over goods as saplings. The beans farmers spends an amount of ₹ 20580/- in the purchase of beans seeds for cultivation and the potato cultivating farmers spends ₹ 320000/- for the purchase of

potato saplings for cultivation. The total amount spend by the farmers in paying wages to the workers was ₹ 781600/- by cabbage cultivators, ₹ 88400/- by cultivators cultivating beans and ₹ 629300/- by farmers cultivating potato. The farmers purchase bags/sacks to pack their good, the cabbage cultivator spent ₹ 483140/- in total while the beans and potato cultivators spent ₹ 940/- and ₹ 14350/- respectively. The cost spend by cabbage cultivators over food, lunch and other miscellaneous cost amounted to ₹ 209800, and the beans cultivators spend ₹ 110000/- and ₹ 201200/- by potato cultivators. The total cost including the overall cost in producing and marketing the cabbage was ₹ 1999290/-. The farmers collectively had a total expenditure of ₹ 219920/- and the farmers of potato total expenditure was ₹ 1164850/-.

Table No.60: Total Expenditures of the Farmers in the Production and Marketing of Vegetables

Expenditure items (in Rs)	Cabbage	Beans	Potato
Purchase of seeds/Saplings	524650	20580	320000
Total Labour Cost	781600	88400	629300
Packing cost/Purchase of Packing bags	483240	940	14350
Food/Lunch and miscellaneous Cost	209800	110000	201200
Total Cost	1999290	219920	1164850

Source: Field Survey 2016-2017.

Table No. 61: Cost and Revenue of the Vegetables under the Study

Vegetables	Revenue in (Rs)	Total Cost(in Rs)	Revenue- Cost(in Rs)
Cabbage	12148700	1999290	10149410
Beans	488195	219920	268275
Potato	1797685	1164850	632835

Source: Field Survey 2016-2017

4.8 Profit Analysis of the Vegetable (Cost Benefit):

The cost benefit and the profit percentage is shown in the table No.61 which shows the cost benefit ratio and the net profit and the profit percentage. As seen in the table from the findings it was observed that taking into account the revenue and the cost the Cost Benefit of cultivating cabbage was 1:6.08 and a net profit ratio of 1:5.08 and a percentage profit of 507.65. Which shows and depicts that cultivation of cabbage is highly profitable to the farmers.

The Cost Benefit ratio of beans is 1:2.22 and a net profit ratio of 1:1.22 and a profit percentage of 121.99 which depicts that the production and marketing of beans is profitable and beneficial to the farmers. Production and marketing of potato shows a Cost Benefit ratio of 1:1.54 and a net profit ratio of 1:0.54 and a percentage profit which shows that production of potato is beneficial and profitable to the farmers.

Table No.62: Cost-Benefit of the Vegetables.

Vegetables	Revenue in (Rs)	Total Cost (in Rs)	Cost Benefit Ratio	Net Profit Ratio	Percentage Profit
Cabbage	12148700	1999290	1: 6.08	1:5.08	507.65
Beans	488195	219920	1:2.22	1:1.22	121.99
Potato	1797685	1164850	1:1.54	1:0.54	54.33

Sources: Field Survey 2016-2017.

In conclusion it was observed that the production and marketing of cabbage, beans and potato are profitable and beneficial to the farmers since they get goods returns. The highest profit is generated from the production and marketing of cabbage, followed by beans and potato.

4.9 Constrains in Vegetable Production and Marketing

To analyse the problem in the production and marketing of vegetables, Garret's ranking technique has been used. The respondents were asked to rank the different factors which created problem in production and marketing of vegetables. The order of merit given by the respondents was converted into ranks by using the following formula.

Per cent position = $\frac{100(R_{ij}-0.5)}{N_j}$

Where,

R_{ij}= Rank given for ith factor by the jth individual.

N_j=Number of factors ranked by the jth individual.

The percent position of each rank thus obtained was converted into scores by referring to the table given by Garrete and Woodworth (1969). Then for each factor the scores of the

respondent has been added together and divided by the total number of respondents for whom the scores added. The mean scores thus obtained all the factors then arranged in descending order and ranks has been given and finally the most limiting factors has identified.

