# Agricultural Risks and Risk Management of Different Farming Systems in Syria

**Final Report**


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# Dedication

***For my country Syria to have prosperous future***

***For my people to have everlasting peace***

***For my lovely family members***

***For my mother***

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## Abstract

Syria is an agricultural developing country, characterized by semi-arid climate and high population growth rate, facing challenges related to mainly agriculture sector and food insecurity. The resolution of the latter is one of the Millennium Development Goal, which can be explicated by the goal to “eradicate extreme poverty and hunger”. Within such a framework the present thesis is devoted to study the food security situation in Syria and the peculiar factors affecting the income of the poor household. In specific, the work investigates food security situation and explores the agricultural risks by studying their main types, current strategies, public management policies and the future possible improvements for risk management.

A variety of analytical approaches have been used since the main methodologies for carrying out the research depending essentially on quantitative as qualitative analyses. As preliminary analysis, secondary data were used to investigate the food security situation, while secondary data on farm semi-structured survey and an *ad hoc* Delphi method survey have been implemented to examine the agricultural risks and risk management strategies.

The food security situation seems very similar to that of other Middle Eastern countries like Jordan and Lebanon. Food aggregate and per capita availability have an acceptable level which is also applied to food accessibility and supply stability. In contrast, food utilization exhibits low level compared to other countries, and lies under the world average in some cases e.g. for many vitamins intake. Therefore, The Government of Syria (GOS) should fill in the gap of food deficiencies both by developing the agricultural products and introducing reforms to the trade sector especially those related to importing/exporting food stuff.

The agricultural risks in Syria are related mainly to production, price and policy change risks. The mentioned risks are quite different both in type and intensity according to the different zones (Farming Systems). The yield risks result mostly from the increasing incidence of drought, frost, storm, flood and diseases, while price risks are related largely to the marketing constraints of the freely marketed crops (e.g. citrus, fruits and vegetables). Policy change risks (e.g. changes in macroeconomic policies or input/output prices) affect mainly the strategic crops (cotton, wheat and sugar beet) that are marketed by the state. Finally, idiosyncratic risks (individual or personal) seem not very relevant, on average, at the national level.

Agricultural risk management policies and strategies are also different according to Syrian zones. In general, diversification of income sources and cultivated crops are the main strategies adopted by farmers, while adopting a risk sharing strategy like “agricultural insurance” is still unfavorable one. Finally, GOS institutions contribute to agricultural risk management by several means like the agricultural supporting policies including the agricultural disasters relief. However, much effort must be done by GOS to manage the agricultural risks including the establishment of agricultural insurance framework.

## List of Abbreviations

| | |
|---|---|
| AASA | Annual Agricultural Statistical Abstract |
| ACB | Agricultural Cooperative Bank |
| ACSAD | Arab Center for Studies of Arid Zones and Dry Land |
| AFESD | Arab Fund for Economic and Social Development |
| AKDN | AGA KHAN Development Networks |
| AOAD | Arab Organization for Agricultural Development |
| CBS | Central Bureau of Statistics |
| CMO | Cotton Marketing Organization |
| FAO | Food and Agriculture Organization of the United Nations |
| FIRDOS | Fund for Integrated Rural Development of Syria |
| FSs | Farming Systems |
| FYNP | Five-Year National Plan |
| GAFTA | Great Arab Free Trade Area Agreement |
| GCC | General Company for Silos |
| GCM | General Company for Mills |
| GECPT | General Establishment for Cereal Trade and Processing |
| GEF | General Establishment for Feed |
| GESI | General Establishment for Sugar Industry |
| GESM | General Establishment for Seed Multiplication |
| GESMAAP | General Establishment for Storing & Marketing Agricultural & Animal Products |
| ICARDA | International Center for Agricultural Research in Dry Areas |
| IFAD | International Fund for Agricultural Development |
| GOS | Government of Syria |
| GOSI | General Organization for Social Insurance |

| | |
|---|---|
| MAAR | Ministry of Agriculture and Agrarian Reform |
| MDGs | Millennium Development Goals |
| MSAL | Ministry of Social Affairs and Labor |
| MOI | Ministry of Irrigation |
| NAPC | National Agricultural Policy Center |
| NGOs | Non-Governmental Organizations |
| NPCMI | National Project for Conversion to Modern Irrigation |
| SAF | Social Aid Fund |
| SP | Syria Pound |
| SPC | State Planning Commission |
| UCC | Unemployment Combating Commission |
| UNDP | United Nation development Program |
| USAID | United State Agency for International Development |
| WFP | World Food Programme |
| WTO | World Trade Organization |

## Introduction

The Millennium Development Goals (MDGs) issued by world leaders in the year 2000 and set to be achieved by 2015 have considered the first goal is to "eradicate extreme poverty and hunger" by means of "reduce by half the proportion of people who suffer from hunger". However, the number of undernourished people in the world remains unfortunately high, about one billion in 2010 (FAO, 2010). FAO stresses that the number of hungry is slightly decreased in 2010 compared to 2009 from 1.023 billion to 925 million hungry people, with a reduction of 80 million in Asia and 12 million fewer hunger people in sub-Saharan Africa. Nevertheless, the number of hunger people in 2010 is surprisingly higher than its value before the food and economic crises in 2008-2009.

Historically, the agriculture sector is considered the main provider of food around the world and still has the same significant role in insuring people food security. In addition, the world average people living and working in rural areas in 2010 was 49.4 % of the world total population, with higher values in the less developed countries, 76.2 % in Eastern Africa for example (FAO, 2011). The fact that indicates the importance of maintaining the agricultural sector and rural people as energetic as possible in the process of sustaining constant supply of food, and protecting them against agricultural various risks that could compromising their stability.

The working field for this thesis is Syria, which is a developing dry and semi-arid country with a total area of 185.18 $km^2$ and a relatively high population growth rate, 2.45 % per year. According to the most recent estimates, at the end of the year 2010 the total population of Syria was 20.8 million inhabitants, 51.1 % of them males and 48.9% females, and unequally distributed around the country with higher density concentrated in the southern region close to the capital Damascus and along the coast. The Syrian population is classified as young community where 62 % of the total population is under the age 24 year and distributed to 53.5 % living in urban areas and the remaining 46.5 % is considered rural people (CBS, 2010). During the last decade, The Government of Syria (GOS) has started economic reforms in which Social Market Economy has been adopted aiming at improving competitiveness, integrating into the international economy and achieving a balance between remarkable economic outcomes and social justice. Consequently, many new economic policies have been declared trying to strengthen the role of the private sector in the national economy and to improve the current legislative environment. The reforms have included issuing many regulations in order to shape the legal framework needed for shifting towards the Social Market Economy including those required for attaining more integration to the global market (NAPC, 2007).

Agricultural sector in Syria is the largest sector of the economy employing 45.1 % of total population and providing the major share of the food as targeting to achieve food self-sufficiency at the national level. Agricultural production is characterized by its high dependence on rainfall, on one hand, where 40-70% of winter crops (mainly cereals like wheat and barley) are rainfed consequently they are highly exposed to the risk of drought as a result of rainfall fluctuations. Irrigated crops, on the other hand form 100% of summer crops and devoted mainly to cultivate strategic crops like cotton and sugar beet and for vegetables, these crops in addition to cereals are considered very vital for food security attainment and for foreign currency acquiring as well (Westlake 2001).

The Syrian agricultural sector is facing currently real challenges due to the increased integration of Syrian economy to the international market from one side and the high rate of population growth, urbanization and changing the people food habits from the other side, which involves more pressure on farmers to prove higher yield and competition (Lançon 2005). However, farmers production and income are exposed to several types of risk including not only the yield risk resulting mainly from water shortage and rainfall fluctuations but also due to price risk driven from the free market conditions of the growing competition and the withdrawal of the Government support of inputs and output prices for some previously subsidized crops (Westlake 2001).

More generally, the developing countries integration into the global market, introduces new risks to the agricultural agents arisen from the increasing specialization of farming activities resulting in larger dependency on the world markets both of farm revenues and consumer provisions of the domestic food. Therefore, farmers are more susceptible to hazardous risk environments including the usual yield risk beside price and other market risks that take place due to the new market linkages.

Given the above mentioned importance of agricultural sector in Syria, the relatively high share of people working and consuming depending on that sector, and the new globally risks related to agriculture and food markets especially in the developing countries. Therefore, the main objective of my thesis is to explore the agricultural risks situation in Syria indicating their main sources and types, the current strategies, public policies and institutions for managing them and the future possible improvement in the risk management sector. The research is also aiming at exploring the expected side effects of the new market dynamics and the government responses on the income and consumption side of the agricultural agents. Furthermore, investigating the food security situation in Syria is another main objective for this thesis. The scope of the research is restricted to two main zones according to the strictly constrained special real circumstances faced the process of carrying out the field works of the thesis. Consequently, in order to represent the risk management in agriculture sector very well, the main research zones would be according to different

Syrian Farming Systems (FSs). This is strongly justified by the relevant characteristics of FSs as they define relatively homogenous areas which reflect geographic zones, marked by different agro-climatic, agro-ecological and market conditions as well as production traditions based on socio-demographic characteristics and supporting public investments (Wattenbach 2006). Thus two main study zones were chosen within the farming systems (1, 2, and 3) in the western and eastern north area of Syria namely in Latakia and Aleppo governorates.

Given the overall thesis' objective mentioned above of exploring the agricultural risk types and their related management strategies in Syria, the following detailed specific objectives can represent more precisely the aims of this thesis:

- To highlight the current situation of the food security in Syria;
- To have a full understanding of the of the various risky factors affecting agricultural activities;
- To define the scope for farmers' own risk management responsibility as opposed to the public intervention;
- To investigate the existence and completeness of markets for risk management instruments;
- To highlight the risk management strategies and institutional arrangements adopted by the farmers;
- To mention the institution for the management of crises and natural disasters.

Hence the main objective of this thesis is to explore to topic of "agriculture risk and risk management in Syria", which focus from one side on understanding the current situation of agriculture risks (yield variability, risk management strategies/policy, coping with risk, insurance, risk-management institutions and organizations), using mainly secondary data and a semi-structured-questionnaire survey at farm level. On the other side, searching more deeply the topic for better understanding and proposing probable solutions to different type of risk performing the "Delphi Method" by interviewing number of experts (bankers, traders, wholesalers, insurers, policy makers, consumers, etc.) and farmers (farmers, farmers' leaders, farmer association members and farmer union members) as well.

The thesis is structured into six main chapters presenting the main sections of the research work. The **first** chapter is devoted to literature review and composed of two main sections highlighting the subjects of food security and agricultural income risk and risk management. The food security section introduces the concept mentioning its definitions and dimensions while the second section highlights the agricultural main types of risks and their risk management tools. The **second** chapter is dedicated to represent the Syrian economy focusing on the agricultural sector through four main sections. The first section is discussing in

general the Syrian macroeconomics, the second and third sections instead are viewing the agricultural sector and the related agricultural policies while the fourth section is highlighting the Syrian main arming systems. The **third** chapter is presenting the methodologies adopted and performed in this thesis focusing, in the first section, on the type of analysis and on the on-farm semi structured survey. The second section is devoted to discuss the Delphi method as the main part of the analytical approach for this thesis whilst the third section is devised to explain the implementation of the Delphi survey. The **fourth** chapter is committed to discuss the current situation of food security and agricultural risk and risk management in Syria. The chapter is consisted of two main sections; the first one is related to food security mentioning in details the main subjects of food availability, accessibility, supply stability, utilization and the related policy intervention. The second section in turn is discussing in many subsections the existing types of risk, the current risk management policies, the government institutions, the non-government and other organizations and the related risk management strategies. In addition the chapter represents some policy recommendations of the functioning of some institutions related to risk management. The **fifth** chapter is dedicated to present and discuss the main results of the research focusing in separate two subsections on results related to each study zone and viewing a critical comparison between the two zones in a third subsection. The **six** and last chapter of this thesis presents the main conclusions and policy recommendations of the research and the chapter is terminated by suggesting possible future research areas related to the subject.

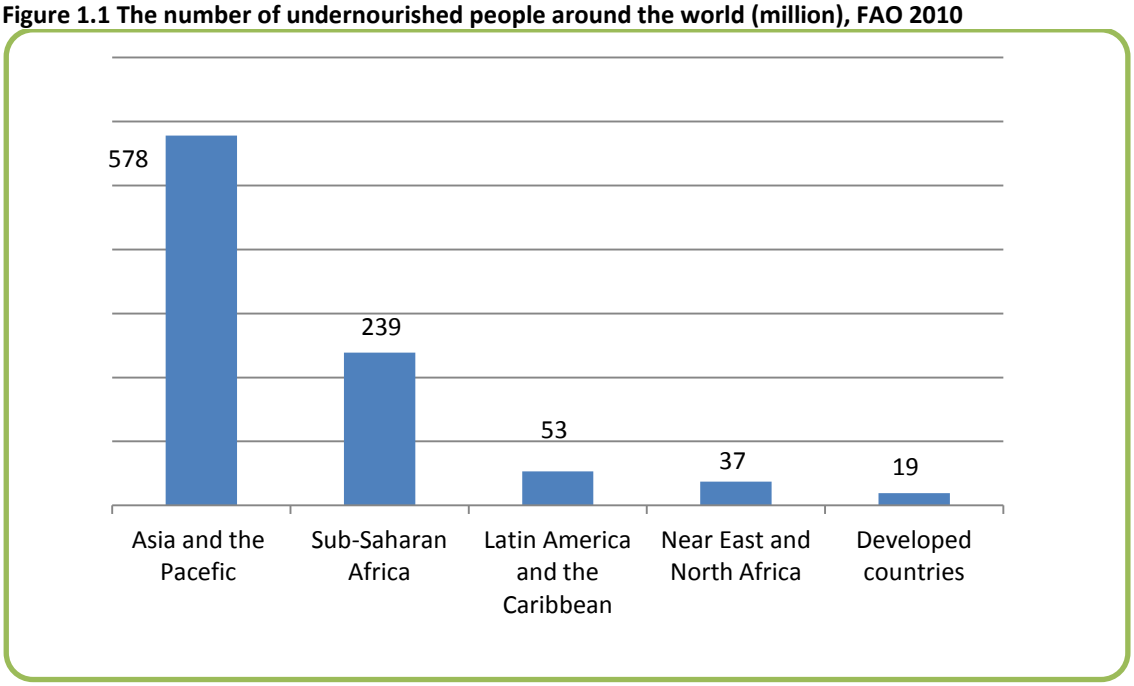
# Chapter One: Literature Review

This chapter is dedicated to review the relevant literatures have been discussed so far the issue of food security and agricultural risk management in the world and specifically in the Developing Countries. The first section is devoted to presenting the concept, definitions and dimensions of the subject of food security. While the second section is discussing the subject of agricultural risk and risk management by presenting types of risks and the strategies used to manage and cope with such existing risks. Moreover, the government policies related to risk are also highlighted in addition to presenting the main institutions related to risk management at government, regional, international and nongovernmental organization levels.

## 1.1 Food Security

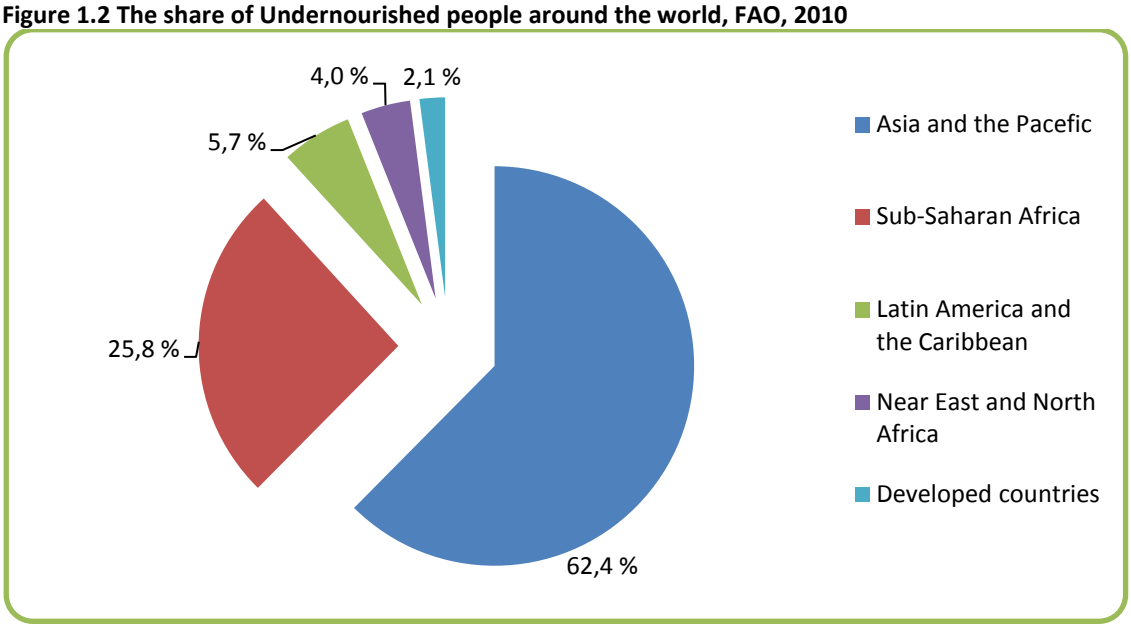
The total number of undernourished people in the world is still relatively high and above the expectations, where according to FAO estimates, there are 925 million hungry people in 2010. The most majority of those people are living in the developing and less income countries as shown in Figure 1.1.

**Figure 1.1 The number of undernourished people around the world (million), FAO 2010**



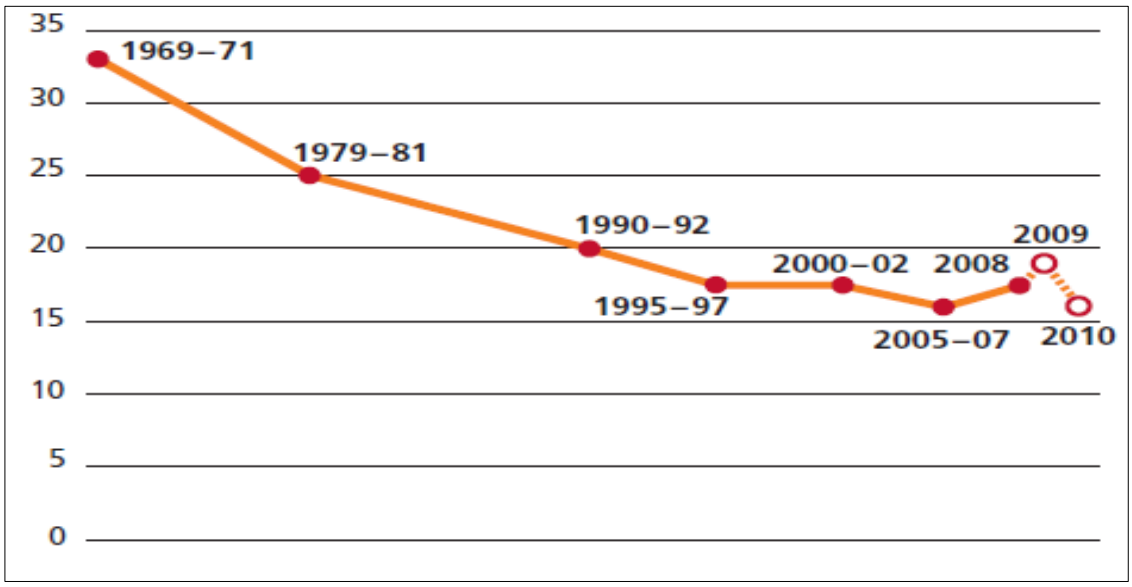

As mentioned above, the majority of undernourished people are living in the developing countries, mostly in Asia and the Pacific, Sub-Saharan Africa and Latin America. In addition, the Near East and North Africa contribute by unavoidable share (4%) to the total undernourished people (Figure 1.2), which justify the concern given to studying the food insecurity situations and the scope for improving food access for those people.

**Figure 1.2 The share of Undernourished people around the world, FAO, 2010**




Again in 2010 the food security seems to be far from achievement as the hungry people still account for 16 percent of the population live in developing countries (FAO, 2010). In fact, the undernourished people rate is still well above the target set by the Millennium Development Goal number one (MDG 1) of halving the proportion of undernourished people in developing countries to 10 percent in 2015 compared to 20 percent of people in 1990-92 (Figure 1.3). However, the figures show some improvement of food security status in 2010 as compared to the number of hungry people registered in 2008 and 2009 after the food prices crises happened in 2008.

**Figure 1.3 The share of undernourished people in developing countries 1969-71 to 2010**




Source: FAO, 2010

### *1.1.1 Food security: Concept, Definitions and Dimensions*

The concept of food security has been developing during the last thirty years reflecting the changes in official policy thinking (Clay, 2002). This concept was originated in 1974 when the World Food Conference defined food security stressing the important of food supply and the availability and price stability of basic foodstuffs at the international as national levels. The exact definition was as follow: "availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices".

After that, FAO defined food security focusing on food access and considering the balance between the demand and supply side of the food security equation as to "ensuring that all people at all times have both physical and economic access to the basic food that they need" (FAO, 1983).

More deeply distinctions were introduced in 1986 by World Bank Report on Poverty and Hunger (World Bank, 1986) between chronic and transitory food insecurity. The chronic usually associated with problems of continuing or structural poverty and low incomes, while the transitory food insecurity involving the incidence of natural disasters or economic collapse leading to an intensified pressure on food.

In 1992 the concept of the livelihood approaches became fundamental to international organizations' development programmes and they have been increasingly applying in emergency contexts including the concepts of vulnerability, risk coping and risk management. However, the analysis of food insecurity as a social and political construct has emerged as the relation between food security, hunger and crop failure becomes an old analysis approach. Nowadays, new dimensions have been entering into the concept of food security including the ethical and human rights dimension of food security (FAO, 2006).

"Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life". This broad accepted definition of food security has been declared during the World Food Summit held at FAO, Rome 1996 (FAO, 1996). The following similar definitions were also used by several international organizations to address the concept of food security:

- "Access by all people at all times to enough food for an active, healthy life" (World Bank, 1986);
- "Availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices" (United Nations, 1975);

- "Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2002).

There are approximately 200 different definitions of the concepts of food security where many of them used more or less the phrase "secure access at all times to enough food" as a part of the definition. Stressing that the terms **secure**, **access**, **time**, and **enough** are particularly distinct in the various definitions as mentioned by Maxwell and Frankenberger (1992). However, the meaning of such terms could be a matter of discrepancy e.g. the term *enough food* could have for some people the meaning of enough for survival, while in recent definitions of food security it means enough food for an active and healthy lifestyle.

The above widely accepted definition of the World Food Summit (1996) implicitly includes the multidimensional nature of food security by considering more profoundly the four main dimensions (food availability, access, use and stability) required to be guaranteed in order to assure the food security for most people:

**Food Availability**: referring to the availability of sufficient quantities of good quality food supplied either through domestic production or by importing from the international food markets in addition to the quantities provided by the food aid programs.

Food availability is not always an easy task but could be constrained by many different problems including the existing of (i) inappropriate agricultural knowledge, technologies, and practices; (ii) inappropriate economic policies, including pricing, marketing, tax and tariff policies; (iii) high population growth rates that offset increased production or imports; and many other economic and political natural obstacles that negatively affect the supplying and/or distributing of food.

**Food Access**: highlighting the ability of different individuals accessing adequate entitlements (income or other resources) for acquiring or purchasing the appropriate foods required to maintain the nutritious diet level of consumption (FAO, 2006).

However, the inadequate economic growth that is leading to a lack of job opportunities and the insufficient training and/or job skills in addition to the lack of credit or other means to exchange assets or income streams could be key constraints to food access. Moreover, food access could be constrained by the domestic losses of food due to ineffective and inefficient harvesting, storage, processing and handling in

addition to the political and social conditions that might not considering equity issues among different socioeconomic groups in the country.

**Food Consumption/Utilization**: stressing the importance of using food properly by adopting adequate food processing and storage techniques and using adequate knowledge about nutrition and child care, in addition to considering more the sanitation and other health care like drinking clean water arriving at a situation of well-being of nutritional and physiological needs. Constraints to food utilization, however, include (i) nutrient losses coupled with food preparation; (ii) inadequate knowledge and practice of health techniques, child care, and sanitation; and (iii) cultural practices that limit consumption of a nutritionally adequate diet by certain groups or family members.

**Food Stability**: indicating the necessity of accessing adequate food by individuals, households or population at all times in order to be considered having a situation of food security. In fact, people should not in any case have the risk losing access to food as a consequence of economic or climatic crisis cyclical events (e.g. seasonal food insecurity). Therefore, the concept of food stability can refer to both the availability and access dimensions of food security (FAO, 2006).

The aforementioned four food security pillars can be measured and evaluated using the following methods and techniques for each:

- Food availability can be assessed by estimating the aggregate and per capita food availability comparing them with international levels;
- Food access is assessed on two bases physical and economic as well. The physical component is usually evaluated using several indicators like political stability, infrastructure settings development, natural disasters frequencies, etc. The economic component is measured in turn by determining the income level and its distribution, price levels, employment and jobs availability and other economic indicators;
- Food utilization and safety comprise several measures such as health status, water quantity and quality, and nutritional status by its two components macro and micro nutrients diversified by adults and children;
- Food supply stability is measured by studying and evaluating the food production steadiness, trade dynamics, stocks provision, consumption fluctuations, income variations and transitional versus chronically hunger.

The above mentioned measures of food security will be referred to in details later in the thesis particularly in Chapter Three that is studying the food security situation in Syria.

### *1.1.2 High and Volatile Food Prices*

Considering the biological nature of agricultural production and its unavoidable reliance on the unforeseen climate conditions the agricultural production is always doomed by variability resulting in volatile outputs' prices. The agricultural commodities' price volatility in turn resulting in unpredictable revenues generated by agricultural agents from one side and high instability of consumers' expenditures from the other side. Therefore, the issue of risk management in agricultural sector is to be given more fundamental attention in the policy making arena also in developed countries, i.e. United States and European Union.

In specific, climatic changing conditions resulting in variable crops' yield which would increase the pressure in the relevant markets increasing the frequency of the price shocks for those crops. This situation of uncertain agricultural commodities' prices has been demonstrated clearly last decade starting in 2003 by a high rise reaching the peak prices in 2008 followed by a price fall tell now. The phase of high prices was derived by several factors such as the demand growth, the market speculations, the protectionist reaction, and the presence of disastrous events (Capitanio, 2010). In addition to that, other variables have clearly contributed to price volatility in the past and the probably persist contributing to agricultural commodities' price variability in the future. Firstly, the nature of the market structure for the main food commodities that allow to the minor changes in the supply and demand to strongly affect their prices. For example, just few countries exporting and importing cereals and rice and the quantities traded through the markets form low share of their international productions (18% and 6% respectively). Second reason is related to the low food reserve in many countries before 2003 as a result of food stable prices dominated in that period, which broken the ability to respond to the price increase and derive further rise between 2003 and 2008. Moreover, the inelastic supply of farm products as a result of the seasonality nature of the production cycles and the increasing share of small farms resulting from land fragmentation reducing the ability of the agricultural sector for sustaining outputs prices.

The concept of volatility hence refers to the variability of a price where it is possible for prices to be high but show little variability or to be low but variable. However, the price levels and volatilities tend to be positively associated due to manly two reasons. First, the small carryover of agricultural commodities from the past will reduce current availability (current production plus lagged carryover) resulting in upward price pressure. Second, the low carryover will reduce the opportunity of using inventory to meet positive demand or negative supply shocks thus increasing volatility (Gilbert and Morgan, 2010).

Given the above illustrated current agricultural products' prices volatility that affects agricultural agents' revenue and expenditures especially in developing countries where the high share of poor people

expenditure is devoted to food purchase. It is therefore important to study the agricultural risks affecting agricultural producers including mainly the income risks from one side and to study the ways of managing and coping of the existing risks from the other side.

## 1.2 Agricultural Income Risk and Risk Management

In this section I am going to highlight the topic of agricultural risk and the main tools adopted by agricultural agents and policy makers as risk management and coping strategies. It is more convenient to start by concise definitions of risk and uncertainty. In general, risk is defined as the combination of the probability of a consequence and its magnitude. Thus the risk considers the frequency or likelihood of occurrence of certain events (often termed 'hazards') and the magnitude of the likely consequences associated with those exposed to these hazardous states or events. Uncertainty, instead, exists where there is a lack of knowledge concerning outcomes. Uncertainty may result from an imprecise knowledge of the risk, i.e. where the probabilities and magnitude of either the hazards and/or their associated consequences are uncertain. Even when there is a precise knowledge of these components there is still uncertainty because outcomes are determined probabilistically.

Hardaker *et al*. (2004) define risk as uncertain outcomes of unpleasant consequences whereas give the uncertainty the meaning of imperfect knowledge. Similarly, the risky events defined as events whose outcomes are not known with certainty and affirm that uncertainties are important just when result in changing the decision of the economic agents or his well-being (Robison & Barry, 1987). Therefore, as the risk alter the decision makers' production circumstances and well-being, it is justifiable to study the risk phenomenon in general and in agriculture sector in particular.

### *1.2.1 Introduction*

The agricultural sector, in general, is exposed to high degree of risk compared to the other sector of the economy. This is due to the biological nature of agricultural production processes and the almost burly reliance on the nature and the climate surrounding the farm, the fact that imposes high level of uncertainty on the economic performance of the enterprises. In fact, agriculture has been considered for long time in many economic textbooks to be a case of economic activity loaded by risks and uncertainties. In addition, agriculture is considered a production sector where final result of its activities are not only under the control the agricultural agents but are heavily affected by external factors like the public interventions aiming for example at reducing income variability.

The high agricultural income risk is still a salient part of the most economies in the less developed countries, where climatic risk, economic fluctuations, and individual specific shocks characterize the life of rural people by severe hardship.

Human beings in general are also subject to different sources of risk during their life, some types of risks affect people well being in very direct way e.g. illness, accident and death. Others affect their ability to sustain and feed themselves either permanently in the case of disability, business failure or temporarily like the loss of property, unemployment and crop failure. Moreover, all men and women are subject during their life-cycle to be in a situation where they need helps from others due their deficiency of taking care of themselves like the case of infants and elderly people Fafchamps (1999).

### *1.2.2 Main Types of Risks*

Many authors have attempted to classify different kind of risks that hit people income, welfare and life. Fluctuations in life are always there, some of them are predictable while others occur in a random manner that cannot be predicted. Therefore, a possible definition of risk is to be factors encompass both predictable and unpredictable variations in income and health.

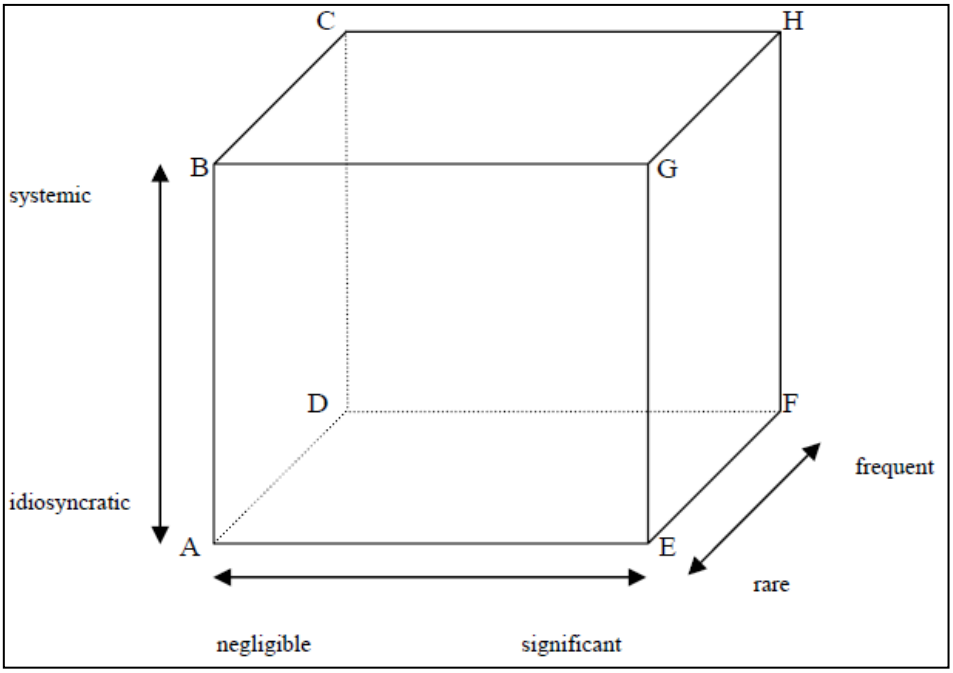
The related literatures have used several different ways to classify types of risks, the more traditional classification distinguishes four types of risks clearly affecting people. The first one is directly related to **production risk** where the agents produce less than what usually expected quantitatively or qualitatively. The second is the **price or market** risks where output's price falling after production commitments have been made, the same is applied to the inputs prices rising. **Personal risks** is also distinguished as an important risks hits people like the risks of personal illness, accidents and the case of human being death. The fourth kind of risk is the **institutional risks** imposed on individuals as a result of suddenly changing the relevant norms and regulations relate to people normal life. In fact, all the mentioned kinds of risks became recently very relevant in the modern agriculture despite the fact that agricultural production risk has attained the most attention in the literatures.

More recently Cafiero et all, (2007) classified risks considering in a way that allow for more policy oriented discussion on the relevance of risk and on the most appropriate means to deal with it. Accordingly, three main groups have been distinguished to classify different risk generating events taking into account the degrees and the levels of the risk and presented in the following dimensions:

1. According to risk **frequency**, from rare to frequent;
2. Risk **severity**, considering the size of damages caused, form negligible to significant; and
3. **Correlation** between affected units: from idiosyncratic to systemic risks to distinguish between events affecting independently single units and events affecting simultaneously many units.

And in order to have more comprehensive picture about the risks Cafiero *et al* (2007) suggested devising the "risk-box" that presents a combination of the three risk dimensions and their degree or levels as shown in Figure 1, where each vertex of the box corresponds to a prototypical risk.

**Figure 1.4 The "risk-box"**




Source: Cafiero *et all*, 2007.

However, it is not expected to have real world event perfectly corresponding to one of the extreme forms of risky events; nevertheless, the classification is better suited to be used as basis for the relevant "ideal" risk management instrument (strategies, policies etc.) discussed in the next section. Still, almost all the risks associated to events depicted in the *risk-box* described above could be efficiently managed with the exception of events of type H, which are frequent and whose negative consequences are significant and systemic and for which the only beneficial strategy would be to avoid them.

Almost in the same context used above, Fafchamps (1999) classifies risks depending on Morduch (1997) who proposes three conceptual distinctions that are useful to characterize risk factors in general: **high and low frequency** and **intensity** risks, **auto-correlated** and **non-auto-correlated** risks and **collective** and **idiosyncratic** risks. A fourth distinction between **utility** and **income** risks is added by Fafchamps (1999) to the previous ones.

**High and low frequency risk:** in general minor illnesses like cold occur very frequently while sever illnesses like heart attacks are quite rare. Other things being equal, high frequency risks are more dangerous than low frequency risks.

**Low intensity and high intensity risks:** the intensity of a risk factor is an indicator of its negative effect and significance on a specific person. Obviously, high frequency risk factors that only have a minor outcome on a person's welfare e.g., an insect bite a specific field are less serious than low frequency risk that have dramatic consequences on that person e.g., cancer. If we aggregate risk factors of different frequencies and intensities together, we can represent the risk faced by individual at time.

**Auto-correlated and non-stationary risk:** autocorrelation refers to the mutual effects of two or more types of risk, where the distribution of danger is auto-correlated over time. For example malnutrition reduces the resistance of the organism to common diseases, while crop failure risk faced by some poor or subsistent farmers may lead to malnutrition which, in turn, raises vulnerability to other risk factors. Risk may also be non-stationary, where shocks affect permanently people's health or capacity to generate income like the case of death as an extreme case. Other less dramatic example could be catching an incurable disease leading to becoming permanently disabled. Another example of non-stationary risk is losing of productive valuable assets for poor people like the death of cow.

**Collective and idiosyncratic risk:** as risks vary over time they also vary across individuals. Therefore usually many authors distinguish between collective or common risk factors that affect a group such as drought, epidemics, policy changes, and different types of conflicts and idiosyncratic risk factors that affect individuals like illness, unemployment, or exposure to specific accident. Here we must consider the extent of a specific risk to be considered as common risk, for example we need to know the percentage of farmers affected by crop failure or disease before call it a drought or an epidemic. In fact, the extent of collective risk depends on the size of the group affected and the extent to which risks are correlated across individuals. The smaller the group and the higher the correlation between risks hit the individuals the more we present collective risk.

**Utility and income risk:** these terms used to differentiate between risk factors that affect directly individual welfare or utility and those risks affecting his income and wealth. However, in practice there is no clear border between the two kinds, disease and disability, for example, affect welfare directly and then considered utility risk. At the same time they may have an effect on income if they beat workers. On the contrary, unemployment and crop failure that affect income directly are a form of income risk, they may also have an indirect effect on people confidence and quality of life, which would be a form of utility risk. However, this distinction is not useful because the analyses of risk coping strategies often ignore utility risk and focus on income risks, for instance, estimating the economic impact of diseases in terms of income loss, not in terms of pain and suffering.

Another type of risk that does not fit to the previous categories of utility and income risks presented by Fafchamps (1999) is **Ritual risk**, where social customs involve much expenditure to be spent in particular events, which could be predictable or not. For example, indebted celebration of birth of a new son or the death of a close parent falls into this category. The risk that is induced by ritual obligations is different from other sources of risk in that it results from social pressure more than physical need.

Regarding their importance the classification of **Common risk** against **idiosyncratic risks** was taken by many authors highlighting their main characteristics. Common or collective risks are aggregate, economy-wide and covariate risks that strike the majority of the community members or the entire homogenous region. While Idiosyncratic or individual risks in general affect only a particular individual like illness or asset loss.

Many previous studies in developing countries find that the idiosyncratic fraction of income risk is relatively high. For example, Dercon (2002) states that ICRISAT data from India shows little correlation in incomes in different villages which indicates the small share of common risk and high share of individual ones. Morduch (2002) finds that an idiosyncratic risk forms 75-96 percent of the total variance in income in ICRISAT villages. Moreover, common risks seems to explain very little share of income variation in Cote d'Ivoire in 1985-1986 as stated by Deaton (1997).

In fact, identifying the nature of risk is crucial in dealing with its consequences and coping with it. While it is difficult to deal with common risk since it affects everybody within both the community and the region because the risk cannot be shared, idiosyncratic risks could be insured within a community more easily. Formal and informal insurance transfers (credit or insurance) from outside the community or inter-temporal transfers such as depletion of individual or community- level savings are very important to treat with common shocks and risks (Dercon 2002).

Moreover, Alderman and Paxson (1994) demonstrate that common (covariate) shocks cannot be insured by risk-sharing as all members of the insurance pool would require payouts at the same time. As a result, the design of appropriate risk management policy interventions must take into account the relative magnitude of idiosyncratic and covariate shocks.

### *1.2.3 Agricultural Risk Management Tools*

In the literatures, a complex set of public and private actions that can be taken, both ex-ante and ex-post could be taken as to cope with the potentially dangerous random events of the economic agents. A large number of private strategies and tools have been developed to assist economic agents especially in agriculture in making choices in presence of uncertainty. Simultaneously, several public policies, both social

and sectoral, have been introduced to reduce the risk or mitigating its consequences. In fact, the realization of the public actions can replace and crowd-out the existing private risk management strategies. Hence, another possible classification distinguishes risk management tools according to whether the effects of the random events are retained, avoided, reduced or transferred. However, I will consider classifying the risk management tools into two main classes, private and public, whether the actor involved in taking the actions is the damaged economic agents or the society as a whole represented by the government.

#### 1.2.3.1 Private Risk Management Strategies

Considering the importance of risk and shocks in poor people life especially those living and working in the rural and agricultural sector, they develop ways either to anticipate the risk or to alleviate its impacts once it becomes part of their being. In fact those ways can be categorized into two main groups depending on their temporal nature i.e. some of them taken in advance before the occurrence of the risk (***ex ante***) and those used once the risk has been realized (***ex post***). According to Alderman and Paxson (1994) people in general implement two main different groups of strategies, mainly **risk-management** as opposed to **risk-coping** strategies.

Risk management as *ex ante* strategies undertaken by people in advance to reduce the riskiness of the income sources, this process is also called *income smoothing*. One clear example of income smoothing is *income diversification,* which could be achieved by combining different activities with low positive covariance like planting two crops with different inputs and water requirements in the case of having water irrigation problems. In addition, income smoothing is attained by *income skewing* achieved by taking *low-risk low-return* activities.

Risk coping strategies instead, as *ex post* risk treatment tool, deal with the consequences of income risk largely by *smoothing consumption*. This process contains *self-insurance* acquired by precautionary savings and informal *group-based* risk-sharing. In practice, households can insure themselves by building assets during good years to be depleted by selling them when they have needs due to any income risks or sudden shock. Other mechanisms can be observed within extended families, ethnic groups, neighborhood group and professional networks, where informal arrangements can be set among these groups' members to support each other when they face any hardship (Dercon 2002).

Fafchamps (1999) presents a conceptual framework of risk management and coping strategies, where he divides these strategies into three categories: first, ***ex* ante** group that reduces the magnitude of the shocks themselves and hence reduces exposure to risk; second, those that rely on the **accumulation of assets as buffer stock**; and last those that explicitly **share risk** with others.

Risk management (*ex ante*) private strategies have been taken by farmers mainly using techniques traditionally experienced as successful one like the reducing exposure to chocks, selecting and modifying environment, specialization, income diversification and agricultural operations flexibility. In addition to that the self sufficiency has been recognized as important strategies for food security risk management.

The most sufficient way to deal with risk is trying to reduce its occurrence by what is called "income smoothing" (Morduch, 1995). Reducing risk can be achieved by variety of method that endeavors to change the production circumstances into the more suitable way for acquiring insured revenues, or by changing the location of the economic activities exposed to risk if the risk is very significant and frequent.

People usually **change their environment** and settlement to be more suitable for their life in terms of climate, health and producing opportunities. Best examples of these come from Africa, where the East African highlands are more densely populated than other parts of Africa because malaria risk is lower at high altitudes. In fact, Ethiopian populations who severely affected by the 1984 famine vigorously resisted their relocation from the drought prone northern highlands to wet southern low lands.

Despite the fact that there are various methods by which poor societies seek to select and modify their environment, their life still characterized by high risk. The rural poor face a high degree of risk from their environment, such as climatic variability, pests, and diseases, where the capacity of poor, non-technological societies to effectively choose and affect their environment is quite limited. Therefore, other risk reduction and avoiding strategies should be explored to insure the sustainability of these poor societies.

The adoption of alternative production techniques (**specialization**) that are resistant to pests, droughts, and other environmental risk factors is considered good approach to handle risk by poor farmers. The best example of this method comes from West Africa where pearl millet is adapted to overcome the unusual conditions of extreme evapotranspiration, poor sandy soils, short rainy season and erratic torrential rains. Adoption of pearl millet in fact enabled human settlement in areas previously reserved just to livestock raising. However, in those areas too dry to support millet, itinerant livestock herding becomes the only production activity. Thus we can conclude that specialization in a single, healthy production technique is the main income smoothing technique.

Adopting **diversification** strategy instead of specialization could be more relevant in different environmental conditions where farmers looking for minimizing their exposure to risk by diversifying their income generating activities. In fact, farmers could plant different crops, or several varieties of the same crop to obtain a more stable output. Intercropping is also used to avoid outcome risk implemented by planting several crops in the same field. This could be applied to livestock producers who normally combine

different species of animals into a single herd to take advantage of differences in their resistance to diseases and drought. The most important feature of diversification concept is its comprehensive scope to include non-farm activities besides farming ones within a single household. For example, 45% of Sub-Saharan incomes come from non-farm work, which indicates the existence of strong diversification strategy to reduce risks as explained by Reardon (1997). Not only that but also temporary migration to nearby cities, mines, and plantations can also be seen as part of diversification strategy (Fafchamps 1999). Another example of income smoothing is *income skewing* achieved by taking *low-risk low-return* activities, in which farmer sacrifices a share of the high returns in order to insure at least minimum outcome.

Cafiero, *et all* (2007) also stress that most effective risk diminution option is still the **diversification** of the collection of income generating activities, where farmers tend to balance their exposure to risk by engaging in cultivation of different crops or by mixing crop and livestock activities. The main reason for successfully attending the diversifying strategy in risk reduction is related to choosing uncorrelated returns activities, where the opportunities and the incentives for income diversification are usually abundant. The cost of diversification to farmers, however, comes from the loss of the foregoing possible gains due to specialization in the single high return activity.

The last way of reducing exposure to risk within this group is to remain **flexible** and deal with shocks as they spread out. For example, replanting is a good flexible method in coping with risk once damage affects new plants and seedlings. In semi-arid tropics, rainfall at the onset of the rainy season is particularly irregular. It is not uncommon for rains to begin only to stop suddenly and restart several weeks later. In such circumstances, seeds planted after the early rains fail to grow and farmers have to replant. To be able to perform this strategy farmers must have varieties that can be planted over an extended period of time and are not highly sensitive to the length of day and other climatic conditions (Fafchamps 1999).

Regarding the **Self sufficiency** strategy, it happens especially when markets are absent or incomplete and rural households worry about their won food, which is the important dimension of food security risk. Therefore, it becomes optimal for them to grow their own food (e.g., Singh, Squire and Strauss (1986)). Self-sufficiency then becomes the natural route toward food security. Fafchamps (1992) shows that even when food markets are there, imperfect market integration may however generates enough food price instability that provokes households to produce their own food. Fafchamps and Kurosaki (1997) estimate a structural model of joint production and consumption choices using data from five Pakistani villages. As a result they proof that consumption preferences strongly affect production choices, thus providing rigorous empirical support for the food security model. The self-sufficiency motive is not restricted to food security

consideration, but it concerns about fodder price volatility encouraging Punjabi farmers in Pakistan to grow their own fodder.

However, self-sufficiency is not the only or even most important strategy through which poor rural households ensure their food security. This is because self-sufficiency unfeasible target for many rural households for whom food is an objective for many reasons like their poor agricultural environment or their insufficient production assets. Thus, self sufficiency is not always considered possible strategy to reduce the risk of food security.

Above we emphasized the possible ex-ante farmers behavior by avoid fall in revenue. However, those strategies cannot eradicate risk altogether, although populations may settle in less dangerous areas, they are still subject to disease. Farmers may diversify risk or choose activities with a stable income stream but they cannot eliminate all risk. They may try to become as flexible as possible but they cannot compensate for all the shocks or doing so would be prohibitively expensive. Thus some risk remains as a matter of fact that must be dealt with it using *ex post* strategies, means dealing with risks after the shocks have been realized.

The most well-known private ex post strategies taken by individuals described below are liquidating productive assets, labor bonding and debt peonage, precautionary saving, reducing consumption to keep productive assets and borrowing. Particularly, one of these actions or combinations of them is used to alleviate the effects of risk once it becomes a real fact threatening the poor people life.

For an individual stricken by an insuperable shock, the most apparent way to handle the situation is to **liquidate productive assets** in order to buy food, pay the rent, or deal with their sudden health problems e.g. take a child to the doctor. However, asset liquidation is relatively dangerous technique that entails negative impact on future earnings. By selling their land to deal with some sudden shocks households lose the most important asset in the production process, and then they may experience a permanent fall in income. Moreover, households who sell productive assets are more likely to face difficulties meeting their consumption needs in the future, and thus more likely to sell assets again (Fafchamps 1999). However, Land is not the only productive asset households may think to sell for acquiring their life expenses, but liquidation may includes other assets like livestock, oxen, bullocks, farm tools, artisanal equipment, vehicles, and farm buildings (Rosenzweig and Wolpin 1993).

Historically, voluntary enslavement or **labor bonding** has taken a variety of forms: indentured labor, debt peonage, serfdom, etc. Of course, to the extent that it is imposed upon dependents, e.g., children, it can hardly be called voluntary, but the process is the same. Although governments typically refuse to admit it,

labor bonding remains a reality in many poor countries, despite being illegal virtually everywhere. In fact, Child carpet makers, prostitutes, migrant workers in sweat shops, and so on are few example of labor bonding.

The logic of labor bonding is the same as that of distress land sales: faced with the choice between immediate starvation or slavery, where it is rational for poor people to choose slavery as their urgent choice (Srinivasan 1989). The puzzle is elsewhere, namely, on the demand side. Labor bonding is based on the fundamental assumption that the bonded laborer will be fed by his or her master, where there is no difference between immediate starvation and labor bonding. Thus for labor bonding to become reality, the marginal value of labor must be above the marginal cost of food. If not, bonded laborers will not find any takers and the only option left to them may be destitution.

Therefore, as bonded laborers cannot survive on their own, it is optimal for them to remain bonded. This may explain why labor bonding happens in certain countries in spite of being illegal. The same logic applies to other forms of self-imposed long-term dependency, such as debt peonage and indentures. To the extent that these forms of dependency could easily be qualified as 'exploitative', we see that there is a close relationship between exploitative social structures, risk, and poverty. To put it differently, the fact that certain people may voluntarily put themselves entirely at the mercy of others in exchange for survival or, in the case of migrant workers, in exchange for the promise of a better future for themselves or their progeny calls for serious concern.

