

## Economic Investigation of Poverty and Income Distribution in Pistachio Cultivating Areas of Kerman Province

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### ABSTRACT

The study of poverty and income in equality are the most important subjects of social/economic research in agriculture sector. The present study focuses on poverty and income inequality among pistachio growers in Kerman province. Absolute poverty line, relative poverty line, poverty gap and intensity were calculated. Also income distribution was investigated using Ginny coefficient, Lorenz curve and income distribution index. The statistical community was all pistachio producers in Kerman province. Data collected through personally interviewing of 200 producer, using multi-stage cluster random sampling, during 2012-2015 cropping years. The results showed that absolute poverty line for pistachio growers in Kerman province was 24000000 (10 Rials) while, relative poverty line was 64922675(10 Rials), annually. Results also indicated that 30 percent of farmers were suffering from absolute poverty while, 57 percent from relative poverty. Income gap for poor pistachio growers under absolute poverty was 0.48, but for poor pistachio growers under relative poverty was 0.60. According to Lorenz curve, Ginny coefficient of 0.66 and income distribution index, it can be concluded that there is an un-fair income distribution among pistachio growers in study area. Finally supporting capital availability specially for small scale poor farmers through low interest credit, production subsidies and national development funds is suggested.

### Introduction

Absolute poverty is the situation that a person can't provide minimum income to cover necessities like food, clothing, housing and so on. Needs are different from time to time and place to place. Comparative poverty is the situation that a person can't afford for providing life which is somehow desirable (Khodadadkashi *et al.*, 2002). Poverty line is minimum income which can differentiate between poor/non- poor people in society (Arshadi & Karimi, 2013). Data showed that absolute poverty line was 23000000 (10 Rials) in Tehran for a family with five people in 2014 and almost 40 percent of people were below poverty line in 2012 (Raghfar, 2014). Absolute poverty line in rural areas is 30 percent less than urban

areas of the country which shows less welfare in rural areas entails immigration from villages to cities. According to data poverty and in-equality were declining from 1984 to 2005 but increasing from the time. Negative economic growth rate in 2012-2013, increasing un-employment rate and high inflation rate of 35 percent were the main reasons of increasing poverty and in-equality after 2005 in the country (Raghfar, 2014). According to economic studies average poverty rate was 30 percent and except few years in other periods economic growth pattern were not acceptable to reduce it (Raghfar, 2015). In general poverty related to average income and income in-equality in country. Increasing income and decreasing

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inequality decline the poverty. Also most of the world studies resulted that there is a significant positive relationship between reduced poverty and in-equality with economic growth (Jalali, 2002). In pistachio cultivating areas of Kerman province, farmers are facing restricted agricultural resources especially water and capital in hand and as a results pistachio productivity is reducing. On the other hand, production and living costs are increasing due to high inflation rate in economy (Sedaghat, 2002; Sedaghat, 2011 and Abdollahi Ezzatabadi, 2012). There are numbers of literatures on poverty and income distribution in agricultural sector in domestic and international level. But few numbers of literature are existed on the subject in pistachio cultivation areas of the country and Kerman province . The related literature on subject are as follows: Fan *et al.* (2001) showed that investment increasing in agricultural research and development increases agricultural production and decreases the prices and leads to lower level of poverty.

Sedaghat (2002) resulted that although pistachio production is economical per hectare, but due to small scale farms and high living expenditure, the economic theory of vicious circle is accepted in most of pistachio cultivating areas of the country.

Fan *et al.* (2003) showed that among all types of investment, agricultural research development has the most effect on reduced poverty in the rural areas.

Tarazkar and Zibae (2004) in their research showed that in-equality of income and poverty gap are more serious in rural areas compare to urban areas of the country. Khaledi and Perme (2005) resulted that poverty line increases as the prices increased. Also they showed that absolute and comparative poverty in rural areas is more than urban areas. Najafi and Shooshtarian (2007) showed that poverty in village areas is highly expanded and family numbers is the main reason of this phenomena.

Kakwani and Son (2008) indicated that per capita income growth rate was stable during study period and also economic growth pattern was in favor of poor in the country. Jafarisani and Bakhshoodeh (2008)

indicated that poverty percent in rural areas is less than urban and also the food security is worse than urban. Rahmati and Zibae (2008) in their research showed that poverty intensity and gap decline as the import tariffs decreases. Shirvanian and Bakhshoode (2009) resulted that about 46 percent of families in research area have the minimum risk, 40 percent have the maximum risk and about 13 percent are facing threat of poverty. Jafarisani and Bakhshoodeh (2009) indicated that urban and rural poverty declined during study but declining rate of poverty was more in rural areas than urban regions. Shirvanian and Esmaeili (2009) indicated that during development programs increasing rate of foods and housing benefit poor villager in case of income in-equality, but increasing rate of other goods and services price loss them in same subject.