Table No.63: Production and Marketing Problems of Vegetables

Problems of vegetable production and marketing	1	2	3	4	5	6	7	8	9	10	Total
Lack of good quality subsidized seeds/samplings(P_1)	163	24	53	30	30	0	0	0	0	0	300
Lack of training and technical knowledge(P_2)	60	40	97	32	7	40	24	0	0	0	300
Lack of storage facilities(P_3)	257	40	3	0	0	0	0	0	0		300
Transportation problems(P_4)	-	-	46	33	155	66	0	0	0	0	300
Price fluctuations(P_5)	17	40	211	32	0	0	0	0	0	0	300
Lack of Institutional credit facilities (P_6)	-	-	80	-	164	20	36	0	0	0	300
Lack of organised market(P_7)	-	-	183	60	40	17	0	0	0	0	300
Problem of taxation (P_8)	-	-	109	45	41	105	0	0	0	0	300
Lack of awareness and market information(P_9)		77	77	72	50	24	0	0	0	0	300
Lack of insurance and minimum support price (P_{10})	117	65	65	0	53	0	0	0	0	0	300

Source: Field Survey 2016-2017

Table No. 64: Garret Values.

Sl.No.	$100(R_{ij}$-0.5)/N_j	Calculated Value	Garret Value
1	100(1-0.5)/10	5	81
2	100(1-0.5)/10	15	70
3	100(1-0.5)/10	25	63
4	100(1-0.5)/10	35	57
5	100(1-0.5)/10	45	52
6	100(1-0.5)/10	55	47
7	100(1-0.5)/10	65	42
8	100(1-0.5)/10	75	36
9	100(1-0.5)/10	85	29
10	100(1-0.5)/10	95	18

Table No. 65: Calculated Garret Score

Problems of vegetable production and marketing	1	2	3	4	5	6	7	8	9	10	total
Lack of good quality subsidized seeds/samplings (P_1)	13203	1680	3339	1710	1560	0	0	0	0	0	21492
Lack of training and technical knowledge (P_1)	4860	2800	6111	1824	364	1880	1008	0	0	0	18847
Lack of storage facilities (P_1)	20817	2800	189	0	0	0	0	0	0	0	23806
Transportation problems (P_1)	0	0	2898	1881	8060	3102	0	0	0	0	15941
Price fluctuations	1377	2800	13293	1824	0	0	0	0	0	0	19294
Lack of Institutional credit facilities (P_1)	0	0	5040	0	8528	940	1512	0	0	0	16020
Lack of organised market (P_1)	0	0	11529	3420	2080	799	0	0	0	0	17828
Problem of taxation (P_1)	0	0	6867	2565	2132	4935	0	0	0	0	16499
Lack of awareness and market information (P_1)	0	5390	4851	4104	2600	1128	0	0	0	0	18073
Lack of insurance and minimum support price (P_1)	9477	4550	4095	0	2756	0	0	0	0	0	20878

Table No.66 Calculated Garret Score, Average Score and Rank of Problems in the Production and Marketing of Vegetables.

Problems of Vegetable Production and Marketing	Garret score	Average score	Rank
Lack of good quality subsidized seeds/samplings (P_1)	21492	71.64	II
Lack of training and technical knowledge (P_2)	18847	62.82	V
Lack of storage facilities(P_3)	23806	79.35	I
Transportation problems (P_4)	15941	53.14	X
Price fluctuations (P_5)	19294	64.31	IV
Lack of Institutional credit facilities (P_6)	16020	53.40	IX
Lack of Organised market (P_7)	17828	59.43	VII
Problem of taxation (P_8)	16499	55.00	VIII
Lack of awareness and market information (P_9)	18073	60.24	VI
Lack of insurance and minimum support price (P_{10})	20878	69.59	III

Table No.66 Clearly reveals the various problems faced in the production and marketing of vegetables in Phek district. The foremost major constraint faced was the lack of storage facilities which has been ranked I with a Garret score of 23806 and an average

score of 79.35. Due to lack of modern basic storage facilities there is a huge post-harvest lost and in the process of transportation. The farmers are also forced to sell the vegetables at a throw away prices in times of bumper crops due to lack of storage facilities.

The second major constrain faced was the lack of good quality subsidized seeds/saplings which an average score was 71.64 and a Garret score of 21492. Due to lack of good quality of seeds/saplings the farmers cost of production increases due to the purchase of imported seeds/saplings especially of cabbage.