As mentioned above liquidating productive assets is one choice to deal with shocks but this choice could be harmful for the farmers' long run welfare, therefore it is often more logical for them to keep their productive assets and **reduce their consumption** as a better choice in many circumstances. However, this is not absolutely applied everywhere. For example, while it is clear strategy for Burkinabe households who preferred to keep their livestock even during the worst shocks like the 1984 Sahelian drought (Fafchamps, *et all*, 1996). Rosenzweig and Wolpin (1993) found that Indian households smooth consumption through purchases and sales of bullocks. This is mainly because households' willing to protect their assets is not always possible if households do not have access to other kinds of risk sharing strategies. Zimmerman (1993) confirms that although households expect their loss of the opportunity to buy tier assets back, stress sales will happen to insure survival from starvation even at a lower level of utility.

Anticipating future shocks by **precautionary savings** where households can build up liquid reserves that can be consumed or sold in the case of sudden income shock. This liquid assets accumulated by poor rural households could take many forms like food stocks, cash money, deposits and bank accounts, and gold and

jewelry as mentioned by Lim and Townsend (1994) and Behrman, Foster and Rosenzweig (1997). As a result, precautionary saving is considered a good way of protecting the productive assets of poor households against the damaging consequences of stress sales without reducing the households' consumption to cope with the shocks.

As seen above, accumulation of assets is a good way for consumption smoothing in the normal circumstances, nevertheless, in cases where long series of bad income and income shocks households will run out of assets and will no longer be able to absorb shocks by liquidating their assets. Therefore, a possible solution to deal with this situation is to make households' assets negative, this means to take the choice of **borrowing**. However, getting credit is a process constrained by many obstacles like the creditors demand of short run repayment and the high interest rate and the necessity of having a guarantee in order to insure the repayment (Carroll, 1992).

Risk sharing strategies

In the previous two sectioned risk coping strategies were discussed which search for smoothing income directly or depending on accumulation and liquidation of households' assets and where the individual was the center and the focus of those strategies. However, risk sharing is a more aggregate approach that considered in more general equilibrium context. Risk sharing could be explicit or implicit as will be explained below.

In order to understand the **implicit risk sharing** it is useful to present the example of the exchange of grain and livestock found in many African and Indian villages. The idea is that villagers sharing risk among themselves by exchanging non-consumable assets such as livestock against consumable assets such as grain. Moreover, villagers can share risk with the rest of the world by exchanging their non-consumable assets for consumable assets with the rest of the world. However, this way of exchanging assets is constrained by the existence of the market and where there is no market poor households are forced to accumulate consumable asset such as grain to face any risk in their income (Fafchamps, 1999). In fact, market limitations are very critical for risk sharing especially with the rest of the world and thus to smooth consumption against common shocks.

There are several cases where it is difficult to smooth consumption or perform implicit risk sharing and where the **explicit risk sharing** becomes the only solution left for poor households within the community, this also happen where individuals fail to accumulate sufficient precautionary saving in order to have good consumption smoothing. Households may run out of assets and then lose their capacity to smooth consumption, thus risk sharing among community members depends on the amount and distribution of

wealth among the individuals. The poorer the community and the more unequal the distribution of wealth, the less efficient the implicit risk sharing is, and thus the higher the efficiency gain from explicit risk sharing. Moreover, agents benefit from explicit risk sharing even though they have plenty of assets in a certainly equivalent world where consumption varies according to the current income (Zeldes, 1989).

Relatively different classification have been provided by Cafiero *et all* (2007) taking into account the fact that the type of private risk management strategy should be related to the type of risk and according to its intensity whether it is tolerable or not. In this regards, e*x post* **risk coping** strategies usually adopted when the potential damage is limited, in this case farmers can retain to risk and handling its bad consequences. Accordingly farmers, as first available option, use their personal financial reserves such as **savings** to smooth consumption when facing unstable income which is considered the most widespread known risk coping strategy. In fact, farmers' self-insurance is considered the most efficient risk management compared to other types of risk transfers such as formal insurance. This is mainly because self-insurance is free of transaction costs exist in the other insurance forms having the opportunity costs of the financial reserves that must be immobilized.

Moreover, *ex ante* **risk reduction** option is considered very effective risk management strategies taken by farmers around the world. One of its most effective strategies is the **diversification** of the agricultural production and the sources of income as well. Diversifying the combination of different crops cultivated by farmers or by mixing crop and livestock activities has been long accepted by farmers who balance their exposure to risk. Additional risk alleviating action is taken by employing part of the families' resources in off-farm and non-agricultural activities. The key aspect of successful diversification in terms of risk reducing potential is to find activities whose returns are uncorrelated. In this sense, the opportunities and the incentives for income diversification are plentiful, especially in developed countries.

Regardless of the degree of the risks, almost all types of economic relevant risks can be transferred using **insurance**, which is recognized as the typical **risk transferring** action taking several forms. In the literature, insurance in agriculture has always been considered one of the most used as an effective tool of risk management strategy for extremely long time. However, it is not always relevant for farmers to restore to insurance especially when the damages are not so relevant, it is usually cheaper for them to retain the risk, using self-insurance by building their savings. Conversely, insurance is recognized by many authors to be very important instrument for coping with risks which have the characteristics of being *idiosyncratic*, *rare* and *significant* damages. This happens, for example, as farmers' yields danger as a result of hail fall, fire, frost and other similar causes, and this is represented by the areas towards the E-vertex in our "risk-box" above.

Despite the fact that insurance is very relevant solution as a risk sharing action, there are some common problems related to its performance of **traditional insurance.** These problems are mainly associated to the presence of **asymmetric information** and to the degree of **correlation** among potentially insured risks. Asymmetric information, in fact, results in the present of the well-known adverse selection and moral hazard problems. The first trouble of **adverse selection** is correlated to the difficulties faced by the insurer in determining the accurate degree of risk exposure of the potential insured and as a consequence the insurer cannot tailor the right premiums to each level of risk exposure. Therefore, only those with above average risk exposure will sign the contract resulting in having ex-post average risk higher than the one on which the premium is calculated. However, trying to raise the premium to improve the insurance performance will only aggravate the problem resulting in possibly losing of the market.

The existence of insurance might also provoke hidden actions taken by the insured party, usually referred to as **moral hazard**, by lower its operating costs for example at the risk of increasing either the probability or the extent of damage. Hence the insured will benefit from decreasing his costs avoiding its costs of the increased risk which has been transferred to the insurer as the insurance contract assures. Therefore, the moral hazard forms a real obstacle to the successful of insurance schemes in the absence of perfect monitoring of the insured actions.

On the other extreme, **risk avoidance** is recognized as the best risk management strategy to be used when the potential damage is very high and intolerable. The strategy includes taking several actions and decisions starting from the *relocation* of the production activity in areas less exposure to the concerned risk until investing in *physical protection* devices such as irrigating the plants as actions against drought, installing protecting nets against hail, building drainage against floods, and so on). In addition, **income skewing** strategy is applied by performing lower risk-lower income activities (Dercon, 2004). However, these mentioned actions are considered relatively costly for famers and are taken only when the combination of frequency and severity of the event is very high such that transferring the risk or coping with it becomes too expensive.

Most of the strategies discussed above are related to production or yield risk, whereas **price risk**, which is also very common in agricultural economic activities has different tools for coping with it. Given that particular agricultural commodities' price for individual producers are obviously highly correlated, and it is not likely to have the risk of all price falling at the same time while the reduction of agricultural commodity's price that damage the producer will probably generates a benefit for the buyers. This fact gives farmers the possibility of transferring the risk by **hedging** the exposure of price falls by means of **contractual arrangements with their marketing counterparts** (sellers of inputs, or buyers of output).

Moreover, by using the called **financial derivatives** as **commodity futures contracts** and **options on futures** farmers are able in advance to keep a certain price for their produce in the future.

Financial markets also have recently entered into the field of agricultural risk management by offering **options on agricultural risks** and **options on weather indexes** which sold to farmers in order to hedge their yield risks.

The other types of yield risks resulted from the bad weather may need to coordinate and collect the exposure in an effectively "packaged" and sold on the global financial market. This can be seen in fields other than agriculture where the increased scale of financial markets have already provided opportunities to hedge the catastrophe risk for which the cost of traditional market based insurance has long been prohibitive. As an example of this type of insurance is the so-called catastrophe bonds (CAT-bonds) that have been issued by insurance companies to hedge their exposure to catastrophes such as hurricanes or Earthquakes.

Table 1.1 represents the main types of risk according to the previously mentioned "risk-box" and their appropriate risk management instruments.

**Table 1.1** The main types of risks and their appropriate risk management tools

| **Type of event** | **examples** | **strategies** | **Best action when the event is predictable** | |
|---|---|---|---|---|
| | | | Ex-ante | Ex-post |
| A – Idiosyncratic, rare and negligible | Minor personal illnesses | Retain | Non | Coping |
| B – Systemic, rare and negligible | Minor epidemics (like the flu) | | Vaccination | |
| C– Systemic, frequent and negligible | Minor droughts Price swings | | Investments, savings | Coping, storage management |
| D – Idiosyncratic, frequent and negligible | Personal illnesses. Small car accidents | | Mutual insurance | Coping |
| E – Idiosyncratic, rare and significant | Hail, Fire, Theft | Not retain | Market based insurance | Rely on public solidarity |
| F – Idiosyncratic, frequent and significant | Car thefts in Naples! | | Relocate; hedge on financial markets | None |
| G – Systemic, rare and significant | Earthquake, tsunami, major epidemics (like the BSE) | | Hedging on the global market (CAT-bonds) | Rely on public solidarity |
| H – Systemic, frequent and significant | Drought in the desert! | Avoid | Public investments, relocation. | |

Source: Cafiero *et all*, 2005.

#### 1.2.3.2 Public Risk Management Policies

The previous section was devoted mainly to describe the wide range of private actions that can be used to manage and/or cope with the different types of risks faced by the agricultural agents. However, in this section I will try to highlight the other public actions taken by the society in order to manage risk through improving the privately taken actions by the concerned economic agent. Economically, welfare economics is used attempting to measure, in monetary equivalent terms, the costs and benefits of public policies and to assess the distribution of such costs and benefits (Cafiero *et all*, 2007).

Cafiero *et all* (2007) have grouped the relative public policies dealing with risk in agriculture according to their objectives and appropriateness relative to the potential intensity of the damages. These policies were classified in three main groups have been designed and justified on several grounds, e.g. ex-ante policies to reduce the incidence of risk, ex-post policies for mitigating the consequences of observed risks and policies trying to enhance the agents' risk management capabilities as seen in the following:

I. **Ex-ante risk reduction policies**, designed to directly reduce and modify the extent of damage caused by potentially risky events. The most common examples of such policies are the *public investments* or *incentives to private investments* in *infrastructures* such as canals and drainage facilities, which would reduce the damages in case of floods. The cost of such investments can be then transferred to the farmers, by imposing definite levies like paying the compulsory contributions to the public irrigation consortiums.

II. **Ex-post risk mitigating policies**, intended to alleviate the effects of damages suffered by farmers by providing an economic recovery such as deferring or reducing taxes after the negative event occurs. In fact, these are basically redistributive policies that spread the cost of damage recovery over the general population through the public budget.

III. Other "**supporting policies**" designed to increase the farmers' risk management ability based on efficiency grounds for correcting the present types of market failure. These policies aiming at protecting farmers from implementing less efficient strategies like risk-skewing activities when markets for risk are incomplete or inefficient. Therefore, governments may intervene in the "risk management market" surrounding the farmers by facilitating the flow of reliable information and in other different ways.

    a. "Risk cost reduction" actions allowing farmers to retain the risk by subsidizing savings, improving the access to credit, providing incentives to storage, providing better marketing infrastructures, and so on;

b. Improving the legal and institutional environment of the operation of some financial instruments in the financial markets, like the future options and other derivatives;
c. “insurance cost reduction” of the existing insurance market by a collection of actions like subsidizing the insurance premiums, providing reinsurance, reducing transaction costs in the insurance markets e.g. certifying available information on yields, providing information on the distribution of insurable events, increasing competition in the supply of insurance services, and providing insurance directly.

Despite the fact that some of these policies might be competing with each other, while other might be complements, their presence will deeply adjust the incentives for private agents and therefore potentially alter their decisions.

However, many important aspects of these policies should carefully be considered from the society’s welfare point of view during the process of designing and implementing the relevant policies. In fact, the present of public policies could encourage unjustified private risk taking behavior like the case where farmers locating their activity in risk prone areas when generous ex-post disaster payments are anticipated. In addition, public policies might exclude other equally efficient privately available actions; the presence of subsidized crop insurance, for example, might reduce the attendance of private risk-reducing activities like diversification. Moreover, the existence of such public policies may cause unintentional consequences, where some policy incentives resulting in farmers’ adoption of risky behaviors causing negative environmental externalities (Roberts et al., 2004).

## Chapter Two: Overview of the Syrian Economy and Agricultural Sector

On the eastern shore of the Mediterranean Sea, Syria is located south to Turkey, and bordered also by Iraq from the east, Palestine and Jordan from the south and Lebanon and the sea from the west. The total area of the country is 185.18 thousand $km^2$ divided geographically into several areas like

southern area, the eastern area, the coastal area, the mountainous heights, the interior plains and Al-Badia[1]. The country has also been divided into diverse ecological systems according to specific characteristics such as their rainfall quantities, thus five agro-ecological zones known as stabilization zones have been defined.

**Box 1**
**The Syrian Five Stabilization Zones**

Syria has been divided into five **agro-climatic** zones according to the annually rainfall precipitation and the expected probability of rainfall in each zone. Accordingly, these **settlement** zones used by the government to define the land use appropriateness for cropping pattern that entailing specific support provided by GOS for farming within each zone. The five zones are defined as follows:

**Stabilization Zone 1**: its area is about 2,701,000 ha accounts for 14.6% of the total area of Syria. The annual rainfall is over 350 mm, and divided into two areas where winter rainfed crops are successfully planted:

a) With annual rainfall over 600 mm; and

b) With annual rainfall between 350-600 mm.

**Stabilization Zone 2**: its area is 2,470,000 ha accounts for 13.3% of the total. The annual rainfall is between 250-350 mm. Usually two barley seasons succeeded every three years, wheat and legumes can also be planted.

**Stabilization Zone 3**: its area is 1,306,000 ha accounts for 7.1% of the total. The annual rainfall is 250 mm but not less than this amount. It is possible to get one to two seasons every three years, barley and legumes are planted.

**Stabilization Zone 4**: its area ***is*** 1,833,000 ha accounts for 9.9% of the total. The annual rainfall is between 200-250 mm. It is good just for barley which used for grazing some years due to its growing weakness.

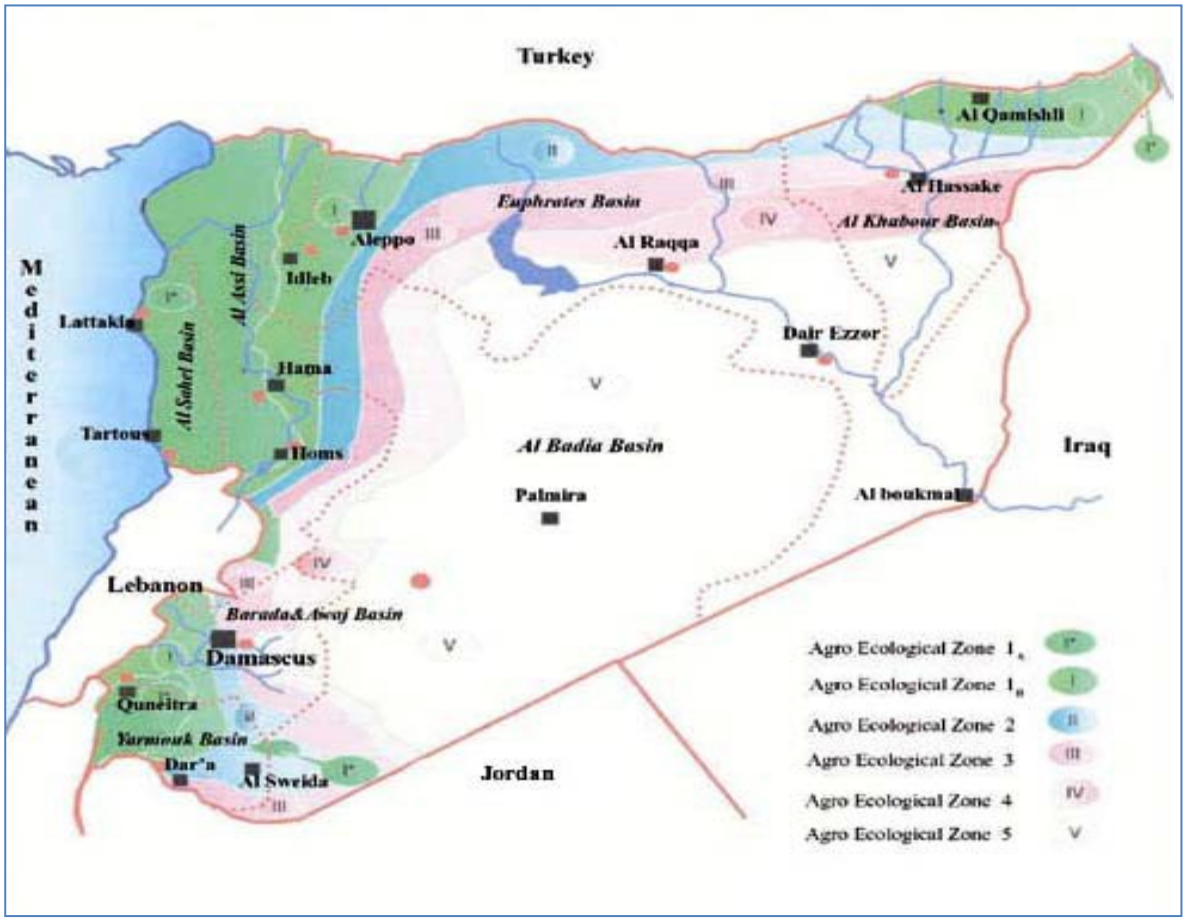
**Stabilization Zone 5**: Desert and steppe area, which is the remainder of the country, with area of 10,208,000 ha accounts for 55.1% of the total area of Syria. It is the natural grazing land for sheep and camels.

Source: The Statistical Agricultural Abstract, 2007 (MAAR, 2007).

[1] Al-Badia is the semi-desert lands in the southern-eastern area with the Jordanian and Iraqi borders

The main Syrian agro-climatic zones are shown in the Figure 2.1 below.

**Figure 2.1 The Syrian Agro-Climatic Zones**




In addition, Syria is located within arid and semi-arid area and characterized by a huge shortage of water supply for different uses including high deficit of the agricultural irrigation water balance accounts for 20% of the available water. In fact, the irrigated land area reached 1.24 million ha in 2009 and accounts just for 25% of the total invested agricultural area in Syria, which indicates high agricultural production risk related to drought and water shortage (NAPC, 2010).

## 2.1 Syrian Macroeconomics

After decades of central planning, in which the Government involvement in the economy was very strong and strict, the central economic system proved to be expensive and inefficient to achieve the national objectives declared by the GOS, but it was able to isolate farmers from the adverse conditions such as price shocks and fluctuations. However, the Government started in the early nineties a programme of economic reform giving more liberty to the private sector and moving to 'indicative' planning in agriculture, in addition to the relatively increased awareness given to risk and uncertainty and their impact on the stability of agricultural incomes.

The above mentioned economic reforms in Syria have shown higher speed last decade due to the economic policies implemented by the government which became more suitable to the open global market economy and the social market economy aiming at achieving competitive economy and social equity as well. The reforms through the national economic policies aimed to cope with the fast international economic development by enhancing the role of the private sector and improving the legislative and regulatory economic environment. The main reforms intended to offer a balanced development among different economic and service sectors through accelerating the economic growth, decreasing the unemployment rate, increasing exports, improving infrastructures and productivity and updating the financing system.

The monetary policy reform involves the unification of the exchange rates reaching an exchange rate as close as to the real one reflecting the price of the Syrian pound according to the real market. Accordingly, in the year 2003, the exchange rate has been set at two levels: 1) related to the state and public sector operations and set at 50 Syrian pounds (SP) per US dollar 2) the free exchange rate sets between SP 53.55 and SP 53.75 per US$. However, according to the Central Bank of Syria, the exchange rate witnesses slight change nowadays and registering small increase of the local currency value arriving to SP 49.45 per US$ for selling and SP 48.95 for buying on 01/10/2011 (http://www.banquecentrale.gov.sy/main-ar.htm).

Regarding the banking system, The Agricultural Cooperative Bank (ACB) is considered the official bank responsible for financing all types of agricultural operations (plant and animal production) by providing loans with relatively low interest rates to farmers. ACB is also the responsible for buying, selling and distributing all required inputs for the agricultural production (e.g. seeds, fertilizers, pesticides, containers etc) and for paying the farmers the values of the insured marketed agricultural crops like cotton, wheat and sugar beet. The last adjustment of the ACB interest rates for its loans was issued in 2008 and sill working from 13/08/2088 up to date. Table 2.2 shows the different interest rates on loans provided by ACB to farmers according to loan period and recipient category.

**Table 2.1** Interest Rates on ACB Loans started on (13/08/2008) and applied up to date, 2011

| Item | Public and cooperative sector | Cooperative members | Private sector |
|---|---|---|---|
| **Short-term (less than 50 thousand SP)** | 6% | 7% | 8% |
| **Short-term (more than 50 thousand SP)** | 8% | 8% | 9% |
| **Mid and long term** | 8% | 9% | 10% |

Source: ACB periodical reports, 2011, http://agrobank.org/english/interest_rates/index.shtml

In addition, and during the period 2000-2006 the government has issued new regulations to reform the current policies at the aim of developing the fiscal legislations and improving the efficiency of the tax regime, where the most important regulations are the following:

- Legislative Decree no. 51 to reform income tax, which reduced the tax on income and raised the minimum level of exempted incomes;
- Law no. 25, which eliminated some taxes and duties;
- Decree no. 319 related to reforming tariffs, reducing custom duties on primary commodities, and simplifying tariffs and the new custom Laws no. 37 and 38.
- Last, in 2006 the Legislative Decree no. 20 was issued aiming at establishing an administration for every border exit (NAPC, 2007).

The reforms have also concerned more about the trade policies aiming at establishing export-oriented approach and diversifying the national combination of exports. The new legislations and laws intended to develop the exports by improving the agricultural products' quality to be suitable to the requirements of the international markets by prohibiting harmful stimulants in agricultural production, motivating organic and bio fertilizers and encouraging the new methods for sorting, packing, and packaging.

Moreover, the new reforms provide an exempting of the agricultural products and exports from many taxes and reduce the duties on imports of the required agricultural inputs in addition to offering subsidized air transportation facilities for exporting and promoting of the establishment of specialized marketing cooperative communities. Protecting the national products and encouraging exports have been also considered by issuing the Law no. 42 of 2006 aiming at controlling the harmful dumping practices of the domestic market. Many other laws concerned the domestic products' competitiveness, monopoly prohibition, trade and companies' law, food safety law and consumer protection law have been studied by establishing a special commission for developing and modifying them.

As a result of the new reforms, the agricultural sector has shifted from a relatively closed market to a more open one where recent changes help increasing its openness and integration with the world economy. In

this regards, a simplified ''harmonized tariff system'' has been introduced through merging many previous duties in one duty, and reviewing the custom duties reducing them for basic food and industrial primary commodities. Taxes on exporting agricultural products have also been eliminated, export license required for many agricultural food products have been removed and restrictions on importing food products produced in “The Great Arab Free Trade Area Agreement (GAFTA)” members has been implemented gradually in 1998 and fully executed early 2005. These reforms have been extended to include other countries such as the association agreement with European countries, the free trade agreement with Turkey and many other signed bilateral agreements aiming at accelerating the free trade process. Furthermore, Syria applied for The World Trade Organization (WTO) membership in 2001 and the application was formally received in 2003. The Syrian accession to WTO is expected to have significant implication on the agricultural reforming process due to the needs for consistency and compatibility with WTO’s rules and regulations.

## 2.2 Syrian Agricultural Sector

The Syrian agricultural has an importance position within the national economy mainly due to the essential role it plays through its contribution to the Gross Domestic Product (GDP), employment opportunities, and national trade balance in addition to the promotion of non-agricultural activities such as marketing, processing, and transportation. Moreover, the agriculture sector is considered vital for the achievement of food security and supplying the raw materials for the agro food industries. And as known, agriculture stimulates the development of other economic sectors through its demand for non-agricultural goods and services used in agricultural production.

In fact, agriculture come secondly after the manufacturing sector at the national economy in Syria as it contributes by share of 19 % to the total national GDP. However, the severe droughts characterized the Syrian climate recent years have reduced considerably the agriculture contribution to the GDP, foreign trade and the workforce absorption as well, Table 2.2 shows GDP components ratios at market price between 2000 and 2009.

**Table 2.2** Development of the Syrian GDP by sectors at constant prices of 2000, %

| Item | 2000 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|
| **Agriculture** | 25 | 26 | 25 | 23 | 23 | 24 | 20 | 18 | 19 |
| **Mining and manufacturing** | 30 | 26 | 24 | 27 | 25 | 24 | 23 | 23 | 23 |
| **Building and construction** | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| **Wholesale and retail trade** | 15 | 16 | 16 | 18 | 20 | 18 | 20 | 22 | 21 |
| **Transport, communication and storage** | 13 | 13 | 14 | 10 | 11 | 11 | 12 | 12 | 12 |
| **Finance, insurance and properties** | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 |
| **Others** | 10 | 12 | 13 | 14 | 13 | 14 | 16 | 16 | 16 |
| **Total** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** |

Source: NAPC, 2011

The majority of Syrian land is considered pastures (Al Badia land) owned by the State and accounts for 55% of the country area while the forests areas represents just 3% of the total area of the Country. However, the arable land accounts for 32% of the total area from which the total actual cultivated land is about 4.7 million ha distributed as 70 % rianfed and the rest 30% is irrigated.

In fact, the irrigated areas have been steadily increasing since the nineties, reaching a stable level in the recent years therefore the actual increase or decrease in the cultivable area is based on rainfall rates that contribute also to the underground water provision. Other water resources in Syria are mainly stemming from rivers, springs, and groundwater, where the annual average water resources capacity is estimated at 15.5 billion $m^3$ out. However, Syria has been experiencing an increasing water shortage due to the growing demand and the frequent droughts affecting most of the country, with an average water deficit of about 3.5 billion $m^3$. Agriculture is considered the greatest user of the available water by consuming 89% of the

total for irrigation against 7 % for drinking and housing uses and 4 % for industrial uses. The main sources of agricultural irrigation water are firstly the ground water (wells) that forms 60 % of the total flowed by government irrigation schemes which account for 23 % and last the remaining 17 % comes from rivers and springs.

The nineties of the previous century was the starting point for Syrian agriculture for the development of the irrigated areas leading to the achievement of self-sufficiency in many agricultural products mainly wheat, dry legumes, and most vegetables and fruits. However, production variations are still charactering the rainfed products such as barley and legumes resulting in general production instability of plant production. Livestock production is also showing increased rates and supplying a good share of the domestic demand for red and meat, eggs, milk, and white dairy products ranging from 80% to 100%. The main animal production activities in Syria are mainly the sheep, goats, and cattle raising for the production of milk, red meat, wool, and leather. Poultry, however, is considered the basic source for white meat and eggs while camels, buffalo, and fish production contributes for just a small share to Syrian animal production.

In 2009, agricultural sector contributes to the total employment of the country by 15-20% of the total labor force corresponding to 758 thousand employees. And it is obvious that the agriculture sector absorbs the highest share of female employment 121 thousand accounts for 20% of total employing female in all sectors, while 636 thousand male are working in agriculture presenting 15% of the total male workers (CBS 2010).

The Tenth Five-Year Plan (2006 – 2010) included the adoption of the social market economy of increasing trade liberalization and the integration into the global economy, which is corresponding to the gradual shift of the agricultural sector to more open market after decades of prevalence of closed economy. In this regards, GOS has taken a set of measures to enhance foreign trade including (i) the cancellation of export license used for exporting many agricultural food products, (ii) allowing the imports of banned agricultural products from Arab countries members of the Great Arab Free Trade Area, and (iii) the gradual reduction of customs duties during the period 1998- 2005 reaching full cancellation by 2005. In addition, at the aim of accelerating trade liberalization, many bilateral agreements of free trade zones with Syria such as Turkey has been set using the same procedures, in addition to applying them similarly with the ongoing Association Agreement with the European Union.

## 2.3 Agricultural Policies

The general goal of agricultural policy in Syria is to attain food security and food sufficiency by increasing agricultural production and improving product quality for enhancing exports. These policies have resulted

in several positive effects on the agricultural system and on the economy as a whole through improving the agricultural contribution to GDP, increasing invested and irrigated lands, achieving self sufficiency in some strategic crops and raising the share of processed agricultural products. However, there were many negative effects of these policies concerning in specific the natural agricultural resources which experienced, as a consequence many problems, like land fragmentation, rapid decrease in soil fertility and huge shortage of the irrigated water.

In details, the current policies aim at improving the agricultural production and insuring the outputs' marketing, developing the infrastructure, protection of agricultural and rural environments. In addition, these policies are more concerned about the investing in agricultural research and extension services, improving animal production, promoting agro-processing and conserving land and water. Moreover, as the agricultural policies are seeking to increase the agricultural sector contribution to GDP and economic stability through increasing production they are contributing to creating new job opportunities.

Accordingly, the most essential positive impacts of these agricultural policies and development plans have been represented through the achievement of the following:

- Improving the agricultural contribution to GDP (SP 177 billion in 1995 to SP 256 billion in 2009);
- Increasing the invested and irrigated areas and investing in new rainfed areas throughout land reclamation projects;
- Raising the share of processed agricultural products to be 16-22% of total agricultural exports;
- Achieving self-sufficiency in the strategic crops like wheat and cotton, vegetables, fruits, olive oil and considering getting surplus for export;
- Developing the key infrastructures of the rural areas like agricultural roads, irrigation water canals, storing and transportation facilities and so on;
- Modernizing the agricultural other important related services like research, extension, agricultural education and health and veterinary services.

However, the above mentioned policies have shown many negative impacts on the agricultural sector in general and more probably that the negative effects on the natural resources (water and land) are the most dangerous and have clear actual problems:

- Agricultural land fragmentation, which is considered the main obstacle of good agricultural performance;
- The rapid decrease of soil fertility especially in areas of intensive agricultural production;

- The huge shortage of irrigated water balance, the deteriorated water quality and the slow rate of shifting to modern irrigation techniques; and
- The continuing degradation of the natural grazing areas and the growing risk of desertification resulting from the cultivation of the marginal area and the random use of machines;

In addition, there are several problems constraint the development of the agricultural sector and related to inconsistency between the new regulations and legislations and the agricultural production development such as agricultural relation law. The existed inconsistency between marketing, exporting and processing activities has resulted in both low productivity of agricultural work and low benefit from the value added.

Moreover, the sustainability of the agricultural sector is also threatened by a group of domestically and foreign restrictions and challenges, the most important constraints are:

1. The limited natural and environmental resources endowed to the agricultural sector, namely the irrigation water shortage, the dry climate and the continually degraded land;
2. The high population growth resulting in agricultural land fragmentation;
3. The existing difficulties in accessing the financial resources and the low rate of investment in the agricultural sector due to its slow capital recovery and the long duration of investment;
4. The lack of coordination mechanisms to link between agricultural irrigation system and the related institutions i.e. these institutions spread among several ministries like MOI and MAAR;
5. The global economic changes related particularly to trade liberalization;
6. The constantly growing level of competition proven by other countries' products; and
7. The other constraints associated with changes in the macro policies such as fiscal, monetary, trade and support policies (NAPC, 2007).

As a result, many agricultural risks have been demonstrated as a result of the agricultural policies and the natural conditions as well, the fact that requests a special concern about the agricultural sector by studying the actual risks and putting the solutions for tackling them.

For the purpose of the research, it appropriate to present specific policies related directly to the agricultural production and relevant to the risk issue in the Syrian agricultural, namely the pricing and marketing policies of the main agricultural products, the inputs distributing and the credit policies.

### *2.3.1 Pricing and Delivery Policy*

The Syrian pricing policies of the agricultural products are dealing mainly with two different groups of crops, strategic crops (fixed administrative prices affected directly by Government pricing policy) and other

crops. The main strategic crops in Syria are particularly wheat, barley, cotton, sugar beet, tobacco, lentil, and chickpea. The Government determines annually the prices for all strategic crops to be applied at the country level and used by public marketing establishments to buy the crops' outputs. These prices, in fact, have been determined based on unit costs of production that guarantee that farmers covering the production costs and make some profits. Some crops like cotton and sugar beet sold only to the government at the officially administered prices, whereas wheat, barley, lentil and chickpea can be sold by farmers to the domestic private markets. Moreover, strategic crops can also be classified into two categories according to the corresponding delivery policy where cotton and sugar beet' harvests must be totally submitted by farmers to the relevant State establishments to be processed by state-owned factories. However, farmers are not forced to deliver other strategic crops like wheat, barley, lentil and chickpea to state establishments.

Cereals, sugar beet and cotton are therefore delivered to the government establishments and factories through the those establishment main collection centers, e.g. wheat usually purchased from farmers by the General Establishment for Cereal Trade and Processing (GECTP). Whereas, the General Establishment for Feed (GEF) is considered the main purchasing body of barley, which is used particularly for animal feed, therefore producers can retain it for their own livestock or sell it to neighboring farmers, traders and private feed millers. Lentils and chickpeas can be sold to the GECTP and the General Company for Mill (GCM) who owns several lentil processing and splitting plants, or can be processed by the existing private factories for lentils and chickpeas processing. The General Establishment of Sugar Industry (GESI) buy the whole produced quantity of sugar beet at fixed prices depending on the quality of the product, and its seven sugar factories are considered the only public and private industry for processing the sugar beet in the country.

The Cotton Marketing Organization (CMO) is the public establishment for purchasing and delivering cotton must by its 16 saw ginneries. The CMO purchases from farmers immediately after harvest and then processes its resulting stock of seed cotton over a period of some ten months. However, the non-strategic crops' prices are determined depending on the market forces without any direct intervention from the Government, and farmers sell the output of these crops in the free markets.

### *2.3.2 Inputs Distribution Policy*

The process of agricultural inputs distributing in Syria is still depending mainly on the functioning of the ACB even though the private sector has been recently involved in that process. ACB delivers the required inputs directly to farmers or through the agricultural cooperatives, where fertilizers, seeds and other inputs of

major crops sold to farmers at fixed prices, usually lower than their market counterparts (Parthasarathy, 2000). In 2009, the GOS raised the fertilizer prices setting them very close their international market counterparts after a long period of fixing these pieces starting from the early nineties. The General Establishment for Seeds Multiplication (GESM) plays the central role on providing the ACB with the required domestic seeds of the main crops like wheat, cotton, and sugar beet, where the ACB is considered the responsible for distributing them to farmers. In addition, the ACB is responsible for distributing other inputs like bags for cotton delivering. Some types of plant protection chemicals are also distributed b ACB although the major part of these items are sold through the private sector, who may also sell the improved seeds, medicines for livestock, and so on.

### *2.3.3 Credit Policy*

Providing farmers by the physical inputs is not the only task of the ACB who is considered the most important institution of the Government for enhancing the process of agricultural production. But also offering financial inputs to farmers is another vital task of ACB, where cash and in-kind loans have been used to fund plant and animal breeding activities. In general, the loans offered by the ACB can be categorized according to the period of repayment in three classed short-term, medium-term, and long-term, covering different types of activities with different interest rates.

However, ACB requires property collateral to be presented by the farmers in order to eligibly offering the medium and long term loans. Many other conditions exist for getting specific loans for some specific projects. However, farmers feel that it is difficult to obtain loans for many purposes due to collateral shortage they usually practiced. In addition they have they believe that lower priority is given by the ACB to medium and long term loans, which practically exclude some important activities like land reclamation and fruit tree replanting from getting the required loans (Parthasarathy, 2001).

Furthermore, the ACB has recently a vital role to play by becoming the link between several public projects and the farmers and rural people. The National Project for Conversion to Modern Irrigation (NPCMI) of the MAAR aiming to convert all irrigated areas in the Country to modern irrigation is one project that operates by cooperation with ACB in providing the required loans for beneficiaries in order to apply the modern irrigation networks.

The above mentioned GOS policies are considered part of the official risk management policies oriented towards the agricultural agents aiming at sustaining the agricultural income and the rural sector as well.

## 2.4 Syrian Farming Systems

Particularly little real work has been done so far regarding the analysis of the various types of risks faced by Syrian farmers, however, the Farming Systems Study (FSs) conducted by the National Agricultural Policy Center (NAPC) was one recent attempt for exploring the topic more (Wattenbach, 2006). In general, the study set its specific objective at the aim of separating the entire country into relatively homogeneous zones of agricultural production, based on appropriate agro-ecological and socio-economic characteristics. The characterization of each farming zone in the national context has allowed reviewing the possible aggregated effect of policy change as well as the dependence of each farming zone on major crops, which could be subject to policy adjustments. In addition, the study discussed the various types of risks relevant to households by discussing the conditions of the productive environment of farmers. Farmers' natural conditions, socio-economic settings, market integration and the public policies have been studied presenting the probable strategies used by farmers to manage their varying conditions.

As mentioned above, Wattenbach (2006) described the main characteristics of the major Farming Systems in Syria highlighting the potential agricultural risks related to rural people within each specific FS and their potential strategies to cope with those risks as following:

1) The Coastal Intensive Irrigated Farming System (FS 1):

FS 1 is located along the Mediterranean coast with favorable agro-ecologic conditions and small size system (1% of Syria) and small average holdings (1.3 ha cultivated land). This farming system has relatively good infrastructure for input supply and market access therefore it plants crops under free market arrangements (greenhouses, citrus, field vegetables). Rural people in this farming system depend more on income other than agriculture where the off-farm job opportunities are found in the public sector located in the two governorate centers (Latakia and Tartous). In addition, the important service sector of the area as a national summer resort and as area for agricultural processing industries gives it additional source of income.

The main agricultural risks affecting farmers' income in this farming system are firstly the **climatic risks** which are relatively lower than in most other systems (but existent for citrus through frost and pests and for greenhouse in storms and pests). **Environmental risks** caused by the high use of fertilizer and other chemicals in the system are considered also significant problem, which require further study and attention especially within the greenhouse system.

The major risk in this FS is the **price risk** associated with intensive cultivation of perishable crops, such as vegetables.

Small households are at risk because of **financial risk** shown by the lack of savings to compensate crop or price failures; however, the reduction of these risks is achieved through the cultivation of different citrus species and varieties. Furthermore, the absence of commercial credit limits the possibilities for the poorest in the system to invest flexibly in new opportunities.

The decreasing farm sizes put pressure on the system exacerbated by the increasing expansion of areas under construction; in fact, the low average farm size is a risk factor for future incomes for almost all households.

Overall, the farming system have shown great adaptability to market opportunities and farmers are prepared to capture new production and market opportunities, taking advantage of the very favorable environmental conditions. In addition, the introduction of new species and varieties to satisfy more differentiated demand could reduce price risks. Moreover, the public sector could contribute significantly through the creation of an enabling trade environment, but also by strengthening quality control, including new products relevant for the exporting. Last by adequate attention to land tenure issues and credit development can prepare the system for a positive performance over the next decade.

2) The Hilly and Mountainous Farming System (FS 2)

FS 2 covers the Syrian western mountains from Latakia and Rural Damascus to the northern hills in Idleb and Aleppo governorates, account for 6% of the area of Syria, 15% of its population and 28% of its holders.

The system characterized by high annual rainfall with relatively little variability, high share of perennials and forests, small holder structure based on tree crops, with a high reliance on off-farm income and little livestock presence. The holding size is about 2 hectares, which is the lowest average after the coastal system with fragmentation of agricultural land.

The agricultural income of the producers depends mainly on Olive, Apple Cherries and Tobacco with high shares of national production originating from this system (61% of olives and 85% of tobacco). Tobacco is the only crop with strictly controlled agricultural plans and is mostly concentrated in niches under the influence of the processing factory.

The farming system is self-sufficient in labor and exports surplus labor to neighboring systems, especially skilled agricultural labor for orchard operations. International labor migration is likewise important e.g. the labor working in Lebanon and Gulf States.

Major recent changes in the farming system include a strong decrease in livestock numbers, while cherry and apple areas were reduced to expand olive cultivation. In addition, the role of non-agricultural employment increased and women have a larger share of formal employment due to better education and social change.

Agricultural policy affects the farming system directly or indirectly: All policies that affect the areas under cotton in neighboring systems impact the off-farm income possibilities within the system by decreasing the work for the migrating labor groups, particularly contracted for harvesting cotton. Non-agricultural work hence gains importance, which can be supported by public investment in rural education in order to allow surplus labor to seek employment outside the system.

The policy of expanding the olive areas at national level could negatively affect olive farmers within this farming system, especially if this policy should result in price declines. However, finding export markets for olive production depends on the improvement of the quality of olive oil, including the storage, processing and quality control.

**Agricultural diversification** could spread labor peaks from one side and generate additional income and minimizing the risk associated with the high dependency on olive production from the other side. Moreover, increasing **off-farm** income and acquiring **non-agricultural** employment are considered the key strategies for the future, especially for poor and medium households. Furthermore, farmers consider that agricultural diversification and intensification, complemented by non-agricultural work and investing in education and are their main strategy for risk management. Finally, FS 2 have good potential of beauty of the landscape, which can be used as strategy of tourism investment depending on the friendly and aesthetically attractive agriculture.

3) The Northern and North-eastern Plains Farming System (FS 3):

The largest in terms of area (4.7 Million hectares), covering one quarter of the national area, 31% of agricultural holders and half of the cultivated land and located in Der Ezzor, Al-Hassakeh, Al-Rakka and Aleppo governorates. FS 3 Characterized by its high dependence on so-called strategic crops like wheat cotton and barley that forms 49%, 6% and 18% respectively of its total area, and by its relatively large

holding sizes and low market access. In addition, it characterized by low education levels compared to the national average with a disproportionate share of women among them.

Policy intervention into the cropping pattern in the FS is mostly limited to wheat, sugar beet and cotton cultivation, which plays the highest importance in the irrigated areas.

The risk of increasing water shortages due to raising demand combined with restrictions to extraction from international waters due to international treaties limit the viability of future expansion, and water policies will have to continue focusing on improved water use efficiency. In this regards, policy instruments should encourage the development of drip irrigation equipment to overcome existing mechanical problems (related to the salinity of irrigation water

FS3, in fact, has the highest exposure to **policy change risk**, due to its high reliance on wheat and cotton, whose are frequently exceeds the permitted share under the agricultural plan. Within FS3, the irrigated farming system (Euphrates Basin and tributaries) is less exposed to **climatic risk** than rainfed areas.

4) Al Ghab and the Central Plains Farming System (FS 4):

Accounts for 6.2% of national land endowed by relatively good rainfall levels and water availability and characterized by good infrastructure creating good market access to large urban markets. The average holding size is 4.5 hectares with 27% of total land irrigated from public networks and wells allowing for intensive cultivation with 52 % of land used for strategic (wheat, cotton and sugar beet) and 4.3% for industrial crops.

The pricing policies of strategic crops (cotton, wheat, sugar beet and barley) aim at insuring acceptable farm income, however, the increased integration into international markets would probably lead to price reductions of strategic crops (wheat, cotton and sugar beet), with negative impact on profit margins of farmers.

The public investment in irrigation canals within the FS is a good potential for supporting and distribution the production systems. However, the most important **risks** for further development of the farming system are the **low irrigation efficiency** and **limited credit access** for most farmers. Coping with those risks would increase production intensity, conserve water and lead to productive employment for the increasing population.

5) The Southern Semi-arid Mountains and Plains Farming System (FS 5):

FS 5 accounts for 6% of total cultivated land in Syria endowed by good raifull conditions complemented by large number of private wells and dominated by freely marketed crops. The system is characterized by high market integration, good market access to the main national market in Damascus and a long export tradition to neighboring countries. The strategic crops cover 45% of cultivated land while tobacco is the only industrial crop and forms just 0.4% of cultivated land. The average holding size is less than the national average (3.8 ha compared to 5.8 ha).

The off-farm source of income is the most important for households in the marginal areas especially the dependence on remittances' income as non-agricultural income possibilities are limited in the area. Risk reduction strategies for the owners of orchards depend on the possibilities to reduce the price fluctuations of apples through their access to storage facilities. The expansion of land area by reclaiming additional land to improve cultivation conditions is also considered good strategy to increase the production potential.

6) The Pastoral and Agro-pastoral Farming System (FS 6):

FS 6 is the largest farming system represents 55% of the Syrian area, however, just 10% of the area is considered cultivable and 9% cultivated land. The farming systems characterized by cereal cultivation under high risk of failure of the grain harvest, and high reliance on sheep raising in addition to few small areas irrigated farming from oasis and wells.

Income generating activities through milk processing are largely broken and demand for these products might even decline, while income sources could found by the involvement of Bedouins in the tourism sector, either through provision of accommodation, guided tours to natural scenery, wildlife sights or historic sites. Another source of income is generated by the marginal barley cultivation in years of high rainfall, while off-farm income and casual employment is still an important livelihood strategy.

The drought **risk** is considerably reduced the investment potential of the population due to failed crops and emergency sales of sheep. In years of drought, barley cultivation is done by investors against share cropping arrangements customized to cover the production risk, where the land owners provide no additional input except the land. **Policy changing risk** affecting the pastoral and agro-pastoral farming systems is relate to marketing, input pricing and resource management.

The above brief description of the Syrian farming systems could help in the next steps of the analysis of the agricultural risk and risk management especially for the selected farming systems namely FS 3 and FS 1&2.

# Chapter Three: The Methodological Approaches

## 3.1 Introduction

The methodologies adopted in this thesis are considered mixed analytical approach combining quantitative and qualitative methods using secondary data, on farm semi-structured survey and Delphi method survey.

The main source of the secondary data is MAAR and NAPC, where information about food security and risk management in Syria has been gathered. The main data is about the relevant institutions and policies implementation at the government level regarding the food security and risk management in the country.

The other source of data was achieved by using the database of a Semi-structured questionnaire survey was already carried out by NAPC staff. The simplicity and flexibility used in this technique helps in asking open questions and implementing an open dialogue, which give the researcher the ability to adjust the research's instruments according to collaboration and the responses of the interviewers. In fact, the research can maintain the objective of the study and giving the respondent some freedom, where people in general give answers to questions we want to ask about later (Gilbert, G.N. 2001).

The questionnaire was carried out by NAPC staff for the purpose exploring the existing types of risks and highlighting the main risk management strategies and institutional arrangements adopted by different actors in the relevant value chin which is very suitable to the objectives of this thesis. Detecting the main policies/strategies undertaken by the government and the agricultural agents in order to mange and cope with those risks is also other objective to be achieved using the questionnaire as an analytical instrument. The main sections of the questionnaire[2] are:

- the five capital assets owned by the household;
- the institutions (formal and informal) existing in the studied area;
- the existing social safety nets;
- rural credit; and
- the existing agricultural risks and risk management and coping strategies.

In addition, many open ended questions have been added in order to give the respondent the freedom to propose new concepts and ideas to the research.

[2] For more information, the complete questionnaire is presented in the Annex A3.1.

However, in order to fill the information gaps of the semi-structured survey, a Delphi technique was practiced to answer questions not fully answered during the first round of the survey as the main part of the thesis research.

The Delphi method, as a qualitative tool, is largely adopted as long as the researcher aims to understand and to interpret specific problems of the social world given that he has wide flexibility and sensitivity with respect to the social context within which the data have been collected. In such framework a qualitative research is able to provide a comprehensive comprehension of rich, contextual and detailed data (Mason, 2002).

Creswell (1998) argues that researchers attempt to use qualitative research to make sense of or to interpret the phenomena in terms of the meaning the participants give to. In this regards the Delphi method is well fitting to achieve the required qualitative data very carefully. The method is also considered as a structured process that uses not only qualitative but also quantitative or mixed research methods. Such flexibility, in fact, provides the ability of the Delphi method to answer more than one research question.

## 3.2 Delphi Method

The Delphi technique is a broadly acknowledged research method using specialized experts' opinion in order to have a consensus on a real-world subject; it works very well when our aim is to improve our understanding of problems, investigating the solutions, or searching for predictions.

### *3.2.1 Foundations of the Delphi Technique*

Delphi method was used for the first time by Rand Corporation, Santa Monica, California in the 1950s in a research devoted to improve the use of experts' predictions in policy making (Woudenberg, 1991). Wouldenberg also stated that the name of Delphi Method is originated to an ancient Greek Delphic oracle and that the name 'Delphi' was given by an associate professor of philosophy working for the RAND called Kaplan. For thousands of years Greeks and people from other nations came to Delphi temple to consult the prophetess Pythia whose words tend to reveal the rules of God (Parke & Wormell, 1956). The role of Pythia was not only to provide simple predictions of the future but also to tell the divine purpose in a normative way aiming at forming the future events.

In our times Delphi method was used by researchers, student and for studies and projects at national levels. After the initial work at RAND, a huge Delphi survey in the civil sector was performed in 1964 (Gordon & Helmer, 1964). Then Japan has taken the lead in the process of Delphi technique development and application especially for foresight studies where achieved successful results. After that Delphi survey started spreading to other countries in Europe like the Netherlands, Germany, United Kingdom and France.