Shirvanian and Torkamani (2010) resulted that about 48 percent of villagers in the area were poor and poverty gap was 35 percent.

Khodadadkashi and Shamsi (2012) in their research showed that poverty declined during 1999-2007. They also indicated that poverty was more serious in first and second development programs but less serous in third development program. Sarvari *et al.*, (2013) indicated that globalization make a better income distribution and therefore a less poverty in long run. Also they showed that a higher growth rate in agricultural sector leads to a lower level of poverty in society. Raghfar *et al.*, (2016) indicated that during past 30 years of the study, the average rate of poverty was about 30 percent. According to the past studies in the province related to the subject we generalize that the situation is worsen by time passing in case of poverty and in-equality situation of the pistachio farmers in Kerman province. So investigation of poverty and income distribution in such a condition is necessary. The main objectives of this research were:

1. Investigation of absolute and comparative poverty in pistachio cultivation areas of Kerman province.
2. Investigation poverty intensity and gap in pistachio cultivation areas of Kerman province.

3. Investigation of income in-equality among producers in pistachio cultivation areas of Kerman province.

## Material and Methods

### Data and information

The statistical community was all pistachio producers in Kerman province (Rafsanjan, Anar, Kerman and Sirjan cities). Data was collected through personally interviewing of 200 producers and completing research questionnaire during research period (2012-2015). Multi-stage random cluster sampling employed for data collection process and the version 16 of SPSS software was used for the aim of descriptive analysis.

### Research Models

Models / formula to estimate for poverty, poverty intensity and poverty gap (Khodadadkashi *et al.*, 2002; Arshadi and Karimi, 2013)

### Absolute poverty

To estimate absolute poverty, major necessities method was used. According to this method, minimum income need for securing major necessities of families is absolute poverty line and families under this line are absolutely poor.

### Comparative poverty

To estimate comparative poverty, 50 percent of average income method was used. According to this method 50 percent of families average income is comparative poverty line and families under this line are comparatively poor.

### Poverty intensity

To account for absolute/ comparative poverty intensity, poor's ratio index applied as below:

$$H=Q/N$$

H is poverty intensity, Q, number of poor people and N is number of samples.

### Poverty Gap

Poverty gap estimated using below model

$$G_i = Z - Y_i$$

$G_i$  is poverty gap for each person, Z is poverty line and  $Y_i$  is income of each person

$$G = \sum G_i$$

G is total poverty

### Income gap ratio index

$$I = 1 - Y_p/Z$$

I is income gap ratio index,  $Y_p$  is average income of poor people and Z is poverty line.

Models / formula to estimate for income distribution (Lashkari, 2010; Jafari Samimi, 2012 and Jabari, 2005).

### In-equality index

To estimate in-equality index we divide the whole income of 10 or 20 percent rich to whole income of 10 or 20 percent poor as follows:

In-equality index = total income of 10 or 20 percent rich / total income of 10 or 20 percent poor

In-equality is worse as the above index increases.

### Lauren's curve

This curve shows the relationship between population and related income. To explain the situation of in-equality in the society equivalent line compared with Lauren's curve according to their distance. As the distance between equivalent line and Lauren's curve increases, the situation got worse.

### Gini Index

To account for Gini index the following model was applied:

$$G = 1 + \frac{1}{n} - \frac{2}{n^2} (y_1 + 2y_2 + \dots + ny_n)$$

G is Gini index, n is number of people or number of groups, y is average income,  $y_1$  is income of the most rich person or group,  $y_2$  is income of next rich person or group and  $y_n$  is income of the most poor person or group.

Gini index places between zero and one. As this index increases the income in- equality increases, too.

## Results

### *Absolute and comparative poverty situation in study area*

The minimum annual income to overcome necessities of life were changing from 3000000 to 80000000 (10 Rials) and its average accounts for 24000000 (10 Rials) is absolute poverty line in study area. Also annual income were changing from 513333 to 190000000 (10 Rials) with an average of 129845351(10 Rials). So comparative poverty line is accounted for 64922675 (10Rials). Total income of people under absolute poverty line was 2.83 percent of sample's total income and the average income of people under absolute poverty line accounted for 12456595 (10 Rials) annually. Total income of people under comparative poverty line was 11.4 percent of sample's total income and the average income of people under comparative poverty line accounted for 26025384 (10 Rials) annually.