The third major constrain was the lack of insurance and minimum support price which greatly hinders the production and marketing of vegetables in Phek district, Nagaland. There is a complete absence of insurance for the farmers in case of natural calamities and unforeseen circumstances. The farmers are hesitant to take risk and expand production due to lack of minimum support price. There is no fixation of minimum support price of the vegetables in time of good production where there is surplus supply the price falls to a very low level resulting in a massive loss to the farmers. The constraints in the production and marketing are related with one another. The next problem faced by the farmers was rapid price fluctuations which is the result of lack of storage facilities, minimum support price etc.

The other major problems faced in the production and marketing of vegetables were lack of training and technical knowledge. There were training and seminar organised by the departments and NGOs however it was not at regular interval and very limited as such many of the farmers did not receive any sort of training and technical knowledge.

Lack of market information is another problem faced in the production and marketing of vegetables. Many of the farmers are not aware of the prices of vegetables in the major towns as such many of the farmers sell the goods as per the price given by the middlemen is far below the market price.

Lack of organised market was another major problem faced in the production and marketing of vegetables followed by the problem of taxation where the farmers and the traders have to pay to different groups and authorities when the vegetables are being transported to Dimapur and Kohima, There is also lack of institutional credit facilities which are easy and friendly most of the farmers do not avail credit facilities due to complex procedures, and lastly lack of transportation due to bad road connectivity adds up the cost and the problems in the production and marketing of vegetables.

CHAPTER 5

SUMMARY AND CONCLUSION

5.1: India due to its varied favourable agro-climatic condition is conducive for the cultivation and production of varieties of vegetables and fruits as such India ranks second in the world's vegetable production. India vegetable production and marketing contributes a major portion in India's export and thereby contributing in the Nations GDP. As per the National Horticulture Database published by National Horticulture Board, during 2015-16, India produced 169.1 million metric tons of vegetables. India produces 14% (146.55 million tons) of the world's vegetables on 15% (8.5 million hectares) of the World area under vegetables. India, with vegetable production of 146.55 million it is the second-largest producer of vegetables contributing 14% of the world's vegetable production, with an area of 8.5 million hectares under vegetables, the average productivity of vegetables in India is 17.3 t/ha in 2010-11(Indian Council of Agricultural Research).

Agriculture is considered as the primary source of livelihood of Nagaland, and it plays an indispensable role in the socio-economic development of the State. Agriculture contributed around 18.1% to the Gross State Domestic Product (GSDP) in 2011-12, it is one of the significant contributors to the Net State Domestic Product and is the largest employer of the workforce in the State. The agro-climatic conditions of the State are very favourable that is exceptionally suited for the cultivation of vegetables and horticultural crops. However the majority of the vegetables are imported from other states due to the production been less than the demand.

The district of Phek covers an area of 2026 sq.km that is 12.22% of the total geographical area of Nagaland. It is the 2nd biggest district in Nagaland. It is a hilly district rich in flora and fauna, which lies in the South-Eastern part of Nagaland with a conducive favourable climatic condition as such the district is known for its horticultural production especially of vegetables. About 70% of the land of the district is covered with a thick evergreen forest.

Phek district has a population of 163,294 as per the 2011 census, of which 83,684 are males and 79,610 females, with a sex ratio of 951 females for every 1000 males, with a density of 81 person per sq.km, 15.07% of the population resides in urban area and 84.93% in rural areas. The district has a high literacy rate of 78.05%.The district has 117 villages and 14 subdivisions.

5.2: Twelve sample villages were taken for the study from Phek district based on its popularity and recognition as a vegetable producing and marketing villages. The twelve villages were Enhulumi, Kami, Lasumi, Lekromi, Leshmi, Mesulumi, Pfutseromi, Razeba, Tsupfume, Zelume, Zapami and Zhavame. Twenty five random vegetable farmers were selected from each of the selected twelve villages; altogether the sample size of farmers was 300.

The biggest village in term of household was Zhavame village with a house hold of 637 followed by Pfutseromi village with 618 household. The smallest in terms of household was Razeba with a total household of 172. The village with the largest population was Pfutseromi with a total population of 3378 followed by Zhavame with a total population of 3208, and the least populated was Razeba which has only 780.