The Delphi technique is based on structural surveys asking participant who are experts in their specializations for their intuitive quantitative as qualitative information at the aim of exploring and predicting the studied items. The Standard-Delphi-Method was defined by Wechsler as flows: "It is a survey which is steered by a monitor group, comprises several rounds of a group of experts, who are anonymous among each other and for whose subjective-intuitive prognoses a consensus is aimed at. After each survey round, a standard feedback about the statistical group judgment calculated from median and quartiles of single prognoses is given and if possible, the arguments and counterarguments of the extreme answers are fed back…" (Wechsler, 1978).

Häder and Häder (1995) described the Delphi method by several characteristics as the followings:

- Uncertain respectively incomplete knowledge are always exist as a component of Delphi studies, and if not there are more efficient methods for decision making.

- The persons involved in Delphi studies only give estimations, where Delphi is judgment processes with unsure aspects.
- The experts participating in Delphi survey are depending on their knowledge and experience to assess in a capable way and they have the chance to gather new information during and among different rounds.
- The sense of mathematical models is less important to be stressed out compared to the psychological process in connection with communication.
- Delphi benefits from the self-fulfilling and self-destroying prophecies for determining or 'creating' events in the future.

### *3.2.2 The Use of Delphi Method*

Delphi methods is performed as a survey of experts' opinion in two or more 'rounds', where after each round a feedback is given about the results of previous rounds. Thus the same experts in the next round will judge the same subject once again influenced by the opinions and knowledge of the other experts.

Delphi is usually used to assess long-term issues and topics that are related to the future by reducing the complexity of knowledge required to simple statements which can be easily judge upon. Eto (2003) argued that Delphi method is the relevant research technique especially when there is politically strong desire to involve many people in the process of decision-making. And in the case of low budget, many business and policy makers believe that it is difficult to achieve every piece of information related to the research but it is more relevant to concern about the long term orientation in which they invest their money. This is exactly what Japanese experience done by using Delphi method for the long-term application-oriented researches (Cuhls & Kuwahara, 1994).

Delphi survey can be organized in different ways depending on the objective of the research and the human, financial and other resources available. It is in general starts by setting the objective followed by formulating the statements and then defining the main questions.

The process of Delphi is, in theory, an iterated operation until a consensus has been achieved. However, many researchers argued that two to three rounds would be enough to collect the required information and to attain a consensus in most cases (Cyphert & Gant, 1971). Custer, Scarcella & Stewart (1999) stressed that the first round questionnaire starts usually with open-ended questions playing the basis role of getting specific information about the subject of the Delphi survey. By receiving the respondents' answers of the first round questions researchers can use the gathered information in order to formulate well-structured questionnaire for the second round. In the second round the participants receive the second questionnaire

and asked to evaluate the information summarized by the researcher based on the results of the first round. During this round, in fact, the panelists are required to rank or order items aiming at establishing priorities among them and as a result of the second round an agreement or disagreement about the main research areas should be recognized (Ludwig, 1994). Generally, in this round a consensus among participants can be formed and the actual outcome is achieved (Jacobs, 1996). In the third round the participants receive a questionnaire contains the items and the ratings summarized by the researcher during the previous round and asked to revise their judgment and specify the reasons of being out of the consensus in the case of disagreement. This round gives the panelists more opportunity to make further reviewing and classifications for their judgment of the studied matters (Weaver, 1971; Dalkey & Rourke, 1972). After that a final opportunity for participants to revise their judgment is offered in a fourth round by sending them the list of remaining items, their ratings, and the items achieving a consensus among them.

Practically, the process of conducting a Delphi survey should be carefully organized and implemented according to the following sequence:

The first step is to found a **steering committee** or management team who is capable of leading the process starting from determining the subject, nominating the panelists, designing the questionnaire, considering the communication means and offering the required human and financial resources.

Then the **field of the Delphi** should be decided: there could be more than one field and where there is always the flexibility of adding or changing the field of the survey. For example information and communication, services and consumption, management and production, chemistry and materials, health and life processes, agriculture and nutrition, environment and nature, energy and resources, construction and dwelling, mobility and transport, space and big science experiments were the fields for Delphi 89 (Cuhls *et all*, 2002).

After that, the **topics** should be formulated depending on literature review and previous surveys and researches available or by founding a working group who is responsible to structure the field work and formulate the topics according to the research specific objectives. The **questions** to be asked should be consistent to the topics, open ended in general and not time consuming questions. The open questions are particularly useful in order to have experts' comments or to ask new questions, topics and alternatives to the statement given to them (Cuhls *et all*, 1995).

The **resources** to be used should be carefully considered and studied e.g. are there enough persons, money and time to perform the survey. Other practical processes should also be studied like the method of

distributing the questionnaires to respondents and the cost of printing them and the cost of holding a workshop if the survey designed to have workshop in one round.

Determining the **experts** is very important and difficult task, in fact, due careful should be given to the selection of the right persons who have the right experience, given the fact that in some field experts could be very rare. The number of experts belonging to each field of Delphi study should be correctly weighted so that no bias of expert numbers is resulting from the expert selection process.

Like other surveys, the Delphi **sample** needs to be large enough to draw conclusions at the end of the survey, however, no definite number is recommended but it is flexible and has a wide range from few to 100. The sample should also be diversified enough to combine persons of different ages, group sectors, gender, social and ethnic origin and so on depending on the topic studied.

After that the process of Delphi could be started by identifying the experts' addresses and asking them for their availability and willingness to participate in the study before starting the first round by sending the questionnaires by the proper way (hard copies, electronic copies, etc.).

### *3.2.3 The Analytical Tools of Delphi Survey*

Most Delphi surveys involve gathering a lot of statistical data, which can be used in different ways in addition to the comments that generally used to interpret the statistics or could be analyzed qualitatively. Here is some example of possible ways of analyzing the resulting data, which should be set in advance due to its implications on the criteria and the design of the questionnaire.

**Ranking** of the statistical data is a very easy way of presenting the results of the survey, which should be aggregated before the ranking. Importance categories then could be ranked to determine the most important topic, measures and assessments could be ranked as well.

Another analysis possibility is the **Qualitative clustering,** which is considered a half quantitative and half qualitative method of analysis. Delphi can be used clustering by ranking the most important categories first and then clustering qualitatively those were highly scored, which give very compact picture of the results.

**Graphics** are also used to illustrate results and make the understanding easier, which are used in different ways according to the nature of the answers (e.g. agreement, disagreement, personages, etc.).

Analyzing Delphi survey can also be done using **Scenarios or roadmaps,** which can be used to identify breaks in the assessment of the statements. With the roadmaps it is possible to check if one development is realized before another.

**Sophisticated calculations and matrices** are also used by Japanese like the use of fuzzy logic; input-output model with specific software (DEA) was also applied to analyze the Japanese-German comparison (Cuhls & Kuwahara, 1994).

As already mentioned, many different analyses models could be used to analyze Delphi survey results with a wide range for innovation and creativity given to the researcher.

However, the implementation is not as easy as the planning. While in some surveys it is enough to provide some results in form of graphics or statistical analyses, it is not the case when foresight processes are targeted especially when the providers of the foresight (researcher) and the users (policy-maker) are not the same persons. Therefore there still some difficulties in bringing them together and link the needs of the users to the methodology implemented by the researcher. It is also important to deliver the useful results and to involve persons who have the power to decide and implement.

### *3.2.4 Strengths and Weaknesses*

Delphi Advantages

Delphi is a technique has frequent application in reliability and used for achieving a consensus from a group of experts and has many advantages compared to methods using panel decision-making Helmer (1983). The Delphi technique, in fact, is well suited when the data collection process is difficult to be applied in specific circumstances using other methods for data collection hence the benefit of Delphi method is clearly realized through its adequacy to the following research's needs:

1. Where subjective judgments are needed rather than precise analytical techniques Delphi became the most relevant;
2. Where the process of data gathering depends on participants needed to the assessment of an extensive or compound dilemma have no history of the satisfactory communication and may represent diverse backgrounds with respect to their knowledge;
3. Whenever there is a limited resources (time, human and costs) to interview face-to-face the optimal number of individuals or to apply group meetings;
4. Where the supplemental group communication process can improve the effectiveness of face-to-face meetings;

5. The politically harsh and unpleasant disagreements among individuals require that the communication process must be anonymous;
6. When assuring the avoidance of "bandwagon effect" (escaping the dominance of the larger number of participants or the stronger personalities) is required, therefore the heterogeneity of the participants must be preserved to guarantee validity of the results (Linstone & Turoff, 1975).

Delphi project, in fact, is considered simple to be designed, implemented, and analyzed without the need of sophisticated mathematical skills and for its other characteristics.

Delphi technique conquers the regular barriers to communication like the reluctance to state unpopular views, to disagree with one's associates or to modify previously stated positions by providing privacy to participants (Barnes, 1987). It also avoids the strong effects of dominant participants during a groupthink. Moreover, the technique gives the participants a high degree of flexibility to respond to the questionnaires regardless of their tight daily schedules and geographic location, since they have the possibility to respond according to their times availability, which was considered the most important strength of the technique by Brooks ( 1979).

At the end, the main advantage of using Delphi method is that the experts will arrive finally a consensus representing their initially different opinions (Helmer, 1983) and (Linstone & Turoff, 1975).

Delphi Limitations

Mitroff & Turoff (1975) argued that Delphi is not without limitations, since the consensus elicited in a Delphi might be a specious or manipulated consensus. A fallacious consensus does not contain the best judgment but could include a compromise position.

In spite of the fact that Delphi appears to be an easy, simple and straightforward research method for forecasting and building consensus. Researchers, however, should be carefully considering the problems coupled with Delphi study before designing it, where the following reasons are essential problems faced by researchers applying Delphi technique:

1. Imposing the researchers' points of view upon the respondent group by over specifying the structure of the Delphi and giving insufficient space for the respondents' involvement in specifying the problem;
2. Delphi cannot be a proxy for all other human communications in a certain situation;
3. The limited skills of summarizing, presenting and interpreting the respondents' answers;
4. Ignoring the divergence of responses resulting in a false consensus generated by the survey;

5. The limited time of the respondents who should be considered as consultants and considering that they asked to answer the questionnaire which is not part of their job.

However, Linstone and Turoff (1975) claimed that the practical problems do not limit the use of Delphi instead the problem lies in the way of selecting the respondent group.

Other concerns mentioned by Barnes (1987) about Delphi technique are about the representativeness of the selected group to be judged and the tendency to eliminate extreme positions and confirm a weak consensus. The required skill in written communication and the participants' commitment necessary to complete the work are also considered by Barnes as additional disadvantages.

Finally, Delphi failure could result when the panelist members are not able to consider the task they are involved in especially when they are very close to the problem and are not able to perceive the possible changes in the future (Fortune, 1992).

## 3.3 Implementation of the Survey

Delphi survey was implemented to explore the research topic of "agriculture risk and risk management in Syria", which focus on understanding the current situation of agriculture risks (yield and prices variability, risk management policies/strategies, risk institutions and organizations). In fact, "Delphi Method" has been carried out to deepen the topic through a better understanding and to propose probable solutions to different types of risk. The survey was implemented by interviewing a number of experts (bankers, traders, wholesalers, insurers, policy makers and consumers) and farmers (farmers, farmers' leaders, farmer association members, and peasant union members).

As shown in the section 2.4 above, risk and risk management in agricultural sector apparently different according to different Syrian Farming Systems. Therefore, the Delphi survey has been separately organized for each of the proposed FSs, where two main different FSs where chosen according to the circumstances characterized the field work. The first farming system is FS 3 located in Aleppo Governorate in two different districts namely Al-Bab and Sfereh, while the second survey area was in Latakia Governorate representing FS 1&2 located in two districts, which are Latakia Center and Jableh. The survey has been conducted by implementing 100 questionnaires in each round distributed on the two studied zones as shown in the following table.

**Table 3.1** The questionnaires carried out during the Delphi Method Survey in Syria, 2011

| | Farming System 3 (Aleppo) | | Farming System 1&2 (Latakia) | Total |
|---|---|---|---|---|
| | Al-Bab | Sfereh | Latakia & Jableh | |
| **First-round** | 25 | 25 | 50 | 100 |
| **Second- round** | 25 | 25 | 50 | 100 |
| **Grand total** | 50 | 50 | 100 | 200 |

According to the timetable the Delphi method lasted almost 2 months and the survey has been carried out by doing the aforementioned two rounds questionnaires. The two rounds aimed at leading to successively more refined requests for expert opinion on risk management policies and strategies in Syrian agriculture. The first round was intended to open up on the subject and discover as wide a range of perspectives as possible. In particular, it aimed to have a deeper insight on the following topics related to risk management: type of risks; spatial and temporal dimensions of risks; private strategies and policies to manage and cope with risks; and policy suggestions. Whilst the aim of the second-round was to consolidate experts' opinions trying to reach large consensus on key issues in risk management policies and strategies in Syrian agriculture.

The first-round survey has been carried out by firstly by conducting the candidate experts in the two studied zones for inspection their interest, willingness to participate and availability. This stage also involved explaining the research topic, objectives and the subsequent steps of performing the survey for the candidate experts. The first-round questionnaire has been constructed based on our secondary data and on the results of the semi-structured survey conducted by NAPC[3] and sent to the nominated experts.

The main sections of the first-round questionnaire (see Annex A3.1) have been set as to comprehensively combine the whole subject by asking mainly open-ended questions. This approach can give the respondent more space to direct the progress of the research from one side, and offering them the opportunity, depending on their experience, of opening new subjects related to the risk management issue from the other side. Hence the main sections of the questionnaire are structured as the followings:

i. The main types of existing risks and their extent;
ii. The related risk management and coping strategies;
iii. The risk strategies for specific risks like the price risk for specialty crops and production risks;
iv. The relevant issues for risk management in Syrian agriculture including the households' source of income, the strategic crops, savings and credit and insurance ; and

[3] See section 3.1 above.

v. The policy suggestions about the perspectives of improving farmers' own risk management strategies from one side and developing the risk management Government policies from the other side.

The results of the first-round survey have been statistically analyzed for each study zone separately and used as input for the designing of the second-round questionnaires. As a result, two different questioners have been constructed for FS3 and FS1&2 (see Annexes A3.2 and A3.3).

The second-round questionnaires start with a brief description of the results of the first-round survey giving the experts full picture about the collective experts' opinions reached in the first round. Therefore, the questionnaires maintain the same sequence of the main sections presented in the first-round but asking more specified questions. The questions, in general, ask the experts to agree or disagree with specific statement, to rank several options according to their importance or influence or to choose between different choices. The results of the second-round survey are presented in the following chapter implicitly including the results of the first-round survey.

# Chapter Four: Food Security and Risk Management in Syria

## 4.1 Food Security in Syria

It is useful at the beginning of this section to recall the definition and dimensions of food security which have been illustrated in the first chapter, section (1.1.1), to be used in highlighting their situation in Syria. In fact, the UN/FAO World Food Summit (Rome 1996) definition of food security and the associated food security dimensions are widely accepted. “All people, at all times, have physical, social, and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life”. The main dimensions of food security are: food availability, food access, food stability and food utilization where food must be safe and nutritious.

At the aim of assessing the food security situation, several methods have been used to evaluate each dimension of the aforementioned four food security dimensions. The following sections analyze the current situation of each individual food security dimension at the national level.

### *4.1.1 Food Availability*

Available food is assessed using the estimation of aggregate and per capita available food at the national level and comparing them with the international levels.

I. Aggregate food availability

The aggregate “available food for consumption” is defined according to the annual commodity balances prepared by MAAR as production + imports – exports, therefore the aggregate quantities include both food component and other uses of agricultural commodities for animal feed, seeds, industrial uses and losses and waste. However, the definition is not accurate in measuring the ‘available food for consumption” since it contains other uses but the available data is limited allowing just the analyzing of the trend of food availability last decade, in specific from 1999 till 2008. And in the absence of comprehensive supply/utilization account for agricultural commodities, the data used remains the best indicator for the review of evolution of food supply in Syria. The analysis has focused on few measures related to the major groups of agricultural products such as change between periods, annual growth rate (AGR) and average annual growth rate (AAGR). Table 4.1 shows the development of total availabilities for selected groups of agricultural products over the studied period 1999 – 2008.

**Table 4.1** Evolution of availabilities for selected food groups in Syria, 1999 - 2008 (000 tonnes)

| Item | Average 1 1999-2001 | Average 2003-2005 | Average 2 2006-2008 | Change % 2/1 | AAGR % 2/1 |
|---|---|---|---|---|---|
| **Food cereals** | 3,671 | 4,430 | 3,650 | -0.6 | -0.1 |
| **Food legumes** | 129 | 170 | 138 | 7.3 | 1.4 |
| **Vegetables** | 1,739 | 2,721 | 2,624 | 50.9 | 8.6 |
| **Fruits** | 2,388 | 2,554 | 3,004 | 25.8 | 4.7 |
| **Meat** | 347 | 379 | 451 | 29.9 | 5.4 |
| **Eggs (million)** | 2,541 | 3,460 | 3,403 | 33.9 | 6.0 |
| **Fresh milk** | 1,635 | 2,121 | 2,588 | 58.3 | 9.6 |

Source: Elaborated from the MAAR, *the Annual Agricultural Statistical Abstract (AASA)*, various issues and NAPC *database*.
AAGR: Average Annual Growth Rate.

The previous table shows a good overall progress in food availabilities achieved from 1999 to 2008 despite the severe drought during the period 2006-2008. Accordingly, only food cereals suffered a slight annual decrease over this period due to the increased export especially for hard wheat. Relying on the aforementioned definition, these total availabilities are influenced by domestic production, imports and exports. The considerable growth in agricultural production realized in the last decades enabled Syria to meet the fast growing demand for both food and agro-industries where the main drivers of the demand for food are the relatively high population growth and income improvement.

The trade liberalization policies started in Syria in the mid-1980s has contributed to considerable increases in both total and agricultural trades. Export earnings grew at a fast rate enabling Syria to finance the increased imports needed to ensure the stability of food and non-food supplies. Another push has been the switching in objectives from self-sufficiency, pursued in the past, to self-reliance, currently in place. This means that more attention is being given to the comparative advantages of Syrian agriculture to access foreign markets and to diversify trading partners. The resulting evolution in total agricultural trade, agricultural exports and agricultural imports for selected food groups from 1999 to 2008 has influenced the self-sufficiency ratios (SSR) of food products during the same period. As demonstrated in Table 4.2 below, SSR decreased slightly for food cereals and declined considerably for meat, remained almost stable for vegetables, fruits, fresh milk and eggs whilst improved considerably for food legumes.

**Table 4.2** Self-sufficiency ratios by food groups, 1999 - 2008 (%)

| Item | Average 1 1999-2001 | Average 2003-2005 | Average 2 2006-2008 | Index % 2/1 |
|---|---|---|---|---|
| **Food cereals** | 108.4 | 106.3 | 102.0 | 0.94 |
| **Food legumes** | 114.5 | 157.5 | 137.7 | 1.20 |
| **Vegetables** | 108.7 | 108.5 | 113.8 | 1.04 |
| **Fruits** | 104.2 | 104.2 | 102.4 | 0.98 |
| **Meat** | 119.1 | 106.6 | 102.3 | 0.86 |
| **Fresh milk** | 100.8 | 100.0 | 100.1 | 0.99 |
| **Eggs** | 100.3 | 101.7 | 100.3 | 1.00 |

Source: Elaborated from the MAAR, *the AASA*, various issues and NAPC *database*. Food cereals include only wheat and rice.

However, the domestic production is still the major pillar of food availability, which is spreading out overall governorates and underlies a regional concentration.

II. Per capita food availability

Food security situation can be better assessed on per capita basis because non-food uses, change in stocks and losses are considered. The 2003-2008 period analysis shows an adverse impact on the per capita availability of food legumes, vegetables and eggs because of the drought spells and relatively high population growth. However, the per capita availability of the other food groups increased (Table 4.3). Consumption data[4] revealed that the aforementioned decline in food availability has not affected negatively the per capita food consumption. The per capita consumption of food legumes exceeded the per capita availability while the per capita availability of milk surpassed the per capita consumption. In addition, the per capita consumption of vegetables is substantially higher than the per capita aggregate availability indicating that households likely store legumes and vegetables at house.

**Table 4.3** Per capita availability of the main food groups, 2003 - 2008 (kg/person/year, %)

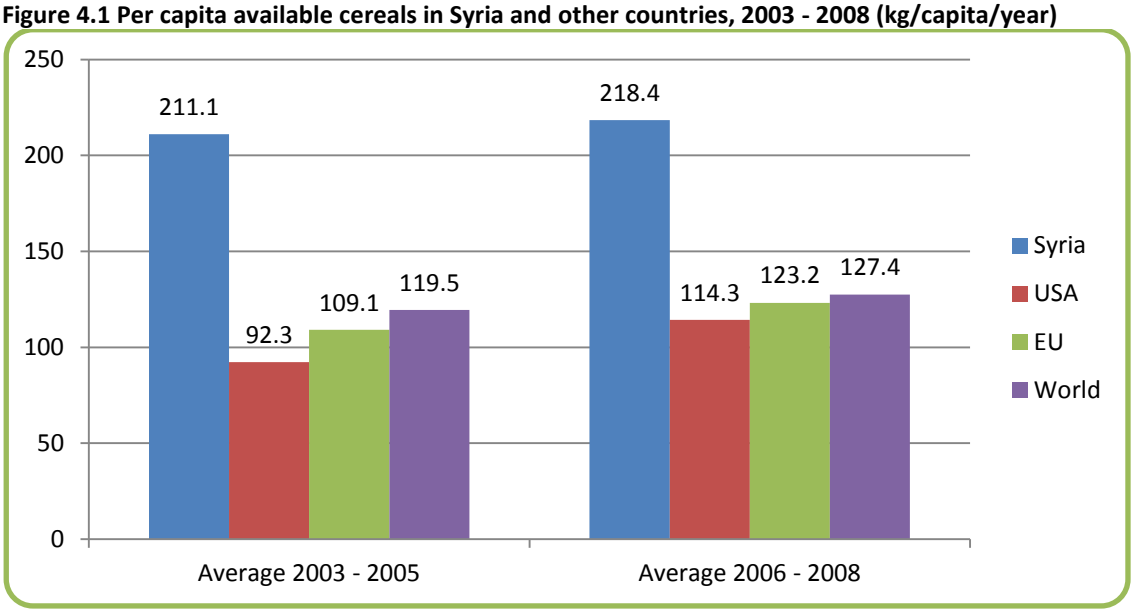
| Item | Average (2003-2005) | Average (2006-2008) | Change % 2003-2008 |
|---|---|---|---|
| **Food cereals** | 211.1 | 218.4 | 3.5 |
| **Food legumes** | 9.1 | 6.1 | -33.4 |
| **Vegetables** | 115.6 | 100.8 | -12.8 |
| **Fruits** | 110.3 | 117.1 | 6.2 |
| **Milk** | 105.6 | 116.7 | 10.5 |
| **Meat** | 19.4 | 20.9 | 7.7 |
| **Eggs (eggs/person)** | 177.7 | 158.2 | -11.2 |

Source: Elaborated from the *NAPC and MAAR database*.

For obtaining clearer picture about the food availability in Syria, a comparison of per capita available in Syria and other countries for the major croups of commodities is used. The comparison in general shows that Syria has good position regarding the food supply from vegetal origin as compared to other countries, but it has high deficient on food intakes from animal sources, for more details see Table A4.1 in the Annexes. In specific, cereals availability is considered very high compared to their availability in USA, EU and the world average as shown in Figure 4.1 below. The figure also shows an improvement of "inter-periodic" cereals availability taken as average of 2006 -2008 and the average of 2003 – 2005, which shows slight improvement from 211.1 to 218.4 kg/capita/year.

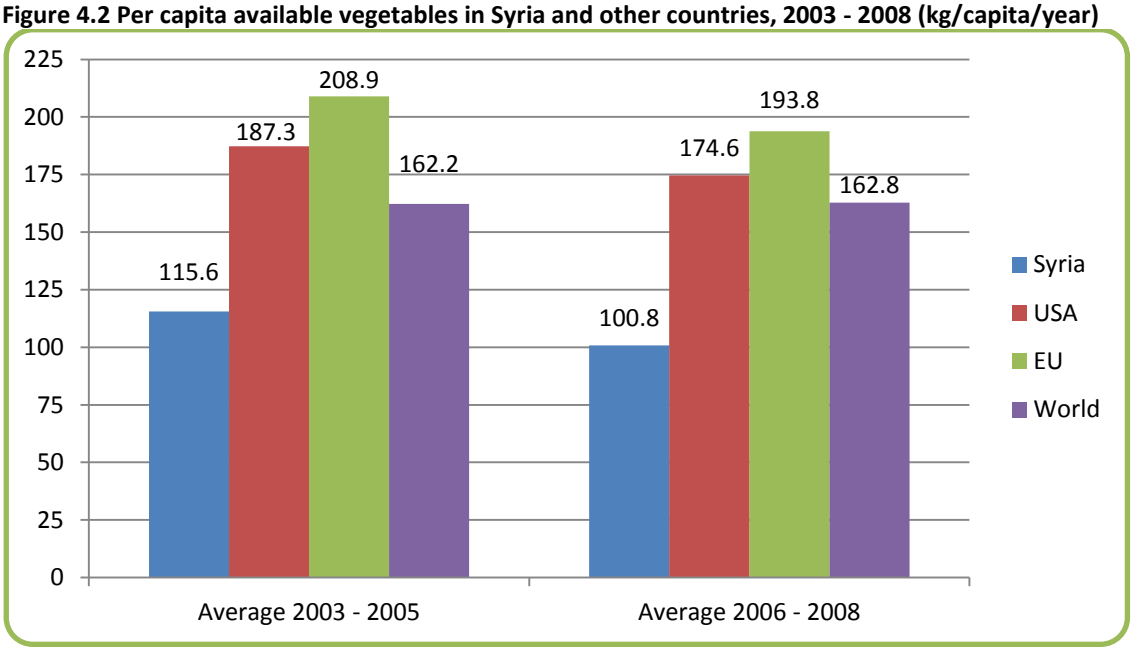
[4] CBS, *Family Budget Survey*, 2004 and 2007.

**Figure 4.1 Per capita available cereals in Syria and other countries, 2003 - 2008 (kg/capita/year)**



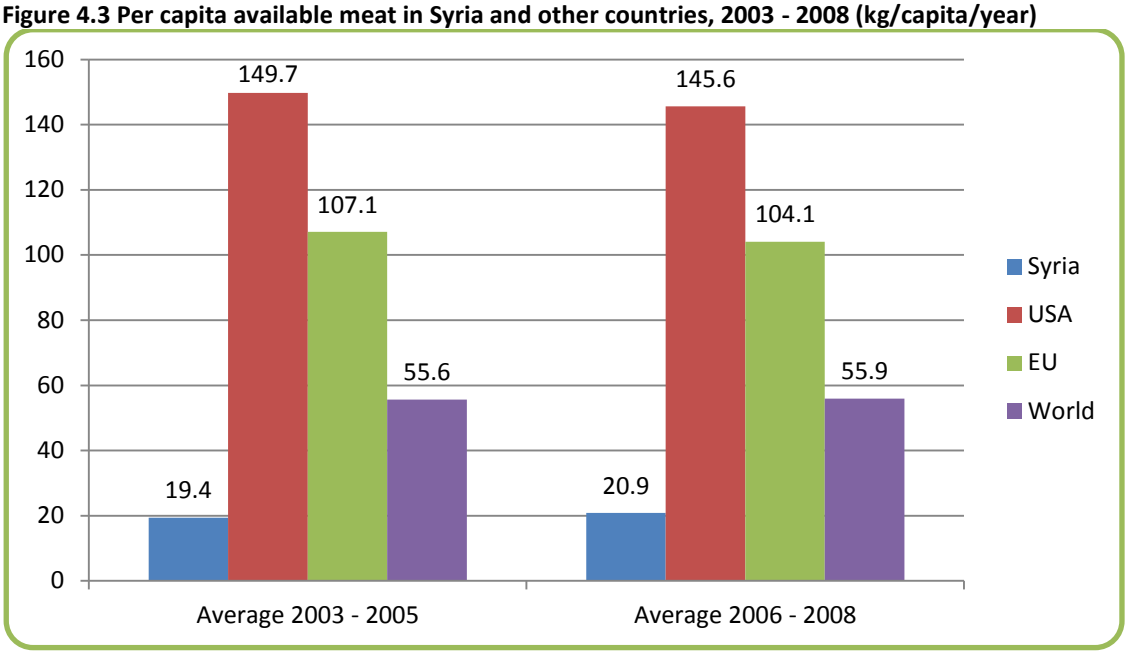

In contrast to cereals good availability vegetables availability is considered low compared to other countries and the world average. Moreover, it is noticeable the reduction in vegetables quantities available in the recent period 2006 – 2008 compared to the previous period 2003 – 2005 as illustrated in the Figure 4.2.

**Figure 4.2 Per capita available vegetables in Syria and other countries, 2003 - 2008 (kg/capita/year)**



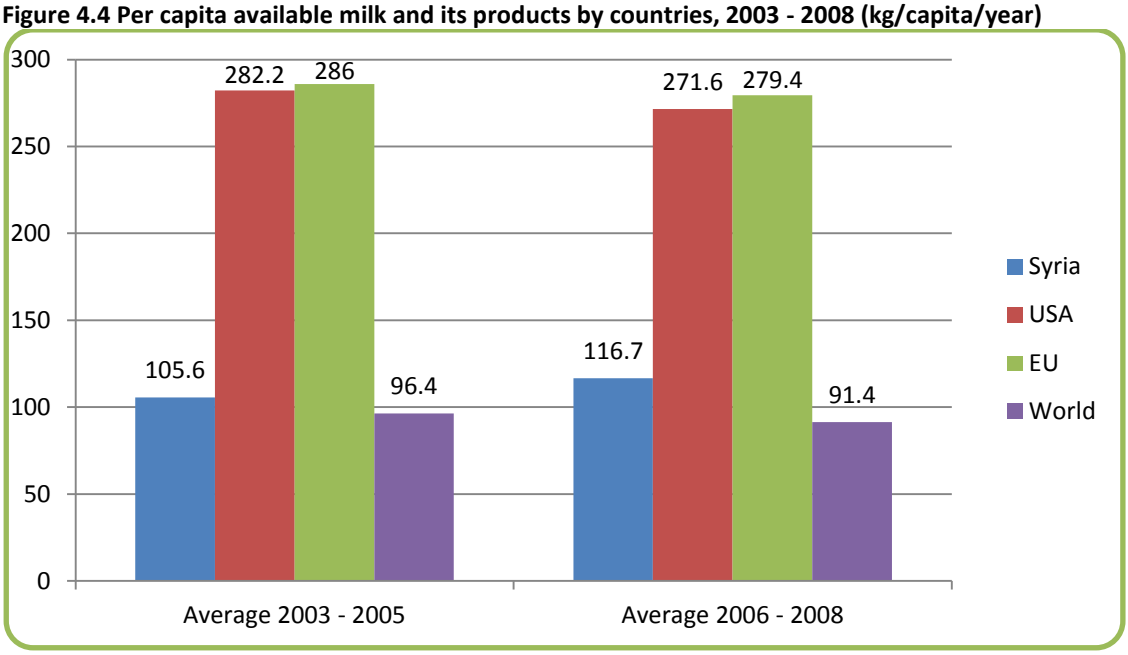

The situation of animal food sources is worse than the vegetable situation where the comparison with other countries shows big gap between the available meat in Syria and USA for example. And although there is slight improvement in meat availability between the two studied periods, the Syrian per capita available meat in the recent period (20.9 kg/capita/year) is still far from reaching the world average of 55.9 kg/capita/year as presented in Figure 4.3 down.

**Figure 4.3 Per capita available meat in Syria and other countries, 2003 - 2008 (kg/capita/year)**




Compared to meat availability milk and milk products are considered more available in Syria as they show moderate level, which is very close and little bit higher the world average level of their availability. However, and although the slight improvement in the recent period compared to 2003 -2005 of the availability of these products, their level in Syria is still far from some rich countries like USA and EU countries as the Figure 4.4 shows.

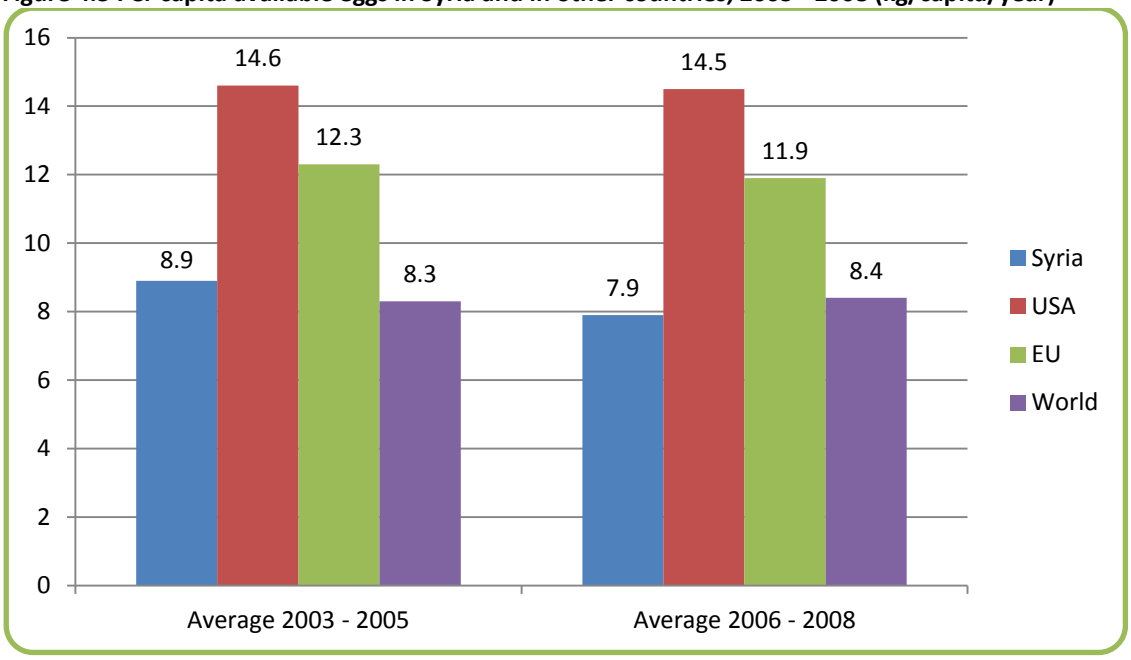
**Figure 4.4 Per capita available milk and its products by countries, 2003 - 2008 (kg/capita/year)**




The egg availability level is more or less similar to the level of milk availability showing figures very close to the world average as illustrated in the Figure 4.5 below. However, the inter-period analysis shows a

reduction in egg availability in 2006 -2008 as compared to 2003 – 2005 period falling the egg per capita available below the world average.

**Figure 4.5 Per capita available eggs in Syria and in other countries, 2003 - 2008 (kg/capita/year)**




Again as stated in the beginning, the analyses show that food availability in Syria has a situation close to the world average in general. However, it is much higher the world average for vegetal food, particularly cereals, and less than the world average level for food obtaining from animal sources like meat and eggs.

### *4.1.2 Food Accessibility*

Food access is assessed on two bases physical and economic as well. The physical component is usually evaluated using several indicators like political stability, infrastructure settings development, natural disasters frequencies, etc. The economic component is measured in turn by determining the income level and its distribution, price levels, employment and jobs availability and other economic indicators.

Syria has been characterized by political stability resulted in a relatively improved infrastructure and in the attempts of the government to provide facilities for remote area and to compensate the citizens in the case of natural disasters[5]. However, the ability of the less privileged groups of the population to continue having access to the needed food depends on other factors among which price, income and income distribution. In

[5] See in the section 4.2.5 the recently establishment of the "Disaster Alleviation Fund" to mitigate the effects of drought and natural disaster on agricultural production in Syria.

fact, the evolution of prices and income affects not only the quantities of food consumed but also strongly affected the distributional structure of this consumption among different groups of the population.

Accordingly, data on both the consumer price index (CPI) and the index of the real per capita gross domestic product (RPGDP) were studied to assess the possible effects of the evolution of price and income on the access to food in the period 2000 – 2009 as shown in the Table 4.4 below.

**Table 4.4** Evolution of the consumer price and real per capita GDP indices, 2000-2009 (%)

| Item | 2000* | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | AGR % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General CPI** | 100 | 103 | 104 | 109 | 114 | 123 | 135 | 141 | 163 | 168 | 5.9 |
| **CPI of food** | 100 | 105 | 103 | 107 | 113 | 122 | 138 | 150 | 181 | 182 | 6.9 |
| **Index of RPGDP** | 100 | | 109 | 105 | 110 | 114 | 117 | 121 | 123 | 127 | 2.7 |

Source: Elaborated from the CBS, *the ASA*, various issues. RPGDP: Real per capita GDP. * Base year. AGR: Simple annual growth rate, which compares between target year (2009) and base year (2000).

The reported values in the Table 4.4 state that Syria has witnessed a reasonable growth in food prices until 2005 since the CPI of food was lower than the general CPI resulting in a positive income effect. This trend however has reversed after 2005 reflecting the negative impact of food price rise leading to more expenditure on food. In addition, CPI of food has recorded higher values compared to the index of RPGDP indicating adverse aggregate impacts on income. The spike in food prices was mostly related to the high international food prices and drought spells in Syria during the period 2006 - 2008. The Syrian prices, however, increased by lower rate compared to the world prices. Syrian food price were very close to international food prices until 2006. After that where the food crisis started Syrian food prices were below world food prices until 2008.

The Syrian real per capita GDP is low compared with other countries and characterized by low growth rate as shown in the Table 4.5 below. The comparison with other countries' per capita GDP implies that the income level of the Syrian population has to be enhanced to assure better access to high quality, healthy and nutritious food.

**Table 4.5** Real per capita GDP by countries at constant prices of 2005, 2003-2008 (US$ and %)

| Item | Average 2003-2005 | Average 2007-2009 | Change % | AAGR % |
|---|---|---|---|---|
| **World** | 6,779 | 7,259 | 7.1 | 3.5 |
| **Syria** | 1,425 | 1,450 | 1.8 | 0.9 |
| **Iraq** | 1,809 | 2,768 | 53.0 | 23.7 |
| **Jordan** | 2,290 | 2,531 | 10.5 | 5.1 |
| **Kuwait** | 29,857 | 31,483 | 5.4 | 2.7 |
| **Lebanon** | 5,585 | 6,082 | 8.9 | 4.4 |
| **Saudi Arabia** | 11,334 | 12,214 | 7.8 | 3.8 |
| **Egypt** | 1,314 | 1,536 | 16.9 | 8.1 |
| **Morocco** | 5,081 | 5,840 | 14.9 | 7.2 |
| **Tunisia** | 4,728 | 5,269 | 11.4 | 5.6 |
| **Turkey** | 4,421 | 4,937 | 11.7 | 5.7 |
| **United States** | 41,122 | 42,722 | 3.9 | 1.9 |
| **European Union** | 27,347 | 28,932 | 5.8 | 2.9 |

Source: Elaborated from *the United States Department of Agriculture (USDA), the Economic Research Service (ERS)*.
AAGR: Average annual growth rate.

However, the income distribution in Syria is considered more equally spread among the population and more adequate for food consumption as compared to those of other countries who exhibit higher values of GINI coefficient as shown in Table 4.6 below.

**Table 4.6** Gini coefficient of income distribution in Syria and other countries, 2007 (%)

| Country | Syria | United States | European Union | Egypt | Jordan | Morocco | Tunisia | Turkey |
|---|---|---|---|---|---|---|---|---|
| **Gini** | 35.0 | 45.0 | 31.6 | 34.4 | 38.8 | 40.0 | 40.0 | 43.6 |

Source: Elaborated from *NAPC database* and www.photius.com.

The aforementioned fact indicates implies that the income of the Syrian population has to be enhanced, which push the Government to promote the creation of new job opportunities, especially by private investments and foreign direct investments, complying with the relatively high population growth. In addition, the Government contributes soundly to job creation through both the General Commission for Employment and Project Operation and various rural development projects. Besides, the Government tries to enhance good supply chain management and market integration practices in a view to improve both the accessibility to food and job opportunities.

### *4.1.3 Food Supply Stability*

The stability of food supplies relies on stability of production, trade and stocks. The steadiness of access, on the other hand, depends on consumption and income fluctuations. The variations are assessed by the estimation of the coefficient of variations.

Considering the above mentioned methodologies, Table 4.7 traces the variability of both domestic production and food availability of the major food groups around their mean over the period 2000 – 2008 in Syria as well as of the real per capita GDP.

**Table 4.7** Variations of domestic production, food availability and real per capita GDP, 2000-2008 (%)

| Item | Coefficient of variation % | | |
|---|---|---|---|
| | Production | Availability | Real per capita GDP |
| **Food cereals** | 23 | 23 | 8 |
| **Food legumes** | 29 | 30 | |
| **Vegetables** | 16 | 17 | |
| **Fruits** | 12 | 15 | |
| **Meat** | 14 | 18 | |
| **Eggs** | 15 | 15 | |
| **Fresh milk** | 19 | 19 | |

Source: Elaborated from NAPC database

The table shows that the fluctuations in the food supplies and availability are considered moderate and close to each other while fluctuation in real income are small (8% variation of GDP), which affects positively the food security situation. The fact that variations are close to each other reflects good stability in food supplies and availabilities.

While production is the stake of food security, trade is an essential element for its stability dimension, as it provides the needed complements to domestic production as well as the necessary non-locally produced food commodities. Its role is particularly important in a country like Syria where large fluctuations in the levels of local production can occur because of the changes in the rates and distribution of rainfall. This is indicated in the small differences between the variability in food supplies and that of food availabilities. In general, these variations in food availabilities of the abovementioned groups are even smaller when looking at the fluctuations in the per capita availabilities (Table 4.8).

**Table 4.8** Variations in the per capita availability for selected food groups, 2003-2008 (%)

| Group | Food cereals | Food legumes | Vegetables | Fruits | Meat | Eggs | Milk |
|---|---|---|---|---|---|---|---|
| **CV %** | 15.7 | 30.2 | 8.6 | 14.4 | 10.1 | 14.1 | 7.8 |

Source: Elaborated from NAPC database

Finally, it is evident that the relatively small variation of per capita food availability reflects a good situation of food stability in Syria.

### *4.1.4 Food Utilization*

Food utilization and safety comprise several measures such as health status, water quantity and quality, and nutritional status by its two components macro and micro nutrients diversified by adults and children.

Food utilization expresses the ability of the human body to make efficient use of macro and micro nutrients from ingested foods. Macro nutrients comprise energy, proteins, fats and carbohydrates, whereas micro nutrients encompass vitamins and minerals. The most important micro nutrients are vitamin C, vitamin A, vitamin B1, vitamin B2, vitamin B6, vitamin B12, calcium, iron and iodine. Both nutrient categories are

considered important for the body to carry out its physiological functions. These nutrients are found in foods from vegetal and animal origins. It is preferable to acquire the required nutrients from both sources because each source has its special benefits. Some foods from animal origins are better than those from vegetal sources because they have a higher nutritional value than the latter, nevertheless, they are difficult to ingest and fibers poor. Vegetal foods instead are fibers rich and have special nutrients that are not available in animal foods like fibers that consist of large particles enhance the feeling of satiation.

At the aim of assessing the evolution in the nutritional status of the Syrian population highlight the situation of macro and micro nutrients, a comparison of daily nutrient intakes in Syria with those of other countries as well as with the daily reference intakes per capita (Table A4.2 and Table A4.3 in the annexes). It relied on food composition values diversified by countries (Table A4.4), which were estimated based on FAO, USDA, and Arab Organization for Agricultural Development (AOAD) and NAPC official data and calibrated according to both FAO and USDA estimates of macro and micro nutrients.

## Expenditure on food

The food consumption situation has been improved in Syria between 2004 and 2009 as illustrated in Table 4.9 below. In specific, the percentages indicate a decreasing of the expenditures' share devoted for the most important food groups while the quantities consumed point out to an increased consumption of cereals, food of animal origin and fruits and nuts.

**Table 4.9** Evolution of the structure of food expenditure, 2004 and 2009 (kg/person, %)

| Item | 2004 | | 2009 | | Index | |
|---|---|---|---|---|---|---|
| | % on food expenditure | Quantity kg/person | % on food expenditure | Quantity kg/person | Share in food expenditure | Quantity |
| **Cereals and its derivatives** | 14.5 | 194 | 13.5 | 208 | 0.93 | 1.07 |
| **Meat, fish, eggs and dairies** | 29.7 | 94 | 28.7 | 95 | 0.97 | 1.01 |
| **Vegetables and legumes** | 18.6 | 247 | 16.7 | 218 | 0.90 | 0.88 |
| **Fruits and nuts** | 7.7 | 46 | 7.2 | 55 | 0.94 | 1.20 |
| **Other foods** | 29.5 | 52 | 33.9 | 59 | 1.15 | 1.13 |

Source: Elaborated from CBS. *Family Budget Survey*, 2004 and 2009.
Other foods include vegetal oils, sugar and sweets, drinks and others.

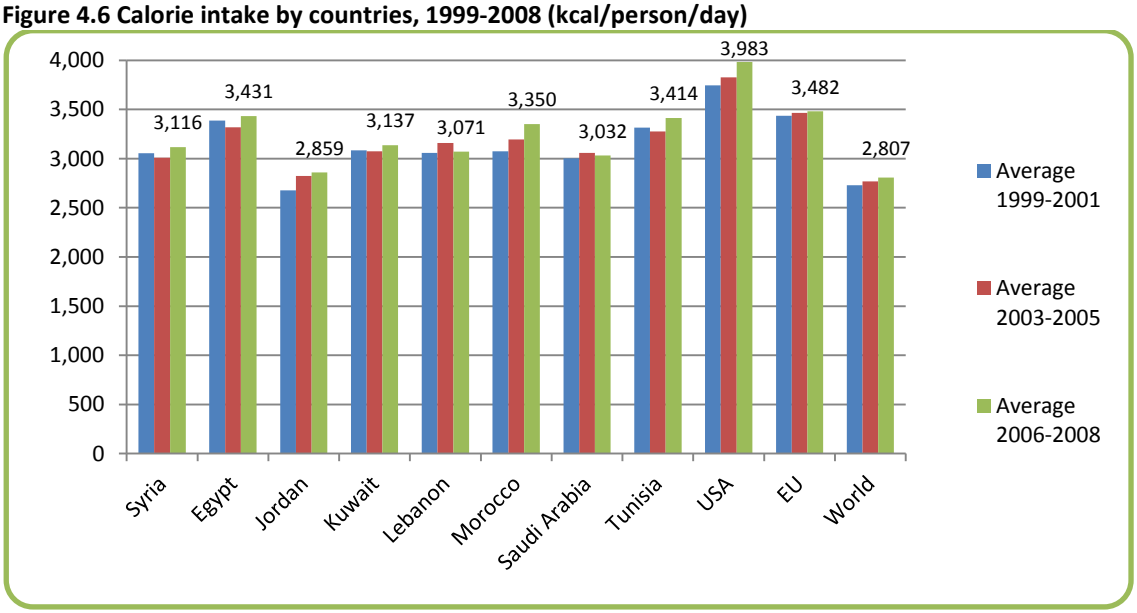
While the share of expenditure on other food has increased by 15% and the quantities consumed increased by 13% indicating a situation of good satisfaction of the basic food by the population which allow them to shift towards other foods.

## Calories intakes

The human body needs the energy to perform its physiological functions. The amount of this energy varies due to work intensity, age, size of the person and environmental conditions. Hence, the minimum energy daily requirements amount to 1,800 kcal/capita/day on average (full rest). The body acquires its energy from proteins, fats and carbohydrates that are available in ingested foods (see Table A4.2 and Table A4.5 in the annexes).

In Syria, the average calorie intake increased from 3,056 kcal/capita/day over the 1999-2001 period to 3,116 kcal/capita/day over the 2006-2008 period thus exceeding the recommended level of the daily energy requirement per capita, which amounts to 2,125-2,700 kcal/capita/day. Figure 4.6 shows that the attained level of calorie intake in Syria is considered good as compared to the world average and to those of selected countries.[6]

**Figure 4.6 Calorie intake by countries, 1999-2008 (kcal/person/day)**




Source: Elaborated by the NAPC from *MAAR, AOAD, FAO and USDA statistics*.
EU: European Union; USA: United States of America; kcal: kilo calorie.