### *Area under bearing gardens and production needed to reach poverty threshold*

According to data of collected net revenue generated from pistachio bearing gardens per hectare was 15176470(10Rials). So the area which needed to reach the threshold of absolute and comparative poverty accounted for **1.58 and 4.28 hectares**, respectively. This means that the farmers who don't have this much of area facing a type of poverty. Taking pistachio price of 25000 (10 Rials) into consideration to prevent from absolute and comparative poverty a farmer need to produce 960 kg and 2597 kg of pistachio. Comparing pistachio quantity and pistachio bearing area needed to overcome poverty we can say that the pistachio area productivity should be at least 607 kg per hectare in the study area.

### *Poverty intensity*

Data analyzed shows that 30 percent of farmers are facing with absolute poverty compared to 57 percent of comparative poverty.

### *Income gap index*

Income gap index for those who are under absolute poverty line accounted for 0.48 but for those who are under comparative poverty line it accounted for 0.60.

### *Poverty gap*

The results for absolute poverty gap in study area showed in Table1.

**Table 1. Absolute poverty gap in study area.**

Sample no.	Absolute poverty line (10 Rials)	Sample no.	Absolute poverty line (10 Rials)	Sample no.	Absolute poverty line (10 Rials)
1	23486666	21	13986667	41	8833333
2	22466667	22	13306667	42	8480000
3	22035333	23	13186667	43	7912500
4	21453333	24	12937667	44	7458333
5	20220000	25	11722167	45	7106667
6	20060000	26	11596000	46	6980833
7	19616667	27	11371667	47	6335333
8	19366667	28	11120000	48	5716067
9	18636667	29	10356000	49	5621667
10	18360000	30	10333333	50	5386667
11	18293333	31	10216667	51	5298333
12	17573000	32	10183333	52	5066667
13	17320000	33	10166667	53	5016667
14	1648333	34	9900000	54	3540000
15	16160000	35	9844500	55	3289333
16	15388333	36	9694000	56	2688000
17	15228333	37	9210000	57	2000000
18	15085833	38	8990000	58	1260000
19	14700000	39	8954667	59	440000
20	14666667	40	8950000		
absolute poverty gap		Total		681060902	

As per above table, total absolute poverty gap is 681060902( 10Rials(10Rials). This means that to eliminate absolute poverty we need to infuse this amount to farmers in study area by employing a

suitable economic mechanism. The results of comparative poverty gap in study area showed in Table2.

**Table 2. Comparative poverty gap in study area.**

Sample no.	Comparative poverty line (10 Rials)	Sample no.	Comparative poverty line (10 Rials)	Sample no.	Comparative poverty line (10 Rials)
1	64409341	39	49880342	77	32202508
2	63389342	40	49872675	78	31692675
3	62958008	41	49756008	79	31206008
4	62376008	42	49402675	80	31106008
5	61142675	43	48835175	81	31056008
6	60982675	44	48381008	82	30730675
7	60539342	45	48029342	83	29906008
8	60289342	46	47903508	84	29489342
9	59559342	47	47258008	85	29442675
10	59282675	48	46638742	86	29048675
11	59216008	49	46544342	87	25756008
12	58495675	50	46309342	88	24256008
13	58242675	51	46221008	89	23906008
14	57406008	52	45989342	90	23843092
15	57082675	53	45939342	91	23308675
16	56611008	54	44462675	92	23256008
17	56151008	55	44212008	93	23062675
18	56008508	56	43610675	94	22466008
19	55622675	57	42922675	95	22064475
20	55589342	58	42182675	96	22028675
21	54909342	59	41362675	97	19722675
22	54229342	60	40122675	98	19558092
23	54109342	61	39756008	99	19152675
24	53860342	62	39741008	100	17989342
25	52644842	63	39279342	101	17593008
26	52518675	64	37989342	102	15408675
27	52294342	65	37464008	103	11156008
28	52042675	66	36998342	104	10889342

**Table 2.** Continued

29	51278675	67	36782675	105	10836008
30	51256008	68	36722675	106	8698675
31	51139342	69	36596675	107	8422675
32	51106008	70	36513508	108	5406008
33	51089342	71	35772675	109	3356008
34	50822675	72	35166008	110	2831008
35	50767175	73	34701008	111	1462008
36	50616675	74	34364342	112	1272675
37	50132675	75	33931008	113	189342
38	49912675	76	33062675	114	56008
Comparative poverty gap		Total	1	4434291147	

As per above table, total comparative poverty gap is 4434291147(10Rials). This means that to eliminate comparative poverty we need to infuse this amount to farmers in study area by employing a suitable economic mechanism.

#### *Income distribution situation in study area*

To investigate the situation of income distribution among farmers in Kerman province the farmers divided into 10 groups from poor to rich ones. The related information are in Table(3).