The average age of the 300 farmers from twelve villages was 49.59 years and an average family size of 300 farmers was 5.25. From the sample population, only 1% of the farmers were illiterate, 76.33% of the farmers had studied from primary till high school and 10.33% of farmers had studied till HSSLC and 12.33% had studied till college level.

From the sample of 300 farmers 17.33% of the farmers annual income was above ₹100000/-, and 76.33% of farmers income was above ₹75000/- and only 6.33% of the farmers annual income was below ₹75000/-.

All the sample villages under study were free from open defection. Each household had their own toilet either pucca or semi pucca based on their house. Every village `had some community toilet constructed by the VDB from the funds and other schemes received. All the farmers had either pucca or semi-pucca house, none with kaccha house. All the villages had road connectivity and with 100% electrification and all the villages had street light which were either donated by some individuals or given by the departments through schemes and departments.

5.3: Potato

In terms of potato cultivation from the sample population Phek district, Nagaland, 82.67% of the farmers were marginal farmers with a farm size of 0-1 Ha, 16% of the farmers were under small farmers who have a farm size of 1Ha-2 Ha and only 1.33% of the farmers were under semi medium farmers who had a farm size of 2 Ha to 5 Ha. None of the potato farmers had a farm size of over 3 Ha. Which shows the majority of the farmers are marginal farmers. The total area under marginal farm size was 65.44%, 30.34% area under small farm size and only 4.22% farm size was semi medium farms.

The village of Zhavame had the largest potato farm size with a total farm size of 28.5 Ha followed by the village of Razeba with a total farm size of 20.5 Ha. The lowest area under potato cultivation was from Enhulumi and Kami village with 12.5 Ha respectively. The overall potato farm size of the sample population was 189.5 Ha.

To know the relationship between potato farm size and production, correlation and regression of potato farm size of India, Nagaland, Phek district and of the sample villages were taken into account.

There was a positive correlation between farm size and production of potato in India from the data collected from 2001-02 to 2017-18: There was high positive correlation with r= 0.95%, the co-efficient of r^2 value was 90% variation in production which is explained by the field size X, the regression values of field size (Y) on production (X) gave.

Y= a+bx, Y= -17412.641+30.230X

The result showed that the regression co-efficient byx is 30.230. This explains that a unit change in Field Size will lead a change in production by 30.230. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5% which proved *the hypothesis that higher the size of the field higher is the production.*

The relationship between farm size and productivity was also found to be positive with r= 0.72% and the co-efficient of r^2 value was 52% variation in production which is explained by the field size X, the regression values of field size (Y) on production (X) gave.

Y= a+bx, Y= 10.256 + 0.006X

The result showed that the regression co-efficient byx is 0.006. This explains that a unit change in Field Size will lead a change in productivity by 0.006. The p-value of 'byx' is 0.001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis which states that bigger the size of the field higher is the production and productivity was proved with regard to potato in India..*

Even in Nagaland there was a positive correlation between farm size of the potato and the production. The data from 2012-13 to 2017-18 showed a high degree of positive correlation with r = 0.99. The co-efficient of determinants on r^2 value shows that 98% of the variation in production which is explained by the field size X, the regression values of field size (Y) on production (X) gave.

Y= a+bx, Y= -84.662+30.842X

The result showed that the regression co-efficient byx is 30.842. This explains that a unit change in Field Size will lead a change in production by 30.842. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *The hypothesis which states that higher the size of the field higher is production was proved.*

The correlation between farm size and productivity of potato in Nagaland was found to be positive with r= 0.99 and co-efficient of determinants on r^2 value shows that 96% of the variation in productivity which is explained by the field size X, the regression values of field size (Y) on productivity gave

Y= a+bx, Y= -8.911+ 4.600X

The result shows that the regression co-efficient byx is 4.600. This explains that a unit change in field size will lead a change in productivity by 4.600. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis which states that bigger the size of the field higher is the production and productivity was proved.*

The relationship between potato farm size and production in Phek district from 2013-14 to 2017-18 showed a positive correlation with r = 0.95 showing a high degree of positive correlation The co-efficient of determinants on r^2 value showed that 90% of the variation in production is explained by the field size X, the regression values of field size (Y) on production (X) gave.