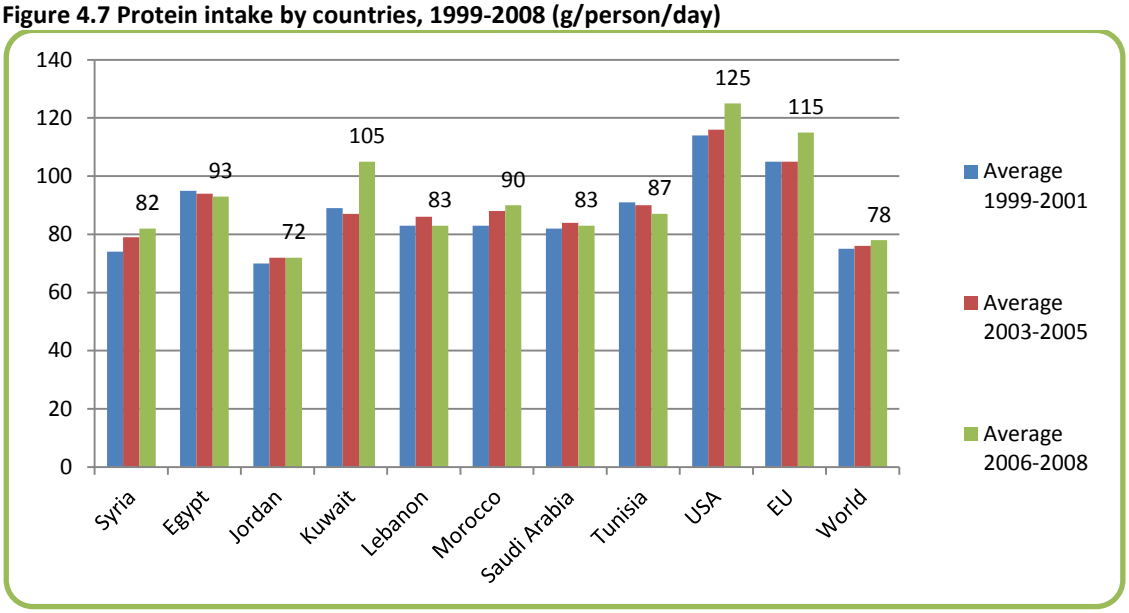
## Protein intakes

Proteins are necessary for the body to provide the amino-acids that the body can't produce, the nitric substances required for producing the amino-acids that the body can create and the nitric vitamins such as thiamin and riboflavin.

[6] For more information see Tables A4.2, A4.3 and A4.6 in the Annexes.

In Syria, the average protein intake has been augmented from 73.9 g/capita/day in the period 1999-2001 to 82 g/capita/day as average of 2006-2008. In fact, this value exceeds the recommended level of the daily protein requirement per capita, which accounts for 41.4 - 75 g/capita/day (Table A3.2, Table A3.3. and Table A3.7 in the annexes) and also exceeds the world average value. However, Figure 4.7 below shows that protein intake in Syria is still below those of all selected states excluding Jordan.

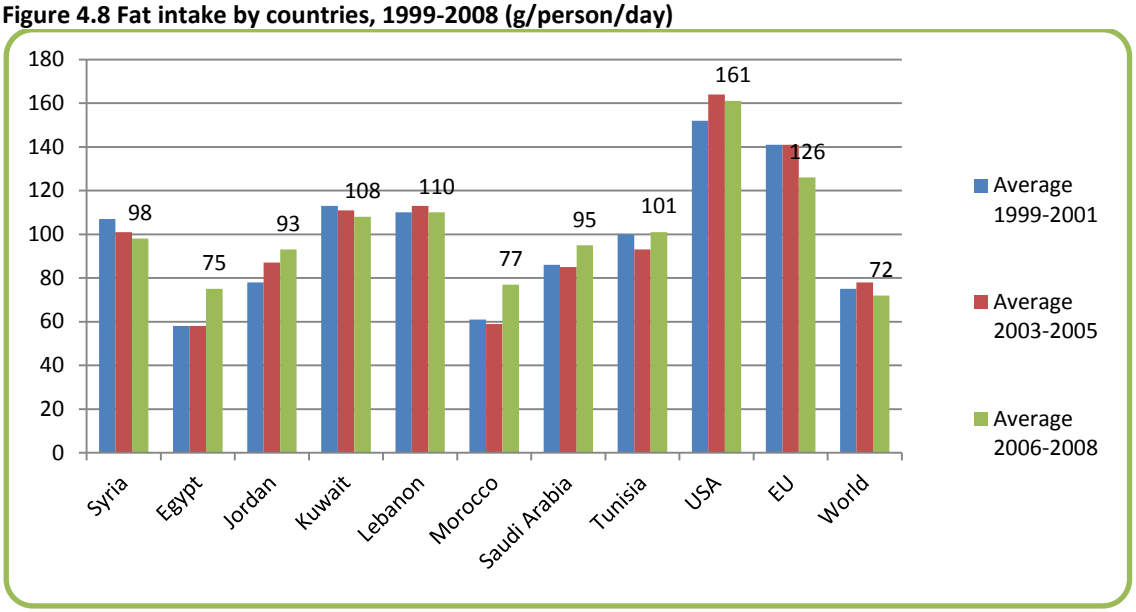
**Figure 4.7 Protein intake by countries, 1999-2008 (g/person/day)**




## Fat intakes

The average fat intake in Syria decreased from 107 g/capita/day (average 1999-2001) to 98 g/capita/day (average 2006-2008) nevertheless its level is still lying above the recommended level of the daily fat requirement per capita, which is 41.4-75 g/capita/day (see Table A4.2, Table A4.3 and Table A4.8 in the annexes) and also still above the world average. In addition, the recorded Syrian fat intake is also considered adequate when compared to those of other countries (Figure 4.8).

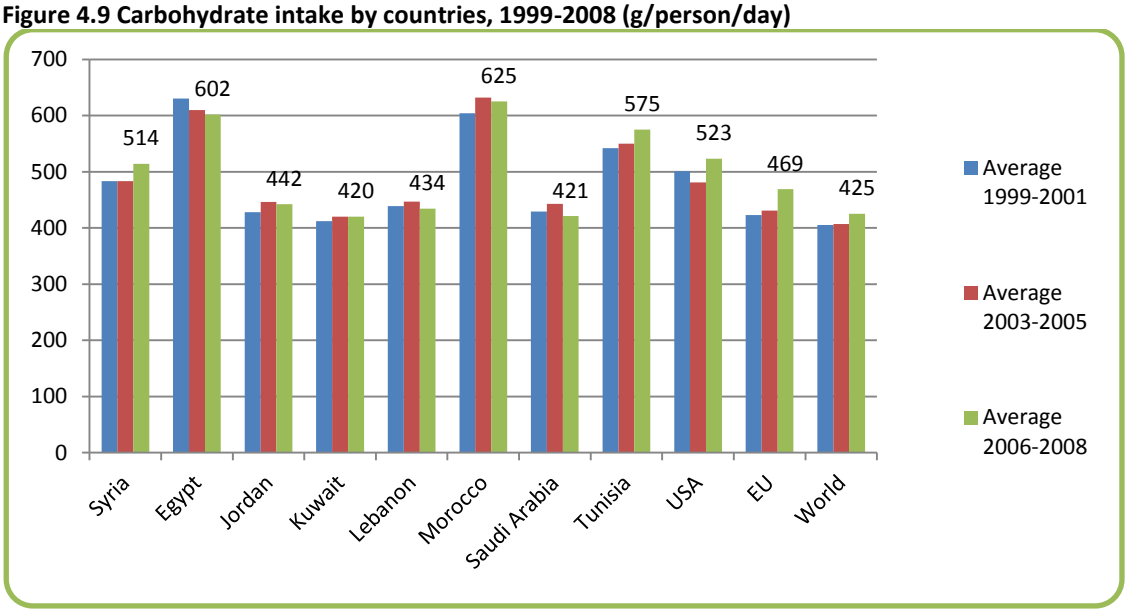
**Figure 4.8 Fat intake by countries, 1999-2008 (g/person/day)**




## Carbohydrate intakes

The average carbohydrate intake in Syria enhanced from 483 g/capita/day during the period 1999-2001 to 514 g/capita/day as average of the period 2006-2008, which is obviously above the recommended level of the daily carbohydrate reference intake per capita of 360 g/capita/day (Table A4.2, Table A4.3 and Table A4.9 in the annexes). It is also noticeable from the Figure 4.9 below that the Syrian carbohydrate intake exceeds those of the world average and considered reasonable as compared to other countries' intakes.

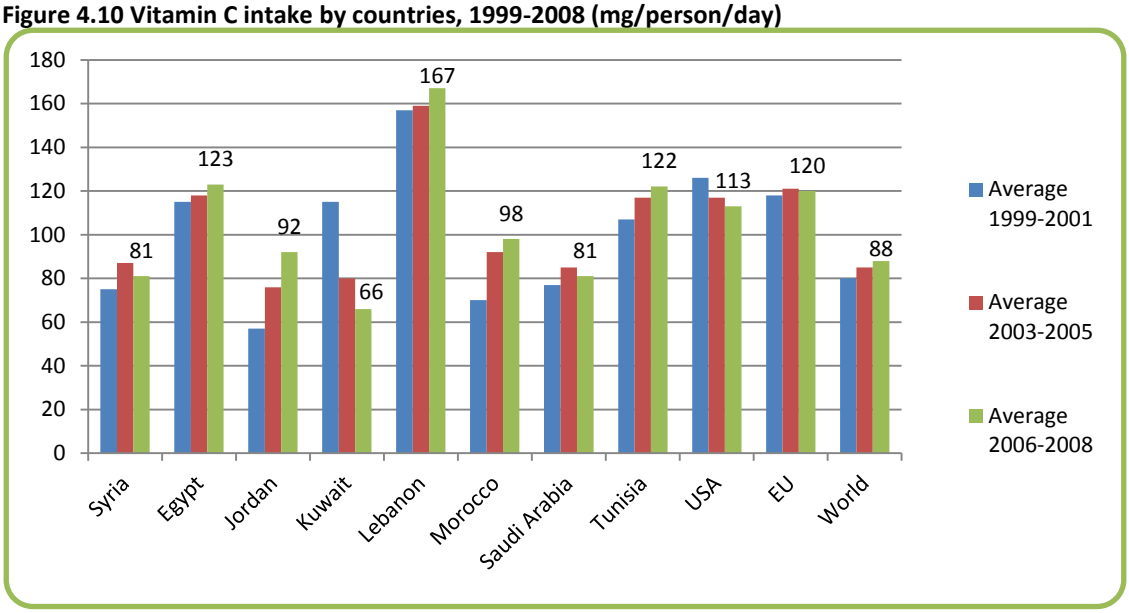
**Figure 4.9 Carbohydrate intake by countries, 1999-2008 (g/person/day)**



## Vitamin C intakes

The average vitamin C intake in Syria increased from 75 mg/person/day (average 1999-2001) to 81 mg/capita/day (average 2006-2008), thus remaining above the daily vitamin C requirement per capita, which is 47.9-75 mg/capita/day (Table A4.2, Table A4.3 and Table A4.10 in the annexes). However, this intake fell below the level of the world average and those of selected states as shown in Figure 4.10 below.

**Figure 4.10 Vitamin C intake by countries, 1999-2008 (mg/person/day)**



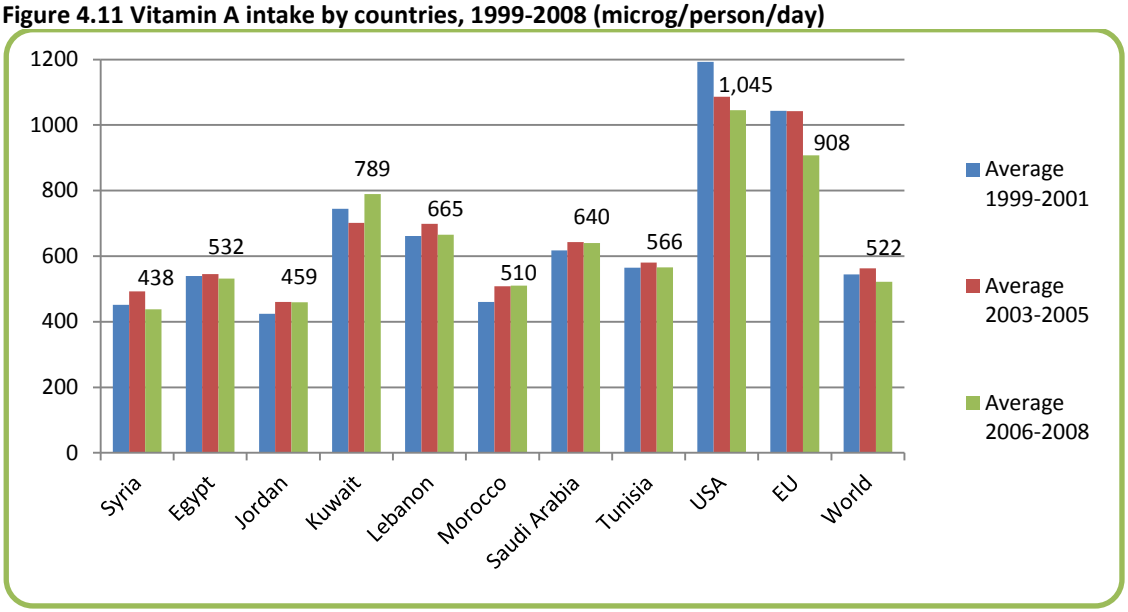

## Vitamin C intakes

FAO classifies countries into three categories according to vitamin A intake. The first group consumes less than 300 microg[7]/capita/day while the third category has a level of vitamin A intake greater than 600 microg/capita/day. The second class where Syria lies ingests 300-600 microg/capita/day (see Table A4.11 in the annexes).

In line with the above, vitamin A intake in Syria diminished from 451 microg/capita/day (average 1999-2001) to 438 microg/capita/day (average 2006-2008) thus lying considerably below the recommended level of the daily vitamin A intake per person, which is 757-1,500 microg/capita/day (Table A4.2, Table A4.3 and Table A4.11 in the annexes). The vitamin A intake in Syria is also less than the world average level and the other countries' level as shown in the Figure 4.11 below.

[7] microg: micro gram.

**Figure 4.11 Vitamin A intake by countries, 1999-2008 (microg/person/day)**

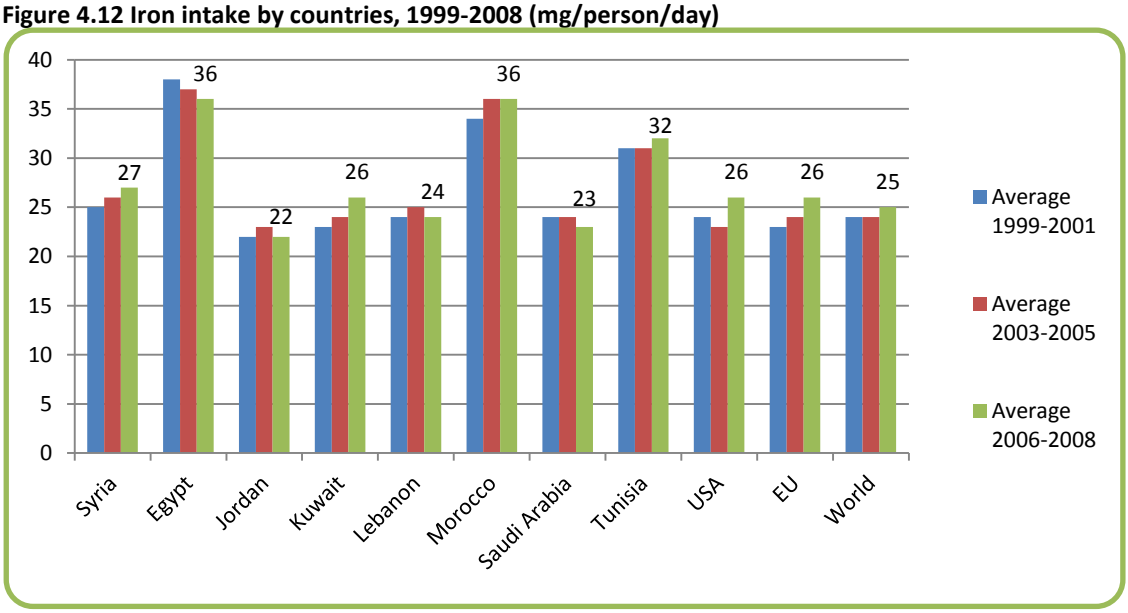



The levels of other vitamins' intakes like vitamin B1, B2 and B12 in Syria are also below the world average level, which reflects real problems of vitamins intakes in Syria (see Table A4.12, Table A4.13 and Table A4.14 in the annexes).

## Iron intakes

The average iron intake in Syria enlarged from 24.9 mg/capita/day (average 1999-2001) to 27 mg/capita/day (average 2006-2008), thus exceeding the daily requirement (12-18 mg/capita/day) and the world average (Table A4.2 and Table A4.15 in the annexes). In addition it has acceptable level as compared to those of other selected countries as shown in the Figure 4.12 below.

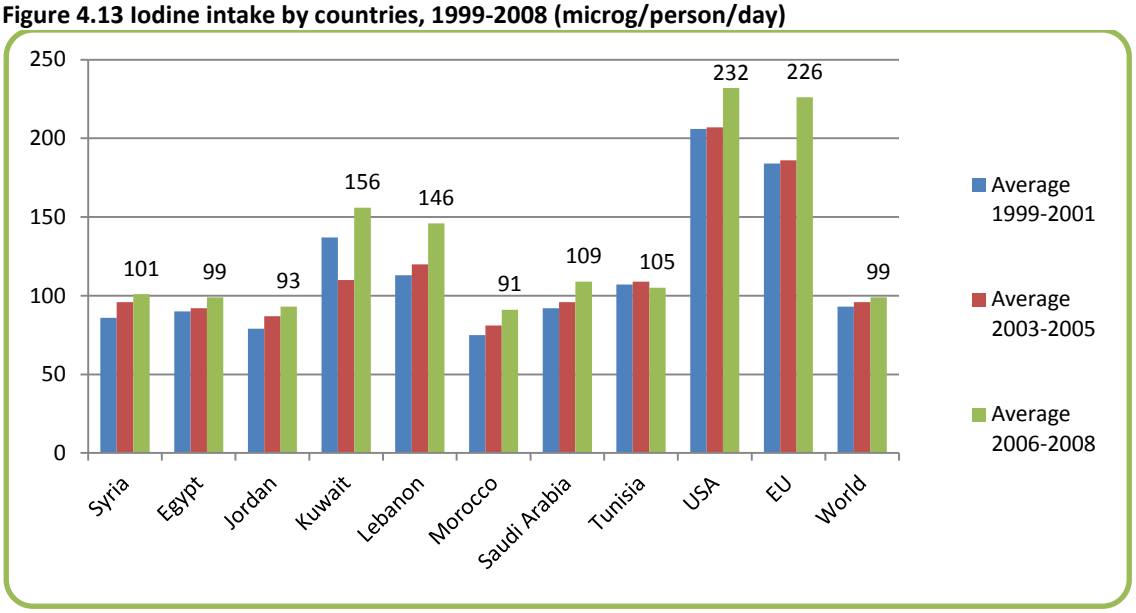
**Figure 4.12 Iron intake by countries, 1999-2008 (mg/person/day)**



## Iodine and calcium intakes

The average iodine intake in Syria has increased from 85.8 microg/capita/day in the period 1999-2001 to 101 microg/capita/day as average of the period 2006-2008. However, it is still below the daily requirement of 134 microg/capita/day (see Table A4.2 and Table A4.16 in the annexes). Figure 4.13 below shows that the iodine intake in Syria is slight exceeding the world average and almost less than those of the other countries.

**Figure 4.13 Iodine intake by countries, 1999-2008 (microg/person/day)**




Regarding the average calcium intake in Syria, it has been improved from 452 mg/capita/day (average 1999-2001) to 542 mg/capita/day (average 2006-2008) but it is still falling below the daily requirement (840-999 mg/capita/day). However, it slightly exceeds the world average and becoming acceptable as compared to those of other countries.

In general, the levels of micro and macro nutrients intakes in Syria are very close to the world average and almost located below the level of most presented countries like USA, European and other Middle East countries.

## Food safety and quality

The government places high value on food safety to ensure both healthy food and life. Therefore, several authorities are involved in food quality control such as: MAAR, Ministry of Economy and Trade, MOH, Ministry of Industry, Consumer Protection Association, Producers Associations, Popular Organizations and other NGOS.

The aforementioned food quality control can't be ensured without the active cooperation among all the relevant parties starting with farmers, processing relevant authorities, up to the consumers. These relationships are governed through regulations and legislations. This means that an integrated approach has to be followed alongside the supply chain to prevent contaminated foods comprising: training and education of personnel, good hygiene practices, enhanced consumer practice, improved retail and food service practices, better manufacturing practices, superior agricultural practices, hazard analysis critical control points (HACCP) implementation and microbiological risk assessment.

Recently, food safety becomes a global issue, which affects Syria in two directions. First, its exports will be exposed to increasingly demanding food safety standards. Second, attitudes and standards prevailing in the developed world will spill over to the local market.

Based on above, the Syrian Government emphasizes the application of both national standards and quality assurance systems to ensure national food safety and strengthens the capability of the laboratories at the borders to comply with international standards. In addition, it takes care of the environment to be clean and healthy so that the nutritional status of the population improves.

## Undernourished and malnutrition in total population

The analyses performed in above reveal the situation of high prevalence of food security in Syria, in general. However, they indicate that there were deficiencies in some micro and macro nutrient intakes like in vitamin A, vitamin B12 and calcium, which require additional government actions, and that there are problems causing undernourishment and malnutrition. The aforesaid weaknesses arose from uneven income distribution, lack of access to food due to poverty, shortage in food intakes of animal origin and inadequate consumption habits.

Undernourishment refers to the condition of people whose dietary energy consumption is continuously below a minimum dietary energy requirement for maintaining a healthy life (food deprivation)[8]. Thus, the intensity of food deprivation indicates how much food-deprived people fall short of minimum food needs in terms of dietary energy. It is measured as the difference between the minimum dietary energy and the average dietary energy intake of the undernourished population (food-deprived). According to FAO assessment for the 2004-2006 period, food deficit in Syria amounted to 130 kcal/person/day.

Furthermore, several studies and surveys were conducted in Syria giving more insights in the state of undernourishment and income distribution in the country.

[8]Source: FAOSTAT and SOFI (State of Food Insecurity).

According to the assessment of the UNDP (2005), there is 11.4% out of the population in Syria (2.02 millions) can't get their basic needs of food and other products (poor people) in spite of the considerable progress achieved by food production and its stability as well as by the improvement of individual income. This evidence was also more intense during the 2007-2008 period, where drought spells were severe and substantial increases in food prices were in place. Hence, the state of poor people exaggerated among the southern, northern and middle areas, and between rural and urban populations.

The CBS and UNICEF performed a study in 2006 and published in 2008 showed that the prevalence of underweight children amounted to 9.7%, while the percentage of stunting children is 22.4%, wasting 8.6%, and of low birth weight infants 9.4%. Relying on the results of this survey, FAO published the figures presented in Table 4.10 about the child nutritional status in Syria.

**Table 4.10** Child nutritional status, 2006 (%)

| Country | Prevalence of under-nutrition in children under five (%) | | | | | | Children overweight (%) Severe |
|---|---|---|---|---|---|---|---|
| | Underweight | | Stunting | | wasting | | |
| | Moderate | Severe | Moderate | Severe | Moderate | Severe | |
| **Syria** | 10 | 2 | 22 | 10 | 9 | 2 | 18.7 |

Source: CBS, 2008.

Given the aforementioned food security situation, the Government tries to execute rigorous poverty mapping in order to initiate programs targeting poor people so that uneven distribution of income is reduced, livelihood of poor people improved and poverty alleviated. In this regard, there are several ongoing activities in the framework of rural development projects, General Commission for Employment and Project Management and Directorate for Rural Women.

### *4.1.5 Policy Intervention*

The Syrian government started designing the 2025 strategy after adopting the 10th Five-Year National Plan (FYNP), taking into account achieving the agricultural sector development and harmonization with the new social market economy approach. The main aim of the social market economy is to achieve further economic liberalization with attention given to producers' interest.

Therefore, the status of the agriculture sector during the period 1992 – 2003 has been analyzed carefully focusing on its achievements, constraints, policy objectives and changes, and future orientations till 2010. In addition, the 11th FYNP (2011-2015) has been placed reflecting the overall objectives for the social and economic development in general and the agriculture sector major objectives, programmes and plans.

Agricultural policies

Given the overall policy orientation of Syria's agriculture including the 10th FYNP (2006-2010) objectives and future orientation of the agriculture sector (MAAR, 2000), and the 11th FYNP (2011-2015) directives about agricultural development till 2015, the GOS aimed at achieving the national food security and improving the living conditions of producers and consumers. Therefore, the Government's objectives intended for ensuring the development of agricultural sector and achievement of food security can be summarized as follows:

1. Using efficiently the natural resources and considering the environmental dimension at the aim of fulfilling the human needs and economic and social development;
2. Achieving food security through the optimal use of the available resources focusing on the comparative advantages and adopting environmental friendly production diversification;
3. Considering the achievement of good quality agricultural products that meet the international standard and specifications required for domestic consumption and for export;
4. Collaborating among all sectors in the development process giving priority to technology, employment, and inputs supply;
5. Ensuring the incentives for increasing the investment in agriculture and agro-processing at the aim of improving the agricultural revenues, creating jobs opportunities, improving living standards, and reducing poverty and rural-urban migration;
6. Contributing more to GDP through increasing agricultural production and productivity;
7. Introducing alternative crops of better economic returns and encouraging export of processed and semi-processed products to increase the economic returns and achieve a positive balance of payments;
8. Encouraging the establishment of income-generating projects especially in the least developed regions to reduce poverty and achieve integrated development in all sectors and regions; and
9. Establishing new structure for regulating the institutional relations between government bodies and producers, activating the role of civil society as a developmental goal, as well as finding adequate banking and financial systems.

Moreover, the long-term goals and objectives for a comprehensive and sustainable future development of the agricultural sector have been defined up to year 2015 as follows:

1) Increasing the economic growth rates of the agricultural sector above 3.5% per year to exceed the population growth rate and hence to enhance the economic and social conditions of producers, to ensure their settlement and reduce rural-urban migration;

2) Improving the rational use of natural resources avoiding their degradation to ensure the environment quality and to achieve the sustainable development;
3) rising the value of agricultural productivity especially in irrigated cropland, and secure the requirements of agro industry;
4) Achieving food security by means of planting the competitive crops in domestic and foreign markets and satisfying the domestic processing and export demand in terms of their output quantities and qualities;
5) Attracting the investments in the agricultural sector and processing of agricultural commodities and developing the agro-processing and marketing sectors;
6) Developing the infrastructure and services in rural areas and establishing income generating projects aiming at providing extra employment opportunities;
7) Updating the regulations and laws related to agriculture and irrigation to ensure the optimum use of land and water and maintain producers' rights; and
8) Promoting a clean and safe agricultural production with high quality to be able to compete in domestic and foreign markets.

In general, all the Government policies related to agricultural sector including the above mentioned ones and other policies related to agricultural planning, pricing, inputs distributing, marketing, financing, credit and fiscal policies were designed to develop the agricultural and rural sectors and to contribute to the food security enhancement in the country. Most of these policies were explained in the chapter Two (sections 2.1, 2.2 and 2.3).

The institutional framework that acts for analyzing and achieving the food security in Syria is related to various ministries and their affiliated institutions. In fact, many ministries and institutions have involved in food security and management of disasters and risks affecting food security and other departments, and commissions are working on the implementation of several programs and activities that contributing to food security achievement. MAAR and its directorates are considered the main official institution concerns about food security in addition to other ministries and their related institutions. In addition to government bodies engaged in food security achievement issue there are Non-Governmental Organization (NGOS), regional and international organization that work for the same purpose. These Government and other institutions concerned about food security are also engaged in agricultural risk management as can be seen in the sections 4.2.3 and 4.2.4 below.

More recently, the Syrian Government has formulated the national Program for Food Security (NPFS) at the aim of studying all elements and dimensions of food security and considering the agricultural and rural development sustainability and poverty alleviating as well (NAPC, 2010a). The NPFS would be in charge of

providing a strategic program framework designed according to priorities. In addition, implementation methods and investment costs should be determined to be funded by GOS, private sector and donors included the International Financial Institutions (IFIs). Thus, the NPFS is a comprehensive program aiming at improving the food security situation for the whole population by proposing actions targeting directly the poor people, small farmers and the most vulnerable groups and food insecure. In specific, the program adopts activities that tend to enhance poor people productivity, to diversify their livelihoods and to build their capacity of achieving sustainable food security. Moreover, NPFS is assisting the poor in their immediate needs by offering a set of safety net programs.

Depending on the importance of food security at international level especially for developing countries and for Syria as well, and given that the agricultural sector is considered the key sector for insuring food security, it is important to study the interrelationship between food security and agriculture. In fain addition, the agricultural sector is being the main provider of food and the provider of the job opportunities and the economic environment for high share of the population including the most poor. Therefore, the need for sustaining and stabilizing the agricultural agents' income emerges from the necessity of ensuring the food security for the whole population including farmers in order to assure their ability to produce food. Hence, the sustainability of agricultural income is vital for insuring food security and must be taken into consideration by enhancing the positive supporting factors and avoiding the risk of agricultural income collapse.

## 4.2 Agricultural Risk and Risk Management in Syria

As mentioned in the previous section the agricultural risk including production and income risk is very urgent issue that negatively affects the food security situation in general. In this regard, Syria as a developing country still witnesses various types of risks affecting the agricultural agents' income. For which specific policies and strategies have been implementing by the government and other stockholders in order to manage and cope with each specific types of the existing agricultural risks presented in the following section. It is important to recall here that the types of risks and management strategies shown here down are the results of the semi-structured survey which conducted by NAPC staff and used as a part of the main activities of this thesis.

### *4.2.1 Types of Risks*

Syrian farmers are exposed to different types of risk characterized the agriculture production processes as their individual conditions. In fact almost all the usual risks faced by farmers in the developing countries are presented in the Syrian rural and agricultural sector like production, price and marketing, financial and other risks.

#### Production risks

These types of risk happen mainly due to external factor like climate and pests infection that cause unexpected loss in the crops' outcome. The main climatic risks found in the Syrian agriculture are related to drought, heavy rainfall, frost, storms, floods, while other risks are related to pests and diseases, risks also come from wild animal, birds and neighboring herds. NAPC (2011) shows that more serious production risks in Syrian agriculture are affecting firstly strategic crops like wheat, barley, cotton and sugar beet in addition to lentils vegetables trees and animal production. In specific, rainfed wheat is more susceptible to drought where at least 6% of farmers have been exposed to this type of risk with clear regional variations where this percentage become 14% in Aleppo Governorate. Trees production is more susceptible to drought as on average 9% of the farmers have lost their production due to severe drought. Drought on trees shows more regional variation than drought on wheat where just 3% of farmers in Latakia experience this risk, instead 11% if farmers in Aleppo have drought on trees and 46% in Al Seweda Governorate southern Syria. Drought has affected mainly olive and pomegranate trees in Aleppo and apple and grape in Al Seweda Governorate while it is less effective in Latakia since it has more rainfall rate and depends on irrigation especially for

citrus production. On average 9% of animal herd affected by drought which was more concentration in Homs governorate, 62% in Albadia[9] of Palmyra.

The frost and heavy rainfall risks have less damaging effects of agriculture production than drought where on average affect 7% of wheat farmers, 12% of trees farmers and 1% of animal breeders. However, these percentages are also variable across different regions, while it is 4% in Aleppo it arrives 45% in Al Seweda on apples and grape.

## Price and Marketing risks

Strategic crops like wheat, cotton and sugar beet are marketed by the government at fixed prices, however, some problem in the marketing process still there, for example 3% of wheat farmers had losses because the high inputs and labor prices. Other 1% had loss of the output prices in 2008 was because farmers could not sell their products to the state due to bad output quality as a result of fungus infection which enforce farmers to sell their products in the black market (traders) at lower prices. In general, 3% - 6% of strategic crops' farmers had income loss due to inputs prices increase, while 1% - 3% of farmers had income loss due to output prices decrease. In addition, the unexpected decrease of the fruits' prices (determined by market forces, supply and demand) compared to the pat years results in income failure for 6% of families. Fruits prices are also affected by changing the marketing policies as allowing importing apples from China and Egypt during the local production peak. In fact, 25% of farmers were exposed to fruit price risk while this percentage is 1% in Aleppo and Hama and 12% in Sewda.

Concerning the livestock sector, 6% of households had loss as a result of increasing inputs prices, and 3% had loss due to output price decrease. However, these percentages are increasing dramatically in Homs Governorate reaching 36% and 18% respectively.

## Financial risk

This type of risk includes difficulties in getting loans by farmers leads them to borrow using informal ways like selling the product in advance against lower prices and buying inputs against higher prices resulting in their income loss. The study indicates that 16 % of farmers are not able to offer the required inputs and agricultural operation for their cultivations on the proper time. However, this percentage varies across different governorates; while it is about 33% in Latakia it is just 9% in Homs where farmers diversify

[9] Albadia is a part of Syrian territories which is less dry than the desert and where few varieties of trees can be grown and used mainly for sheep herd.

agriculture by having animal production used as assets could be sold (asset liquidation) to by inputs for crop production. As the study shows that 54% of studied farmers buy the required inputs and pay higher prices later at harvesting time resulting in a serious risk of losing. This risk also affects households by different rates across different governorates, while 38% of farmers in Latakia affected by this risk about 66% of them exposed to risk in Homs, Hama and Sweda.

Institution risks

The institutional risk In Syria resulting from changing the current policies and laws related to agricultural sector where the changing in the marketing policies and subsidy policy of inputs like fertilizers and fuel is considered the main type of this risk. The study shows that 12% of the growers of fruit trees in Sweda and 10% of them in Latakia had loss due to changing the marketing policies. In addition to that the process of trade liberalization and opening the local market to foreign markets resulted in decreasing the prices leading to local farmers' loss especially fruits farmers like apples. Moreover, 2% of wheat farmers have losses as a result of changing the marketing policies where some marketing centers stopped receiving the bad quality wheat which had fungal infection.

### *4.2.2 Current Risk Management Policies*

The agricultural policies, in general, are considered the main development institutions in the agricultural sector and thus considered key risk management polices at the country level. In addition to the Ministry of Agricultural and Agrarian Reform (MAAR), the following ministries play important role in the process of making decisions related to the agricultural and alimentary sectors and picturing the agricultural policies, Irrigation, financial, industry, economy and foreign trade and the state planning commission in addition to the General Union of Peasants (GUP). The agricultural policies in Syria generally tend at increasing the agricultural production and improving its quality in order to achieve national food security and self sufficiency of the main agricultural products. Besides, improving the exports and creating new job opportunities are other targets of the agricultural policies in addition to attaining the integration between the agricultural sector and other economic sectors like industry.

The agricultural policies involve many fields like production and marketing, agricultural support, infrastructure improvement, agricultural services offering like research and extension, crops pastures and forest protection. Other policies are related to natural resources conservation like land and water e.g. establishing the National Project for Conversion to Modern Irrigation (NPCMI) attending to promote the usage of modern irrigation techniques such as drip and sprinkler irrigation at the aim of reducing the irrigation water consumption and maintain the quality of the existing water resources. Moreover, the

agricultural processing policies are designed to enhance the agricultural production by increasing the value added of the agricultural products in addition to solve the agricultural marketing and price risks.

Many other policies concerning plant and animal production, marketing and agricultural financing sector are considered part of the risk management policies. Marketing and pricing policies for agricultural outputs and inputs, agricultural support policies, land and labor policies and agricultural credit policies are the main examples of insuring farmers' income sustainability. In fact, all the agricultural policies mentioned in the section 2.2 above are related to the risk management policies in addition to the government and other institutions and their policies mentioned in the next two sections (4.2.3 and 4.2.4).

### *4.2.3 Government Institutions*

The Government of Syria (GOS) has many ministries, governmental bodies and organization that play different roles in the context of risk management in the agricultural sector and apply different programs and activities which contribute to alleviate and cope with different types of risk.

The Ministry of Agriculture and Agrarian Reform (MMAR) is the first governmental institute concerns about the agricultural risk through it plans which are corresponding to the orientation of "social market economy" adopted by the government during the last decade. The ministry, in fact, is setting the mechanisms and the agricultural policies to perform the programs, projects and developing activities related to plant and animal production, forest, fish production and is considered the responsible for organizing the water use at farm level. Moreover, MAAR provides all supporting services for agricultural sector like agricultural researches, agricultural extension services, agricultural learning and training, veterinary care and crop protection services. MAAR depends on its related bodies is aiming to adopt ex ante risk management and alleviating strategies and ex-post risk-coping strategies as well through the functioning of its following institutions.

The General Commission for Scientific Agricultural Research (GCSAR) of MAAR plays central role in ex-ante risk management through its role in improving plant and animal varieties and providing new ones which are more productive and resistant to adverse climate conditions and to pests and diseases. The role of GCSAR can be classified under specialization ex-ante strategies for risk management, which is also achieved by its research for improving water irrigation methods, land use and the integral pest control.

Many other directorates belong to MAAR work to help farmers and support the functioning of agricultural production can be considered as a contributor to agricultural risk management in general.

The General Commission for Al-Badia Management and Development aims at developing the local society, natural and human resources and infrastructures in Al-Badia (Syrian Desert) according to economic, social and environmental development programs.

The General Establishment for Seed Multiplication (GESM) established in 1970 at the aim of providing farers with sifter and sterile improved seeds, with encouraging prices. GESM provides farmers by 100% of cotton seeds, 45% of wheat, 8% of barley, 27% of potato, 41% of maize, 27% of chickpeas and other seeds.

The General Establishment for Feed (GEF), established in 1974 for insuring at least 25% of the required feed for the animal production sector. GEF has 118 centers for feed distribution, 25 feed stores with total capacity of 370 thousand tones and 7 factories for feed manufacturing and packaging. The establishment is considered the responsible for the supervision of feed manufacturing storing and distribution around the country in addition to feed importing and exporting.

Agricultural Extension belonging to MAAR aims to transfer all agricultural knowledge, skills and results of agricultural researches to farmers in order to develop the plant as animal production from one side and participating in solving all problems constrain the agricultural production activities at the national level on the other side. Extension services are provided freely to farmers through the extension units distributed around the country, with a total number of 1085 extension units in 2008 supported by huge staff of agricultural engineering and plant and animal specialists. The working team of the extension unit supervises all the agricultural activities within the extension unit framework, controls the urgent plant and animal diseases and other production risks and participates in the marketing of outputs especially the strategic crops like cotton, wheat and sugar beet. Many other tasks are related to the extension units main job and mission in developing the agricultural production and the rural sector as well by participating in process of improving the rural women and establishing the small and medium projects for income generating activities within their work areas.

The directorate of Agricultural Production Supporting Fund, was established in 2008 at the aim of contributing to the food security achievement, enhancing the agricultural production efficiency and promoting the of agricultural production competitiveness. The fund has branches in each governorate and started his work at the beginning of year 2009 with a fund of SP 10 billion, in order to offer the farmers by the following agriculture supports:

- Supporting the strategic crops (wheat, cotton and sugar beet) in the year 2009 by according to the actual cost of production in addition to marginal profit equal to 5% of the production costs;

- Supporting the seeds of wheat and barley distributed by GESM by SP 2.2billion in the agricultural season 2008-2009;
- Supporting the sugar beet seeds (single fetus) by 38.2 SP million for GESM ;
- Supporting the breeders of silk worm SP 3.075 million;
- Supporting the main crops (chickpeas, lentil, potato, maize, citrus, olives, apples and others) by a specific amount of money paid on the unit-area base.

In fact, MAAR is strongly involved in the agricultural sector development, strengthen and sustainability by the huge services provided to farmers and rural sector by the other working institutions belonging to MAAR in concerning the plant and animal production, irrigation water management, crops' marketing and others[10].

The second ministry contributes to agricultural risk management is The Ministry of Irrigation (MOI) by its policies, plans, research and studies to develop the water recourses quantitatively and qualitatively and distribute the available water among the different economic sectors. In addition MOI administer and utilize all water projects and irrigation networks and is the responsible for all public water projects investment and maintenance. In this regards MOI considered the responsible of supplying agricultural irrigation water and hence for drought risk management at the national level.

The State Planning Commission (SPC) is also one of the most important Government bodies that coordinates among different ministries and public bodies and control and follow up all production plans. SPC is also responsible for coordinating the process of providing loans and grants and determining the investments for all ministries including MAAR, therefore SPC is important for risk-management in agriculture.

The Ministry of Economy and Foreign Trade (MEFT) is also an important GOS body that concerns about internal and external trade by setting the conditions and measurements of quality especially for agricultural products. Many companies and establishments are belonging to MEFT like The General Establishment for Cereal Processing and Trade (GECPT), the General Company for Silos (GCC), the General company for Miles (GCM), The General Establishment for Storing and Marketing Agricultural and Animal Products (GESMAAP).

[10] Examples of other directorates belonging to MAAR are: Animal Production and Animal Protection Directorates, Plant Production directorate, Agricultural Marketing Directorate, Agricultural Economic Directorate, Drought Management Directorate, the directorate of The National Project for Conversion to Modern Irrigation.

GECPT plays the role of marketing cereals domestically by buying 2.5-3.5 million tons of wheat every year at price covering the production costs in addition 25% as profit for farmers. It is also the responsible for importing and exporting cereals in general especially wheat considering keeping the strategic storage which is enough for at least one year. The functioning of GECPT is integrated with the work of GCC and GCM in order to insure the needs of the local markets for the main cereals and bread.

GESMAAP contributes to marketing plant and animal products locally and internationally, by concentrating on the wholesale marketing, importing and exporting of these products. The establishment distributes locally fruits and vegetable at harvesting peaks using 100 special vehicles and 400 selling centers distributed around the country in addition to its role in exporting the surplus.

Ministry of Social Affairs and Labor (MSAL) is also important GOS body regarding its role in providing part of the job opportunities for local people and helping them in improving their level of living. In fact the ministry is the responsible for setting the labor policies in the agricultural sector and registering and following up the labor contracts in addition to registering and supervising the charities around the country which are considered as social safety nets for fragile and vulnerable people. Moreover, the ministry starts in 2011 the functioning of The Social Aid Fund (SAF) as a program of social safety net aiming at poverty combating and alleviating by providing regular or urgent supports for people according to certain criteria. The General Organization for Social Insurance (GOSI) is an important body belongs to MSAL that concerns about all labor in public and private sectors and play a significant role in protecting them against risks related to emergency cases like accidents at work, death, inability to work and other diseases.

Ministry of Information (MOI) plays through its different means an essential task of disseminating the required awareness of conserving the natural resources like land and forest, combating desertification and rationalizing the use of irrigation water, this usually done by coordinating between MOI and the Agricultural Extension Directorate of MAAR. MOI's different types of media play a mediation role between the responsible institutions and the producers by providing specialized program for farmers concerning the problems and risks faced by farmers in the production and marketing processes. The media is also considered key tool for warning farmers about the expected adverse climate condition like wind and frost, and used also to inform farmers about the prices of their products especially the strategic ones.

The General Directorate of Meteorology (GDM) also contributes to agricultural risk alleviation by determining the biophysical indicators related to desertification and drought and studying and forecasting the precipitation in the different zones and delivering this information to farmers by cooperation with MOI. Furthermore, The Remote Sensing Commission (RSC) is also playing good role by performing many projects

and studies concerning the protection of the nature, predicting the natural disaster and surveying the natural resources and the existing plantations.

The Export Development and Promoting Agency (EDPA) was found at the aim of increasing the export and widening their size and scope. In addition, EDPA is responsible for improving the comparative advantages of local products compared to international ones and insuring their access to foreign markets.

The Agricultural Cooperative Bank (ACB) is the main credit institute working in the agricultural sector in Syria that provides farmers by different types of loans in cash and kind and for short, medium and long run. ACB has 106 centers (bank branch) distributed around the country in almost all districts working for financing the agricultural production in both plant and animal sides and insuring the required inputs for this sector. The bank is also considered the main provider for the cooperative and private sector for the purpose of promoting them to establish new agricultural projects and enhancing the agricultural development in general.

The General Commission of Employment and Business Development Projects (GCEBD) is established for finding job opportunities for unemployed people by providing loans for small, medium and large projects. GCEBD provides loans for poor people in order to start new income generating activities and provides loans for the existing projects and trade activities for improving and expanding them which create more new job opportunities. The Unemployment Combating Commission (UCC) is also providing loans especially for animal production projects. UCC, in general, postponing the repayment of these loans of the case of drought or other risk faced by farmers, which is considered as risk alleviation behavior played by this institute.

*The Popular Organization*

The General Union of Peasants (GUP) is a popular organization of social and economic aspects and has its own financial and administrative dependence. GUP play an important role in ex-ante risk management participating in setting the regulations, legislations, strategies and policies for the agricultural sector in the country. In addition, GUP also works thorough the agricultural cooperatives that help farmers accessing to credits and acquiring the required inputs in addition to marketing the production where specialized marketing cooperatives were founded for plant products and animal as well. Moreover, GUP play key role in the process of desertification combating, soil protecting, conserving the plant cover and forests and it is a member of all agricultural activities and in the broad of trustees of the ACB.

Agricultural cooperatives are the regulatory framework at the village level that combines the peasants at the aim of providing inputs and loans and marketing the production. Cooperative members are responsible by interdependence and solidarity of the repayment of all kinds of loans borrowed by other cooperative's members, which reflects the insuring nature of these cooperatives. In 2009, the total number of cooperatives' members arrives around 1 million peasants 97 thousands of them are women whose role is still growing in the framework of agricultural production and development sector. Cooperatives provide many privileges to participants getting loans from ACB by low interest rate and exempting participants from all fees and taxes and reducing prices by 5% for all services provided by public establishments. Regarding the risk management framework, cooperatives play a role in financing their members by providing loans either from their special fund or through the ACB or other resources and provide a social loans from the social aid allocations. Cooperatives can also postponing the repayments of the half of the loans given from their own fund to their members for one year and for just one time. Irrespective the fact that interdependency and solidarity among cooperative member is considered a type of risk sharing, however, this could have bad consequences on cooperative financing where may member fail to pay and put the cooperative under debt, which negatively affect other member who are no longer able to get loans, inputs and other services through their cooperatives.

### *4.2.4 Non-Government, Regional and International Organizations*

During the last decade many Non-Government Organizations (NGOS) have started working in Syria and participating with the national institutions in the development process of the Syrian different economic sectors especially in the rural area and agricultural sector contributing by their services to agricultural risk management.

The Syria Trust for Development is one of the most important NGOS in Syria was established in 2007 at the aim of promoting the education, rural development and art and heritage by a collaboration with the local societies, other NGOS, charities, private and government sector. In this regards Syrian Trust is trying to build the capacities, creating opportunities, changing the bearings within the local communities depending on many initiatives like The Fund for Integrated Rural Development of Syria (FIRDOS) and many others.

FIRDOS was established in 2001 as the first NGOS non-profit concern about the rural sector in the country. In 2007 jointed with other NGOS under the patronage of Syria Trust and started to work within the rural areas in six Syrian governorate (Latakia, Aleppo, Homs, Hama, Idleb and Quneitra) for developing the economic, social and institution situation. Till now, FIRDOS has worked in sixty villages in the six governorates offering 3500 loans (SP 150 million) for establishing income generating projects with special

concern about women where 50% of the loans should be provided to rural women. In addition to the mentioned economic activities, FIRDOS has worked for strengthening the social environment and developing the institutions in the rural areas reaching to build a more organized and civil communities which must be stronger and less vulnerable to many types of risks.

*Regional and International Organizations*

Arab Organization for Agricultural Development (AOAD) has been established in 1970 and started the real work in 1972 at the aim of developing the agricultural, natural, human and financial resources within different Arab countries. AOAD have implemented many regional projects including Syria related to the urgent situation strike the agricultural sector especially the animal production which is characterized by frequent exposures to diseases and other epidemic infections. The projects intend to provide practical training of the domestic staff about how to deal with these diseases by improving their diagnostic and treatment skills and providing the required material and medicines. Moreover, each year AOAD is offering training courses for agricultural sector' staff related to different subjects of the agricultural production and development.

The Arab Center for Studies of Arid Zones and Dry Land (ACSAD) has been established in 1971 under the umbrella of the Arab League aiming at developing and maintenance of the natural resources in the arid Arab areas. The most important task of ACSAD in Syria was to support the animal production by carrying out many activities as surveying the animal resources, surveying and evaluating of the feed resources, implementing the genetic improvement of Awassi sheep project, establishing the centre of distributing the Shami goat and starting many studies concerning the improvement of the pastures, choosing the right diet and the supplementary feeding. In addition, the center has carried out several studies for the interest of the existing developing projects in Syria.

Arab Fund for Economic and Social Development (AFESD) who supports developing project in the different sectors in the Arab country by offering the required fund and foreign currency for importing the machines, tools and other instruments and improving the infrastructures needed for further development. AFESD has contributed to the development of several agricultural projects like the land reclamation and rural development projects in the various areas in Syria.

The International Center for Agricultural Research in Dry Areas (ICARDA) was established in 1977, where the main centre is located 30 km from Aleppo city at the aim of implementing studies and researches for the arid and semi-arid environments around the world. The most important task of ICARDA is studying the field crops like wheat, barley, legumes, lintels and others for devising new high productive varieties which

are also resistant to the adverse environment conditions and some diseases. In addition to that, supporting the animal production and pasture management was another vital job done by ICARDA through implementing several projects about the production of the green fodders, rehabilitation of pastures and supporting other researches related to agricultural (plant and animal) production in general.

The International Fund for Agricultural Development (IFAD) has provided the Syrian government in 1982 by a fund of US$ 126.2 million at the aim of financing several rural development projects in various areas of the Country. Those projects in general concern about the management and development of the natural resources (land reclamation, pastures' development, water resources development and animal and fish resources development) in addition to a special aim of implementing human development projects. Most of these projects have provided rural people by a financial support through offering the income generating loans and some grants more directed towards rural women.