**Table 3. Income distribution for 10 different groups ( Tenth) in study area.**

Group	Group income (10 Rials)	Average group income (10 Rials)	Group income percent from total income	Accumulative group income percent from total income
Group 1	113399167	5669958	0.44	0.44
Group 2	263970331	13198517	1.08	1.52
Group 3	382369600	19118480	1.47	2.99
Group 4	587405002	29370250	2.26	5.25
Group 5	808409701	40420485	3.11	8.36
Group 6	1239788202	61989410	4.77	13.13
Group 7	1784728166	89236408	6.87	20
Group 8	2790000000	140000000	10.7	30.7
Group 9	4430000000	221000000	17	47.7
Group 10	13600000000	679000000	52.3	100

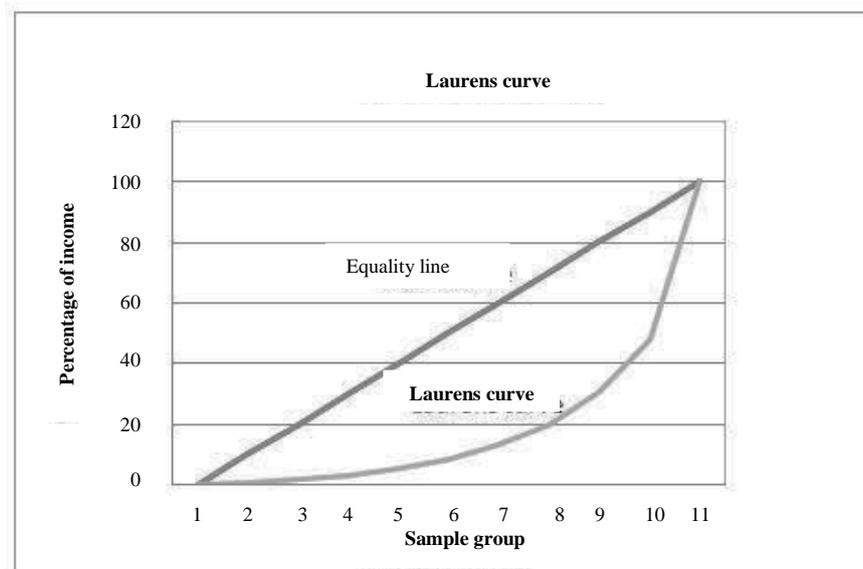
### ***In- equality index***

Using information in Table3, the in-equality index calculated as 119.93 while we divide the income of group 10 to group 1. It also accounted for 47.77 while we take into consideration the income of 2 rich groups(9 and 10) divided by the income of 2 poor

groups (1 and 2). As this index distance from the best situation (number one) is too much so we can say that the income distribution is in a bad situation.

### **Laurens' curve:**

The Laurens' curve for the study area shown in Fig.1.



**Fig. 1.** Laurens' curve for the study area.

As seen in above figure, there is a big gap between equality line and Laurens' curve and so we can say that the situation of income distribution is not justly.

### ***Gini index***

The Gini index calculated as 0.66 in study area. As there is a far distance between the calculated index and zero, we can say that the situation of income distribution is not suitable.

### **Discussion and Conclusions**

Absolute poverty line and comparative poverty line are 24000000 and 64922675 (10 Rials). 30 percent of farmers are facing with absolute poverty against 57 percent of comparative poverty (which is mostly in agreement with results of Arshadi and Karimi (2013)). Income gap for those who are under absolute and comparative poverty line is 0.48 and 0.6

respectively(which is mostly in agreement with results of Arshadi and Karimi (2013)). With infusion of 681060902 and 4434291147 (10 Rials) annually it is possible to remove absolute and comparative poverty respectively. Gini index accounted for 0.66, Laurens' curve is quite far from equality line and in-equality index is 119.93 and 47.77 as we take into consideration one and two groups above and down respectively. So, we can say that Income distribution among the farmers in study area is not suitable. In general, it can be concluded that the situation of farmers in case of poverty and income in- equality is not acceptable and the future will be dark if the same situation continues.

### **Suggestions**

According to the results of the study, the following suggestions are made:

1. As income distribution in the study area is not justly, pistachio buying and price guarantee for poor small scale farmers and early payment is suggested to increase their income and decrease income gap.

2. As there is water deficit and crisis in the study area, it is suggested that low interest credit for a better use of water supplies to the farmers. If this happens, water productivity and farmers income will increase.

3. It is an urgent need for enhancing education and extension for poor farmers by employing varied and suitable ways. If so, the new knowledge may help farmers to optimize managing their farms and supporting their income, which leads to a better situation if income equality in study area.

4. Supporting capital availability for small scale poor farmers through low interest credit, production subsidies and national development fund.

5. Economic structural reforms in the case of reducing inflation, side employment for farmers, availability of social security and the like, to the poor farmers is suggested.

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