Y= a+bx, Y= 27.0640+ 0.09713X

The result shows that the regression co-efficient byx is 0.03. This explains that a unit change in Field Size will lead a change in production by 0.09713. The p-value of 'byx' is 0.012 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *The hypothesis which states that higher the size of the field higher is the production was proved.*

The Most important was to find out the relationship between farm size and production of potato in the twelve villages from Phek district, Nagaland. The correlation showed that there was a high degree of positive correlation r = 0.89, and the co-efficient of determinants on r^2 value shows that 80% of the variation in production is explained by the field size X, the regression values of field size (Y) on production (X) gave us.

Y= a+bx, Y= -87.579 + 11.077 X

The result shows that the regression co-efficient byx is 11.077. This explains that a unit change in field size will lead to a change in production by 11.077. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%.

The overall correlation between the area under potato cultivation and productivity of potato in Phek District, Nagaland shows a positive relation with r = 0.47. The co-efficient of determinants on r^2 value shows that 22% of the variation in production is explained by the field size X, the regression values of field size (Y) on productiivity (X) gave us.

Y= a+bx, Y= 1.574 + 5.008 X

The result shows that the regression co-efficient byx is 5.008. This explains that a unit change in field size will lead to a change in productivity by 5.008. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis which states that bigger the size of the field higher is the production and productivity has been proved.*

5.4: Beans

In the production of beans, it was observed that all the farmers from the study area were marginal farmers who cultivated in an area below 1 Ha. One of the reasons was that beans was cultivated mostly for consumption unlike potato and cabbage which was cultivated for commercial purpose. The total area cultivating beans was 150 Ha in the study area.

To find the relationship between the area size and the production, the data of Nagaland and Phek district were analysed. In Nagaland the production and farm size of beans from 2008-09 to 2017-18, showed a high degree of positive correlation with r = 0.88,The co-

efficient of correlation between the area and productivity is significant which showed that as the size of area under beans production increases, the productivity of beans also increases. The co-efficient of determinants on r^2 value showed that 78% of the variation in production is explained by the field size X, the regression values of field size (Y) on production (X) gave.

Y= a+bx, Y= -1751.922X + 2.099X

The result showed that the regression co-efficient byx is 2.099. This explains that a unit change in Field Size lead a change in production by 2.099. The p-value of 'byx' is 0.001 which is less than 0.05. The regression co-efficient is significant at 5%. *Thus, the hypothesis which states that higher the size of the field higher is the production was proved with regard to farm size and production of beans in Nagaland.*

In Phek district from the data of 2008-09 to 2017-18, the farm size and production showed a high degree of positive correlation with r = 0.96.

The co-efficient of correlation between the area and productivity is significant which showed that as the size of area under beans production increases, the productivity of beans also increases. The co-efficient of determinants on r^2 value shows that 92% of the variation in production is explained by the field size X, the regression values of field size (Y) on production (X) gave.

Y= a+bx, Y= -122.893+1.748X

The result shows that the regression co-efficient byx is 1.748. This explains that a unit change in Field Size will lead a change in production by 1.748. The p-value of 'byx' is 0.0001 which is less than 0.05. The regression co-efficient is significant at 5%. *The*

hypothesis which states that higher the size of the field higher is the Production has been proved with regard to farm size and production of Beans in Phek district, Nagaland.

5.5 Cabbage:

With regard to the production of cabbage 300 farmers were taken as sample population from twelve villages in Phek district, Nagaland. From the sample of 300 farmers it was found that 85.67 % were marginal farmers, 12.67% were small farmers and 1.67% was semi medium farmers. In total 128.5 Ha (72.19%) of farm size was under the marginal farmers, 39.5 Ha (22.19%) were under cultivation of small farmers and only 10 Ha (5.62%) were under the semi medium farmers. In total the farmers cultivated cabbage in 178 Ha from the sample population. The village Zhavame cultivated the largest area of 26 Ha followed by Razeba with 20.5 Ha. The least area was cultivated by Enhulumi, Kami, Lasumi and Tsupfume each cultivated an area of 12.5 Ha.

To find out the relationship between the farm size of cabbage and its production the data of India, Nagaland, Phek district and the sample villages farms size and production of cabbage were analysed.