In addition to that, many other international organizations are still working in the country like The United Nation development Program (UNDP), the Food and Agriculture Organization of the United Nations (FAO), World Food Program (WFP) and the AGA KHAN Development Networks (AKDN). All of these international institutions and organizations aim at insuring the food security of poor people and developing the agricultural and rural sector maintaining the stability of poor people income through their projects and financial supports. An as a results, all the above mentioned domestic and institutions and organizations are contributing in some way to the management and alleviating of agricultural risk threatens farmers' income and well beings.

### *4.2.5 Risk Management Strategies*

In Syria little work has been already done at the aim of exploring the current risk-management strategies and policies. However, two main groups of agricultural risk management actions have been distinguished, either *ex-ante* precautionary (preventive) strategies or *ex-post* corrective (therapeutic) strategies. Each type combines both official measure applied by the public institutions and informal measure undertaken by individuals.

#### I. <u>The public risk-management measures</u>

The role played by the public institutions as ex-post risk management strategies have been shown by the functioning of the relevant ministries and institutions presented in the section (3.2.3.) above. A positive analysis of the current situation of the services provided by those institutions to farmers has been considered the research as the availability of those public bodies to the real beneficiaries.

The most important services provided to farmers are through the extension units, plant pests and disease protection, veterinary services. The training services provided for the farmers by the agricultural extension staff are considered important ex-ante measures for agricultural yield and price risks. However, 73% of farmers have not received these training services before, while 67% of farmers claim that these services are very useful and effective and can be easily spread among farmers. Extension units help in transferring the modern techniques to farmers concerning the irrigation methods and the new good quality and resistant varieties, however, according to the survey, 84% of farmers still not accessing these services. In addition, the extension unit plays a central role in facilitating process of accessing credits by farmers by reducing the required documents and alleviating the cost of operational procedures and therefore this public institution contributes to reducing the financial risk faced by farmers. However, 85% of farmers have not accessed credit through the help of this institution, and this is because the fact that ACB is the responsible for loans offering while the extension units play just the role of facilitating the progress of borrowing process.

The agricultural cooperative are the other example of risk managing institutions working in the agricultural sector and trying to provide many services at the aim of enhancing the farmers yield, income and welfare from one side and insuring the sustainability of the agricultural production activities from the other sides.

The cooperatives provide many services to farmers including the acquiring of the inputs and marketing some farmers' products. Accessing to credits is considered one important task of the cooperatives through the collaboration with ACB, which is one of the most key measures for risk management. However, 45% of cooperative farmers claim that they benefit from this service while other farmers impute their failure to get loans through the cooperatives to the bad performance of cooperatives' administration resulting in losing the confident dealing with them. Farmers also claim that all other services to be provided by the cooperatives like helping in land preparation, irrigation and harvesting, accessing inputs and marketing facilitating are not working well mainly due to the high rate of corruption characterized most them.

ACB is the main government institute for financing the agricultural sector by providing different types of loans for investing in new agricultural projects as for providing the production requirement for the existing plant as animal activities and hence play a vital role from the risk management perspective. However, similar to other public institutions mentioned above, just 34% of farmers are satisfied about the functioning of ACB while other farmers criticize the routine and long official procedures characterizing process of getting the loans.

Given the low efficiency of the public institution in the agricultural risk management as presented by the fragile functioning of the extension units, imposes huge concern about the effectiveness of the official risk

management strategies. Therefore, much more work should be done regarding the development of the role of these institutions.

More recently, in 2011, the GOS has issued the legislative decree No. 114 which aimed to establish what so called “The Disaster Alleviation Fund” in order to mitigate the effects of drought and natural disaster on agricultural production (plant and animal production) in Syria. The legislative decree No. 114 announced the establishment of the fund at MAAR, in the Drought Management Directorate. The operational procedures of the fund are related to:

(i) covering the expenses measures of responses to drought cases;

(ii) compensating for farmers or group of farmers whose agricultural production is damaged as a result of drought and other adverse climate conditions (frost, high temperatures, flood, dust storm, hail, strong wind and rain intensities) which result in significant material loss in agricultural production, agricultural assets or the owned means of production.

(iii) The compensation should be paid for farmers just when the effect of the adverse event is collective (common) and the adverse negative effect (the damage) is not less than 25% of production or other assets.

The recently established Drought Alleviation Directorate of MAAR, October 11th, 2011 shall follow up and coordinate the activities related to the management of The Disaster Alleviation Fund in coordination with the concerned authorities at different levels (central level, the province and the targeted area). In addition, the directorate should operate and develop of an early warning system for drought and climate change, natural disasters. Moreover, training program of technical personnel has to be carried out in order to implement the drought management activities and to prepare maps and documents necessary to study the effects of drought and climate change. Other task is the development of appropriate criteria for receiving aid, determine the type of aid and the populations affected by drought and assessing the situation after the drought. The directorate is also in charge of communicating with international and regional organizations and scientific bodies involved in monitoring and evaluating the effects of climate change. Finally, by its operational activities, the directorate contributes to strengthening the capacity of local communities on the face of drought and the effects of climate change and natural disasters agricultural. In fact, the Directorate and the Fund act as ***ex post*** risk coping strategy alleviating the effect of the risk once the risk has been realized and negatively affected the agricultural agents.

II. The individual risk-management measures

Individual *ex ante* preventive risk management strategies include agricultural and income diversification and specialization as well while *ex post* corrective risk management strategies include consumption smoothing, borrowing, asset liquidating and working out of agriculture.

According to farmers, the most used *ex post* strategy is the borrowing followed by consumption smoothing, working out of agriculture and selling the households' assets respectively. Working out of agriculture is considered the most effective strategy according to the majority of farmers.

Regarding the *Ex ante* precautionary strategies used by farmers, it is proven that reducing the required inputs quantities and attending a crop rotation are the most applied by farmers to avoid agricultural risks while the strategy of agricultural diversification comes as a second strategy.

However, given the agricultural risks and risk-management situation described above by highlighting the main existing types of risks, risk-management institutions and risk-management strategies as well, it is obvious that much more work should be done at all levels to achieve an acceptable agricultural risk-management level. In fact, the role of different types of institutions both formal and informal in risk management is more oriented to be ***ex ante*** risk management with more role plaid by formal ones. In addition, there is no clear framework methodology or mechanisms for ***ex post*** risk management like agricultural insurance, but there are emergency solutions deal with each case according to their type and intense. Regardless of the strong reciprocal vertical and horizontal relationships amongst the different institutions working for risk management however, some of these relationships are not strong enough while the others have many discrepancies like those between formal and informal institutions e.g. the contrast between formal laws and informal traditions and norms within some societies.

### *4.2.6 Policy Recommendations*

These recommendations are resulting mainly from the on-farm survey as analyzing the role of some official and unofficial institutions and their mutual relationships in agricultural risk-management. It is clear that almost all institutions in the country tend to adopt an *ex ante* risk management strategies ignoring the *ex post* risk-coping ones. In addition, the role of official institutions is considered more relevant and has larger magnitude than the unofficial institutions' role in risk management. The official institutions do not have actual clear methodologies or fixed working mechanisms for *ex post* risk-coping strategies like "agricultural insurance" but there are relief solutions dealing with the current situations according to the type and intense of the risk. Finally, the official and unofficial institutions often experience conflicts in their work in

spite of the supposed vertical and horizontal cooperation among them, for example the conflict could happen when a new official law does not sound well due to specific traditions within the targeted rural society.

Given the current functioning of the Government and other popular institutions and their role of agricultural risk-management mentioned above in section 4.2.3, many suggestions have been considered to improve the role of the relevant institutions such as the Agricultural Extension, ACB, and the Peasant Associations.

Regarding the Agricultural Extension that belongs to MAAR and provides farmers with many important services for agricultural risk management through offering the technical knowledge, therefore the following suggestions could enhance the role of extension in making farmers more risk resistant:

1. Training the agricultural employees and choosing them according to their expertise in the related farming system;
2. Acquiring the tools required for helping the extentionists playing their role in the field and transferring efficiently the knowledge and skills to farmers;
3. Enhancing the agricultural extension activities by expanding and increasing them and responding to farmers' needs for more effective extension actions;
4. Easing the licensing procedures and eliminating them for small agricultural areas;
5. Insuring the existing of the laboratories for analyzing the soil in the extension units; and
6. Establishing an information system for forecasting the climate conditions and training the farmers for better understanding of this information and for responding and dealing with it in the proper ways.

In fact, the extension units are the closest official institution to farmers and their employees are considered at high responsibility in improving the agricultural productivity from one side. While they are from the other side very essential for the process of marketing the production especially the strategic crops that sold usually to the state. Additional role is in charge of the extension unit, which is important for the risk management, is related to the evaluation and compensation of the damage caused by the disasters like drought, diseases, frost, wind and others that negatively affecting the agricultural production.

The Peasant Associations (cooperatives) are also very important as agricultural risk management institution, which need many reforms in their basic performances. The following suggestions have been proposed to improve the services provided to farmers by these cooperatives:

1. Providing the agricultural inputs and other agricultural services at competitive prices and good quality;
2. Improving the general performance of the cooperatives;
3. Participating in marketing the non-strategic crops;
4. Insuring the agricultural machineries for farmers like tractors and pumps for plant protection; and
5. Reviewing the interdependence and solidarity issue that has resulted in disabling the role of cooperatives due to the accumulated debts during the last periods.

Indeed the role and functioning of the agricultural cooperatives should be reviewed taking into account the abovementioned and other points in order to retain their role in developing the agricultural production as well as insuring financing and marketing of the production. Moreover, these cooperative should maintain their role of protecting the agricultural and rural communities by sustaining their solidarity, which is considered a type of risk management strategy and more close to insurance in principle.

The Agricultural Cooperative Bank, in turn, is very vital institution for financing the agricultural agents through offering farmers by its different types of loans and providing the most important inputs at the beginning of the agricultural season. The following suggestions, in general, are considered fundamental for the improvement of the functioning of the ACB:

1. Improving the procedures for accessing credits and alleviating the routine involved in that process;
2. Improving the debt repayment policies;
3. Acquiring the agricultural inputs for farmers by ACB without the agricultural licensing procedures and on the right time; and
4. Improving the conditions for getting loans for the medium and long run.

There is definitely a crucial role for the ABC in managing the financial risks faced by farmers, which give more important to the previous reform to be realized in order to enhance the bank performances.

The Unemployment Combating Commission (UCC) that provides loans especially for animal production projects (section 4.2.3) is considered an important Government institution for agricultural risk management. Given that the following suggestions are thought to enhance and develop its performance:

1. Reviewing the required collaterals by beneficiaries for getting the UCC unemployment loans;
2. Expanding the UCC operations to cover more activities; and
3. Increasing loans provided for animal production in particular.

The overall aforementioned suggestions are considering the improvement of the performance of specific institutions related to the agricultural production sector and enhancing at the same time their role in management or alleviating the risks faced by farmers.

# Chapter Five: Major Results of the Research

## 5.1 Introduction

For better understanding of the results obtained below, it is crucial to recall the specific characteristics of the studied farming systems before presenting the results. The two studied FSs, are located in two different agro-ecological zones corresponding to different stabilization zones and as a consequence have different cropping pattern. In fact, while FS 3 mainly located in the agro-climatic zones 2, 3 and 4 with a relatively low rainfall, the most majority of FS 1&2 areas are located within the agro-climatic zones 1 and 2 that have a relatively high precipitation rates (at least above 250 mm/year). Moreover, the cropping patterns are different between the two farming systems (FS 3 depends mainly on strategic crops like cotton, wheat and other field crops while FS 1&2 plant mainly free marketed crops like citrus, olives, apples and tomato in green houses), which justify the exposure to different types of risks by each. Government policies are also different according to the cropping pattern especially regarding the strategic crops which have special marketing and pricing policies.

The results presented in this section are mainly the findings of the second round of Delphi method survey carried out in the studied area for the purpose of addressing the risk management issues and the strategies undertaken by the policy maker and/or the agricultural agents in order to cope with the existing risks.

## 5.2 Main Findings in Farming System 3

### *5.2.1 Types of Risks*

A vast majority of experts assert that **price** and **market risks** are the main risks faced by farmers in FS 3 mainly due to marketing problems. While the second important risk affecting farmers is **production** and yield risk resulting from drought, frost and pest and diseases. Finally, **policy changes** risks seem also very important, especially due to lacking support for many crops and inputs prices volatility in addition to the relatively high share of strategic crops that have been supported by the government. This means that any policy changes towards pricing and marketing (purchasing at world price or purchasing just the high quality production) of these crops will have negative effects on farmers' income.

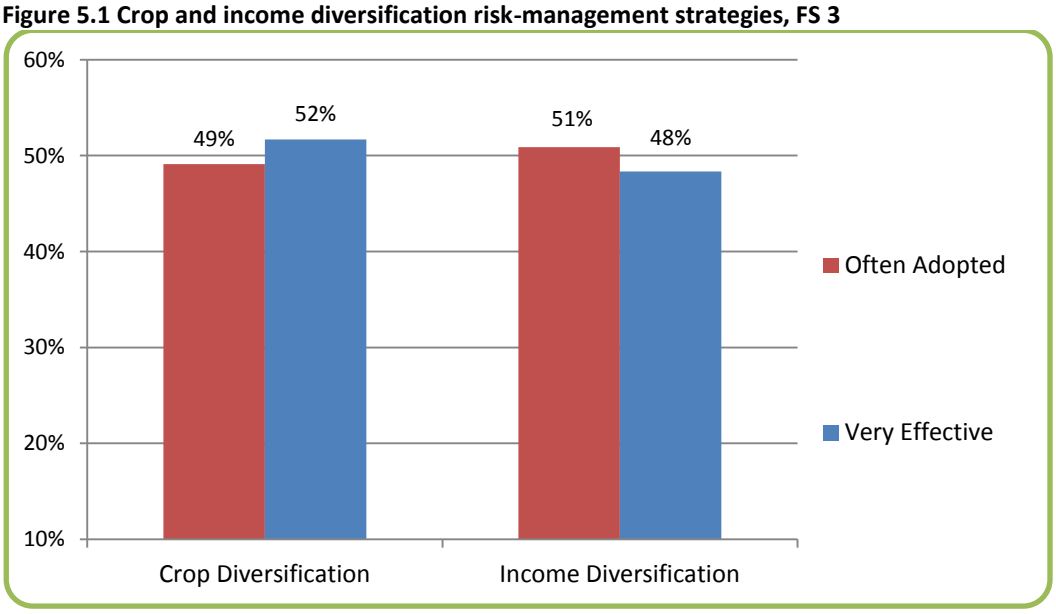
### *5.2.2 Risk Management and Coping Strategies*

Risk management strategies can be grouped into two categories: (i) *Ex-ante* strategies aimed to reduce the probability of an adverse event occurring and/or to mitigate the potential impact of the adverse event; and (ii) *Ex-post* (or coping) strategies aimed to relieve the impact of the risky event once it has occurred.

***Ex ante* risk-management strategies**

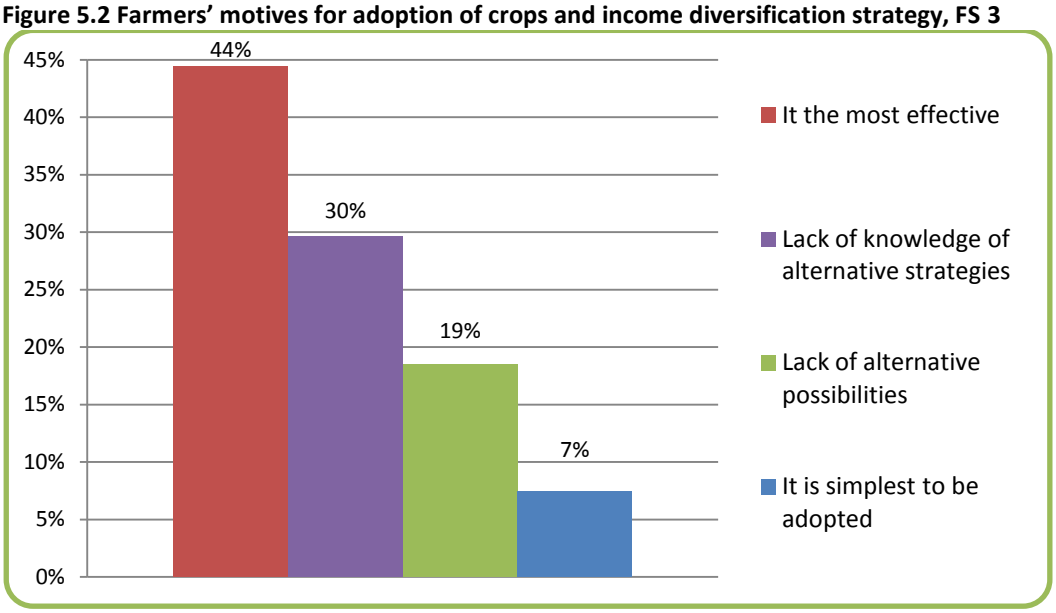
In this regards **diversification** of crop and diversification of income sources seem the most relevant *ex-ante* strategies for risk management in Syria, which have been adopted very frequently by farmers and proved high rate of effectiveness as relevant strategies within FS 3. Figure 5.1 shows that the two mentioned strategies have very similar adoption rate by farmers and similar effectiveness as well.

**Figure 5.1 Crop and income diversification risk-management strategies, FS 3**



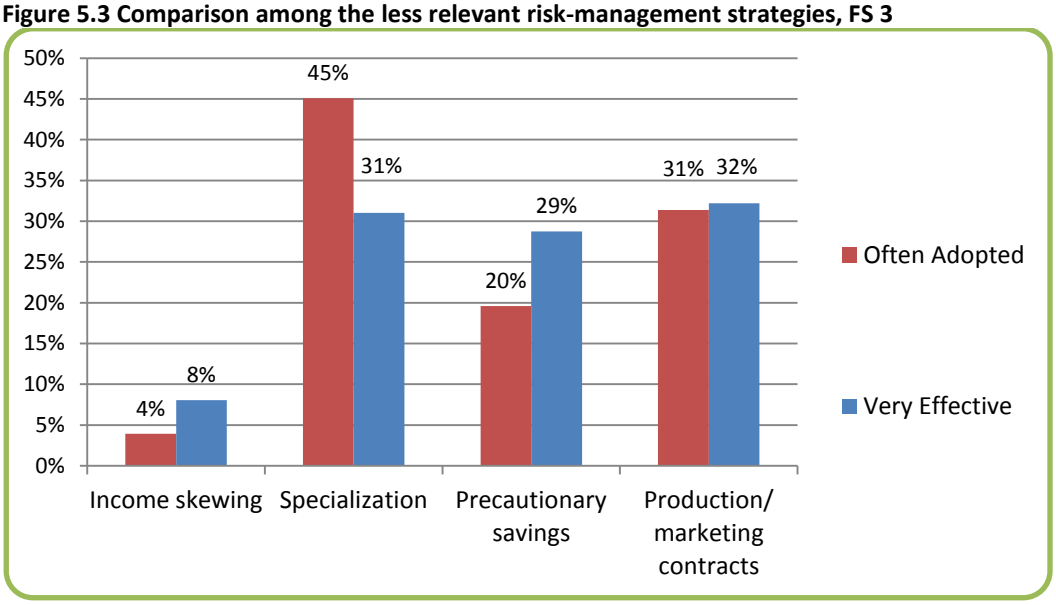
In fact, farmers adopt these strategies firstly because they are the most effective strategies as *ex ante* risk management, while the second reason for adopting them is the of Lack of knowledge of alternative strategies. And as Figure 5.2 illustrates, the third reason for adopting these strategies is due to the Lack of alternative possibilities whereas farmers adopt these strategies because they are simple to be adopted comes as the last motive.

**Figure 5.2 Farmers' motives for adoption of crops and income diversification strategy, FS 3**




Other *ex-ante* strategies seem less relevant for risk management in Syrian agriculture. In fact, **Income skewing**, **specialization**, **precautionary savings** and **production/marketing contracts** are classified as less important due to a low rate of adoption or to their low effectiveness as shown in Figure 5.3 below.

**Figure 5.3 Comparison among the less relevant risk-management strategies, FS 3**

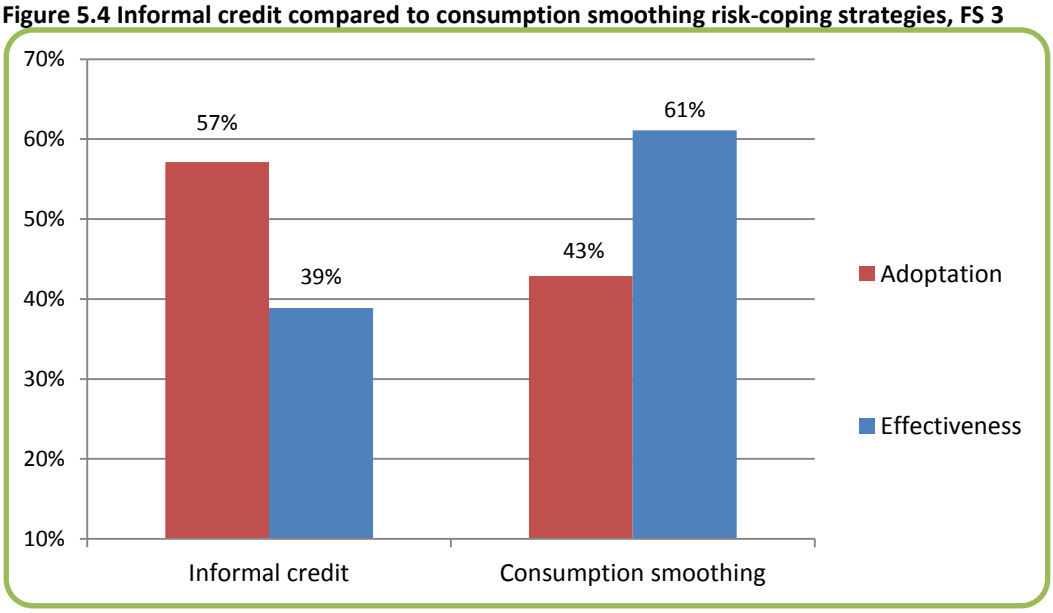


Comparing these strategies to each other reveals that income skewing is the less adopted strategy by farmers as they claim that it is not effective. In contrast, specialization seems more relevant since 45 % of experts claim that farmers adopt it while just 31% of experts affirm that it is an effective risk management strategy. However, the third strategy of precautionary savings is a little bit problematic because 29% of experts say that it is an effective strategy but just 20% of them stress that farmers adopt this strategy. This is also applied to the last strategy which is considered by experts a relatively an effective one however, less percentage of farmers adopt production/marketing contract as risk management strategy.

***Ex post* risk-coping strategies**

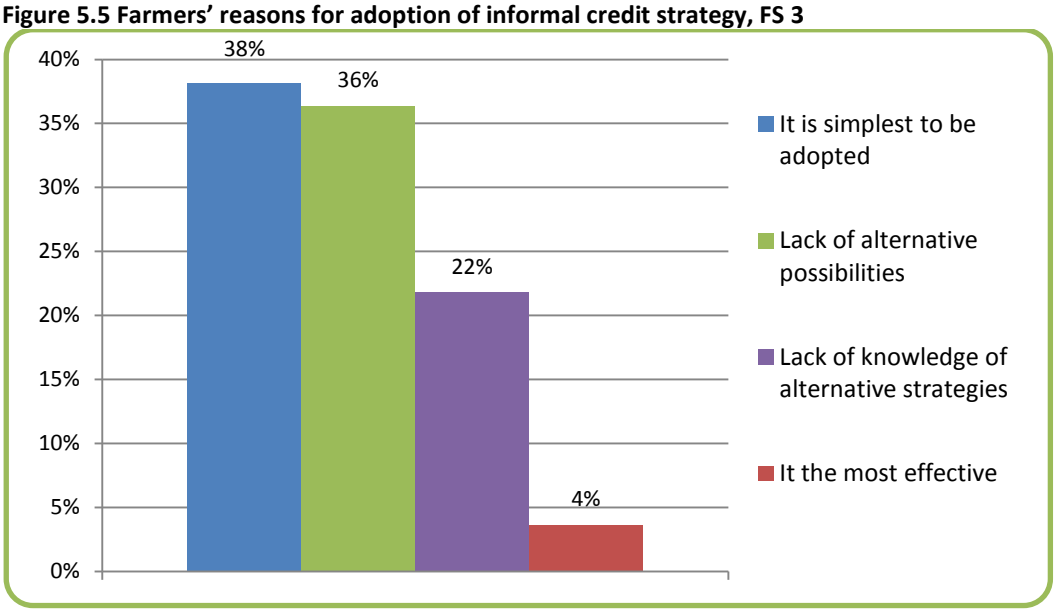
**Informal credit** seems the most relevant *ex-post* strategy for risk-coping in Syria. However, there is no consistency between the adoption and effectiveness of this strategy in FS 3. Figure 5.4 shows a comparison between informal credit and **consumption smoothing** risk-coping strategy, which is used by farmers to reduce the effects of adverse risky event. Although the former seems not very effective 57 % of farmers adopting it while just 43 % of farmers adopt the second strategy even though it is considered effective by 61% of experts.

**Figure 5.4 Informal credit compared to consumption smoothing risk-coping strategies, FS 3**



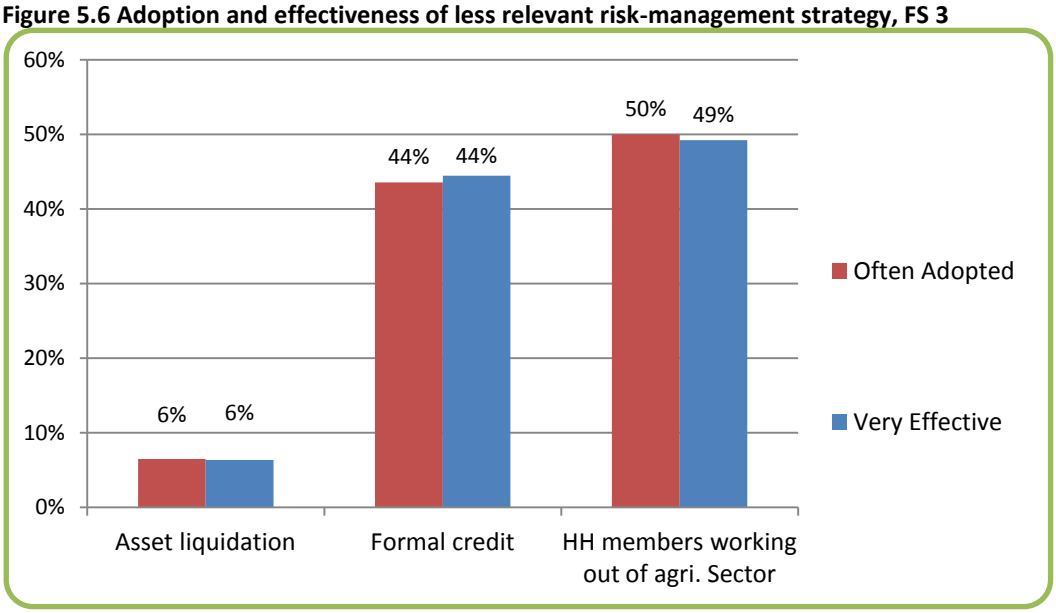

However, experts justify the relevance of the informal credit strategy in FS 3 because it is simplest to be applied as the first reason followed by the lack of alternative possibilities. The Lack of knowledge of alternative strategies come third while the last motive for adopting this strategy is because it is the most effective risk-coping strategy as the Figure 5.5 below illustrates.

**Figure 5.5 Farmers' reasons for adoption of informal credit strategy, FS 3**




Other *ex-post* strategies seem less relevant for risk coping in Syrian agriculture. **Asset liquidation**, **formal credit**, and HH members **working out of agriculture** sector are classified as less important. Such results might be due to a low rate of adoption or to their low effectiveness. However, HH members working out of agricultural sector strategy seems to be the most relevant *ex-post* strategy in FS 3, where relatively high share of farmers are adopting this effective risk-coping strategy (Figure 5.6). Formal credit is also another exception exhibiting good adaptation rate and effectiveness as well, 44% for each. In this regards the only confirmed results to our premise is that the asset liquidation strategy is really not relevant in FS 3, where just 6% of experts stress that it is frequently adopted or effective.

**Figure 5.6 Adoption and effectiveness of less relevant risk-management strategy, FS 3**

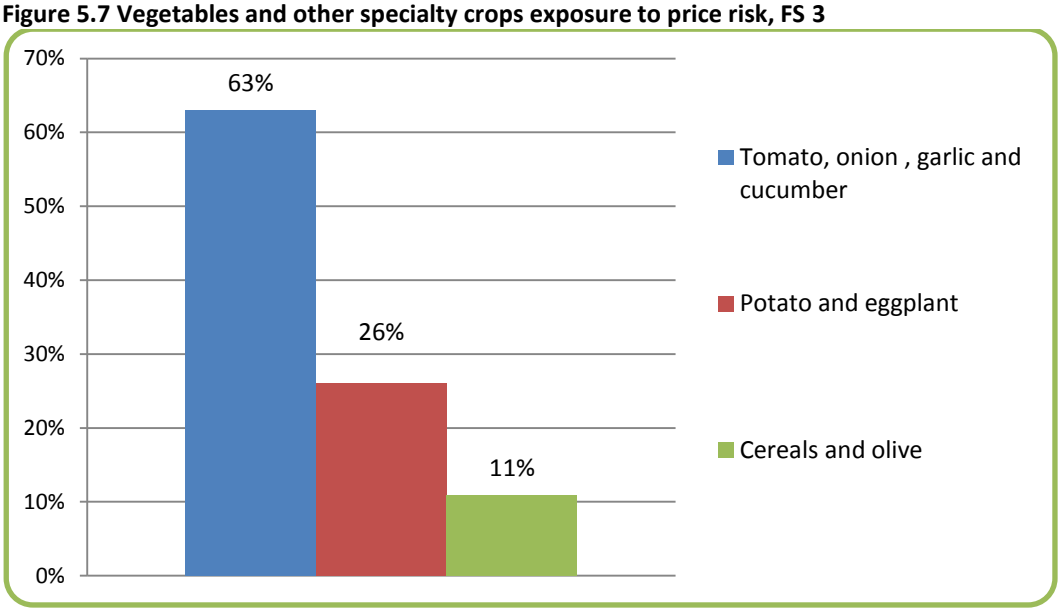


Last, despite of our premise about their role in the rural and agricultural sector in Syria, 61% of experts emphasize that **safety nets**, **support programs** and **welfare policies** are very relevant risk-coping strategies in FS 3.

### *5.2.3 Risk Management Strategies for Specific Risks*

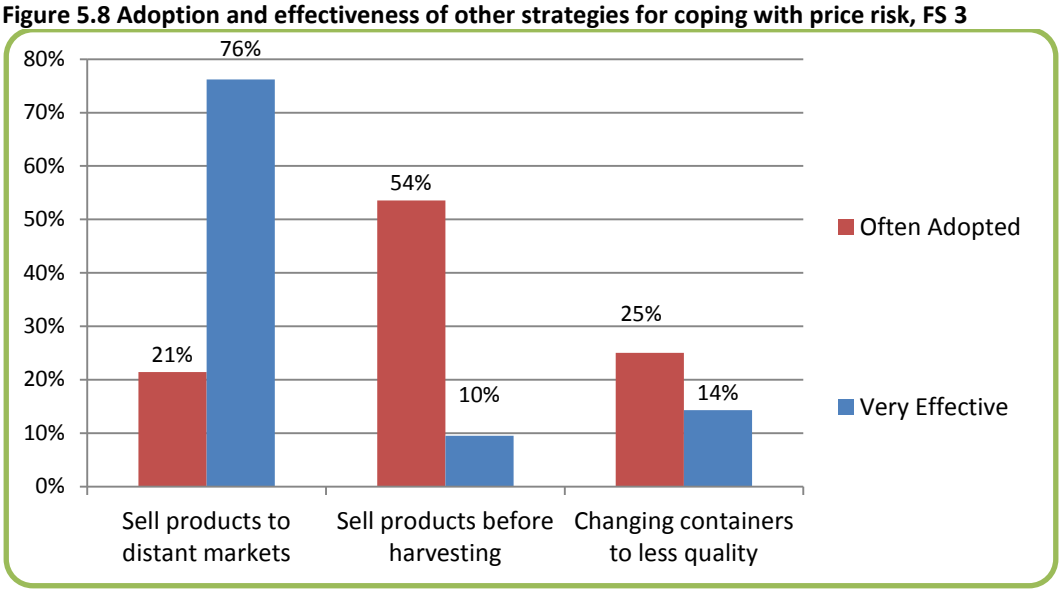
The majority of experts (94%) argue that vegetables are the most exposed specialty crops to price risks in FS 3. In particular tomatoes, onion, garlic and cucumbers are the most exposed mainly due to the crops sensitiveness. Figure 5.7 presents a comparison among different groups of crops regarding to their exposure to price risk confirming that among vegetables, potato and eggplant seem the least exposed to price risks compared to the previously mentioned group. However, some experts do not affirm that, stressing the higher rate of exposure to price risk experienced by eggplant farmers compared to potato farmers who are able to store their production to avoid price shocks at peak harvesting. Apart, almost all experts claim that cereals, olive oil and dried fruits are the least exposed crops to price risk affecting just 11% of farmers.

**Figure 5.7 Vegetables and other specialty crops exposure to price risk, FS 3**




Usually farmers attempt to cope with price risks using several strategies by trying to sell their products to distant markets, selling the products before harvesting or changing the containers to less quality in order to reduce the marketing cost. However, farmers in FS 3 do not use the first strategy even though it seems very effective according to the experts. In contrast, the second strategy of "selling the products before harvesting' seems very famous and used frequently by farmers even though it is not effective strategy as shown in Figure 5.8. Approximately the same results shown regarding the third strategy, where quarter of the farmers using "changing containers to less quality" strategy even if it has low effectiveness.

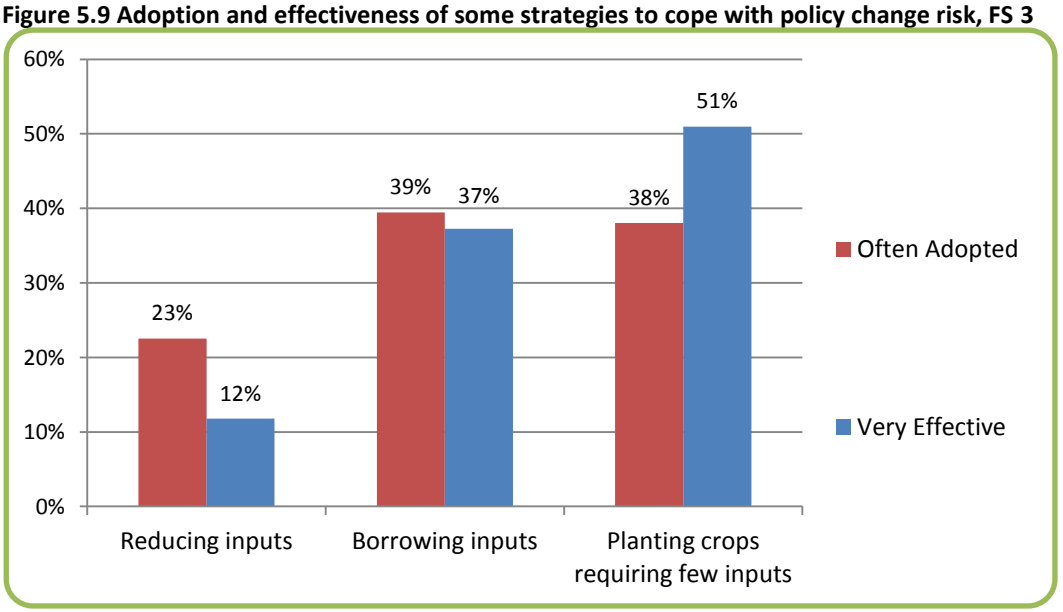
**Figure 5.8 Adoption and effectiveness of other strategies for coping with price risk, FS 3**




Regarding the production risk, 90% of experts assert that farmers cope with production risks by changing crops or seeds, or reducing the area planted in the subsequent area; however, in both cases it seems they rarely adopt agronomical techniques to improve or stabilize yields.

Concerning the policy changes risks, farmers, in general, endeavor to cope with this risk by reducing the inputs, borrowing inputs and planting crops that require low inputs. The most effective strategy is the third one as shown in Figure 5.9 that also shows a good adoption rate for this strategy. However, the less effective strategy is the first one of "reducing inputs", which also adopted by about 23% of farmers. The second strategy of "borrowing inputs" is exhibiting a relatively moderate effectiveness and adoption rates by farmers.

**Figure 5.9 Adoption and effectiveness of some strategies to cope with policy change risk, FS 3**



Illness and death give the impression that they are the most common idiosyncratic risks (unsystematic risk), in this regard 71% of experts affirm that farmers cope with this type of risk through the social help from other family members and distributing the land among other household members who are able to take care of the agricultural activities. Anyway, almost all experts stress that these strategies are not effective, since the distribution of the father's land among other HH members leads to cause excessive fragmentation.

### *5.2.4 Relevant Issues for Risk Management in Syrian Agriculture*

**Source of HH income**

The agricultural income within the studied rural areas, in particular crops and trees, represents the largest source of income while expenditure for food accounts for more than 40% of total households' expenditure. As a result income, expenditure and agricultural prices dynamics would be tightly linked. However, 97% of experts assert that there is no clear consensus on the influence of international dynamics (via the changing of the inputs and food prices as well) on income/expenditure and local economies.

According to a recent survey, diversification of crops and income source, strategies to manage risks in agriculture, are not usually adopted by farmers. Experts justify this because farmers lack of financial capital and agricultural labor from one side and the small holding size and land fragmentation from the other side. In addition to that, the limited number of alternative crops and varieties planted in the area constrains agricultural diversification which is also limited because the lack of marketing plans for the new crops. Income diversification, in turn, is limited by the lack of farmers' expertise, skills and human and financial resources to diversify. Low education rate and job opportunities in the area also limited the diversification of income.

**Strategic crops**

Strategic crops are defined as crops for which the Government sets prices at which government establishments will purchase from farmers or their cooperatives. This definition leads to the following crops being classified as strategic: wheat – cotton - barley – sugar beet. In fact, all experts affirm that production risks, mainly drought but also pest and diseases are considered the most relevant risks faced by farmers.

**Savings**

According to experts, farmers who do not have savings accounts usually save money in alternatives ways, *e.g.* buying houses, land, cars, tractors, storable inputs or outputs, as well as keeping money in cash at

home. Experts claim that farmers do not use bank savings accounts due to several reasons but they prefer capital in kinds like houses, pieces of land or cars. Farmers also prefer money at hand in order to be used directly in financing the agricultural activities or could be employed in trade activities mainly of agricultural products. Moreover, the interest is prohibited in Islam so the majority of Muslim farmers do not deal with it. Furthermore and due to lack of savings and the need to use money immediately in the farm and for household expenditures farmers keep them at hand. The few number of banks' branches in the area make them distant from the farmers who are always busy at farm. Finally, there still no enough confidence of these banks and farmers feel that their money at hand or in kind as a house is better. At the end, again all experts affirm that interest rate (prohibited in Islam) is one of the main limitations to the adoption of savings through bank account.

**Credit and insurance**

Almost all experts assert that Agricultural Cooperative Banks (ACB) is the mostly common used type of formal credit, while 97% of them claim that Loans from wholesalers and from friends/neighbors are the mostly common used type of informal credit. In fact, according to the majority of experts informal credit is costly with respect to formal credit, which is preferred to farmers.

The complexity of procedures is the main limitation to access to formal credit. Experts stress that bureaucracy related to the functioning of bank and the routine that costs farmers money and time to collect the required document are the main aspects of the complex procedure. Farmers also need to provide the bank with documents that affirm their ownership like the property registration of land or the mortgaged declaration. However, and due to land fragmentation and the heritage problems, in many cases the property of the land is not entitled to the current owner but to his father or grandfather or other relatives, which needs to have agreement from many person, some of them are died so it is difficult to have complete ownership of the land. Last, corruption still exists at the bank employees' level which constraints farmers' ability to complete their required documents to get the loans. On the other side, there is consensus of the experts that the second problem of getting loans by farmers is the lack of collaterals due to excessive land fragmentation.

The interest rate is important regarding access to credit, while 90% of the experts affirm that the excessively high interest rates limit the access to informal credit, just 29% of them claim that the excessively high interest rates limit access to formal credit. In fact, the interest rate of the informal credit is not obvious but it is a kind of implicit interest rate since the farmers are obliged to market their production

to the creditors (usually wholesaler) who usually deduct the interest and decide without real agreement with the farmer.

As known, there is a fund for insuring cattle at the agricultural chamber but it seems that farmers rarely order contracts to insure their cattle. Experts claim that farmers do not use this form of insurance firstly due to their lack of knowledge and awareness about the fund. Second reason is the lack of confidence between farmers and funds' employees due to corruption, where farmers believe that the fund set hard conditions and administrative procedure to get the payment. The lack of awareness about the importance of the insurance for farmers and because it is new experience is also limit the insuring rates. Eventually, the short period of keeping the animals especially for males used for meat production could also be a reason to limit the adoption of the insuring fund.

As a result, insuring seems to be a new concept for farmers and needs much time to be understood well and then to be adopted, actually 52% of experts assert that farmers are still reluctant to stipulate insurance contracts (e.g. for production yield, whether, etc.).

### *5.2.5 Policy Recommendations*

First of all it is important to point out that the Delphi survey has revealed that the agricultural risk management is still an immature sector in Syrian agriculture and needs a lot of awareness from the Government, farmers, and other related institutions.

The suggested recommendations are emerged from the Delphi survey as the experts' consensus about the different priorities for risk management policies and strategies according to different study zone. Two sub-groups recommendations have been extracted and concluded from the participant experts related mainly to the required policies to be taken by the government and the appropriate strategies to be adopted by farmers in the context of agricultural risk management.

Given that Farming System 3 cultivates significant quantities of strategic crops (wheat, cotton and sugar beet) in addition to various types of freely marketed crops, many political changes would be desirable to improve the current set of government policies. Thus according to experts, these priorities (political actions) are fundamental as risk management tools in FS 3. The priorities of first sub-group are presented below ranked according to their relevance to farmers:

1) Establishing a marketing system for all crops managed by the government:

This policy, in fact, reflects the importance of considering some crops as strategic ones, which marketed by the government at specific prices. This first priority is considered as *ex ante* marketing and price risk management strategy, which is desired by famers and needed to be applied for other crops.

2) Improving water management and irrigation services:

It is vital policy to be undertaken since the most important crops including the strategic ones are irrigated summer crops and depend mostly on the public irrigation schemes that need to be improved and maintained effective and efficient. This required policy can be classified as *ex ante* production risk management strategy.

3) Providing good quality seeds and high productive varieties:

It is also a policy that could improve the *ex ante* production risk management strategy required by farmers to insure good yields.

4) Providing subsidies for newly crops or crops important for Syrian economy:

This policy could enhance the *ax ante* diversification strategy undertaken by farmers by increasing the success probabilities of the new crops.

5) Improving storage facilities to delay the selling when prices are too low:

In general, it is essential as *ex ante* marketing and price risk management policy, however, it is at moderate importance for farmers in FS 3 since the most majority of their production (strategic crops) are marketed directly after harvesting by the state.

6) Subsidizing farmers by lowering inputs prices:

It is also considered as *ex ante* price risk management policy, maintain the prices of inputs but it is not very important since inputs are already subsidized and provided to farmers by ACB.

7) Limiting (e.g. by tariffs) imports of goods produced in Syria:

It does not seem very relevant for this farming system since the majority of the agricultural production marketed by the state (strategic crops).

8) Offering loans according to land area or to different crops:
9) Establishing funds for agricultural disasters:

This policy is considered as *ex post* agricultural risk coping and has been recently announced to be undertaken by the government in the context of the new Government "social market economy".

10) Establish market for insurance:

Despite of its key role in risk management, experts do not believe that farmers are ready to adopt insurance as risk management policy to be undertaken by the government.

According to experts the second sub-group by whom farmers could improve their strategies to cope with risks in several ways are presented below and ranked according to their relevance:

1) Diversifying the income sources;
2) Cultivating several different crops;
3) Organizing production and selling activities in cooperatives;
4) Cooperating with extension units to improve agricultural production techniques; and
5) Stipulating insurance contracts.

It is clear that the most important strategies for farmers are diversifying their income sources and cultivating different crops to insure horizontally stable income. In contrast, adopting insurance contracts is felt as the last priority for farmers to be adopted as agricultural risk management strategy, this is mainly because their fear to adopt new strategy that needs a lot of effort and time to be accepted by the traditional farmers. While the collective activities in production and marketing seems more accepted by farmers reflecting their willingness to ensure marketing for all crops the same as done for strategic crops. Cooperating with the agricultural extension system is also important strategy for farmers that help in alleviating the production risks through benefiting by extension technical support.

## 5.3 Main Findings in Farming Systems 1&2

This section presents the main results of the second-round Delphi method survey carried out in the Farming Systems 1&2 in Latakia governorate in Syria. The results will present mainly the current types of risks and the existing risk-management and risk-coping strategies and other specific findings regarding the strategic and specialty crops. Savings and credits are also analyzed in addition to existing idiosyncratic risks.

### *5.3.1 Types of Risks*

All experts in Farming System 1&2 assert that price and market risks are the main risks faced by farmers mainly due to lack of marketing culture and facilities within a freely marketing environment for most crops. However, they stress that production and yield risks resulting from frost, pest and diseases and storm are marginally important. Finally, they claim that policy change risks and financial risks might affect farmers' activities in this farming system.

### *5.3.2 Risk management and coping strategies*

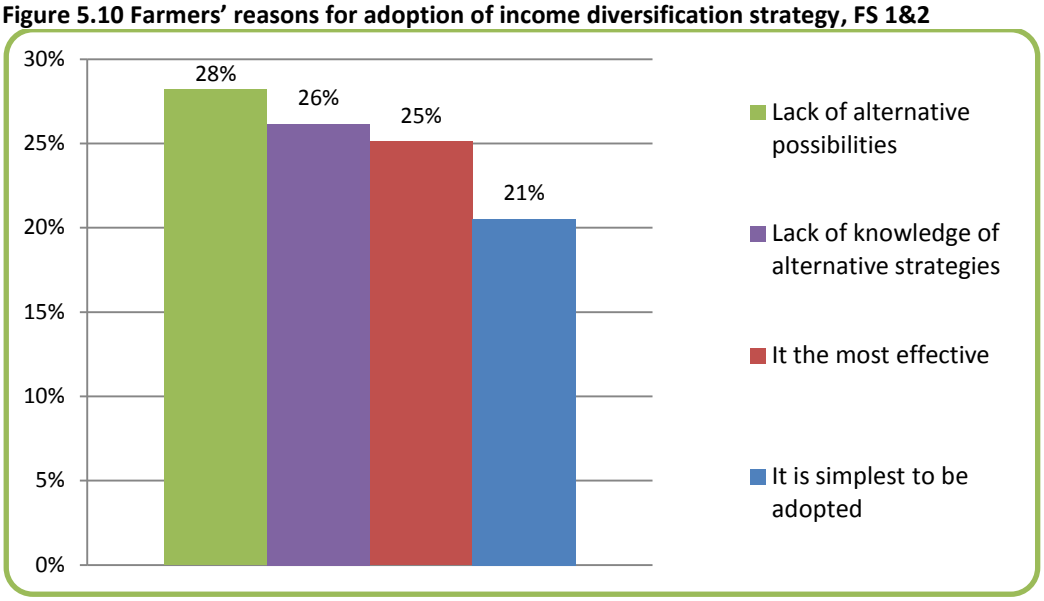
As mentioned before, risk management strategies are classified as *ex ante* and *ex post* strategies dealing with the expected agricultural risk before its occurrence or trying to mitigate the effect of the risk once it become as a matter of fact. In the following I will present each group of risk management strategy separately starting by the *ex ante* risk-management undertaken by farmers to reduce the probability of exposing to the risk.

#### ***Ex ante* risk-management strategies**

**Diversification** of crop and income sources looks like the most relevant *ex-ante* strategies for risk-management in Syria. In fact, all experts affirm that these strategies have been equally adopted by farmers in FS 1&2 and that they have high rate of effectiveness.

Experts explain that diversification of income sources and crop cultivations are the main adopted strategy. This is respectively because the lack of alternative possibilities, the lack of knowledge of alternative strategies, because It is the most effective strategy and finally because It is simplest to be adopted. However, Figure 5.10 shows that these reasons for adopting diversification strategies are almost equally important where they contribute by 21% to 28% to total rationality rate of adoption.

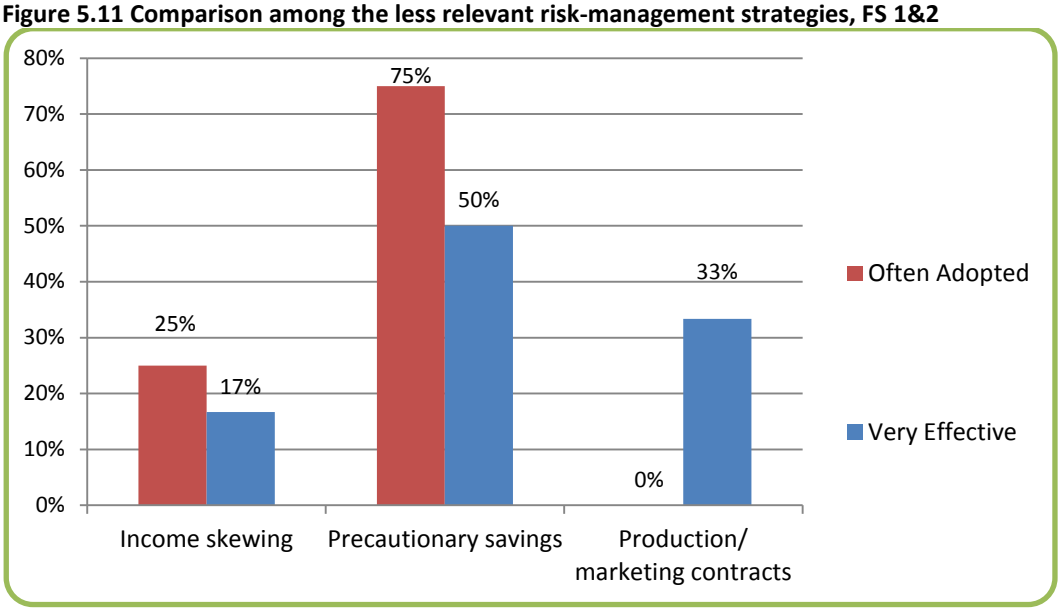
**Figure 5.10 Farmers' reasons for adoption of income diversification strategy, FS 1&2**




Regarding the other risk-management strategies practiced in this farming system, all experts argue that specialization (e.g. the adoption of suitable production techniques or crops resistant to pest, drought, etc.) is a relevant *ex-ante* risk management strategy and farmer start recently adopting those techniques like the modern irrigation techniques and planting high yield varieties.

Other *ex-ante* strategies are considered less relevant for risk management in Syrian agriculture. **Income skewing**, **precautionary savings** and **production/marketing contracts** are classified as less important, which is mainly due to a low rate of adoption by farmers or to their low effectiveness. However, in this farming system, precautionary saving is considered an important and effective strategy compared to the others as shown in the Figure 5.11 below. Actually farmers adopting this strategy mostly because they have other source of income than agricultural one which gives them the opportunity to save some money from working out agriculture to be invested in agriculture sector.

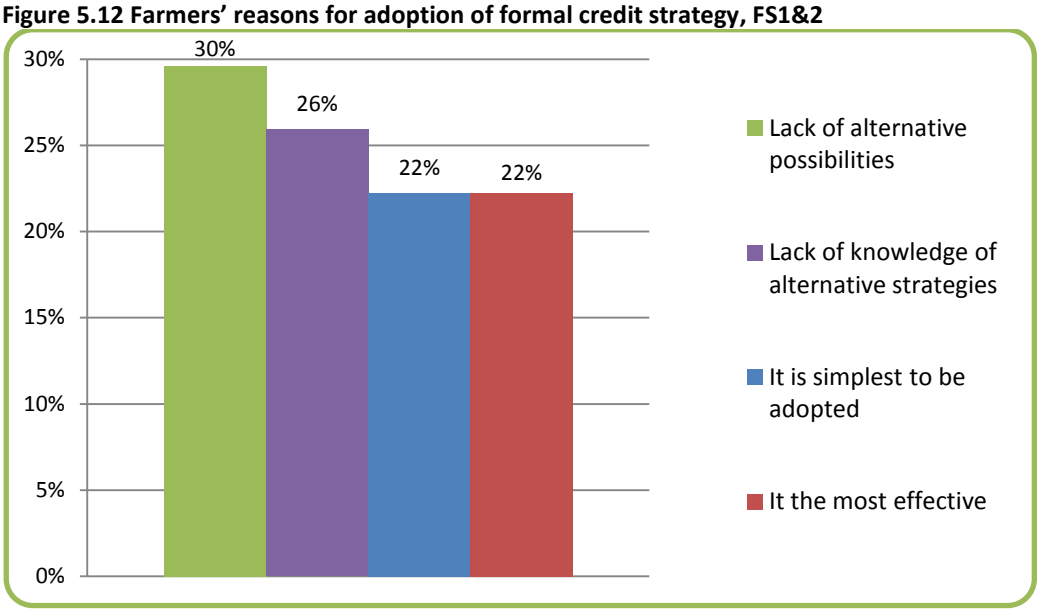
**Figure 5.11 Comparison among the less relevant risk-management strategies, FS 1&2**




In fact, the majority of experts stress that income skewing is rarely adopted and they claim that it is not effective strategy within this farming system. Finally, all experts strongly affirm that production/marketing contracts is not exist as risk management strategy in this farming system, however, they argue that it would be effective when applied.

**Formal credit** seems the most relevant *ex-ante* strategy for risk-management in Syria. According to all experts, formal credit strategy is very well adopted in FS 2&1 and 71% of them stress that it is an effective strategy. Figure 5.12 shows that formal credit is adopted because the lack of alternative possibilities as first reason and secondly because the lack of knowledge of alternative strategies. Whereas being the most effective and being the simplest to be adopted are equally valuated by farmers and classified as the third and fourth reasons for adopting this strategy.

**Figure 5.12 Farmers' reasons for adoption of formal credit strategy, FS1&2**




***Ex post* risk-coping strategies**

All experts stress that Household members **working out of agricultural** sector is a very relevant *ex-post* strategy for risk-coping in Syria and in this farming system as well, where it is highly adopted and proved good effectiveness. That is mainly due to the fragmentation of agricultural land where the prevalence of small holding sizes induces households' members especially the young to seek for job out of agricultural sector. The other jobs are mainly including the work out of the country and hence using remittances to support the household's agriculture activities.

Other *ex-post* strategies seem less relevant for risk coping in Syrian agriculture like **asset liquidation** and **informal credit** which are classified as less important ones probably due to their low rate of adoption or to their low effectiveness. This is also applied to FS 1&2 where 71% of experts claim that asset liquidation and informal credit are not adopted by farmers and 86% of them stress that they are not effective strategies.

The relevance of the other risk coping strategies like **consumption smoothing**, **safety nets**, **support programs** and **welfare policies** is not clear since just 57% of our experts believe that these are very relevant strategies within FS 1&2 areas. In specific, adopting consumption smoothing strategy is linked to the existing of other source of incomes driven from other sectors (working out of agriculture), which gives farmers the chance to compensate their agricultural income deficient and thus maintain their consumption level. Welfare policies like pensions also exist since the majority of farmers have other source of income, in particular, the share of farmers working as government employees are high in this farming system. Safety net and supporting programs, however, are not common within this farming system area except the

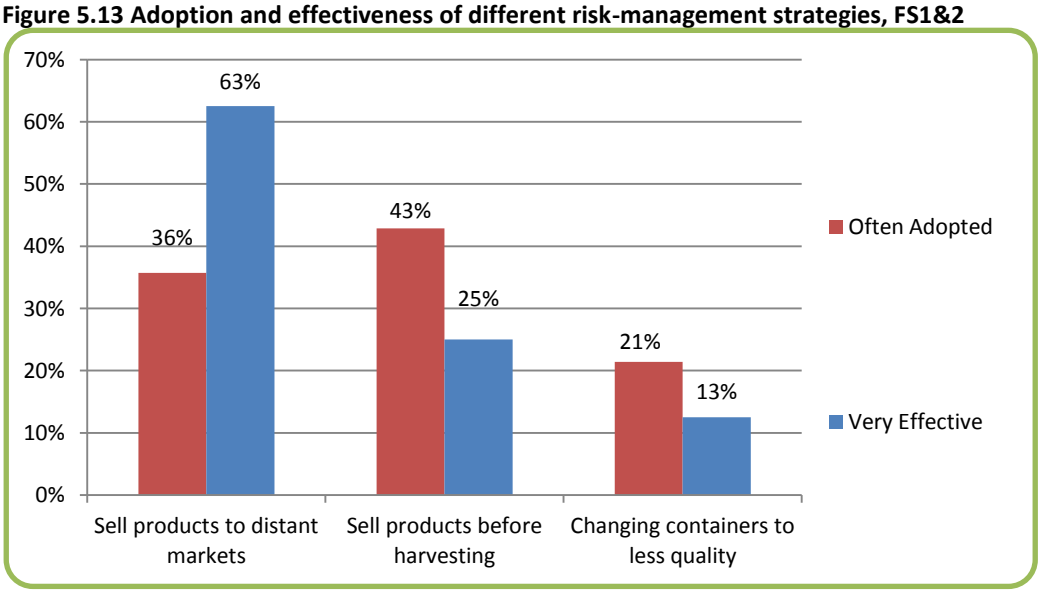
existing of few income-generating projects like the rural development and woman empowerment projects and other institutions mentioned in sections 3.2.3 and 3.2.4 above

### *5.3.3 Risk Management Strategies for Specific Risks*

The majority of experts (71%) argue that fruits are the most exposed specialty crops to price risks in FS 1&2. In particular citrus, but also apricots, apples, peaches seem the most exposed mainly due their perishability and the lack of storage facilities. However, 29% of experts stress that citrus and apples can be stored for few months but again there still a lack of the capacity of the cooling units. In turn, olive oil is the least exposed specialty crop to price risks as 86% of experts stress. However, some experts claim that olive oil is also exposed to price risk due to the high marketing costs resulting from land fragmentation and the crop alternation, and due to exporting constraints which leave the product at farmers' homes without adequate storing facilities resulting in deteriorating the quality of the oil.

Moreover, experts state that farmers cope with price risks trying to sell products to distant markets and they affirm that it is an effective strategy and moderately adopted by farmers. Figure 5.13 shows also that although "selling the products before harvesting" strategy is not effective it seems to be more adopted according to experts. In contrast, the last strategy of "changing the containers to less quality" in order to reduce the marketing cost is less frequently adopted by farmers mainly because it is not effective.

**Figure 5.13 Adoption and effectiveness of different risk-management strategies, FS1&2**




Farmers seem to cope with olive oil production/yield risks adopting specific agronomical techniques to improve or stabilize yields. However, 86% of experts stress that farmers do not adopt this strategy despite the fact that it is an effective one according to 71% of those experts.

Regarding policy changes risks 71% of experts stress that farmers cope with these risks by reducing the inputs, mainly waters and fertilizers. Finally, the idiosyncratic (personal) risks seem not relevant in FS 1&2 according to the majority of our experts.

### *5.3.4 Relevant Issues for Risk Management in Syrian Agriculture*

**Source of HH income**

As known, agriculture production represents the largest source of rural people income and the expenditure for food accounts for more than 40% of their total expenses. As a result income, expenditure and agricultural prices dynamics would be tightly linked.

However, there is no clear idea about the influence of international dynamics on income/expenditure and local economies in this farming system where just 57% of experts affirm that this influence of international dynamics is rather limited.

According to a recent survey, diversification of crops and income source, strategies to manage risks in agriculture, are not usually adopted by farmers. Experts claim that some reasonable reasons limit the adoption of these two strategies. In fact, small holding sizes and land fragmentation is the first reason limit crop diversification. Lack of farmers' experience and skills in diversifying crops and the long distance between farms and the city center is also constraints the crop diversification. Still, the fact that almost all farms are occupied by trees in general does not allow for crop cultivation and leave little space to diversify crops and trees which require long time and huge investment to be replaced by others. Income diversification in turn is limited by the low education level of farmers, the lack of job opportunities within the FS 1&2 area and the restricted skills of farmers in the other sectors like trade and industry. Lack of finance is also constraints the income diversifying opportunities in this farming system.

**Strategic crops**

Strategic crops are defined as crops subsidized by the Government and for which the government establishments will purchase from farmers or their cooperatives at sets of fixed prices. This definition leads to the following crops being classified as strategic: wheat – cotton - barley and sugar beet. However, these crops are not relevant in this farming system where there are no significant areas planted by any of them.

**Savings**

According to experts, farmers who do not have savings accounts usually save money in alternatives ways, e.g. buying houses, land, cars. However, for many reasons farmers do not use the bank accounts to earn interests. This is due to the traditions of many farmers who prefer to keep money at hand to fulfill their needs of money to perform farm activities and for consumption. In addition, the existing boring routine, bureaucracy and complicated administrative procedures in depositing and withdrawing the money from the bank branches (usually located far away from the farmers) make farmers reluctant to save their small savings in general. In addition, having bank account, in fact, is not widely spread idea among farmers mainly because the low return from the interest compared to investing money in other economic activities. Finally, the limited knowledge and low awareness of farmers about the functioning of the bank and its working procedures is also constraint the saving process and make farmers reluctant to save.

Again, 100% of experts argue that savings through bank account is limited by the necessity of liquidity (e.g. money promptly disposable) to manage and improve farm infrastructures.

**Credit and insurance**

Regarding farmers' source of financial capital, all experts stress that The Agricultural Cooperative Bank (ACB) is the mostly common used type of formal credit. However, just 71% of experts affirm that personal loans from sectors other than agriculture are the common used type of informal credit. In fact, informal credit is costly with respect to formal credit, which is preferred by farmers as 100% of experts stated.

The complexity of procedures is the main limitation to access formal credit. Experts argue that several factors have contributed to complicate such procedures. First reason is relevant to the routine of the functioning of the bank that costs farmers money and time to collect the required documents for getting the loan. In fact, farmers obliged to present many documents which are not always available to them like the property registration of the land in order to prove the land ownership. However, due to land fragmentation and the land heritage traditions, it is difficult for many farmers to get a real state registration of their land, which could still entitled to fathers, grandfathers or other relatives. The lack of the experience of bank's employees is also other reason to hold back the process of getting loans in addition to the fact that the bank is deducting the interest at the same time of providing the loans, which is not accepted by many farmers.

All our experts affirm that the second problem of formal credit access is the lack of collaterals due to excessive land fragmentation. In addition, 57% of experts stress that formal credit is poorly managed by the farmers and this also limits the farmers' access to loans.

Concerning the other type of credit, 86% of experts state that the excessively high interest rate limits the access to informal credit.

The insurance is very limited currently in agricultural sector, where the only example is the fund for insuring cattle at the agricultural chamber but it seems that farmers rarely stipulate contracts to insure their cattle. Experts argue that farmers do not use this form of insurance because they do not have enough information and awareness about the fund in the area. Moreover, the lack of farmers' confidence of the fund employees and administrative procedure is also limiting the insuring process. The small number of cows owned by each farmer, in general one or two cows, prevents them from the participation in the insurance fund. As a result, there is a lack of confidence of insuring cows in general.

Finally, 86% of experts affirm that farmers still reluctant to insurance contracts in general, including insurance contracts related to production and yield risks, whether risks, price risk and so on.

### *5.3.5 Policy Recommendations*

The same recommendation suggested for FS 3 could be applied to FS 1&2 but with different importance presented in their diverse ranking compared to the above suggestions. The different ranking of the priorities are related to the different cropping pattern prevalent in FS 1&2 that depends mainly on freely marketed agricultural commodities. In fact, the absence of strategic crops in this farming system and the dominance of mainly fruits, olive and vegetables has shaped the priorities of farmers. Accordingly, the political changes attractive to improve the current set of policies adopted by the government (the first sub-group of recommendations) for risk management could be the following suggestions ranked according to their relevance:

1) Establishing a marketing system for all crops managed by the government:

Very relevant claim especially for citrus crop since there is significant production surplus at harvesting peak that strictly negatively affecting the prices. This policy, in fact, could act as *ex ante* strategy to manage marketing and price risks.

2) Limiting (e.g. by tariffs) imports of goods produced in Syria:

This is important policy to be undertaken by the government since the majority of production is freely marketed and exposed to the fluctuation of the international prices. Therefore, the suggested policy could protect the domestic production for those agricultural commodities and act as *ex ante* strategy for price risks.

3) Improving storage facilities to delay the selling when prices are too low:

It is also important policy act to manage marketing and price risks.

4) Establishing funds for agricultural disasters:

This is very vital *ex post* production risk coping strategy since FS 1&2 has frequently witnessed many climatic adverse conditions like storms, winds and frost that negatively affecting the production of most crops like citrus and vegetable in the greenhouses.

5) Offering loans according to land area or to different crops;
6) Subsidizing farmers by lowering inputs prices;
7) Providing subsidies for newly crops or crops important for Syrian economy;
8) Improving water management and irrigation services;
9) Providing good quality seeds and high productive varieties;

Offering loans, subsidizing inputs prices are also key policy to be undertaken by the government but they are less important compared to the first four policies. While improving the water services is at less important mainly because there is no big irrigation water problem in the area the irrigation water is available for almost all the plain areas in the system. Unlike to FS 3 where seeds of strategic crops (cotton, wheat and sugar beet) are produced and distributed by the state, providing good quality seeds is not relevant in FS 1&2 because seeds for the most crops are freely marketed.

10) Establish market for insurance:

According to experts and the same as noted in FS 3, establishing insurance market is still the last priority for farmers in FS 1&2.

The second sub-group of recommendations related to the suggested risk management strategies to be adopted by farmers in this farming system is similar to those recommended in FS 3 but have different ranking according to their importance to farmers:

1) Organizing production and selling activities in cooperatives;
2) Diversifying the income sources;
3) Cultivating several different crops;
4) Stipulating insurance contracts; and
5) Cooperating with extension units to improve agricultural production techniques.

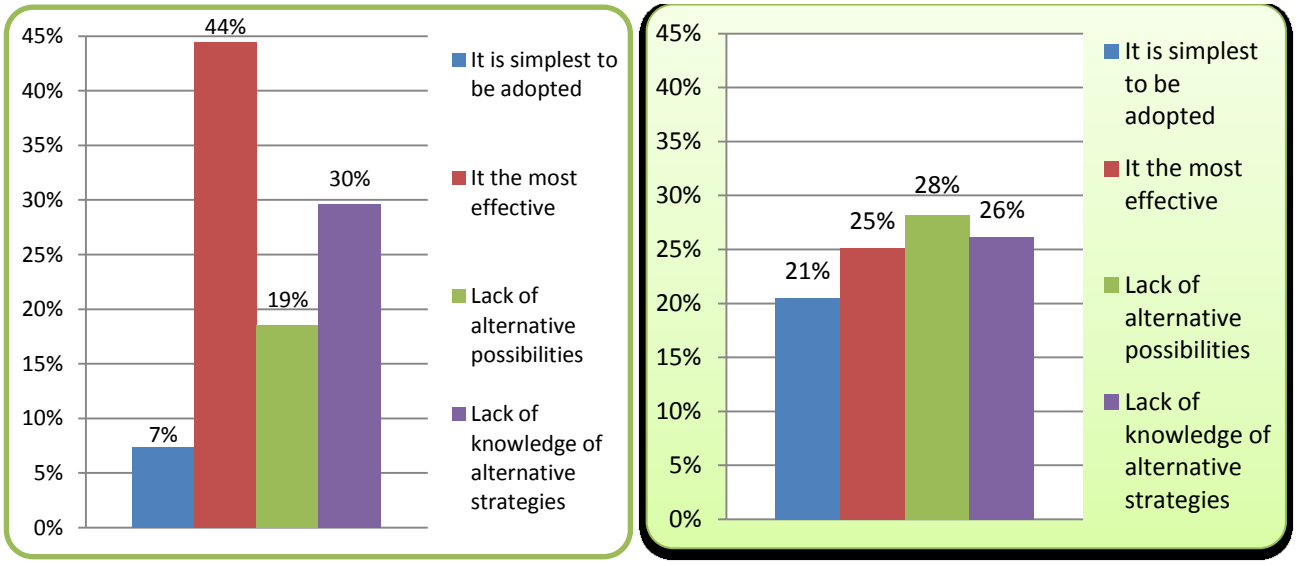
The apparent important strategy is the cooperation in production and marketing activities, which reflects the need to ensure the freely marketed agricultural commodities. While diversifying income source and diversifying crop cultivation comes as second and third priorities. Stipulating insurance contracts, however, seems more relevant to farmers in this farming system compared to FS 3. This could be due to the better education level of the farmers in FS 1&2 and their better knowledge and awareness about the insurance compared to farmers in the other farming system. Finally, the cooperation with the extension units seems as the last priority for farmers may be due to their less important in the production process e.g. they have no role in the marketing of the production compared to their role in marketing the strategic crops in FS 3.

## 5.4 Critical Comparison of the Study Zones

Regarding the **existing risks** within the two farming systems, the price and market risks are the main risks faced by farmers mainly due to marketing problems related to the marketing of the main strategic crops e.g. sugar beet in FS 3, and due to lack of marketing culture and facilities within a freely marketing environment for most crops in FS 1&2. The second important risks faced by farmers within the two zones are the production and yield risk resulting from drought, frost and pest and diseases, however, they are less important in FS 1&2 than in FS3. Finally, policy changes risks seem also very important, especially due to the lack of support for many crops and inputs prices volatility in general, in addition to the relatively high share of strategic crops supported by the government in FS 3. Finally, policy changes risks might also affect farmers' activities in FS 1&2 in addition to the financial risks.

The most applied ***ex ante*** strategies for risk management in the two zones is the **diversification** of crops cultivated by farmers and the diversification of income sources as well. These strategies are largely adopted within the two farming systems and seem very effective. However, the motives for using these strategies are different between FS 3 and FS 1&2 since farmers attribute their adoption to several similar reasons but different levels of importance in each farming system. Figure 5.14 shows that farmers in FS 3 consider the effectiveness as first reason for adopting these strategies, while farmers in FS 1&2 consider the lack of alternative possibilities the most important motivation for adoption.

**Figure 5.14 Motivations for crop and income diversification, FS3 and FS1&2**

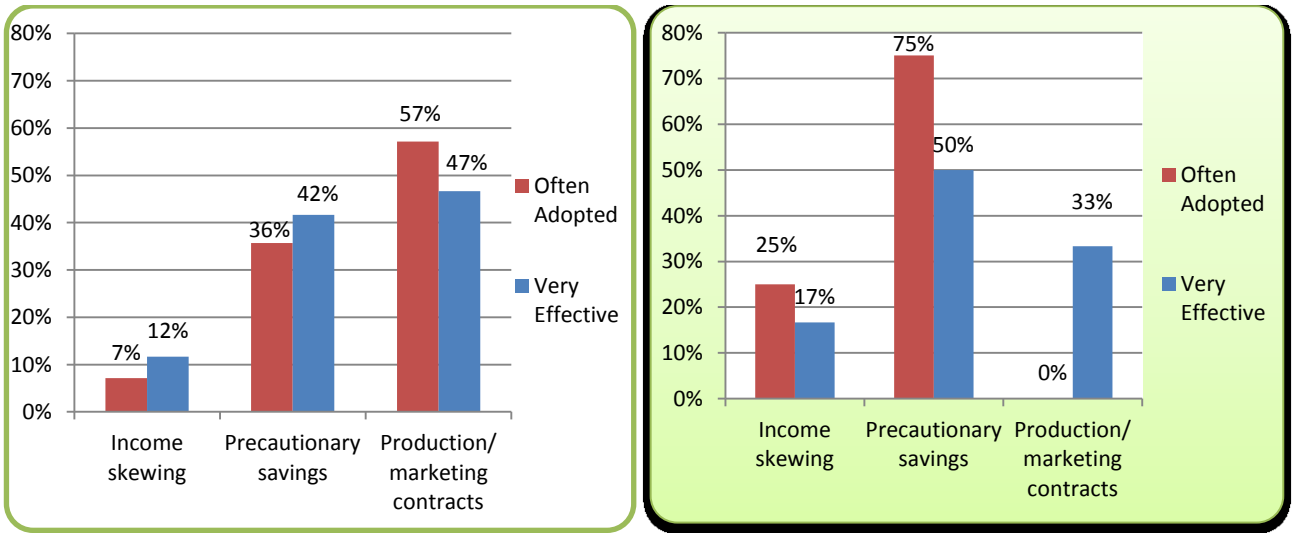



Specialization (e.g. the adoption of suitable production techniques or crops resistant to pest, drought, etc.) is a relevant ex-ante risk management strategy in FS 1&2, where farmers start recently adopting modern

irrigation techniques and planting high yield varieties. This strategy, however, is considered less important in FS3.

Other ex-ante strategies seem less relevant for risk management in Syrian agriculture. **Income skewing**, **specialization**, **precautionary savings** and **production/marketing contracts** are classified as less important, due to a low rate of adoption or to their low effectiveness. However, precautionary saving seems more important in FS 1&2 than FS 3, whereas farmers do not adopt "production/marketing contract" at all irrespective of its good effectiveness. Instead this strategy is used frequently in FS 3, this is mainly for the strategic crops and the seed multiplication contracts. However, the third strategy of income skewing seems not commonly adopted by farmers in the two Farming Systems as shown in the Figure 5.14 below.

**Figure 5.15 Adoption and effectiveness of less important *ex ante* strategies, FS3 and FS1&2**



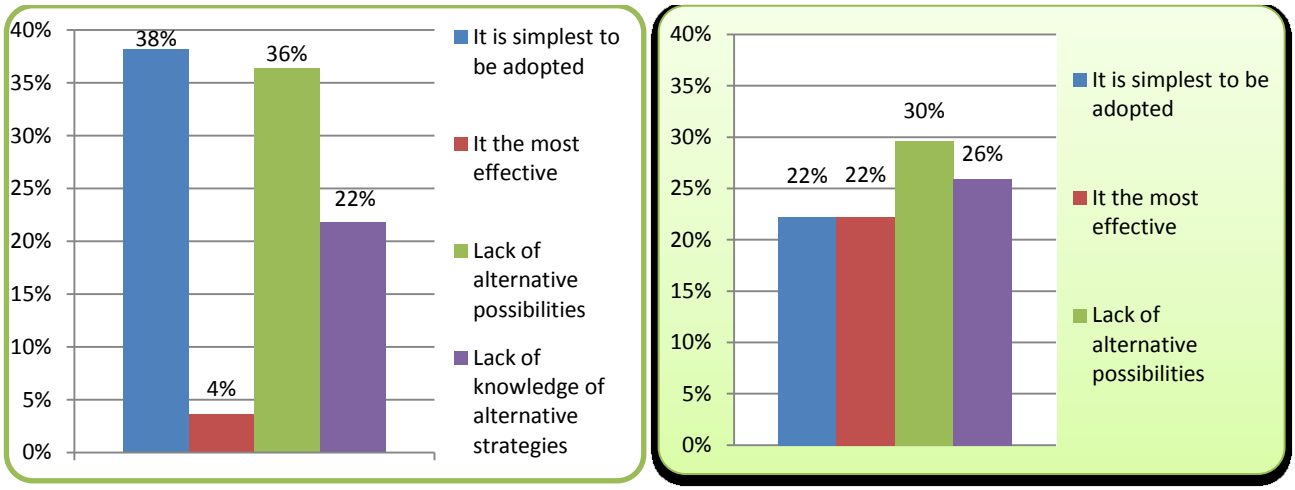

**Informal credit** seems the most relevant ***ex-post* strategy** for risk-coping in FS 3 in addition to **consumption smoothing** strategy adopted by farmers as risk-coping strategy to reduce the effects of adverse risky event. However, informal credit seems less relevant for risk coping in FS 1&2 whereas consumption smoothing has a moderate adoption rate.

In contrast, **Formal credit** seems the most relevant strategy for risk-management in FS 2&1. Here it is important to clarify that formal and informal credit strategies are used by farmers as *ex ante* and *ex post* risk management strategies, where they used to buy inputs and finance the cultivation from one side and for consumption smoothing once the income risk occurs from the other side.

Figure 5.15 shows the comparison of the main motives of farmers for adoption the two strategies informal credit in FS3 and formal credit in FS 2&1. Despite the fact that farmers believe that informal credit is not the most effective strategy to be used in FS3, they adopt it mainly because it is simplest to be applied. The

formal credit strategy instead is adopted by farmers in FS 1&2 due to lack of alternative possibilities and lack of knowledge about alternative strategies.

**Figure 5.16 Motives for adopting informal credit and formal credit, FS3 and FS1&2**




**Working out of agricultural** sector is a very relevant ex-post strategy in the two Farming Systems, FS3 and FS 1&2, mainly due to the existing small holding sizes and land fragmentation that encourages households' members to seek jobs out of agricultural sector and usually out of the country.

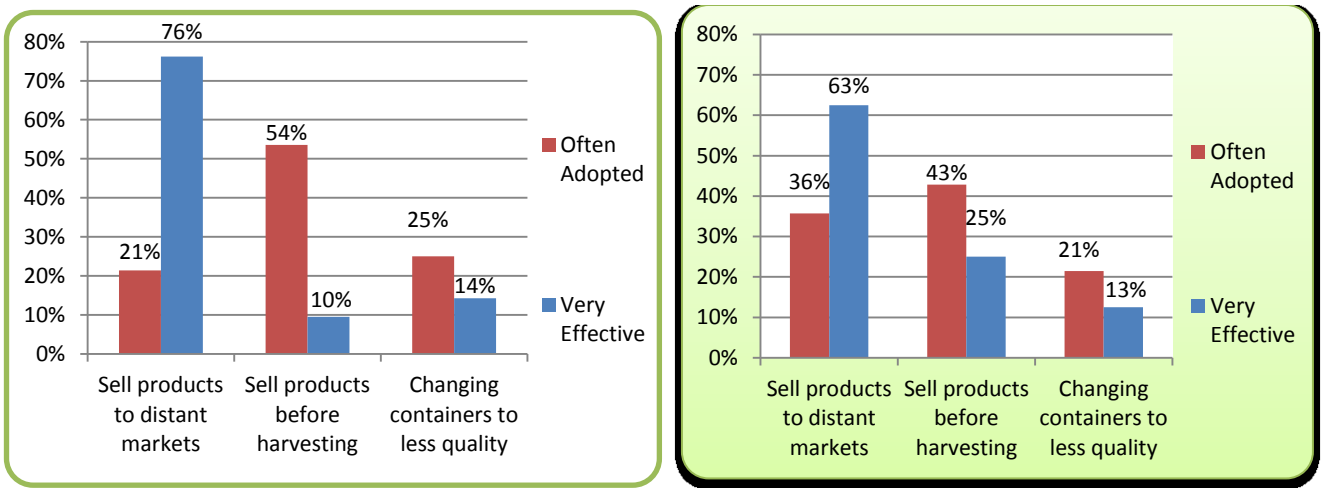
**Asset liquidation** strategy is proven to be less important in the two Farming System give the impression that there is no severe risk that enforce farmers to sell their capitals.

Finally, experts emphasize that **safety nets**, **support programs** and **welfare policies** are not relevant risk-coping strategies in FS 3. However, the adoption of these policies seems more relevant in FS 1&2 but their adoption still relatively ambitious where not all experts believe that these are very relevant strategies within FS 1&2 areas.

The vegetables are the most exposed **specialty crops** to price risks in FS 3. In particular tomatoes, onion, garlic and cucumbers are the most exposed mainly due to the crops sensitiveness. Whereas citrus, apricots, apples, peaches are the most exposed crops to price risk in FS 1&2 mainly due their perishability and the lack of storage facilities. However, 29% of experts stress that citrus and apples can be stored for few months but again there still a lack of the capacity of the cooling units. Olive oil and dried fruits are the least exposed crops to price risk affecting in the two Farming Systems. However, some olive oil is also exposed to price risk due to the high marketing costs resulting from land fragmentation and the alternation, and due to exporting technical constraints and the lack of adequate storing facilities.

In order to cope with **price risks** farmers use several strategies as well as selling their products to distant markets, or selling the products before harvesting or changing the containers to less quality in order to reduce the marketing cost. The strategy of "selling the products before harvesting" is well adopted by farmers in the two Farming Systems despite the fact that it is not an effective strategy as shown in Figure 5.17. While the first strategy which seems very effective according to the experts is not used frequently by farmers in FS 3 but used very well by farmers in FS 1&2 manly for marketing the citrus production to the main cities' markets. The third strategy of "changing containers to less quality", in turn, is moderately used by farmers in the two zones regardless of its low effectiveness.

**Figure 5.17 Adoption and effectiveness of some price risk-coping strategies, FS3 and FS1&2**




Regarding the **production risk**, farmers cope with production risks by changing crops or seeds, or reducing the area planted in the subsequent area; however, in both cases it seems they rarely adopt agronomical techniques to improve or stabilize yields in FS 3. In contrast, FS 1&2 farmers seem to cope with olive oil production/yield risks adopting specific agronomical techniques to improve or stabilize yields.

Farmers cope with **policy changes risks**, in general, by reducing the inputs, borrowing inputs and planting crops that require low inputs. The most effective strategy in FS 3 is the third one; instead farmers in FS 1&2 cope with these risks by reducing the inputs, mainly waters and fertilizers.

Finally, farmers cope with the most common **idiosyncratic risks** like illness and death through the social help from other family members and distributing the land among other household members to be able to take care of the agricultural activities. However, the idiosyncratic (personal) risks seem not relevant in both Farming Systems according to the majority of our experts.

The agricultural income, in general, represents the largest source of income within the studied rural areas where food accounts for more than 40% of total households' expenditure. As a result income, expenditure

and agricultural prices dynamics would be tightly linked. However, experts assert that there is no clear consensus on the influence of international dynamics (via the changing of the inputs and food prices as well) on income/expenditure and local economies in the two Farming Systems where the influence of international dynamics is rather limited. Accordingly, they give more weight to the harvesting, processing, storing and internal marketing policies in the determining the price and as a sequence influencing the price risk. In fact, the most majority of experts claim that the existing price risks are more related to the "marketing" policy, which implicitly includes planning the planted area and acquiring and improved the processing of the production in addition to insuring the output marketing. This marketing problem is clearer in FS 1&2 where crops like citrus, apples, olives and other fruits are prevalent and which need special processing, storing and marketing concern from the government. Instead, the most crops planted in FS 3 are strategic crops and marketed by the state.

According to the on-farm survey, the diversification of crops and income sources are strategies to manage risks in agriculture but they are not relatively highly adopted by farmers. Experts justify this because farmers lack of financial capital and agricultural labor from one side and the small holding size and land fragmentation from the other side. In addition to that, the limited number of alternative crops and varieties planted in the area constrains agricultural diversification which is also limited because the lack of marketing plans for the new crops. Income diversification, in turn, is limited by the lack of farmers' expertise, skills and human and financial resources to diversify. Low education rate and the rare job opportunities in the area also limited the diversification of income in FS 3. In FS 1&2, the same reasons are applied in addition to the fact that almost all farms are occupied by trees, in general, which does not allow for crop cultivation and leave little space to diversify crops and trees which require long time and huge investment to be replaced by others.

**Strategic crops** are defined as crops for which the Government sets prices at which government establishments will purchase from farmers or their cooperatives. This definition leads to the following crops being classified as strategic: wheat – cotton - barley – sugar beet. In fact, all experts affirm that production risks, mainly drought but also pest and diseases are considered the most relevant risks faced by farmers in FS 3 while these crops are not relevant in FS 1&2 where there are no significant planted areas.

Generally, farmers in the two farming systems who do not have **savings accounts** usually save money in alternatives ways, e.g. buying houses, land, cars, tractors, storable inputs or outputs, as well as keeping money in cash at home. In fact, farmers do not use bank savings accounts due to several reasons:

1. they prefer capital in kinds like a house, a piece of land or a car;
2. they prefer money at hand to be used directly in financing the agricultural activities and improving farm infrastructures;
3. they could employ money in trade activities mainly of agricultural products;
4. the fact that interest is prohibited in Islam reduce dealing with it and with bank as a consequence;
5. farmers keep money at hand due to lack of savings and the need to fulfill the farm and house expenditures;
6. the lack of banks' branches in the rural area make;
7. the lack of farmers' confidence of these banks within the two farming systems; and
8. the limited knowledge and low farmers' awareness about the functioning of the bank and its working procedures.

Most of the mentioned constraints are common between the two farming systems, however, farmers in FS3 are more concerned about the interest rate than those in FS 1&2, mainly due to their stronger religious beliefs (being more religiously conservative). In contrast, farmers in FS 1&2 are more concern about the boring routine, bureaucracy and complicated administrative procedures in depositing and withdrawing the money from the bank branches.

The common source of **formal credit** is the Agricultural Cooperative Banks (ACB), borrowing from wholesalers and from friends/neighbors are the mostly common sources of informal credit. The informal credit is costly with respect to formal credit which is preferred by farmers. However, personal loans from sectors other than agriculture are the common used type of informal credit in FS 1&2.

The **complexity of procedures** is the main limitation to access to formal credit. The two Farming Systems suffering from bureaucracy related to the functioning of bank and the routine that costs farmers money and time to collect the required document are the main aspects of the complex procedure. Farmers also need to provide the bank by documents that affirm their ownership like the property registration of land or the mortgaged declaration. However, and due to land fragmentation and the heritage problems, in many cases the property of the land is not entitled to the current owner but to his father or grandfather or other relatives, so it is difficult to have complete ownership of the land. The corruption at the bank employees' level is constraints farmers' ability to complete their required documents to get the loans. The lack of the experience of bank's employees is also other reason to hold back the process of getting loans in addition to the fact that the bank is deducting the interest at the same time of providing the loans, which is not accepted by many farmers. On the other side, almost all experts state that the second problem of getting loans by farmers is the lack of collaterals due to excessive land fragmentation. In addition, experts stress

that formal credit is poorly managed by the farmers in FS 1&2 and this also limits the farmers' access to loans.

The interest rate is important regarding access to credit where the excessively high interest rates limit the access to informal credit in the two studied zones. Some experts also claim that the excessively high interest rates limit access to formal credit.

The **insurance** is very limited currently in agricultural sector, where the only example is the fund for **insuring cattle** at the agricultural chamber but it seems that farmers rarely stipulate contracts to insure their cattle. However, farmers do not use this form of insurance firstly due to their lack of knowledge and awareness about the fund. Second reason is the lack of confidence between farmers and the funds' employees due to corruption, where farmers believe that the fund set hard conditions and administrative procedure to get the payment. The lack of awareness about the importance of the insurance for farmers and because it is new experience is also limit the insuring rates. Eventually, the small number of cows owned by each farmer and the short period of keeping the animals especially for males used for meat production could also be a reason to limit the adoption of the insuring fund.

As a result, insuring seems to be new concept for farmers and needs much time to be understood well and then to be adopted, actually farmers still reluctant to stipulate insurance contracts (e.g. for production yield, whether, price risk etc.).

## Chapter Six: Conclusions and Recommendations

The current chapter is devoted to provide the main general conclusions and recommendations of the research. It starts by highlighting the economic conditions of the study zone and discussing the main research objectives and limitations before presenting a summary of the main thesis results and finally suggesting the future related study areas.

The economic general political situation in Syria has been changed to a more open economy after the central planning period where the Government has been involved strictly in the economy to achieve the national objectives especially those related to food security and of food self sufficiency. In addition, the GOS was able to isolate farmers from the adverse conditions such as price shocks and fluctuations. However, the Government started in the early nineties a program of economic reforms giving more freedom to the private sector, moving to 'indicative' planning in agriculture and giving augmented awareness of risk and uncertainty and their impact on the stability of agricultural incomes.

The economic reforms in Syria have been accelerated during last decade with more direction towards the open global market economy and the social market economy aiming to achieve competitive economy and social equity as well. These reforms intended to deal with the fast international economic developments by improving the legislative and regulations of the economic environment and give more space to the private sector in the economic development process. The main reforms projected to give a balanced development among different economic and service sectors and accelerating the economic growth, decreasing the unemployment rate, increasing exports, improving infrastructures and productivity and updating the financing system.

Regarding the agricultural policy in Syria, it aims mainly to achieve food sufficiency by increasing agricultural production and improving product quality for enhancing exports. These policies have been implemented by increasing the invested and irrigated lands and achieving self sufficiency in some strategic crops which also results in improving the contribution of agricultural sector to GDP. In specific, the present policies would improve the agricultural production and insure its marketing, the development of the infrastructures and protection of the agricultural and rural environments. Investing more in agricultural researches and extension services, improving animal production, promoting agro-processing and conserving land and water are other central aspects of the agricultural policies.

The trade policies have been also reformed by establishing export-oriented approach and diversifying the national combination of exports. The new legislations and laws intended to develop the exports by improving the agricultural products' quality to be suitable to the requirements of the international markets

by motivating organic and bio fertilizers production and developing new sorting, packing, and packaging methods. Enhancing exports by exempting the agricultural exports' taxes reduce the duties on imports of the required agricultural inputs and offering subsidized air transportation facilities for exporting are other positive trade policies. Consequently the new reforms of the agricultural and trade sectors have shifted the agricultural relatively closed market to a more open and integrated market to the world economy.

Before summarizing the main conclusions, it is important to recall the main objective of the thesis which is to highlight the food security situation in Syria and explore the different agricultural risks and their related management strategies. The objective is researched by investigating a set of more detailed specific objectives. Highlighting the current situation of the food security in Syria is the first task of the thesis while investigating the types of risks and government/farmers strategies to cope with them is the other task. In addition, investigating the existence of markets for risk management instruments, highlighting the institutional arrangements adopted by the farmers, and exploring the existence of institutions for the management of agricultural crises and natural disasters are the other objectives.

The main limits of the research were related to the data collection task which has been constrained by logistic problems of carrying out the required survey because the instability of political and security condition in Syria at this period. Due to the contingent situation of civil conflict in Syria, the analytical approach of the thesis focused on a qualitative investigation based on secondary data and the specific information collected through the Delphi survey.

The ambiguous and confused directions of the Syrian economic policies at macro as micro economic level was also another important limit to the research that does not allow to carry out clear analyses. For example, the prices of fuel have been often changing in short time, the exchange rate of the Syrian currency has been also changing frequently and the banking and credit system policies have the most rate of instability. Trade policies have been also changing frequently especially those related to the dedication of foreign currency by the central bank to imports which has been reduced significantly and constrained mainly to import the urgent needs of food commodities. This has been reflected on real economic problems resulting mainly from the international sanctions imposed against the Syrian economy in general and against the banking system in specific.

The main conclusion regarding the food security tells that the Syrian food security situation is more or less comparable to the general food security situation of other Middle Eastern countries like Jordan and Lebanon. Food aggregate and per capita availability have an acceptable level which is also applied to the state of food accessibility and supply stability. Food utilization, however, exhibits low level compared to

other countries especially EU countries and USA, and lies under the world average in some cases e.g. for many vitamins intake. Therefore, it is important that GOS undertaken the required actions and policies to fill in the gap of food deficiencies both by developing the agricultural products and introducing reforms to the trade sector especially those related to importing and exporting of the main food commodities.

The results from the Delphi survey reveal the existence of different types of agricultural risks in Syria, namely the price, marketing, production, financial and policy change risks. While the idiosyncratic (individual) risks are considered at less important. These risks are faced by a set of related risk management strategies classified into two main groups, the first is the ***ex ante*** risk management strategies like crop and income diversification, specialization, precautionary savings, income skewing and production/marketing contracts. The second group of strategies is the ***ex post*** risk coping strategies like consumption smoothing, informal and formal credit, asset liquidation and working out of agriculture, in addition to the existing of safety nets, supporting programs and welfare policies.

Different study zones exhibit diverse extent and severity of different risk types from one side and different policies and strategies of risk management from the other side. Differences in risks and their related management strategies between the study zones are related mainly to the different agro-climatic zones, cropping patterns and the presence of strategic crops. While the different Government agricultural policies, different cultures, norms sand religion beliefs and different education levels and sequentially different job opportunities are other reasons for those divergences.

The results of on-farm survey have revealed the role of different institutions in agricultural risk-management. A salient feature of these institutions is their role in the adoption of *ex ante* risk management strategies rather than the *ex post* risk-coping ones. In addition, they do not have actual working mechanisms for *ex post* risk-coping strategies like agricultural insurance but they intervene by relief solutions according to the type and the intensity of risks.

The main institution related to the agricultural sector is the Agricultural Extension that provides farmers with several important services for agricultural risk management (mainly production and marketing). In addition, extension unit plays an important role of agricultural risk management: the evaluation and compensation of the damage caused by the disasters like drought, diseases, frost, wind and others that negatively affecting the agricultural production. Other important institutions related to the performances of the agricultural sector and have risk management role are the Peasant Associations (cooperatives), The Agricultural Cooperative Bank and The Unemployment Combating Commission. The function of these

institutions as agricultural risk management institution, in fact, needs many reforms in their basic performances.

The common feature of the functioning of these institutions is that the majority of them do not work as planned. This, in fact, indicates to two essential issues related to the operational procedure of these institutions, particularly to their human capital situation. A first issue is the high level of corruption affecting the functioning of these institutions, which result in many cases to the collapse of their performance. Such a problem should be seriously taken into account by the government. The second is related to the administrative level of most institutions that need to be developed and trained in order to achieve more efficient utilization of these institutions' roles in agricultural risk management.

Delphi survey has revealed that the agricultural risk management sector is still an immature sector in Syrian agriculture and needs a lot of awareness from the Government, farmers, and related institutions. However, in addition to the implemented polices and institutions working directly or indirectly for agricultural risk management, GOS has recently started to give more attention to the issue by adopting some emergency policies in the case of production failures or natural disasters that affect the agricultural sector in specific areas. The recently announced "Disaster Alleviation Fund" established to compensate farmers who have negatively been affected by drought, frost, flood or other adverse climatic conditions is considered one example. Deferring the repayment of farmers' loans is another example of the government policies in the case of common production failure affecting specific crops or striking certain area. These two examples can be considered as *ex post* risk management policies aiming to alleviate the negative effects of the risk once it has been realized. However, the *ex ante* Government policies directed to agricultural risk management are more spread in Syria. These policies aim to enhance the agricultural production process and to improve it through the functioning of the different institutions working in the agricultural sector and belong to the MAAR and other related ministries. The aforementioned policies and institutions (sections 4.2.2, 4.2.3, 4.2.4 and 4.2.5) help farmers by providing production inputs and financial services e.g. ACB, extension services and marketing services especially for strategic crops. Some policies are directed to alleviate production risks by organizing the use of the natural resources mainly water, e.g. NPCMI is the establishment for promoting the conversion to modern irrigation techniques has a significant role in agricultural production risk management. Other institutions offer loans for income generating projects in agricultural sector like GCEBD and UCC which are Government institutions and other NGOS like FIRDOS that contribute mainly to manage financing risks. In fact, all policies and institutions of the Government, NGOS and other regional and international organization working in Syria contributing by different means to manage production and financial risks and to less extent marketing and price risks.

Two sets of recommended suggestions are required to boost the agricultural risk management sector in Syria. The first set is the required policies to be performed by the government at the aim of alleviation the occurrence of those risks and coping with their negative effects as well. The second set is the farmers' own risk management strategies that could be adopted for the purposes of agricultural risk management.

The set of recommended policies could be devised to enhance the government role in the management of the existing agricultural risks. According to the study zone the recommended policy suggestions differ in for each different farming system by changing their relevance to farmers. Consequently, the most important policy suggestion for FS 3 that cultivates significant quantities of strategic crops (wheat, cotton and sugar beet) in addition to various types of freely marketed crops are (i) establishing a marketing system for all crops managed by the government and (i) improving the water management and irrigation services. The policy recommended for risk management in FS 1&2 that planting mostly freely marketed crops (fruits, olives and vegetables in green houses) are similar to those in FS 3 where they have the same first priority of establishing a marketing system for all crops managed by the government, which reflects the important of insuring marketing of the farmers' outputs. In contrast the second and third priorities for FS 1&2 are more relevant to the freely marketed crops where farmers claim the needs to (i) limit (e.g. by tariffs) imports of goods produced in Syria and to (ii) Improve storage facilities to delay the selling when prices are too low. Establishing funds for agricultural disasters is also important policy to be implemented by the government reflecting the existence of many types of production risks like the drought, frost, storms and flood.

However, farmers in the two farming systems rank the need for establishing insurance market for agricultural production as their last priority to be undertaken by the government.

The second set of recommended strategies adopted by farmers, to improve their risks management mechanisms, is almost similar in the two study zones. In specific, the diversifying the income sources and cultivated crops are the most important strategies in FS 3, while where organizing production and selling activities in cooperatives is the most important in FS 1&2 reflecting the farmers need for more secure marketing system. In addition the stipulation of insurance contracts seems more important for farmers in FS 1&2 than those in FS 3. Therefore, it seems important to plan how to implement an insurance system within the FS 1&2 that is characterized by freely marketed production.

However, much effort must be done by GOS to manage the agricultural risks including the establishment of agricultural insurance framework.

Finally, depending on what already stated above, the agricultural agents in Syria still reluctant to adopt the risk sharing strategies especially the insurance strategy, which award more space to the subject to be

studied by more consideration. In specific, the agricultural risk management issue still has the potential for further studies especially on the following research questions:

I. Why farmers are reluctant to adopt insurance as risk sharing strategy;
II. How to induce and encourage farmers of adopting insurance strategy in the future;
III. How the welfare of different agricultural stakeholders would be affected by adopting different scenarios of macroeconomic policies, agricultural policies, or *ad hoc* policies for risk management.