The farm size and production of cabbage from 2001-02 to 2017-18 in India showed a high degree of positive correlation between farm size and production with r = 0.99. The co-efficient of determinants on r^2 value showed that 98% of the variation in Production is explained by the field size X, the regression values of field size (Y) on Production (X) gave

Y= a+bx, Y= -74.966+22.441X

The result showed that the regression co-efficient byx is 22.441. This explains that a unit change in Field Size will led to a change in Production by 22.441. The p-value of 'byx' is 5.14E-16 which is less than 0.05. Hence the regression co-efficient is significant at 5%. *The hypothesis which states that larger the size of the field higher is the Production was proved with regard to cabbage farm size and production in India.*

The farm size and production of cabbage in Nagaland were taken from the year 2008-09 to 2017-18, where it showed that there was a high degree of positive correlation between the farm size and production in Nagaland with r = 0.99, The co-efficient of correlation between the area and productivity is significant, which shows that as the size of the area under cabbage production increases, the production of cabbage also increases. The co-efficient of determinants on r^2 value shows that 99% of the variation in production is explained by the field size X, the regression values of field size (Y) on production (X) gave us.

Y= a+bx, Y= -18909.952+21.450X

The result showed that the regression co-efficient byx is 21.450. This explains that a unit change in Field Size led to a change in Production by 21.450. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis that larger the size of the field higher is the production was proved in Nagaland with regard to cabbage farm size and production.*

To find out the relation between farm size and production of cabbage in Phek district the data were collected from 2008-09 to 2017-18 which revealed that there was a high degree of positive correlation between farm size and production of Cabbage in Phek district with

r = 0.96. The co-efficient of correlation between the area and productivity is significant, which showed that as the size of the area under Cabbage production increases, the production of cabbage also increases. The co-efficient of determinants on r^2 value showed that 93% of the variation in production is explained by the field size X, the regression values of field size (Y) on production (X) gave us.

Y= a+bx, Y= -6978.440+22.238X

The result showed that the regression co-efficient byx is 22.328. This explains that a unit change in Field Size lead to a change in production by 22.328. The p-value of 'byx' is 0.0001 which is less than 0.05. The regression co-efficient is significant at 5%. *Thus, the hypothesis which states that the larger the size of the field higher is the production was proved with regard to cabbage farm size and the production in Phek district.*

From the analysis of 300 framers cultivating cabbage it was found that the farm size of cabbage and the production had a high degree of positive correlation with r = 0.92, The co-efficient of correlation between the area and productivity is significant which showed that as the size of area under cabbage production increases, the production of cabbage also increases. The co-efficient of determinants on r^2 value shows that 86% of the variation in production is explained by the field size X, the regression values of field size (Y) on production (X) gave.

Y= a+bx, Y= -71.006+263.924X

The result showed that the regression co-efficient byx is 263.924. This explains that a unit change in Field Size will lead a change in production by 263.924. The p-value of 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient is significant at 5%. *Thus, the hypothesis which states that larger the size of the farm size*

higher is the production has been proved with regard to cabbage farm size and production in the study area.

The overall correlation between the area under cabbage cultivation and productivity of cabbage in study area, showed a positive relation with r = 0.86. The co-efficient of correlation between the area and productivity is significant which shows that as the size of area under cabbage production increases, the productivity of cabbage also increases. The co-efficient of determinants on r^2 value showed that 74% of the variation in productivity is explained by the field size X, the regression values of field size (Y) on productivity gave:

Y= a+bx, Y= 20.760 + 7.775 X

The result showed that the regression co-efficient byx is 7.775, which explains that a unit change in field size will lead a change in productivity by 7.775. The p-value 'byx' is 0.0001 which is less than 0.05. Therefore, the regression co-efficient was significant at 5%.

Thus, the hypothesis which states that bigger the size of the farm size higher is the production and productivity has been proved with regard to cabbage farm size, production and productivity in the study area.

Marketing side

5.6 Cabbage:

The marketable surplus of cabbage from the study area was 97.15% of the total production which is comparatively higher than other vegetables because cabbage in the

study area is cultivated mostly for selling or commercial purpose. The marketed surplus of cabbage was 94.55% of the total production.

In the marketing of cabbage, it is disposed through three different channels

Channel I= Producer to consumer

Channel II = Producer – retailers – consumers

Channel III = Producer- wholesaler- retailer – consumers

Through Channel I 0.77% of the cabbage were disposed, Channel II disposed 1.23% and Channel III disposed 98.01% , which shows a majority of the cabbage is disposed off through Channel III where the wholesaler and retailers acts as an intermediary between the producer and the consumer.