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# Annexes

**Annex A3-1 On Farm Semi-structured Risk Management Questionnaire**

## Questionnaire on Risk Management in Agriculture

### I. GENERAL INFORMATION

1.1. Questionnaire No ----------

1.2. Mouhafaza ----------

1.3. Mantika ----------

1.4. Nahia ----------

1.5. Village ----------

1.6. Zone ----------

1.7. Farming System ----------

1.8 Household head name ----------

1.9. Name of respondent ----------

1.10.Household's phone number ----------

1.11 Name of Enumerator ----------

1.12. Date of visit ----------

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**HOUSEHOLD ASSETS**

## A. Human Capital

**Socio demographic characteristics**

| Q No. | Description | RESPONSE |
|---|---|---|
| Q 2.1 | Age of household head (years) | |
| Q 2.2 | Highest level of school education completed<br>**0** =None **1**= Can read and write **2**= Primary **3**= Secondary<br>**4**= High school **5=** Institute **6=** University | |
| Q 2.3 | Number of years of formal schooling? | |
| Q 2.4 | Number of years of farming? | |
| Q 2.5 | No. of HH members with no education * | |
| Q 2.6 | No. of HH members who can read and write only * | |
| Q 2.7 | No. of HH members completed elementary school only * | |
| Q 2.8 | No. of HH members completed preparatory school only * | |
| Q 2.9 | No. of HH members completed secondary school only * | |
| Q 2.10 | No. of HH members completed an institute only * | |
| Q 2.11 | No. of HH members completed university * | |

*** Note: only refer to the last degree**

**Household composition**

| Q No. | Age range | HH members residing in the village | | Total HH members working on the farm | | Total HH members working on farm full time | |
|---|---|---|---|---|---|---|---|
| | | Female | Male | Female | Male | Female | Male |
| | | **a** | **b** | **c** | **d** | **e** | **f** |
| Q 2.12 | < 7 years | | | - | - | - | - |
| Q 2.13 | 8 - 15 years | | | | | - | - |
| Q 2.14 | 16 – 60 years | | | | | | |
| Q 2.15 | > 60 years | | | | | - | - |

Q 2.16: Total family size: _____Persons

## B. Social capital

Q 2.17. Are you a member of cooperatives?

1=Yes 2= no

Q 2.18. Do you receive any tangible resources or services that support your livelihood from other households (when is needed)?

*1-Receive money*

*2- Receive food*

*3-Receive farm input*

*4-Nothing*

*5-Other (specify)*

Q 2.19: Are there any types of cooperation between your HH and other kinship or neighbour?

1= yes 2= no

Q 2.20: If yes, which type?

On-farm type of activity

*1- Irrigation*

*2- Sowing*

*3- Weeding*

*4- Harvesting*

*5- Marketing*

*6- Other (specify)*

Q 2.21. What is the level of your participation in your community?

*1- leader*

*2- very active*

*3- active*

*4- moderate*

*5- not active*

**C. Natural Capital**

Q: What is your total land holding? ----------(ha)

| | Land tenure type | Area of the holding | | | |
|---|---|---|---|---|---|
| | | Irrigated | Rainfed | Supplementary Irrigation | Total |
| | | **a** | **b** | **c** | **d** |
| Q 2.22 | Owned | | | | |
| Q 2.23 | Rented | | | | |
| Q.2.24 | Share cropping | | | | |
| Q.2.25 | Other (specify) | | | | |
| Q 2.26 | Other (specify) | | | | |

Q: What is your total livestock holding?

| | Livestock type | 2000 | 2005 | 2008 |
|---|---|---|---|---|
| | | **a** | **b** | **c** |
| Q 2.27 | Milk Cows | | | |
| Q 2.28 | Fattening Cows | | | |
| Q 2.29 | Milk Sheep | | | |
| Q 2.30 | Fattening Sheep | | | |
| Q 2.31 | Milk Goats | | | |
| Q 2.32 | Fattening Goats | | | |

Q 2.33 If number changed state the reason ----------

*1=sold for financial reasons*

*2= given as gifts*

*3= died or stolen*

*4= bought*

*5= other (specify)*

**D. Physical capital**

Can you estimate the value of the following items if available?

| | Items | Number of units | Market Price per unit (current value) | Total Value |
|---|---|---|---|---|
| | | **a** | **b** | **c** |
| Q 2.34 | Non-arable land (Donum) | | | |
| Q 2.35 | Arable land (Donum) | | | |
| Q 2.36 | Land planted with trees (Donum) | | | |
| Q 2.37 | House (Number) | | | |
| Q 2.38 | Shops (Number) | | | |
| Q 2.39 | Tractors(Number) | | | |
| Q 2.40 | Drill (Number) | | | |
| Q 2.41 | Plough (Number) | | | |
| Q 2.42 | Tractor accessories (Number) | | | |
| Q 2.43 | Mower /grass cutting (Number) | | | |
| Q 2.44 | Hoe (Number) | | | |
| Q 2.45 | Irrigation equipments (Number) | | | |
| Q 2.46 | Harvesting machines (Number) | | | |
| Q 2.47 | Trailer (Number) | | | |
| Q 2.48 | Milk extractor(Number) | | | |
| Q 2.49 | Milk processor(Number) | | | |
| Q 2.50 | Rollers (Number) | | | |
| Q 2.51 | Motorcycle (Number) | | | |
| Q 2.52 | Cars (Number) | | | |
| Q 2.53 | Pick-up (Number) | | | |
| Q 2.54 | Lorry / truck (Number) | | | |
| Q 2.55 | Other equipments (specify) | | | |
| Q 2.56 | Other equipments (specify) | | | |

**E. Financial Capital**

Q 2.57: In what form do you keep savings?

*1-I don't keep savings*

*2- Jewellery*

*3- Cash*

*4- Bank deposit*

*5- Livestock*

*6- Other (specify*)

Q 2.58: How many HH members have a regular salary? No. --------

Q 2.59: How many HH members have a casual wage? No. --------

Q 2.60: Is there any member of your family living away for remit money? No. --------

## II. HOUSEHOLD INCOME AND EXPENDITURE

### A. Household income

Household income by sources during the last 12 months **(net income)**

| | Sources of income | Amount (000 SP) |
|---|---|---|
| Q3.1 | cash income from sale of wheat | |
| Q3.2 | cash income from sale of cotton | |
| Q3.3 | cash income from sale of tobacco | |
| Q3.4 | cash income from sale of sugar beat | |
| Q3.5 | cash income from sale of other crops | |
| Q3.6 | cash income from sale of livestock | |
| Q3.7 | cash income from sale of livestock products (milk, eggs, meat…) | |
| Q3.8 | cash income from regular agricultural wage jobs | |
| Q3.9 | cash income from irregular agricultural wage jobs | |
| Q3.10 | cash income from regular non-agricultural wage jobs | |

| | | |
|---|---|---|
| Q3.11 | cash income from irregular non-agricultural wage jobs | |
| Q3.12 | cash income from own non-agricultural enterprise | |
| Q3.13 | cash income from pensions | |
| Q3.14 | cash income from land rent | |
| Q3.15 | cash income from state and NGO assistance | |
| Q3.16 | cash gifts from friends, neighbours and relatives | |
| Q3.17 | cash from remittances from household members living elsewhere | |
| Q3.18 | Income from other sources (specify)---------- | |
| Q3.19 | Income from other sources (specify)---------- | |

Q3.20 Is your current household income adequate to meet your needs?

*1=not enough even for food*

*2=enough for food but nothing left for other necessities*

*3=enough for food and necessities, but not much left for other expenses;*

*4=enough to meet most of our needs and we can make savings*

**B. Household Expenditure**

Q 3.21 What is the average of your monthly consumption? ----------(000 SP)

What is the average amount spent **per month** for the following:

| | Item | Value (000 SP) |
|---|---|---|
| Q 3.22 | Food | |
| Q 3.23 | Self-sufficient commodities | |
| Q3.24 | Non-food (clothes, house maintenance, fuel, gas) | |
| Q3.25 | Health | |
| Q3.26 | Education | |
| Q3.27 | Electricity, water, and phones | |
| Q3.28 | Transportation (+ car fuel, maintainance) | |
| Q3.29 | Other expenditure (specify) | |
| Q3.30 | Other expenditure (specify) | |

Q 3.31 What are the main self-sufficient products and their percentages of total production?

| | Products | Share of total production (%) | Value (000 SP) |
|---|---|---|---|
| | **a** | **b** | **c** |
| Q3.31-1 | | | |
| Q3.31-2 | | | |
| Q3.31-3 | | | |
| Q3.31-4 | | | |
| Q3.31-5 | | | |

## III. ACCESS TO CREDIT

Q 4.1 What are the main credit sources available in your area (Mantika level)?

| **Source** | | **1= yes 2= no** | **Interest rate (%)** |
|---|---|---|---|
| | | **a** | **b** |
| Q 4.1-1 | Agricultural bank | | |
| Q 4.1-2 | Unemployment programme. | | |
| Q 4.1-3 | Other banks | | |
| Q 4.1-4 | Agricultural inputs shop | | |
| Q 4.1-5 | Traders | | |
| Q 4.1-6 | Shopkeeper in the village | | |
| Q 4.1-7 | Relatives and/or friends | | |
| Q 4.1-8 | Sandouk | | |
| Q 4.1-9 | Agricultural. cooperative. | | |
| Q 4.1-10 | Cheese makers | | |
| Q 4.1-11 | Other GVT. Institutions. | | |
| Q 4.1-12 | Agricultural subsidy fund | | |
| Q 4.1-13 | Other source (specify) | | |
| Q 4.1-14 | Other source (specify) | | |

Q 4.2 During the last 12 months, have you borrowed (Cash and/or in Kind)

1= yes 2= no

If yes, please specify what was the main source?

| Source | | Amount (000 SL) | | Duration | Interest rate (%) | Purpose of credit | Were you able to repay on time? 1=yes 2=no |
|---|---|---|---|---|---|---|---|
| | | Cash | In Kind | | | | |
| | | **a** | **b** | **c** | **d** | **e** | **f** |
| Q 4.2-1 | Agricultural bank | | | | | | |
| Q 4.2-2 | Unemployment programme. | | | | | | |
| Q 4.2-3 | Other banks | | | | | | |
| Q 4.2-4 | Agricultural inputs shop | | | | | | |
| Q 4.1-5 | Traders | | | | | | |
| Q 4.2-6 | Shopkeeper in the village | | | | | | |
| Q 4.2-7 | Relatives and/or friends | | | | | | |
| Q 4.2-8 | Sandouk | | | | | | |
| Q 4.2-9 | Agricultural. cooperative. | | | | | | |
| Q 4.2-10 | Cheese makers | | | | | | |
| Q 4.2-11 | Other GVT. Institutions. | | | | | | |
| Q 4.2-12 | Agricultural subsidy fund | | | | | | |
| Q 4.2-13 | Other source (specify) | | | | | | |
| Q 4.2-14 | Other source (specify) | | | | | | |

Q 4. 3 If no, why?

*1= no need*

*2= unable to borrow for the lack of collateral*

*3=unable to borrow for lack of source of credit*

*4= other (specify)*

Q 4.4 Do you have other loans (medium/long term) that you are repaying now?

| | Source | Amount (000 SP) | Date of getting loan | Duration | Purpose | Remain balance | Interest rate % | Were you able to repay on time? 1=yes 2=no |
|---|---|---|---|---|---|---|---|---|
| | | **a** | **b** | **c** | **d** | **e** | **f** | **g** |
| Q 4.4-1 | Agricultural bank | | | | | | | |
| Q 4.4-2 | Other banks | | | | | | | |
| Q 4.4-3 | Other GVT. In. | | | | | | | |
| Q 4.4-4 | Other source (specify) | | | | | | | |
| Q 4.4-5 | Other source (specify) | | | | | | | |

Q 4.5 What are the most important problems you face when you get formal credit?

*1= complicated procedures*

*2= high demand for the collateral by the ACB*

*3= insufficient amount of the credit*

*4= high cost of documentation required (i.e. crop license) relative to the size of the loan*

*5= other (specify)*

*0= no problems*

Q 4.6 What are the most important problems you face when you get informal credit?

*1= high interest rate*

*2= insufficient amount of credit*

*3= the repayment duration is restricted (not flexible)*

*4= other (specify)*

*0= no problems*

Q 4.7 Are you able to access to the credit market to buy farm inputs **on time**?

1= yes 2= no

Q 4.8 If "yes', what is the source of finance?

*1= the Agricultural Cooperative Bank (ACB)*

*2= other formal sources (sandouk, cooperative…etc)*

*3= local trader*

*4= friends and relatives*

*5=other sources (specify)*

Q 4.9 If finance were not available, would the production be negatively affected?

*1= not affected*

*2= somewhat*

*3= a lot*

Q 4.10 Do you buy your inputs and pay later?

1= yes 2= no

If “yes”, what are the inputs you buy this way and their values?

| Input | | paid value (000 SP/ton) | Actual value (000 SP/ton) |
|---|---|---|---|
| | | **a** | **b** |
| Q 4.10-1 | Input 1 | | |
| Q 4.10-2 | Input 2 | | |
| Q 4.10-3 | Input 3 | | |
| Q 4.10-4 | Input 4 | | |

Q 4.11 Do you sell your production in advance?

1= yes 2= no

If “yes”, what is the price you receive compared to the actual price of product?

| Crop | | Selling price (SP/kg) | Actual/market price (SP/kg) |
|---|---|---|---|
| | | **a** | **b** |
| Q 4.11-1 | Crop 1 | | |
| Q 4.11-2 | Crop 2 | | |
| Q 4.11-3 | Crop 3 | | |
| Q 4.11-4 | Crop 4 | | |

**RISK OR PRODUCTION LOSS PREVENTION STRATEGIES**

***Note: Numerator Explain to the respondent what crop insurance is***

| | **Crop** | | **Source of risk** | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Drought | Heavy rainfall, flooding, untimely rains, hailstorm , frost | Unexpected decline in non-strategic crops price compared to the previous year | Major harvest losses due to wild animals, birds, livestock, insects, pests | Increase the input prices | Unexpected change in marketing policies | Other (specify) |
| | | | **a** | **b** | **c** | **d** | **e** | **f** | **g** |
| Q 4.12 | **Wheat** | 4.12-1 How many years has the HH been affected Over the past ten years **(couldn't cover production costs)** | | | | | | | |
| | | 4.12-2 When did you last face this risk? (give date) | | | | | | | |
| | | 4.12-3 How much loss comparing to normal year (SP/ha) | | | | | | | |
| | | 4.12-4 What is the maximum premium you are willing to pay as insurance (SP/ha) | | | | | | | |
| Q 4.13 | **Barley** | 4.13-1 How many years has the HH been affected Over the past ten years**(couldn't cover production costs)** | | | | | | | |
| | | 4.13-2 When did you last face this risk? (give date) | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 4.13-3 How much loss comparing to normal year (SP/ha) | | | | | | | |
| | | 4.13-4 What is the maximum premium you are willing to pay as insurance | | | | | | | |
| Q 4.14 | **Cotton** | 4.14-1 How many years has the HH been affected Over the past ten years**(couldn't cover production costs)** | | | | | | | |
| | | 4.14-2 When did you last face this risk? (give date) | | | | | | | |
| | | 4.14-3 How much loss comparing to normal year (SP/ha) | | | | | | | |
| | | 4.14-4 What is the maximum premium you are willing to pay as insurance | | | | | | | |
| Q 4.15 | **Trees** | 4.15-1 How many years has the HH been affected Over the past ten years**(couldn't cover production costs)** | | | | | | | |
| | | 4.15-2 When did you last face this risk? (give date) | | | | | | | |
| | | 4.15-3 How much loss comparing to normal year (SP/ha) | | | | | | | |
| | | 4.15-4 What is the maximum premium you are willing to pay as insurance | | | | | | | |
| Q 4.16 | **Livestock** | 4.16-1 How many years has the HH been affected Over the past ten years**(couldn't cover production costs)** | | | | | | | |
| | | 4.16-2 When did you last face this risk? (give date) | | | | | | | |
| | | 4.16-3 How much loss (SP/head) | | | | | | | |
| | | 4.16-4 What is the maximum premium you are willing to pay as insurance | | | | | | | |

| | Crop | | Source of risk | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Drought | Heavy rainfall, flooding, untimely rains, hailstorm , frost | Unexpected decline in non-strategic crops price compared to the previous year | Major harvest losses due to wild animals, birds, livestock, insects, pests | Increase the input prices | Unexpected change in marketing policies | Other (specify) |
| | | | **a** | **b** | **c** | **d** | **e** | **f** | **g** |
| Q 4.17 | | 4.17-1 How many years has the HH been affected Over the past ten years **(couldn't cover production costs)** | | | | | | | |
| | | 4.17-2 When did you last face this risk? (give date) | | | | | | | |
| | | 4.17-3 How much loss comparing to normal year (SP/ha) | | | | | | | |
| | | 4.17-4 What is the maximum premium you are willing to pay as insurance (SP/ha) | | | | | | | |
| Q 4.18 | | 4.18-1 How many years has the HH been affected Over the past ten years**(couldn't cover production costs)** | | | | | | | |
| | | 4.18-2 When did you last face this risk? (give date) | | | | | | | |
| | | 4.18-3 How much loss comparing to normal year (SP/ha) | | | | | | | |
| | | 4.18-4 What is the maximum premium you are willing to pay as insurance | | | | | | | |
| Q 4.19 | | 4.19-1 How many years has the HH been affected Over the past ten years**(couldn't cover production costs)** | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 4.19-2 When did you last face this risk? (give date) | | | | | | | |
| | | 4.19-3 How much loss comparing to normal year (SP/ha) | | | | | | | |
| | | 4.19-4 What is the maximum premium you are willing to pay as insurance | | | | | | | |
| Q 4.20 | | 4.20-1 How many years has the HH been affected Over the past ten years**(couldn't cover production costs)** | | | | | | | |
| | | 4.20-2 When did you last face this risk? (give date) | | | | | | | |
| | | 4.20-3 How much loss comparing to normal year (SP/ha) | | | | | | | |
| | | 4.20-4 What is the maximum premium you are willing to pay as insurance | | | | | | | |

Note: Put **ZERO** if not applicable

Q 4.21 What is the average yield during good, medium or bad season?

| | Crop | Average yield in good season (ton/ha) | Average yield in medium season (ton/ha) | Average yield in bad season (ton/ha) |
|---|---|---|---|---|
| | | a | b | c |
| Q 4.21-1 | | | | |
| Q 4.21-2 | | | | |
| Q 4.21-3 | | | | |
| Q 4.21-4 | | | | |
| Q 4.21-5 | | | | |
| Q 4.21-6 | | | | |
| Q 4.21-7 | | | | |

Q 4.22 What are the major non-agricultural or personal risks that you encountered and that negatively affected your total income?

| | Source of risk | Question | | |
|---|---|---|---|---|
| | | How many times has the HH been affected Over the past ten years | When did you last face this risk? (give date) | How much was your income loss (000 SP) |
| | | a | b | c |
| Q 4.22-1 | HH member death | | | |
| Q 4.22-2 | HH member illness | | | |
| Q 4.22-3 | Loss in non-agricultural asset | | | |
| Q 4.22-4 | Loss in non-agricultural enterprise | | | |
| Q 4.22-5 | Other (specify) | | | |

Q 4.23: Which strategies you have adopted to cope with income losses resulting from the above hazard conditions?

| | Strategy | How many times the strategy have been used during the last ten years | Effective<br>1= very effective<br>2= somewhat effective<br>3= not effective |
|---|---|---|---|
| | | **a** | **b** |
| 4.23-1 | Crop rotation | | |
| 4.23-2 | Variety diversification | | |
| 4.23-3 | Crop diversification | | |
| 4.23-4 | Using irrigation technique | | |
| 4.23-5 | Cultivating resistant crop | | |
| 4.23-6 | Reducing the farm input use/ operations/cost | | |
| 4.23-7 | Trees planting | | |
| 4.23-8 | Reducing the consumption\ change consumption pattern | | |
| 4.23-9 | Engaging in non-farm sector | | |
| 4.23-10 | Withdraw from saving | | |
| 4.23-11 | Borrowing to meet HH needs | | |
| 4.23-12 | Selling assets / **specify which asset**---------- | | |
| 4.23-13 | Reliance on assistance and aid | | |
| 4.23-14 | Send children to work | | |
| 4.23-15 | Send household members away to look for work (migration) | | |
| 4.23-16 | Family migration (all HH members) to other area | | |
| 4.23-17 | Others (specify) | | |

## IV. SAFETY NETS

Q 5a: What are the main safety nets in your community?

| | Safety net | How many HH members benefit from | How many times benefit in the last year | How many time did you benefit from in the last ten years |
|---|---|---|---|---|
| | | **a** | **b** | **f** |
| 5-1 | Tuition fees | | | |
| 5-2 | Health care | | | |
| 5-3 | Food stamp | | | |
| 5-4 | Fuel subs | | | |
| 5-5 | Pension | | | |
| 5-6 | Farmer training | | | |
| 5-7 | Social solidarity | | | |
| 5-8 | Land redistribution | | | |
| 5-9 | Agri Subs Fund | | | |
| 5-10 | Micro finance | | | |
| 5-11 | Other (specify) | | | |

Q 5b: If you are not receiving any of the following support plz explain why?

| | Safety net | Not aware | Not eligible | Doesn't exist in the area | Not accessible | No need | Other (specify) |
|---|---|---|---|---|---|---|---|
| | | **a** | **b** | **c** | **d** | **e** | **f** |
| 5-12 | Tuition fees | | | | | | |
| 5-13 | Health care | | | | | | |
| 5-14 | Food stamp | | | | | | |
| 5-15 | Fuel subs | | | | | | |
| 5-16 | Pension | | | | | | |
| 5-17 | Farmer training | | | | | | |
| 5-18 | Social solidarity | | | | | | |
| 5-19 | Land redistribution | | | | | | |
| 5-20 | Agri Subs Fund | | | | | | |
| 5-21 | Micro finance | | | | | | |
| 5-22 | Other (specify) | | | | | | |

## V. Role of the Key institutions

Q 6a: What organizations and associations are there in the community?

| **6-1:formal** | **1= yes 2= no** | **6-2: informal** | **1= yes 2= no** |
|---|---|---|---|
| 6-1-a: Extension unit | | 6-2-a Religious | |
| 6-1-b: Municipality, Mokhtar | | 6-2-b Leaders | |
| 6-1-c: Schools | | 6-2-c Charity organization | |
| 6-1-d: Health care centres | | 6-2-d Cooperative | |
| 6-1-e : Labour and social affairs unit, mayor, political representative | | 6-2-e Civil organization | |
| 6-1-f Other (specify) | | 6-2-f Other (specify) | |

Q 6b: Have you received any visit or sought services from extension unit for the following purposes during the last year?

| | Activities | How many time | Effectiveness of the service (see code)* |
|---|---|---|---|
| | | **a** | **b** |
| Q 6-3 | Pest control | | |
| Q 6-4 | Veterinary services | | |
| Q 6-5 | Climate forecast | | |
| Q 6-6 | Training | | |
| Q 6-7 | Obtaining loans and farm inputs | | |
| Q 6-8 | Dissemination new technologies | | |
| Q 6-9 | Other | | |

*****1=Not effective*

*2=somewhat effective*

*3=Effective*

*4= Very effective*

Q 6-10: In your opinion, what are your suggestions to improve its performances?

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Q 6-11 Are you a member of farmer coop? ----------

1= yes 2= no

Q 6-12 If "yes", do you benefit from the following services?

| **Services** | **1= yes 2=no** | **If no, why?** |
|---|---|---|
| | **a** | **b** |
| 6.12-1: Access to credit | | |
| 6.12-2: Land preparation | | |
| 6.12-3: Irrigation | | |
| 6.12-4: Harvesting | | |
| 6.12-5: Marketing | | |
| 6.12-6: Other (specify) | | |

Q 6.13 Are you satisfied with the services? ----------

*1= no*

*2= somewhat*

*3= satisfied*

*4=highly satisfied*

Q 6.14 In your opinion, what are your suggestions to improve its performance?

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Q 6.18 In your opinion, does the "General Establishment of Seed Multiplication" provide a good- quality and higher-yield seeds variety?

1= yes 2= no

Q 6.19 If "no", what are the most important problems you face concerning the varieties you receive from the GESM?

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Q 6.20 In your opinion, what is the impact of input-subsidy elimination concerning fertilizer and fuel?

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Q 6.21 Are you satisfied with the performance of the ACB?

*1= no*

*2= somewhat*

*3= satisfied*

*4=highly satisfied*

Q 6.22 In your opinion, what are your suggestions to improve its performance?

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Q 6.23 Have you benefited from Unemployment programme? ----------

1= yes 2= no

Q 6.24 If yes, are you satisfied? ----------

*1= no*

*2= somewhat*

*3= satisfied*

*4=highly satisfied*

Q 6.25 In your opinion, what are your suggestions to improve its performance?

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Q 6.26 Are you a member of any other organization (specify)? ----------

Q 6.27 In your opinion, what are your suggestions to improve its performance?

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**Annex A3-2 The Delphi Method Questionnaire, First Round**

**Risk management questionnaire**

**(Delphi method – Round 1)**

This questionnaire is the first of two rounds, successively more refined requests for expert opinion on risk management policies and strategies in Syrian agriculture. In this round, the aim is to open up the subject and discover as wide a range of perspectives as possible. In particular, we aim to have a deeper insight on the following topics related to risk management: **type of risks; spatial and temporal dimensions of risks; private strategies and policies to manage and cope with risks; policy suggestions**. The aim is not to achieve consensus; therefore, please feel free to include your views, even if they are unusual or unpopular. There are 24 questions overleaf; there is also space for you to address anything that you feel we might have omitted at this early stage. Please continue your answers on additional sheets, if needed (in the case of the questionnaire on hard copy).

Please return the completed questionnaire in the enclosed freepost envelope or by e-mail if you prefer. The returns from this round will be coded, analyzed and returned to you in the form of an initial report; they will also be used to construct the second round of the questionnaire, which will indicate the proportion of those suggesting particular perspectives in returns to the first round. The second questionnaire will be a more specific request for information and will be intended to complete the Delphi method.

(For further guidance or assistance in completing this form, please contact Firas Yassin,
Mobile 988 317 425 or firasyassin@gmail.com)

Thank you for your participation at this stage.

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Farming System: □ **1** □**3**

Respondent preliminary information. Please mark the category best suit your case:

□ Farmer

□ Farmers' leader

□ Farmers union member

□ Work for Syrian Government

□ Other (please specify) _____

□ Work in an International institutions

□ Work in credit institution

□ Work for insurance company

□ Work as seller/trader

## I. Type of risks

1. To what extent risk is problematic in the Farming System (FS) ?

2. In your opinion what are the main types of agricultural risks faced by farmers? Please rank the types of risk according to their relevance *(**1** most important, **2** second most important **3** third most important, and so on…)*:

__ Price and market risk
*(i.e. risks associated with changes in the price of outputs or inputs that may occur after the commitment to production has begun)*

__ Policy changes
*(i.e. changes in policies and regulations that affect agriculture offsetting farmers expectations)*

__ Production or yield risk
*(i.e. risk due to the sensitivity of agriculture to many events outside farmers control related to weather, including excessive or insufficient rainfall, extreme temperatures, hail, pest, etc.)*

*more specifically (Please rank):*
*(**a**: most important, **b** second most important **c** third most important, … )*
__ Drought
__ Heavy rainfall / Flooding
__ Frost
__ Storm
__ Other (*specify:* _____ )

__ Financial risk
*(i.e. risks related to the way the firm's capital is obtained and financed since a farmer might be subject to fluctuations in interest rates on borrowed capital, or face cash flow difficulties if there are insufficient funds to repay creditors)*

__ Personal risk
*(i.e. injures, health risk, death, etc.)*

__ Other (*please specify:* _____)

Please explain why such risks are relevant in the FS under consideration:

**Risk management and coping strategies**

*Risk management strategies can be grouped into two categories: **Ex-ante** strategies aimed to reduce the probability of an adverse event occurring and/or to mitigate the potential impact of the adverse event; **Ex-post** (or coping) strategies aimed to relieve the impact of the risky event once it has occurred.*

3. What are the main types of risk management instruments and strategies adopted ex-ante and ex-post by farmers and/or Government? Please rank them according to their relevance *(**1** most important, **2** second most important **3** third most important, and so on…)*:

| *Ex-ante (Rank from 1 to …)* | *Ex-post (Rank 1 to …)* |
|---|---|
| _ Crop diversification | _ Consumption smoothing *(temporary reduction of consumption level)* |
| _ Income skewing *(choose low risky and lower profitable activities rather than more risky but more profitable ones)* | _ Asset liquidation |
| _ Specialization *(adopt suitable production techniques or crops resistant to pest, drought, etc. )* | _ Informal credit *(Borrowing from neighbors/family, etc.)* |
| _ Diversification of income source | _ Formal credit *(borrowing from agricultural coop. bank, etc.)* |
| _ Precautionary savings | _ Safety nets *(something that provides security against misfortune or difficulty)* |
| _ Production/marketing contracts | _ Support programs *(e.g. ad-hoc public disaster assistance, etc.)* |
| _ Insurance through formal market | _ *Welfare policies (health care, pension, etc.)* |
| _ *Other (specify)* _____ | _ *Other (specify)* _____ |
| _ *Other (specify)* _____ | _ *Other (specify)* _____ |
| _ *Other (specify)* _____ | _ *Other (specify)* _____ |

Please explain why such strategies are relevant in the FS under consideration:

## II. Risk management strategies for specific risks

4. Price risk is mainly concerned to specialty crops (*e.g.* fruits and vegetables, tree nuts, dried fruits, horticulture, nursery crops) and as a result the revenues of producers of specialty crops are more sensitive to price fluctuations. Generally, which crop are considered the most (less) exposed to price risks, and why?

   Most:

   Less:

   Please explain.

5. When price risk is a problem, how farmers cope with price risks?

6. How farmers cope with production and yield risks?

7. How farmers cope with policy change risks?

8. Idiosyncratic risks (or unsystematic risk) affect single individuals and might be almost eliminated with diversification. Please indicate the strategies implemented by farmers to cope with idiosyncratic risks [*e.g.* networks of solidarity, welfare policies, etc. ].

9. In your opinion what are the weakness and strengths of strategies implemented by farmers to cope with idiosyncratic risks?

## III. Relevant issues for risk management in Syrian agriculture

### Source of HH income

*Agriculture, in particular crops and trees, represents the largest source of income. Moreover, expenditure for food accounts for more than 40% of total expenditure. As a result income, expenditure and agricultural prices dynamics would be tightly linked.*

10. To what extent international prices dynamics did affect farmers' income/expenditure and local economies?

11. Diversification of crops and income source are strategies to manage risks in agriculture. What does limit the adoption of these two strategies?

### Strategic crops

Strategic crops are defined as crops for which the Government sets prices at which government establishments will purchase from farmers or their cooperatives. This definition leads to the following crops being classified as strategic: wheat – cotton - barley – sugar - tobacco

12. What are the main risks related to strategic crops? Please explain your point of view.

**Savings**

13. According to a recent survey, a vast majority of farmers do not have savings accounts. What are the main types of savings for farmers in the FS?

14. In your opinion what does limit the adoption of different forms of savings [e.g. bank deposits, physical assets, etc.] ?

**Credit and insurance**

15. What are the main types of credit in formal and informal markets?

16. According to farmers' opinion, one of the main problem faced with formal credit market are the complicated procedures. Do you agree or disagree with this point of view? If agree, could you please explain what make complicated such procedures?

17. According to farmers' opinion, a second important problem faced with formal credit market is the lack of collaterals. Do you agree or disagree with this point of view? Are there policies to provide credit to farmers lacking collaterals [*e.g.* micro-credit, policies for subsidized credit, etc.] ?

18. In your opinion, are there further relevant problems in formal credit markets? Please explain.

19. According to farmers' opinion, the adoption of informal credit market is limited by the high interest rates and a restricted period for repayment. Do you agree or disagree with this point of view? Please explain.

20. In your opinion, are there further relevant problems in informal credit markets? Please explain.

21. To what extent farmers adopt insurance to cope with risk? And what type of contracts are available [e.g. insurance against damage due to rain, dry, etc.]?

22. What does limit the use of insurance?

## IV. Policy suggestions

23. In your opinion, how to improve the current set of policies adopted by the government for risk management?

24. And how farmers could improve their strategies to cope with risks?

**Annex A3-3 The Second Round Risk Management Questionnaire for FS 3**

**Risk management questionnaire – Farming System 3**

**(Delphi method – Round 2)**

This questionnaire is the second and final round of the Delphi Method you kindly offered your availability to participate. The aim is to consolidate experts opinions trying to reach large consensus on key issues in risk management policies and strategies in Syrian agriculture. The aim is not to achieve consensus hence many questions are in closed-ended and few asking to express your opinion in more detail. Please continue your answers on additional sheets, if needed (in the case of the questionnaire on hard copy).

Please return the completed questionnaire in the enclosed freepost envelope or by e-mail if you prefer. The returns from this second round will be analyzed and returned to you in the form of a final report summarizing the results of the Delphi Method.

(For further guidance or assistance in completing this form, please contact Firas Yassin,

Mobile + *** *** or firasyassin@gmail.com)

Thank you for your participation at this stage.

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Farming System: □**3**

Respondent preliminary information. Please mark the category best suit your case:

□ Farmer

□ Farmers' leader

□ Farmers union member

□ Work for Syrian Government

□ Work in an International institutions

□ Work in credit institution

□ Work for insurance company

□ Work as seller/trader

□ Other (please specify) _____

**Brief summary of first-round results**

On the basis of first-round results, olive, apples and tomatoes are the most common crops in Farming system 3. Price and market risks are considered the main risks faced by farmers and they seem mainly due to marketing problems. Drought, frost, and pest and diseases are considered the main production and yield risks while policy change risks seem important, because of the low support provided to many crops and the inputs prices volatility.

Diversification of crop and income sources seem the most relevant ex-ante strategies for risk-coping in Syria, while income skewing, specialization, precautionary savings and production/marketing contracts are classified as less important. Informal credit seems the most relevant ex-post strategy for risk-coping in Syria, followed by consumption smoothing. Asset liquidation, formal credit, and HH members working out of agriculture sector are classified as less important. Finally safety nets, support programs and welfare policies seem not relevant strategies.

Many experts argue that vegetables, particularly tomatoes, onion, garlic and cucumbers, are the most exposed specialty crops to price risks in FS 3. Among vegetables, potato and eggplant seem the least exposed to price risks. Moreover, cereals, olive oil and dried fruits are the least exposed specialty crops. Farmers seem to cope with price risks trying to sell products to distant markets, selling the products before harvesting or changing the containers to less quality in order to reduce the marketing cost. Other strategies include changing crops or seeds and reducing the area planted in the subsequent area. In general farmers rarely adopt agronomical techniques to improve or stabilize yields. In order to cope with policy changes risks farmers reduce the inputs use, borrow inputs, plant crops that require low inputs. As regard idiosyncratic risks (or unsystematic risk), illness and death seem the most common and farmers cope through the social help from family members, or distributing the land among HH members.

According to experts, farmers who do not have savings accounts usually save money in alternatives ways, *e.g.* buying houses, land, cars, tractors, storable inputs or outputs, as well as keeping money in cash at home. Agricultural cooperative banks is the mostly common used type of formal credit. Loans from wholesalers and from friends/neighbors are the mostly common used type of formal credit. Some experts argue that informal credit is costly with respect to formal credit, which is preferred by farmers. In general there is necessity to deepen the analysis on formal and informal credit markets and insurance markets.

## I. Types of risks

1. A vast majority of experts assert that price and market risks are the main risks faced by farmers mainly due to marketing problems. Do you agree or disagree? (if disagree please explain our reasons)

   □ Agree □ Disagree

   Please explain your reasons_____

2. Second important risks faced are production and yield risk: particularly drought, but also frost, and pest and diseases. Do you agree or disagree? (if disagree please explain our reasons)

   □ Agree □ Disagree

   Please explain your reasons_____

3. Finally, policy change risks seems very important, especially due to lacking support for many crops and inputs prices volatility. Do you agree or disagree? (if disagree please explain our reasons)

   □ Agree □ Disagree

   Please explain your reasons_____

## II. Risk management and coping strategies

*Risk management strategies can be grouped into two categories: **Ex-ante** strategies aimed to reduce the probability of an adverse event occurring and/or to mitigate the potential impact of the adverse event; **Ex-post** (or coping) strategies aimed to relieve the impact of the risky event once it has occurred.*

4. Diversification of crop and income sources seem the **most relevant ex-ante** strategies for risk-coping in Syria. In your opinion, how effective are these strategies in FS 3? (please choose one)

   Crop diversification:

   Choose one: □ Very effective □ Not very effective

   Choose one: □ Often adopted □ Rarely adopted

   Income source diversification:

   Choose one: □ Very effective □ Not very effective

   Choose one: □ Often adopted □ Rarely adopted

5. In your opinion, why diversification (of income sources and crop cultivations) is the main adopted strategy?

   _ It is simplest to be adopted

   _ It the most effective

   _ Lack of alternative possibilities

   _ Lack of knowledge of alternative strategies

6. Other ex-ante strategies seems **less relevant** for risk coping in Syrian agriculture. Income skewing, specialization, precautionary savings and production/marketing contracts are classified as less important. Such results might be due to a low rate of adoption or to their low effectiveness. Please mark if you believe they are rarely/often adopted and if they are effective/not effective.

| | Often adopted | Rarely adopted | Effective | Not effective |
|---|---|---|---|---|
| Income skewing | □ | □ | □ | □ |
| Specialization | □ | □ | □ | □ |
| Precautionary savings | □ | □ | □ | □ |
| Production/marketing contracts | □ | □ | □ | □ |

4. Informal credit seem the **most relevant ex-post** strategy for risk-coping in Syria. In your opinion, how effective is the strategy in FS 3? And effective and how often adopted? (please choose)

   Choose one: □ Very effective □ Not very effective

   Choose one: □ Often adopted □ Rarely adopted

5. In your opinion, why informal credit is one of the most relevant strategy in FS3?

   _ It is simplest to be adopted

   _ It the most effective

   _ Few alternative possibilities

   _ Lack of knowledge of alternative strategies

6. Consumption smoothing seem also a **very relevant ex-post** strategy for risk-coping in Syria. In your opinion, how effective and how often adopted? (please choose)

   Choose one: □ Very effective □ Not very effective

   Choose one: □ Often adopted □ Rarely adopted

7. Other ex-ante strategies seems **less relevant** for risk coping in Syrian agriculture. Asset liquidation, formal credit, and HH members working out of agriculture sector are classified as less important. Such results might be due to a low rate of adoption or to their low effectiveness. Please mark if you believe they are rarely/often adopted and if they are effective/not effective.

| | Often adopted | Rarely adopted | Effective | Not effective |
|---|---|---|---|---|
| Asset liquidation | □ | □ | □ | □ |
| Formal credit | □ | □ | □ | □ |
| HH members working out of ag. sect. | □ | □ | □ | □ |

8. Safety nets, support programs and welfare policies seem not very relevant.
   □ Agree □ Disagree

**III. Risk management strategies for specific risks**

9. The majority of experts argue that vegetables are the most exposed specialty crops to price risks in FS 3. In particular tomatoes, onion, garlic and cucumbers are the most exposed mainly due to the crops sensitiveness.

   □ Agree □ Disagree

10. Among vegetables, potato and eggplant seem the least exposed to price risks.

   □ Agree □ Disagree

10b. Cereals, olive oil and dried fruits are the least exposed specialty crops.

   □ Agree □ Disagree

11. Farmers seem to cope with price risks trying to sell products to distant markets, or selling the products before harvesting or changing the containers to less quality in order to reduce the marketing cost. How often are these strategies adopted, and how effective are in your opinion?

| | Often adopted | Rarely adopted | Effective | Not effective |
|---|---|---|---|---|
| Sell products to distant markets | □ | □ | □ | □ |
| Sell products before harvesting | □ | □ | □ | □ |
| Changing containers to less quality | □ | □ | □ | □ |

12. Farmers seem to cope with production risks changing crops or seeds, or reducing the area planted in the subsequent area. In both cases it seems they rarely adopt agronomical techniques to improve or stabilize yields. Do you agree or disagree with these results?

□ Agree □ Disagree

13. Farmers seem to cope with policy changes risks in different ways: reducing the inputs, borrowing inputs, planting crops that require low inputs. In your opinion which strategy is the most adopted and the most effective?

| | Often adopted | Rarely adopted | Effective | Not effective |
|---|---|---|---|---|
| Reducing inputs | □ | □ | □ | □ |
| Borrowing inputs | □ | □ | □ | □ |
| Planting crops requiring few inputs | □ | □ | □ | □ |

14. Illness and death seem the most common idiosyncratic risks (or unsystematic risk) and farmers cope through the social help from family members, or distributing the land among HH members.

□ Agree □ Disagree

15. Some problems highlighted by experts on the adoption of social help from family members, or the distribution of land among HH members are that such strategies are not very effective.

□ Agree □ Disagree

15b. Land distribution among HH members seem to cause excessive fragmentation.

□ Agree □ Disagree

## IV. Relevant issues for risk management in Syrian agriculture

### Source of HH income

*Agriculture, in particular crops and trees, represents the largest source of income. Moreover, expenditure for food accounts for more than 40% of total expenditure. As a result income, expenditure and agricultural prices dynamics would be tightly linked.*

16. According to experts, there is not a clear consensus on the influence of international dynamics on income/expenditure and local economies. In your opinion, the incomes and expenditures are influenced?

□ Yes □ No

17. According to a recent survey, diversification of crops and income source, strategies to manage risks in agriculture, are not usually adopted by farmers. In your opinion what does limit the adoption of these two strategies?

### Strategic crops

Strategic crops are defined as crops for which the Government sets prices at which government establishments will purchase from farmers or their cooperatives. This definition leads to the following crops being classified as strategic: wheat – cotton - barley – sugar – tobacco

18. Production risks, mainly drought but also pest and diseases are considered the most relevant risks faced by farmers.

□ Agree □ Disagree

**Savings**

19. According to experts farmers who do not have savings accounts usually save money in alternatives ways, *e.g.* buying houses, land, cars, tractors, storable inputs or outputs, as well as keeping money in cash at home. What does limit the use of bank savings accounts (e.g. bank accounts used to earn interests)?

20. Experts argue that interest rate (prohibited in Islam) is one of the main limitation to the adoption of savings through bank account.

□ Agree □ Disagree

**Credit and insurance**

21. Agricultural cooperative banks is the mostly common used type of formal credit.

□ Agree □ Disagree

21b. Loans from wholesalers and from friends/neighbors are the mostly common used type of informal credit.

□ Agree □ Disagree

21c. Some experts argue that informal credit is costly with respect to formal credit, which is preferred by farmers.

□ Agree □ Disagree

22. The complexity of procedures is the main limitation to access to formal credit. What does make complicated such procedures?

23. A second problem is the lack of collaterals due to excessive land fragmentation.

□ Agree □ Disagree

24. The excessively high interest rates limit access to formal credit.

□ Agree □ Disagree

25. The excessively high interest rates limit access also to informal credit.

□ Agree □ Disagree

26. As known, there is a fund for insuring cattle at the agricultural chamber but it seems that farmers rarely stipulate contracts to insure their cattle. Could you please tell why in your opinion farmers do not use this form of insurance?
27. A further explanation that a general farmers reluctance to insurance contracts. In your opinion are would be farmers reluctant to stipulate insurance contracts (e.g. for production yield, whether, etc.).

□ Yes □ No

## V. Policy suggestions

28. According to experts, many political changes would be desirable to improve the current set of policies adopted by the government for risk management. Please rank, from 1 to 10, these options according to their relevance.

_ Establish market for insurance
_ Establishing a marketing system for all crops managed by the government
_ Offering loans according to land area or to different crops
_ Limiting (e.g. by tariffs) imports of goods produced in Syria
_ Subsidizing farmers by lowering inputs prices
_ Providing subsidies for newly crops or crops important for Syrian economy
_ Establishing funds for agricultural disasters
_ Improving storage facilities to delay the selling when prices are too low

_ Providing good quality seeds and high productive varieties

_ Improving water management and irrigation services

29. According to experts, farmers could improve their strategies to cope with risks in several ways. Please rank, from 1 to 5, these options according to their relevance.

_ Stipulating insurance contracts

_ Diversifying the income sources

_ Cultivating several different crops

_ Cooperating with extension units to improve agricultural production techniques

_ Organizing production and selling activities in cooperatives

**Annex A3-4 The Second Round Risk Management Questionnaire for FS 1&2**

**Risk management questionnaire – Farming Systems 1 and 2**

**(Delphi method – Round 2)**

This questionnaire is the second and final round of the Delphi Method you kindly offered your availability to participate. The aim is to consolidate experts opinions trying to reach large consensus on key issues in risk management policies and strategies in Syrian agriculture. The aim is not to achieve consensus hence many questions are in closed-ended and few asking to express your opinion in more detail. Please continue your answers on additional sheets, if needed (in the case of the questionnaire on hard copy).

Please return the completed questionnaire in the enclosed freepost envelope or by e-mail if you prefer. The returns from this second round will be analyzed and returned to you in the form of a final report summarizing the results of the Delphi Method.

(For further guidance or assistance in completing this form, please contact Firas Yassin,

Mobile + *** *** or firasyassin@gmail.com)

Thank you for your participation at this stage.

--

Farming System: □ **1&2**

Respondent preliminary information. Please mark the category best suit your case:

□ Farmer

□ Farmers' leader

□ Farmers union member

□ Work for Syrian Government

□ Work in an International institutions

□ Work in credit institution

□ Work for insurance company

□ Work as seller/trader

□ Other (please specify) _____

**Brief summary of first-round results**

On the basis of first-round results, citrus, olives, vegetables and greenhouses are the most common crops in Farming system 1&2. Price and market risks are the main risks faced by farmers mainly due to lack of marketing culture and facilities. Production and yield risks (particularly frost, pest and diseases, and storm), are marginally important policy change risks and financial risks might affect farmers' activities.

Diversification of crop and income sources seems the most relevant ex-ante strategies for risk-coping in Syria. Some experts argued that specialization (e.g. the adoption of suitable production techniques or crops resistant to pest, drought, etc.) is a relevant ex-ante risk coping strategy. Income skewing, precautionary savings and production/marketing contracts are classified as less important.

Formal credit seem the most relevant ex-post strategy for risk-coping in Syria HH working out of agricultural sector seem also a very relevant ex-post strategy for risk-coping in Syria. Asset liquidation and informal credit are classified as less important. Finally, consumption smoothing, safety nets, support programs and welfare policies seem not very relevant.

The majority of experts argue that fruits are the most exposed specialty crops to price risks in FS 1&2. In particular citrus, but also apricots, apples, peaches seem the most exposed mainly due their perishability and the lack of storage facilities. Olive oil seems the least exposed specialty crop to price risks. Farmers seem to cope with price risks trying to sell products to distant markets, or selling the products before harvesting or changing the containers to less quality in order to reduce the marketing cost. Farmers seem to cope with olive oil production/yield risks adopting specific agronomical techniques to improve or stabilize yields. They also cope with policy changes risks reducing the inputs, mainly waters and fertilizers. Idiosyncratic (personal) risks seem not relevant in FS 1&2.

According to experts, the influence of international dynamics on income/expenditure and local economies is rather limited. Diversification of crops and income source, strategies to manage risks in agriculture, are not usually adopted by farmers. According to experts farmers who do not have savings accounts usually save money in alternatives ways, *e.g.* buying houses, land, cars. Some experts argue that savings through bank account is limited by the necessity of liquidity (e.g. money promptly disposable) to manage and improve farm infrastructures.

Agricultural cooperative banks is the mostly common used type of formal credit. Personal loans from sectors other than agriculture is the mostly common used type of informal credit. Some experts argue

that informal credit is costly with respect to formal credit, which is preferred by farmers. Formal credit is poorly managed by the personal and this limit the access to formal credit. Second problem is the lack of collaterals due to excessive land fragmentation. The complexity of procedures is the main limitation to access to formal credit. Experts have not a consensus whether access to informal credit is limited by excessively high interest. As known, there is a fund for insuring cattle at the agricultural chamber but it seems that farmers rarely stipulate contracts to insure their cattle.

In general there is necessity to deepen the analysis on formal and informal credit markets and insurance markets.

## I. Types of risks

7. Experts assert that price and market risks are the main risks faced by farmers mainly due to lack of marketing culture and facilities. Do you agree or disagree? (if disagree please explain our reasons)

   □ Agree □ Disagree

   Please explain your reasons_____

8. Production and yield risks (particularly frost, pest and diseases, and storm), are marginally important: Do you agree or disagree? (if disagree please explain our reasons)

   □ Agree □ Disagree

   Please explain your reasons_____

9. Finally, policy change risks and financial risks might affect farmers' activities. Do you agree or disagree? (if disagree please explain our reasons)

   □ Agree □ Disagree

   Please explain your reasons_____

## II. Risk management and coping strategies

*Risk management strategies can be grouped into two categories: **Ex-ante** strategies aimed to reduce the probability of an adverse event occurring and/or to mitigate the potential impact of the adverse event; **Ex-post** (or coping) strategies aimed to relieve the impact of the risky event once it has occurred.*

10. Diversification of crop and income sources seem the **most relevant ex-ante** strategies for risk-coping in Syria. In your opinion, how effective are these strategies in FS 1&2? (please choose one)

    Crop diversification:

    Choose one: □ Very effective □ Not very effective

    Choose one: □ Often adopted □ Rarely adopted

    Income source diversification:

    Choose one: □ Very effective □ Not very effective

    Choose one: □ Often adopted □ Rarely adopted

11. In your opinion, why diversification (of income sources and crop cultivations) is the main adopted strategy?

    _ It is simplest to be adopted

    _ It the most effective

    _ Lack of alternative possibilities

    _ Lack of knowledge of alternative strategies

5b. Some experts argued that specialization (e.g. the *adoption of suitable production techniques or crops resistant to pest, drought, etc.*) is a relevant ex-ante risk coping strategy.