In Channel I the marketing cost of the producer was 7.10% of the consumer rupee and the Net Price received by the producer was 92.90% of the consumer rupee. Where as in channel II with the introduction of retailers the producers cost of marketing was 5.69% of the consumer rupee and the retailers cost of marketing was 18.06% and the overall cost of marketing in channel II was 23.75%. The net price received by the producer was 54.13% and the net margin received by the retailer was 21.94%. The price spread amounted to 40% of the consumer rupees.

The sale price of producer in Channel III was 33.33% of the consumer rupee. The total marketing cost of the producers, wholesaler, and retailer was 3.44%, 14.94% and 6.89% respectively. The total overall marketing cost was 25.27%. The Net price received by the producer in Channel III was 29.89% and the Net margin of the wholesaler and the

retailers was 31.73% and 13.11% respectively. The consumer price spread was 66.67% of the consumer rupees.

To determine the marketing efficiency of cabbage through various channels three different methods were used, namely Conventional method, Shepherd's method and Acharya-Agarwal method.

The conventional method gave the marketing efficiency index of 1.00 to channel I, 1.92 to Channel II and 2.77 to channel III: according to this method channel III is most efficient: however Shepherd method showed that marketing efficiency index ratio of 13.08 in channel I, 3.21 for channel II and 2.96 for channel III. Acharya-Agarwal method showed that marketing efficiency index ratio of 13.08 for Channel I, 1.19 for Channel II and 0.43 for Channel III. Based on the measurement used it came to conclusion that Channel I where there is direct marketing between the producer and the consumer is the most efficient since there is less cost of marketing, no price spread and that the net returns of the producer is highest.

5.7: Beans

Unlike other vegetables not much focus was given by the farmers with regard to massive production and marketing of beans in the study area. Beans were cultivated mostly for consumption but whatever was left over was marketed. In the study area the total production of beans was 289.76 quintal, of which 56.21% was marketable surplus and finally 48.92% were marketed surplus.

In the marketing of beans there were two channels in existence for the disposal of beans. channel I consist of no intermediary and there was a direct connection between the

producer and in channel II the retailers comes into existence. From the channel I, 81.27% of the beans and 18.73% were disposed of through channel II.

The marketing cost of producer in channel I was just 1.01% of the consumer rupee. The marketing cost of the producer in channel I was the cost involved in hiring labourers and the purchase of sacks for packing and miscellaneous. The net price received by the Producer in channel was 98.99% of the consumer price. In channel II the marketing cost of the producer was 0.72%, and of the retailers was 6.03% and the total marketing cost was 6.81% of the consumer rupee. The Net price received by the producer in channel was 71.11% and the retailers' Net margin was 22.86%. The Price spread in channel II was 28.89%.

To estimate and find out the marketing efficiency of beans three different methods were implied namely; Conventional method, Shepherd's Method and Acharya- Agarwal method.

The conventional Method gave an efficiency index of 1.00 for Channel I and 4.36 for Channel II. The Shepherd method, the efficiency index was 98.07 for Channel I and 13.68 for Channel II. The Acharya- Agarwal method gave an efficiency index of 98.07 to channel I and 2.37. The ratio through the various methods depicts that there is higher efficiency in Channel I where there is direct marketing between the Producer and the Consumer and that there is lesser Efficiency when there is the involvement of intermediaries.

5.8: Potato

From the sample of twelve villages from Phek district, 300 farmers cultivating and marketing potato were taken as sample population. The total production of potato from the sample population was 1048.16 quintal. The total marketable surplus out of the total production was 77.34% and the marketed surplus was 68.41%. Like cabbage the potato in the study area is disposed of through three channels: namely,

Channel I: Producer - Consumer

Cannel II: Producer – Retailers (Village Traders /street vendors) -Consumer

Channel III: Producer – Wholesaler (Village Trader/ agents) - Retailers – Consumer.

From Channel I 182.72 quintal (25.48%) of potato were disposed of, 246.81 quintal (34.42%) from II and 287.50 quintal (40.10%) were disposed from Channel III.

Three methods were used to estimate the marketing efficiency of various Channels, namely Conventional, Shepherds, Acharya-Agarwal method.

The conventional Method, the marketing efficiency of potato in Channel I was 1.00, 2.13 in Channel II, and 3.05 in Channel III. Whereas from Shepherd methods marketing efficiency index ratio in Channel I was 37.74, channel II was 4.63 and Channel III 4.25. Similarly, under Acharya-Agarwal Method, the marketing efficiency was 37.74 in Channel I, 1.64 in Channel II, and 0.72 in Channel III. It concluded that the Channel I was the most efficient where there is direct marketing between the producer and the consumers.

5.9 Problems in the Production and Marketing of Vegetables;

Inspite of the conducive agro climatic conditions the supply is less than the demand resulting in the massive import of vegetables from other states: The major problems in the production and marketing of vegetables as highlighted by the Producers and as observed are:

1. The foremost major problem faced by the farmer was the unavailability of high yielding diseases resistance seeds. The prices of seeds and saplings were also expensive, the subsidized seeds and saplings provided by some NGOs and Government were not sufficient enough and were not supplied on time.
2. The second most major problem was the lack of finance and credit facilities for the farmers. The banks and cooperatives were hesitant to give credit to the farmers until and unless they have some family members and relatives who has government job as their guarantee.
3. The lack of crop insurance was also a major obstacle to the farmers who suffers immense loss in times of natural calamities and others affecting the crops.
4. Most of the farmers had never attended any training and workshop. Only a few farmers have attended training programmes, however such training are held only for few famer and are not held at regular intervals.
5. The absence of cold storage and storage facilities causes a huge loss during the post-harvest period and during the transaction period.
6. The problems of bad roads was another major problems which affects both the producer and the consumers since the transportation cost becomes very expensive which further increases the final price of the vegetables.

7. The producer also complained of the rapid price fluctuations and the absence of the minimum support price from the concerned departments. The price falls to a very low level in times of the harvest season and in times of good production where the farmers suffer loss instead of profit.
8. The lack of organized market and the lack of information about the market and the prices affect the producers and the intermediaries.
9. The various multiple taxation is another major problem faced in the marketing of vegetables which discourages the marketing of vegetables.

5.10: Suggestions and Recommendations

From the findings it was evident that the production and marketing of vegetables in Phek district was profitable, creating employment and generating income for the farmers due to favourable climatic condition and high demand for the vegetables which point to immense scope. However it was also observed that there were number of production and marketing problems which greatly impacted the farmers. Therefore based on the study certain recommendations and suggestions are given below which can remove the problems and increase the farmers income and boost their morals and increase production of vegetables.

i) As per the need there is a urgent and a dire need for modern scientific storage facilities where the vegetables can be stored for a longer duration knowing the fact that the vegetables are highly perishable in nature. A good storage facility will boost the moral in the production and marketing of vegetables through the reduction of post-harvest losses and storing till better prices are offered.

ii) The farmers cost of production is high due to the purchase of imported cabbage seeds

as such the cost can be reduced if the concerned authority can provide sufficient and timely good quality of seeds and sapling at the subsidized rate to the farmers.

iii) There are no facilities of insurance for farmers in cases of destruction of crops by weather or by unforeseen situation: it is highly recommended that farmers have some sort of crop insurance so that the farmers can take some sort of risk and increase production. Same wise the farmers do not get due returns when there is bumper good crop due to lack of minimum support price. The Govt. and the department concerned should see that the minimum support price is maintained.

iv) Vegetable goods being very perishable and due to seasonality price fluctuates to a great extend which greatly discourages the production and marketing of vegetables as such steps should be taken not to let the price fall below a certain limit nor increase beyond a certain ceiling.

v) Regular workshop, training and seminars should be held at a regular interval for the cultivators and not just once in a year. Most of the farmers did not receive any sort of training.

vi) Market information should be updated regularly to the farmers, it is recommended if the media such as newspapers and radio update daily regarding the prices and market information of the state.

vii) The credit institutional facilities should be expanded with more friendly and lesser paper work. It was found that majority of the farmers did not avail credit facilities due to paper works and others unfriendly nature of the financial institution.

viii) Taxation on consumer goods such as on vegetables should either be done away or reduced. The Government and the department should see that there are no illegal taxation and over charging of basic taxes.

The above recommendations are based on the suggestions of the farmers and of the scholar through the survey and field study. In conclusion it can be stated that the production and marketing of vegetables in Phek District Nagaland is beneficial and that with certain measures taken the profitability of the farmer can be increased which will further increase production.

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