□ Agree □ Disagree

Please explain your reasons_____

12. Other ex-ante strategies seems **less relevant** for risk coping in Syrian agriculture. Income skewing, precautionary savings and production/marketing contracts are classified as less important. Such results might be due to a low rate of adoption or to their low effectiveness. Please mark if you believe they are rarely/often adopted and if they are effective/not effective.

| | Often adopted | Rarely adopted | Effective | Not effective |
|---|---|---|---|---|
| Income skewing | □ | □ | □ | □ |
| Precautionary savings | □ | □ | □ | □ |
| Production/marketing contracts | □ | □ | □ | □ |

13. Formal credit seem the **most relevant ex-post** strategy for risk-coping in Syria. In your opinion, how effective is the strategy in FS 2&1? And effective and how often adopted? (please choose)

Choose one: □ Very effective □ Not very effective

Choose one: □ Often adopted □ Rarely adopted

14. In your opinion, why formal credit is one of the most relevant strategy in FS 1&2?

_ It is simplest to be adopted

_ It the most effective

_ Few alternative possibilities

_ Lack of knowledge of alternative strategies

15. H working out of agricultural sector seem also a **very relevant ex-post** strategy for risk-coping in Syria. In your opinion, how effective and how often adopted? (please choose)

Choose one: □ Very effective □ Not very effective

Choose one: □ Often adopted □ Rarely adopted

16. Other ex-ante strategies seems **less relevant** for risk coping in Syrian agriculture. Asset liquidation and informal credit are classified as less important. Such results might be due to a low rate of adoption or to their low effectiveness. Please mark if you believe they are rarely/often adopted and if they are effective/not effective.

| | Often | Rarely | Effective | Not |
|---|---|---|---|---|

| | adopted | adopted | | effective |
|---|---|---|---|---|
| Asset liquidation | □ | □ | □ | □ |
| Informal credit | □ | □ | □ | □ |

17. Consumption smoothing, safety nets, support programs and welfare policies seem not very relevant.

□ Agree □ Disagree

**III. Risk management strategies for specific risks**

18. The majority of experts argue that fruits are the most exposed specialty crops to price risks in FS 1&2. In particular citrus, but also apricots, apples, peaches seem the most exposed mainly due their perishability and the lack of storage facilities.

□ Agree □ Disagree

19. Olive oil seems the least exposed specialty crop to price risks.

□ Agree □ Disagree

*20. Omitted*

21. Farmers seem to cope with price risks trying to sell products to distant markets, or selling the products before harvesting or changing the containers to less quality in order to reduce the marketing cost. How often are these strategies adopted, and how effective are in your opinion?

| | Often adopted | Rarely adopted | Effective | Not effective |
|---|---|---|---|---|
| Sell products to distant markets | □ | □ | □ | □ |
| Sell products before harvesting | □ | □ | □ | □ |
| Changing containers to less quality | □ | □ | □ | □ |

22. Farmers seem to cope with olive oil production/yield risks adopting specific agronomical techniques to improve or stabilize yields. In your opinion how often is such strategy adopted? And how effective is it?

Choose one: □ Very effective □ Not very effective

Choose one: □ Often adopted □ Rarely adopted

23. Farmers seem to cope with policy changes risks reducing the inputs, mainly waters and fertilizers.

□ Agree □ Disagree

24. Idiosyncratic (personal) risks seem not relevant in FS 1&2.

□ Agree □ Disagree

*25. Omitted*

## IV. Relevant issues for risk management in Syrian agriculture

**Source of HH income**

*Agriculture, in particular crops and trees, represents the largest source of income. Moreover, expenditure for food accounts for more than 40% of total expenditure. As a result income, expenditure and agricultural prices dynamics would be tightly linked.*

26. According to experts, the influence of international dynamics on income/expenditure and local economies is rather limited. Do you agree or disagree?

□ Agree □ Disagree

27. According to a recent survey, diversification of crops and income source, strategies to manage risks in agriculture, are not usually adopted by farmers. In your opinion what does limit the adoption of these two strategies?

**Strategic crops**

Strategic crops are defined as crops for which the Government sets prices at which government establishments will purchase from farmers or their cooperatives. This definition leads to the following crops being classified as strategic: wheat – cotton - barley – sugar – tobacco

28. Production risks seem not very relevant.

□ Agree □ Disagree

**Savings**

29. According to experts farmers who do not have savings accounts usually save money in alternatives ways, *e.g.* buying houses, land, cars. What does limit the use of bank savings accounts (e.g. bank accounts used to earn interests)?
30. Some experts argue that savings through bank account is limited by the necessity of liquidity (e.g. money promptly disposable) to manage and improve farm infrastructures.

□ Agree □ Disagree

**Credit and insurance**

31. Agricultural cooperative banks is the mostly common used type of formal credit.

□ Agree □ Disagree

26b. Personal loans from sectors other than agriculture is the mostly common used type of informal credit.

□ Agree □ Disagree

27c. Some experts argue that informal credit is costly with respect to formal credit, which is preferred by farmers.

□ Agree □ Disagree

28. The complexity of procedures is the main limitation to access to formal credit. What does make complicated such procedures?

29. A second problem is the lack of collaterals due to excessive land fragmentation.

□ Agree □ Disagree

30. Formal credit is poorly managed by the personal and this limit the access to formal credit.

□ Agree □ Disagree

31. Experts have not a consensus whether access to informal credit is limited by excessively high interest. In your opinion, high interest rates limit the access to informal credit?

□ Yes □ No

32. As known, there is a fund for insuring cattle at the agricultural chamber but it seems that farmers rarely stipulate contracts to insure their cattle. Could you please tell why in your opinion farmers do not use this form of insurance?

33. A further explanation that a general farmers reluctance to insurance contracts. In your opinion are would be farmers reluctant to stipulate insurance contracts (e.g. for production yield, whether, etc.).

□ Yes □ No

## V. Policy suggestions

34. According to experts, many political changes would be desirable to improve the current set of policies adopted by the government for risk management. Please rank, from 1 to 10, these options according to their relevance.

_ Establish market for insurance
_ Establishing a marketing system for all crops managed by the government
_ Offering loans according to land area or to different crops
_ Limiting (e.g. by tariffs) imports of goods produced in Syria
_ Subsidizing farmers by lowering inputs prices
_ Providing subsidies for newly crops or crops important for Syrian economy
_ Establishing funds for agricultural disasters
_ Improving storage facilities to delay the selling when prices are too low
_ Providing good quality seeds and high productive varieties
_ Improving water management and irrigation services

35. According to experts, farmers could improve their strategies to cope with risks in several ways. Please rank, from 1 to 5, these options according to their relevance.
_ Stipulating insurance contracts
_ Diversifying the income sources
_ Cultivating several different crops
_ Cooperating with extension units to improve agricultural production techniques
_ Organizing production and selling activities in cooperatives

**Annex 4**

## Table A4-1 Aggregate Per Capita Food Availabilities by Countries, 2003-2008 (kg/capita/year)

| Item | 2003 | 2004 | 2005 | Average 1 2003-2005 | 2006 | 2007 | 2008 | Average 2 2006-2008 | ACH % 2/1 |
|---|---|---|---|---|---|---|---|---|---|
| **Food cereals** | | | | | | | | | |
| Syria | 230.3 | 190.8 | 212.2 | 211.1 | 243.5 | 249.9 | 161.8 | 218.4 | 3.5 |
| Egypt | 176.7 | 171.0 | 175.1 | 174.3 | 184.4 | 179.7 | 182.1 | 182.1 | 4.5 |
| Jordan | 145.0 | 135.3 | 153.5 | 144.6 | 141.6 | 139.9 | 140.7 | 140.7 | -2.7 |
| Kuwait | 135.7 | 141.7 | 139.5 | 139.0 | 146.0 | 142.3 | 144.2 | 144.2 | 3.7 |
| Lebanon | 126.6 | 126.7 | 129.7 | 127.7 | 116.0 | 114.8 | 115.4 | 115.4 | -9.6 |
| Morocco | 184.7 | 183.3 | 178.5 | 182.2 | 196.3 | 160.5 | 178.4 | 178.4 | -2.1 |
| Saudi Arabia | 123.5 | 130.6 | 129.4 | 127.8 | 121.9 | 119.3 | 120.6 | 120.6 | -5.6 |
| Tunisia | 196.3 | 191.7 | 200.5 | 196.2 | 204.4 | 200.3 | 202.4 | 202.4 | 3.2 |
| USA | 93.4 | 91.7 | 91.8 | 92.3 | 113.1 | 115.0 | 114.6 | 114.3 | 23.8 |
| EU | 108.6 | 108.5 | 110.2 | 109.1 | 124.3 | 129.4 | 115.8 | 123.2 | 12.9 |
| World | 119.8 | 119.7 | 119.0 | 119.5 | 137.8 | 120.3 | 124.0 | 127.4 | 6.6 |
| **Vegetables** | **2003** | **2004** | **2005** | **Average 1 2003-2005** | **2006** | **2007** | **2008** | **Average 2 2006-2008** | **Change % 2/1** |
| Syria | 113.0 | 121.9 | 112.0 | 115.6 | 106.0 | 96.6 | 99.8 | 100.8 | -12.8 |
| Egypt | 215.8 | 220.7 | 220.3 | 218.9 | 225.4 | 221.1 | 223.3 | 223.3 | 2.0 |
| Jordan | 125.7 | 141.7 | 161.7 | 143.0 | 167.2 | 101.5 | 134.4 | 134.4 | -6.0 |
| Kuwait | 162.3 | 178.3 | 162.8 | 167.8 | 126.5 | 123.3 | 124.9 | 124.9 | -25.6 |
| Lebanon | 275.2 | 294.3 | 295.4 | 288.3 | 268.7 | 264.0 | 266.3 | 266.3 | -7.6 |
| Morocco | 166.9 | 196.6 | 175.9 | 179.8 | 178.4 | 163.7 | 171.1 | 171.1 | -4.8 |
| Saudi Arabia | 115.3 | 123.3 | 122.8 | 120.5 | 118.9 | 116.4 | 117.7 | 117.7 | -2.3 |
| Tunisia | 224.7 | 233.0 | 213.4 | 223.7 | 257.9 | 276.6 | 267.2 | 267.2 | 19.4 |
| USA | 190.2 | 192.2 | 179.5 | 187.3 | 175.2 | 176.6 | 172.1 | 174.6 | -6.8 |
| EU | 206.0 | 214.6 | 206.2 | 208.9 | 195.2 | 192.3 | 193.8 | 193.8 | -7.2 |
| World | 159.7 | 163.4 | 163.5 | 162.2 | 162.6 | 163.0 | 162.8 | 162.8 | 0.4 |
| **Fruits** | **2003** | **2004** | **2005** | **Average 1 2003-2005** | **2006** | **2007** | **2008** | **Average 2 2006-2008** | **Change % 2/1** |
| Syria | 103.2 | 123.6 | 104.0 | 110.3 | 125.8 | 91.8 | 133.8 | 117.1 | 6.2 |
| Egypt | 95.7 | 97.7 | 95.8 | 96.4 | 108.2 | 105.2 | 106.7 | 106.7 | 10.7 |
| Jordan | 56.3 | 58.8 | 57.4 | 57.5 | 102.9 | 102.3 | 102.6 | 102.6 | 78.4 |
| Kuwait | 40.7 | 42.7 | 42.2 | 41.9 | 40.5 | 39.5 | 40.0 | 40.0 | -4.5 |
| Lebanon | 147.3 | 138.4 | 125.0 | 136.9 | 169.8 | 168.3 | 169.1 | 169.1 | 23.5 |
| Morocco | 66.1 | 68.2 | 65.4 | 66.6 | 75.5 | 134.5 | 105.0 | 105.0 | 57.7 |
| Saudi Arabia | 104.4 | 103.4 | 111.0 | 106.3 | 95.4 | 94.7 | 95.1 | 95.1 | -10.5 |
| Tunisia | 84.4 | 91.1 | 91.9 | 89.1 | 86.2 | 81.6 | 83.9 | 83.9 | -5.8 |
| USA | 114.0 | 115.3 | 111.0 | 113.4 | 110.1 | 107.2 | 102.7 | 106.7 | -5.9 |
| EU | 102.2 | 104.9 | 108.6 | 105.2 | 103.8 | 96.6 | 100.2 | 100.2 | -4.8 |
| World | 61.5 | 63.5 | 64.7 | 63.2 | 67.7 | 68.3 | 68.0 | 68.0 | 7.6 |
| **Meat** | **2003** | **2004** | **2005** | **Average 1 2003-2005** | **2006** | **2007** | **2008** | **Average 2 2006-2008** | **Change % 2/1** |
| Syria | 19.7 | 19.5 | 19.1 | 19.4 | 22.4 | 22.9 | 17.6 | 20.9 | 7.7 |
| Egypt | 36.5 | 37.6 | 38.3 | 37.5 | 33.6 | 35.0 | 34.3 | 34.3 | -8.5 |
| Jordan | 38.1 | 41.5 | 41.2 | 40.3 | 33.6 | 37.5 | 35.5 | 35.5 | -11.9 |
| Kuwait | 73.7 | 86.6 | 103.1 | 87.8 | 79.1 | 77.1 | 78.1 | 78.1 | -11.0 |
| Lebanon | 58.1 | 60.3 | 61.8 | 60.1 | 43.1 | 42.8 | 42.9 | 42.9 | -28.6 |
| Morocco | 30.7 | 31.6 | 33.6 | 32.0 | 33.7 | 30.2 | 32.0 | 32.0 | 0.0 |
| Saudi Arabia | 58.0 | 57.9 | 63.9 | 59.9 | 57.2 | 58.8 | 58.0 | 58.0 | -3.2 |
| Tunisia | 35.8 | 38.2 | 38.7 | 37.6 | 33.5 | 32.0 | 32.7 | 32.7 | -13.0 |
| USA | 146.7 | 151.6 | 150.7 | 149.7 | 146.7 | 144.5 | 145.6 | 145.6 | -2.7 |
| EU | 107.9 | 106.8 | 106.7 | 107.1 | 105.7 | 102.5 | 104.1 | 104.1 | -2.8 |
| World | 55.1 | 55.5 | 56.2 | 55.6 | 54.3 | 54.4 | 59.0 | 55.9 | 0.5 |
| | **2003** | **2004** | **2005** | **Average 1** | **2006** | **2007** | **2008** | **Average 2** | **Change %** |

| Milk and its products | | | | 2003-2005 | | | | 2006-2008 | 2/1 |
|---|---|---|---|---|---|---|---|---|---|
| Syria | 96.7 | 106.3 | 113.9 | 105.6 | 118.6 | 120.1 | 111.4 | 116.7 | 10.5 |
| Egypt | 90.6 | 75.1 | 75.8 | 80.5 | 60.0 | 64.4 | 62.2 | 62.2 | -22.7 |
| Jordan | 103.3 | 93.5 | 67.8 | 88.2 | 103.4 | 113.0 | 108.2 | 108.2 | 22.7 |
| Kuwait | 126.3 | 104.6 | 118.4 | 116.4 | 142.2 | 138.7 | 140.5 | 140.5 | 20.7 |
| Lebanon | 134.8 | 133.9 | 129.2 | 132.6 | 146.9 | 145.6 | 146.2 | 146.2 | 10.3 |
| Morocco | 58.4 | 58.1 | 60.9 | 59.1 | 49.7 | 47.5 | 48.6 | 48.6 | -17.8 |
| Saudi Arabia | 104.3 | 112.5 | 95.1 | 104.0 | 108.6 | 107.0 | 107.8 | 107.8 | 3.7 |
| Tunisia | 113.0 | 104.5 | 108.0 | 108.5 | 98.7 | 95.7 | 97.2 | 97.2 | -10.4 |
| USA | 284.1 | 280.9 | 281.7 | 282.2 | 273.0 | 271.7 | 270.2 | 271.6 | -3.8 |
| EU | 288.8 | 283.5 | 285.7 | 286.0 | 279.4 | 278.7 | 280.0 | 279.4 | -2.3 |
| World | 95.4 | 96.1 | 97.7 | 96.4 | 84.8 | 85.7 | 103.7 | 91.4 | -5.2 |
| **Eggs** | **2003** | **2004** | **2005** | **Average 1 2003-2005** | **2006** | **2007** | **2008** | **Average 2 2006-2008** | **Change % 2/1** |
| Syria | 8.8 | 10.1 | 7.7 | 8.9 | 9.0 | 7.9 | 6.8 | 7.9 | -11.2 |
| Egypt | 2.8 | 2.7 | 2.7 | 2.7 | 2.5 | 3.0 | 2.7 | 2.7 | 0.0 |
| Jordan | 5.1 | 5.4 | 4.4 | 5.0 | 4.8 | 4.0 | 4.4 | 4.4 | -12.0 |
| Kuwait | 9.9 | 12.2 | 12.8 | 11.6 | 12.6 | 12.3 | 12.5 | 12.5 | 7.8 |
| Lebanon | 7.9 | 7.2 | 7.9 | 7.7 | 8.5 | 8.4 | 8.4 | 8.4 | 9.1 |
| Morocco | 6.5 | 5.1 | 5.2 | 5.6 | 4.5 | 5.3 | 4.9 | 4.9 | -12.5 |
| Saudi Arabia | 4.4 | 4.4 | 5.0 | 4.6 | 4.5 | 4.8 | 4.7 | 4.7 | 2.2 |
| Tunisia | 6.8 | 7.2 | 7.2 | 7.1 | 6.4 | 6.8 | 6.6 | 6.6 | -7.0 |
| USA | 14.6 | 14.7 | 14.6 | 14.6 | 14.9 | 14.4 | 14.3 | 14.5 | -0.7 |
| EU | 12.4 | 12.5 | 12.0 | 12.3 | 12.1 | 11.8 | 12.0 | 11.9 | -3.3 |
| World | 8.2 | 8.3 | 8.3 | 8.3 | 8.4 | 8.4 | 8.5 | 8.4 | 1.2 |

Source: Elaborated from the FAOSTAT, USDA *database*, AOAD *database*, MAAR *database* and NAPC *database*.

**Table A4-2 Per Capita Daily Requirements of Nutrients**

| Item | Unit | Calories | |
|---|---|---|---|
| | | Lower | Upper |
| Full rest | kcal | 1,800 | 1,900 |
| Relative rest | kcal | 2,200 | 2,400 |
| Easy work | kcal | 2,400 | 3,000 |
| Hard work | kcal | 3,300 | 3,800 |
| Very hard work | kcal | 4,100 | 6,500 |
| Average | kcal | 2,125 | 2,700 |
| **Nutrients** | | | |
| Carbohydrate | g | | 360 |
| Fat | g | 41.4 | 75 |
| Protein | g | 41.4 | 75 |
| Mineral salt | g | 25 | 30 |
| Water | g | 1,975 | 2,500 |
| **Vitamins** | | | |
| A | microg | 756.5 | 1,500 |
| C | mg | 47.9 | 75 |
| B1 | mg | 0.9 | 1.5 |
| B2 | mg | 0.9 | 2 |
| B6 | mg | 1.1 | 3 |
| B12 | micro g | 1.9 | 2 |
| **Minerals** | | | |
| S | Sulfure (g) | | 1.2 |
| P | Phosphor (g) | | 1.2 |
| Cl | Chloride (g) | | 6 |
| Mg | Magnesium (g) | | 0.32 |
| Na | Sodium (g) | 3.2 | 4 |
| K | Potassium (g) | | 3.6 |
| Ca | Calcium (mg) | 840 | 999 |

| | | | |
|---|---|---|---|
| Mn | Manganese (mg) | | 3 |
| Fe | Iron (mg) | 11.5 | 18 |
| Cu | Copper (mg) | | 2.5 |
| Zn | Zink (mg) | | 20 |
| I | Iodine (microg) | 40 | 200 |

Source: Mehmalji Rateb, *Food Chemistry*, Damascus University, 1981-1982 and *Strategy of the Syrian Ministry of Health*, 2009.

**Table A4-3 Per Capita Daily Requirements of Nutrients by Age Groups**

| Sex and age | Energy kcal | Protein g | Vitamin A micro g | Vitamin E mg | Vitamin C m g | Vitamin K mg | Fe mg | Zn mg | Iodine (I) micro g | Selenium micro g |
|---|---|---|---|---|---|---|---|---|---|---|
| **Breast fed** | | | | | | | | | | |
| 0-0.5 | 650 | 13 | 375 | 3 | 5 | 30 | 6 | 5 | 40 | 10 |
| 0.5-1 | 850 | 14 | 375 | 4 | 10 | 35 | 10 | 5 | 50 | 15 |
| **Children** | | | | | | | | | | |
| 1-3 | 1,300 | 16 | 400 | 6 | 15 | 40 | 10 | 10 | 70 | 20 |
| 4-6 | 1,800 | 24 | 500 | 7 | 20 | 45 | 10 | 10 | 90 | 20 |
| 7-10 | 2,000 | 28 | 700 | 7 | 30 | 45 | 10 | 10 | 120 | 30 |
| **Male** | | | | | | | | | | |
| 11-14 | 2,500 | 45 | 1,000 | 10 | 45 | 50 | 12 | 15 | 150 | 40 |
| 15-18 | 3,000 | 59 | 1,000 | 10 | 65 | 60 | 12 | 15 | 150 | 50 |
| 19-24 | 2,900 | 58 | 1,000 | 10 | 70 | 60 | 10 | 15 | 150 | 70 |
| 25-50 | 2,900 | 63 | 1,000 | 10 | 80 | 60 | 10 | 15 | 150 | 70 |
| +50 | 2,300 | 63 | 1,000 | 10 | 80 | 60 | 10 | 15 | 150 | 70 |
| **Female** | | | | | | | | | | |
| 11-14 | 2,300 | 46 | 800 | 8 | 45 | 50 | 15 | 12 | 150 | 45 |
| 15-18 | 2,200 | 44 | 800 | 8 | 55 | 60 | 15 | 12 | 150 | 50 |
| 19-24 | 2,200 | 46 | 800 | 8 | 60 | 60 | 15 | 12 | 150 | 55 |
| 25-50 | 2,200 | 50 | 800 | 8 | 65 | 60 | 15 | 12 | 150 | 55 |
| +50 | 1,900 | 50 | 800 | 8 | 65 | 60 | 10 | 12 | 175 | 55 |
| Pregnant | +30 | 60 | 800 | 10 | 65 | 70 | 30 | 15 | 175 | 65 |
| Breast feeding (lactating) | | | | | | | | | | |
| First six month | +500 | 65 | 1,300 | 12 | 65 | 95 | 15 | 19 | 200 | 75 |
| Second six month | +500 | 62 | 1,200 | 11 | 65 | 95 | 15 | 16 | 200 | 75 |

**Table A4-3 Continued**

| Sex and age | International recommendation for nutrition requirements | | | | | | | | Sufficient intakes | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Thiamin mg | Riboflavin micro g | Niacin mg | B6 mg | Alcohol micro g | B12 micro g | Phosphor mg | Magnesium mg | Vitamin D micro g | Pentatonic acid mg | Biotin micro g | Coli n mg | Calcium mg | Florid Mg |
| **Breast fed** | | | | | | | | | | | | | | |
| 0-0.5 | 0.2 | 0.3 | 2 | 0.1 | 65 | 0.4 | 100 | 30 | 5 | 1.7 | 5 | 125 | 210 | 0.01 |
| 0.5-1 | 0.3 | 0.4 | 4 | 0.3 | 80 | 0.5 | 275 | 75 | 5 | 1.8 | 6 | 270 | 270 | 0.5 |
| **Children** | | | | | | | | | | | | | | |
| 1-3 | 0.5 | 0.5 | 6 | 0.6 | 50 | 0.9 | 460 | 80 | 5 | 2.0 | 8 | 200 | 500 | 0.7 |
| 4-8 | 0.6 | 0.6 | 8 | 0.6 | 200 | 1.2 | 500 | 130 | 5 | 3.0 | 12 | 250 | 800 | 1.1 |
| **Male** | | | | | | | | | | | | | | |
| 9-13 | 0.9 | 0.9 | 12 | 1.0 | 300 | 1.8 | 1,250 | 240 | 5 | 4 | 20 | 375 | 1,300 | 2.0 |
| 14-18 | 1.2 | 1.3 | 16 | 1.3 | 400 | 2.4 | 1,250 | 410 | 5 | 5 | 25 | 550 | 1,300 | 3.2 |
| 19-30 | 1.2 | 1.3 | 16 | 1.3 | 400 | 2.4 | 700 | 400 | 5 | 5 | 30 | 550 | 1,000 | 3.8 |
| 31-50 | 1.2 | 1.3 | 16 | 1.7 | 400 | 2.4 | 700 | 420 | 5 | 5 | 30 | 550 | 1,000 | 3.8 |
| 51-70 | 1.2 | 1.3 | 16 | 1.7 | 400 | 2.4 | 700 | 420 | 10 | 5 | 30 | 500 | 1,200 | 3.8 |
| +70 | 1.2 | 1.3 | 16 | 1.7 | 400 | 2.4 | 700 | 420 | 15 | 5 | 30 | 500 | 1,200 | 3.8 |
| **Female** | | | | | | | | | | | | | | |
| 9-13 | 0.9 | 0.9 | 12 | 1.0 | 300 | 1.8 | 1,250 | 240 | 5 | 4 | 20 | 375 | 1,300 | 2.0 |
| 14-18 | 1.0 | 1.0 | 14 | 1.2 | 400 | 2.4 | 1,250 | 360 | 5 | 5 | 25 | 400 | 1,300 | 3.2 |
| 19-30 | 1.1 | 1.1 | 14 | 1.3 | 400 | 2.4 | 700 | 310 | 5 | 5 | 30 | 425 | 1,000 | 3.8 |
| 31-50 | 1.1 | 1.1 | 14 | 1.3 | 400 | 2.4 | 700 | 320 | 5 | 5 | 30 | 425 | 1,000 | 3.8 |
| 51-70 | 1.1 | 1.1 | 14 | 1.5 | 400 | 2.4 | 700 | 320 | 10 | 5 | 30 | 425 | 1,200 | 3.8 |
| +70 | 1.1 | 1.1 | 14 | 1.5 | 400 | 2.4 | 700 | 320 | 15 | 5 | 30 | 425 | 1,200 | 3.8 |
| Pregnant | 1.4 | 1.4 | 18 | 1.9 | 600 | 2.6 | * | +40 | * | 6 | 30 | 450 | * | * |
| Lactating | 1.5 | 1.6 | 17 | 2.0 | 800 | 2.8 | * | * | * | 7 | 35 | 550 | * | * |

Source: Elaborated from the Nutrition Strategy of the Syrian Ministry of Health, 2009. * The same intake as the females in the same age.

**Table A4-4 Food Composition Per 1000 g by Food Groups and Countries**

| Item | Energy | Protein | Fat | Carbo-hydrate | Vitamin A | Vitamin C | Vitamin B1 | Vitamin B2 | Vitamin B6 | Vitamin B12 | Calcium | Sodium | Iron | Iodine |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kcal | g | g | g | micro g RE | mg | mg | mg | mg | micro g | mg | mg | mg | microg |
| **Cereals** | | | | | | | | | | | | | | |
| ***Syria*** | 2,907.4 | 85.5 | 14.5 | 660.0 | 228.0 | 0.0 | 3.1 | 1.2 | 0.8 | 0.0 | 225.0 | 52.4 | 43.0 | 45.0 |
| ***Egypt*** | 3,162.9 | 87.4 | 22.6 | 660.0 | 228.0 | 0.0 | 3.1 | 1.2 | 0.5 | 0.0 | 225.0 | 52.4 | 43.0 | 45.0 |
| ***Jordan*** | 3,108.7 | 89.0 | 16.0 | 660.0 | 228.0 | 0.0 | 3.1 | 1.2 | 0.6 | 0.0 | 225.0 | 52.4 | 43.0 | 45.0 |
| ***Kuwait*** | 3,205.6 | 79.4 | 10.3 | 660.0 | 228.0 | 0.0 | 3.1 | 1.2 | 0.9 | 0.0 | 225.0 | 52.4 | 43.0 | 45.0 |
| ***Lebanon*** | 2,986.4 | 78.6 | 9.6 | 660.0 | 228.0 | 0.0 | 3.1 | 1.2 | 0.6 | 0.0 | 225.0 | 52.4 | 43.0 | 45.0 |
| ***Morocco*** | 2,753.5 | 81.9 | 12.3 | 660.0 | 228.0 | 0.0 | 3.1 | 1.2 | 0.3 | 0.0 | 225.0 | 52.4 | 43.0 | 45.0 |
| ***Saudi Arabia*** | 3,348.5 | 89.7 | 21.6 | 660.0 | 250.0 | 0.0 | 3.1 | 1.2 | 0.7 | 0.0 | 225.0 | 52.4 | 43.0 | 45.0 |
| ***Tunisia*** | 2,903.8 | 87.0 | 10.5 | 660.0 | 228.0 | 0.0 | 3.1 | 1.2 | 0.5 | 0.0 | 225.0 | 52.4 | 43.0 | 45. |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | 0 |
| ***USA*** | 2,679.3 | 80.5 | 11.0 | 660.0 | 228.0 | 0.0 | 3.1 | 1.2 | 0.5 | 0.0 | 225.0 | 52.4 | 43.0 | 45.0 |
| ***EU*** | 2,655.6 | 81.4 | 10.3 | 660.0 | 228.0 | 0.0 | 3.1 | 1.2 | 0.5 | 0.0 | 225.0 | 52.4 | 43.0 | 45.0 |
| ***World*** | 3,195.0 | 79.9 | 14.5 | 660.0 | 228.0 | 0.0 | 3.1 | 1.2 | 0.8 | 0.0 | 225.0 | 52.4 | 43.0 | 45.0 |
| **Food legumes** | | | | | | | | | | | | | | |
| ***Syria*** | 3,521.2 | 231.9 | 21.5 | 495.7 | 0.0 | 5.4 | 4.3 | 2.7 | 1.7 | 0.0 | 825.0 | 150.0 | 50.0 | 7.0 |
| ***Egypt*** | 3,548.6 | 263.6 | 20.3 | 495.7 | 0.0 | 5.4 | 4.3 | 2.7 | 1.7 | 0.0 | 825.0 | 150.0 | 50.0 | 7.0 |
| ***Jordan*** | 3,500.0 | 220.0 | 25.0 | 495.7 | 0.0 | 5.4 | 4.3 | 2.7 | 1.7 | 0.0 | 825.0 | 150.0 | 50.0 | 7.0 |
| ***Kuwait*** | 3,454.5 | 228.1 | 26.1 | 495.7 | 0.0 | 5.4 | 4.3 | 2.7 | 1.7 | 0.0 | 825.0 | 150.0 | 50.0 | 7.0 |
| ***Lebanon*** | 3,522.4 | 229.7 | 23.0 | 495.7 | 0.0 | 5.4 | 4.3 | 2.7 | 1.7 | 0.0 | 825.0 | 150.0 | 50.0 | 7.0 |
| ***Morocco*** | 3,467.5 | 240.9 | 18.3 | 495.7 | 0.0 | 5.4 | 4.3 | 2.7 | 1.7 | 0.0 | 825.0 | 150.0 | 50.0 | 7.0 |
| ***Saudi Arabia*** | 3,435.3 | 225.4 | 21.5 | 495.7 | 0.0 | 5.4 | 4.3 | 2.7 | 1.7 | 0.0 | 825.0 | 150.0 | 50.0 | 7.0 |
| ***Tunisia*** | 3,462.8 | 224.6 | 23.4 | 495.7 | 0.0 | 5.4 | 4.3 | 2.7 | 1.7 | 0.0 | 825.0 | 150.0 | 50.0 | 7.0 |
| ***USA*** | 3,421.9 | 228.1 | 11.4 | 495.7 | 0.0 | 5.4 | 4.3 | 2.7 | 1.7 | 0.0 | 825.0 | 150.0 | 50.0 | 7.0 |
| ***EU*** | 3,406.7 | 219.0 | 12.2 | 495.7 | 0.0 | 5.4 | 4.3 | 2.7 | 1.7 | 0.0 | 825.0 | 150.0 | 50.0 | 7.0 |
| ***World*** | 3,421.9 | 211.0 | 22.8 | 495.7 | 0.0 | 5.4 | 4.3 | 2.7 | 1.7 | 0.0 | 825.0 | 150.0 | 50.0 | 7.0 |
| **Fruits** | | | | | | | | | | | | | | |
| ***Syria*** | 536.0 | 6.0 | 2.1 | 85.4 | 76.0 | 130.0 | 0.5 | 0.4 | 0.7 | 0.0 | 100.0 | 70.0 | 1.7 | 8.6 |
| ***Egypt*** | 607.1 | 7.9 | 2.9 | 85.4 | 76.0 | 130.0 | 0.5 | 0.4 | 0.7 | 0.0 | 100.0 | 70.0 | 1.7 | 8.6 |
| ***Jordan*** | 497.7 | 5.7 | 2.6 | 85.4 | 76.0 | 130.0 | 0.5 | 0.4 | 0.7 | 0.0 | 100.0 | 70.0 | 1.7 | 8.6 |
| ***Kuwait*** | 430.8 | 5.3 | 2.6 | 85.4 | 76.0 | 130.0 | 0.5 | 0.4 | 0.7 | 0.0 | 100.0 | 70.0 | 1.7 | 8.6 |
| ***Lebanon*** | 432.5 | 6.0 | 2.3 | 85.4 | 76.0 | 130.0 | 0.5 | 0.4 | 0.7 | 0.0 | 100.0 | 70.0 | 1.7 | 8.6 |
| ***Morocco*** | 465.2 | 5.4 | 3.6 | 85.4 | 76.0 | 130.0 | 0.5 | 0.4 | 0.7 | 0.0 | 100.0 | 70.0 | 1.7 | 8.6 |
| ***Saudi Arabia*** | 768.8 | 8.3 | 2.8 | 85.4 | 150.0 | 130.0 | 0.5 | 0.4 | 0.7 | 0.0 | 100.0 | 70.0 | 1.7 | 8.6 |
| ***Tunisia*** | 520.6 | 6.1 | 3.0 | 85.4 | 76.0 | 130.0 | 0.5 | 0.4 | 0.7 | 0.0 | 100.0 | 70.0 | 1.7 | 8.6 |
| ***USA*** | 373.1 | 4.4 | 2.0 | 85.4 | 76.0 | 130.0 | 0.5 | 0.4 | 0.7 | 0.0 | 100.0 | 70.0 | 1.7 | 8.6 |
| ***EU*** | 451.3 | 5.3 | 2.7 | 85.4 | 76.0 | 130.0 | 0.5 | 0.4 | 0.7 | 0.0 | 100.0 | 70.0 | 1.7 | 8.6 |
| ***World*** | 474.1 | 5.3 | 3.0 | 85.4 | 76.0 | 130.0 | 0.5 | 0.4 | 0.7 | 0.0 | 100.0 | 70.0 | 1.7 | 8.6 |
| **Vegetables** | | | | | | | | | | | | | | |
| ***Syria*** | 248.6 | 9.8 | 1.7 | 79.8 | 249.0 | 135.0 | 0.5 | 0.3 | 1.0 | 0.0 | 135.0 | 680.0 | 4.5 | 30.4 |
| ***Egypt*** | 286.9 | 10.1 | 1.6 | 79.8 | 249.0 | 135.0 | 0.5 | 0.3 | 1.0 | 0.0 | 135.0 | 680.0 | 4.5 | 30.4 |
| ***Jordan*** | 254.2 | 10.1 | 1.7 | 79.8 | 249.0 | 135.0 | 0.5 | 0.3 | 1.0 | 0.0 | 135.0 | 680.0 | 4.5 | 30.4 |
| ***Kuwait*** | 267.9 | 11.0 | 2.0 | 79.8 | 249.0 | 135.0 | 0.5 | 0.3 | 1.0 | 0.0 | 135.0 | 680.0 | 4.5 | 30.4 |
| ***Lebanon*** | 352.9 | 11.2 | 1.8 | 79.8 | 249.0 | 135.0 | 0.5 | 0.3 | 1.0 | 0.0 | 135.0 | 680.0 | 4.5 | 30.4 |
| ***Morocco*** | 395.0 | 11.4 | 1.5 | 79.8 | 249.0 | 135.0 | 0.5 | 0.3 | 1.0 | 0.0 | 135.0 | 680.0 | 4.5 | 30.4 |
| ***Saudi Arabia*** | 233.7 | 9.9 | 1.7 | 79.8 | 300.0 | 135.0 | 0.5 | 0.3 | 1.0 | 0.0 | 135.0 | 680.0 | 4.5 | 30.4 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Tunisia*** | 279.9 | 11.4 | 2.2 | 79.8 | 249.0 | 135.0 | 0.5 | 0.3 | 1.0 | 0.0 | 135.0 | 680.0 | 4.5 | 30.4 |
| ***USA*** | 349.8 | 12.4 | 1.5 | 79.8 | 249.0 | 135.0 | 0.5 | 0.3 | 1.0 | 0.0 | 135.0 | 680.0 | 4.5 | 30.4 |
| ***EU*** | 419.7 | 13.8 | 1.4 | 79.8 | 249.0 | 135.0 | 0.5 | 0.3 | 1.0 | 0.0 | 135.0 | 680.0 | 4.5 | 30.4 |
| ***World*** | 442.0 | 12.9 | 1.9 | 79.8 | 249.0 | 135.0 | 0.5 | 0.3 | 1.0 | 0.0 | 135.0 | 680.0 | 4.5 | 30.4 |
| **Meat** | | | | | | | | | | | | | | |
| ***Syria*** | 1,954.2 | 135.7 | 153.4 | 1.7 | 1,168.0 | 9.2 | 1.8 | 1.7 | 2.9 | 20.9 | 115.0 | 690.0 | 12.5 | 117.4 |
| ***Egypt*** | 1,405.0 | 128.3 | 94.7 | 1.7 | 1,168.0 | 9.2 | 1.8 | 1.7 | 2.9 | 20.9 | 115.0 | 690.0 | 12.5 | 117.4 |
| ***Jordan*** | 1,734.7 | 132.7 | 129.5 | 1.7 | 1,168.0 | 9.2 | 1.8 | 1.7 | 2.9 | 20.9 | 115.0 | 690.0 | 12.5 | 117.4 |
| ***Kuwait*** | 1,615.7 | 122.7 | 121.2 | 1.7 | 1,168.0 | 9.2 | 1.8 | 1.7 | 2.9 | 20.9 | 115.0 | 690.0 | 12.5 | 117.4 |
| ***Lebanon*** | 1,803.1 | 133.3 | 137.7 | 1.7 | 1,168.0 | 9.2 | 1.8 | 1.7 | 2.9 | 20.9 | 115.0 | 690.0 | 12.5 | 117.4 |
| ***Morocco*** | 1,300.8 | 126.2 | 81.5 | 1.7 | 1,168.0 | 9.2 | 1.8 | 1.7 | 2.9 | 20.9 | 115.0 | 690.0 | 12.5 | 117.4 |
| ***Saudi Arabia*** | 1,527.4 | 128.4 | 108.3 | 1.7 | 1,200.0 | 9.2 | 1.8 | 1.7 | 2.9 | 20.9 | 115.0 | 690.0 | 12.5 | 117.4 |
| ***Tunisia*** | 1,322.8 | 124.9 | 88.2 | 1.7 | 1,168.0 | 9.2 | 1.8 | 1.7 | 2.9 | 20.9 | 115.0 | 690.0 | 12.5 | 117.4 |
| ***USA*** | 1,208.2 | 116.0 | 78.8 | 1.7 | 1,168.0 | 9.2 | 1.8 | 1.7 | 2.9 | 20.9 | 115.0 | 690.0 | 12.5 | 117.4 |
| ***EU*** | 1,522.4 | 117.8 | 113.0 | 1.7 | 1,168.0 | 9.2 | 1.8 | 1.7 | 2.9 | 20.9 | 115.0 | 690.0 | 12.5 | 117.4 |
| ***World*** | 1,554.8 | 118.9 | 114.7 | 1.7 | 1,168.0 | 9.2 | 1.8 | 1.7 | 2.9 | 20.9 | 115.0 | 690.0 | 12.5 | 117.4 |
| **Eggs** | | | | | | | | | | | | | | |
| ***Syria*** | 1,436.1 | 107.7 | 101.7 | 12.3 | 1,696.0 | 0.0 | 1.3 | 3.2 | 1.1 | 9.8 | 430.0 | 1,100.0 | 12.6 | 371.8 |
| ***Egypt*** | 1,390.5 | 104.3 | 104.3 | 12.3 | 1,696.0 | 0.0 | 1.3 | 3.2 | 1.1 | 9.8 | 430.0 | 1,100.0 | 12.6 | 371.8 |
| ***Jordan*** | 1,430.4 | 108.5 | 103.6 | 12.3 | 1,696.0 | 0.0 | 1.3 | 3.2 | 1.1 | 9.8 | 430.0 | 1,100.0 | 12.6 | 371.8 |
| ***Kuwait*** | 1,393.1 | 105.9 | 97.5 | 12.3 | 1,696.0 | 0.0 | 1.3 | 3.2 | 1.1 | 9.8 | 430.0 | 1,100.0 | 12.6 | 371.8 |
| ***Lebanon*** | 1,403.8 | 105.3 | 101.8 | 12.3 | 1,696.0 | 0.0 | 1.3 | 3.2 | 1.1 | 9.8 | 430.0 | 1,100.0 | 12.6 | 371.8 |
| ***Morocco*** | 1,216.7 | 101.4 | 81.1 | 12.3 | 1,696.0 | 0.0 | 1.3 | 3.2 | 1.1 | 9.8 | 430.0 | 1,100.0 | 12.6 | 371.8 |
| ***Saudi Arabia*** | 1,414.4 | 104.9 | 100.4 | 12.3 | 1,800.0 | 0.0 | 1.3 | 3.2 | 1.1 | 9.8 | 430.0 | 1,100.0 | 12.6 | 371.8 |
| ***Tunisia*** | 1,216.7 | 103.4 | 85.2 | 12.3 | 1,696.0 | 0.0 | 1.3 | 3.2 | 1.1 | 9.8 | 430.0 | 1,100.0 | 12.6 | 371.8 |
| ***USA*** | 1,384.5 | 105.7 | 98.2 | 12.3 | 1,696.0 | 0.0 | 1.3 | 3.2 | 1.1 | 9.8 | 430.0 | 1,100.0 | 12.6 | 371.8 |
| ***EU*** | 1,407.9 | 114.7 | 99.1 | 12.3 | 1,696.0 | 0.0 | 1.3 | 3.2 | 1.1 | 9.8 | 430.0 | 1,100.0 | 12.6 | 371.8 |
| ***World*** | 1,376.2 | 107.7 | 95.7 | 12.3 | 1,696.0 | 0.0 | 1.3 | 3.2 | 1.1 | 9.8 | 430.0 | 1,100.0 | 12.6 | 371.8 |
| **Milk** | | | | | | | | | | | | | | |
| ***Syria*** | 632.8 | 36.5 | 39.0 | 29.6 | 250.0 | 4.1 | 0.2 | 1.0 | 0.2 | 2.2 | 960.0 | 550.0 | 0.5 | 157.9 |
| ***Egypt*** | 450.7 | 30.0 | 27.4 | 29.6 | 250.0 | 4.1 | 0.2 | 1.0 | 0.2 | 2.2 | 960.0 | 550.0 | 0.5 | 157.9 |
| ***Jordan*** | 567.8 | 34.6 | 30. | 29.6 | 250.0 | 4.1 | 0.2 | 1.0 | 0.2 | 2.2 | 960.0 | 550.0 | 0.5 | 157 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 7 | | | | | | | | | | | .9 |
| ***Kuwait*** | 485.5 | 34.4 | 18.5 | 29.6 | 250.0 | 4.1 | 0.2 | 1.0 | 0.2 | 2.2 | 960.0 | 550.0 | 0.5 | 157.9 |
| ***Lebanon*** | 475.0 | 33.3 | 24.2 | 29.6 | 250.0 | 4.1 | 0.2 | 1.0 | 0.2 | 2.2 | 960.0 | 550.0 | 0.5 | 157.9 |
| ***Morocco*** | 474.5 | 32.9 | 17.0 | 29.6 | 250.0 | 4.1 | 0.2 | 1.0 | 0.2 | 2.2 | 960.0 | 550.0 | 0.5 | 157.9 |
| ***Saudi Arabia*** | 560.1 | 37.2 | 23.1 | 29.6 | 350.0 | 4.1 | 0.2 | 1.0 | 0.2 | 2.2 | 960.0 | 550.0 | 0.5 | 157.9 |
| ***Tunisia*** | 570.5 | 32.7 | 27.5 | 29.6 | 250.0 | 4.1 | 0.2 | 1.0 | 0.2 | 2.2 | 960.0 | 550.0 | 0.5 | 157.9 |
| ***USA*** | 559.1 | 33.0 | 30.8 | 29.6 | 250.0 | 4.1 | 0.2 | 1.0 | 0.2 | 2.2 | 960.0 | 550.0 | 0.5 | 157.9 |
| ***EU*** | 491.9 | 30.8 | 28.4 | 29.6 | 250.0 | 4.1 | 0.2 | 1.0 | 0.2 | 2.2 | 960.0 | 550.0 | 0.5 | 157.9 |
| ***World*** | 555.4 | 33.1 | 30.3 | 29.6 | 250.0 | 4.1 | 0.2 | 1.0 | 0.2 | 2.2 | 960.0 | 550.0 | 0.5 | 157.9 |
| **Animal fats** | | | | | | | | | | | | | | |
| ***Syria*** | 8,428.2 | 6.6 | 942.4 | 0.0 | 5,500.0 | 3.0 | 0.1 | 0.1 | 0.4 | 1.3 | 160.0 | 70.0 | 2.2 | 0.0 |
| ***Egypt*** | 7,554.7 | 8.5 | 848.8 | 0.0 | 5,500.0 | 3.0 | 0.1 | 0.1 | 0.4 | 1.3 | 160.0 | 70.0 | 2.2 | 0.0 |
| ***Jordan*** | 7,039.3 | 0.0 | 782.1 | 0.0 | 5,500.0 | 3.0 | 0.1 | 0.1 | 0.4 | 1.3 | 160.0 | 70.0 | 2.2 | 0.0 |
| ***Kuwait*** | 7,004.1 | 9.9 | 789.2 | 0.0 | 5,500.0 | 3.0 | 0.1 | 0.1 | 0.4 | 1.3 | 160.0 | 70.0 | 2.2 | 0.0 |
| ***Lebanon*** | 7,300.0 | 7.3 | 824.9 | 0.0 | 5,500.0 | 3.0 | 0.1 | 0.1 | 0.4 | 1.3 | 160.0 | 70.0 | 2.2 | 0.0 |
| ***Morocco*** | 7,300.0 | 0.0 | 821.3 | 0.0 | 5,500.0 | 3.0 | 0.1 | 0.1 | 0.4 | 1.3 | 160.0 | 70.0 | 2.2 | 0.0 |
| ***Saudi Arabia*** | 7,884.0 | 0.0 | 890.6 | 0.0 | 6,300.0 | 3.0 | 0.1 | 0.1 | 0.4 | 1.3 | 160.0 | 70.0 | 2.2 | 0.0 |
| ***Tunisia*** | 8,142.3 | 0.0 | 898.5 | 0.0 | 5,500.0 | 3.0 | 0.1 | 0.1 | 0.4 | 1.3 | 160.0 | 70.0 | 2.2 | 0.0 |
| ***USA*** | 6,264.2 | 4.9 | 705.3 | 0.0 | 5,500.0 | 3.0 | 0.1 | 0.1 | 0.4 | 1.3 | 160.0 | 70.0 | 2.2 | 0.0 |
| ***EU*** | 6,124.2 | 9.8 | 681.0 | 0.0 | 5,500.0 | 3.0 | 0.1 | 0.1 | 0.4 | 1.3 | 160.0 | 70.0 | 2.2 | 0.0 |
| ***World*** | 6,205.0 | 9.1 | 693.5 | 0.0 | 5,500.0 | 3.0 | 0.1 | 0.1 | 0.4 | 1.3 | 160.0 | 70.0 | 2.2 | 0.0 |
| **Vegetal oils and fats** | | | | | | | | | | | | | | |
| ***Syria*** | 8,812.6 | 0.0 | 996.4 | 0.0 | 750.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.0 | 1,080.0 | 0.0 | 0.0 |
| ***Egypt*** | 8,917.1 | 0.0 | 1,007.2 | 0.0 | 750.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.0 | 1,080.0 | 0.0 | 0.0 |
| ***Jordan*** | 8,848.5 | 0.0 | 999.1 | 0.0 | 750.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.0 | 1,080.0 | 0.0 | 0.0 |
| ***Kuwait*** | 8,843.1 | 0.0 | 1,000.0 | 0.0 | 750.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.0 | 1,080.0 | 0.0 | 0.0 |
| ***Lebanon*** | 8,829.8 | 0.0 | 1,001.1 | 0.0 | 750.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.0 | 1,080.0 | 0.0 | 0.0 |
| ***Morocco*** | 8,818.1 | 0.0 | 998.1 | 0.0 | 750.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.0 | 1,080.0 | 0.0 | 0.0 |
| ***Saudi Arabia*** | 8,869.5 | 0.0 | 1,003.8 | 0.0 | 1,200.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.0 | 1,080.0 | 0.0 | 0.0 |
| ***Tunisia*** | 8,813.9 | 0.0 | 997.5 | 0.0 | 750.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.0 | 1,080.0 | 0.0 | 0.0 |
| ***USA*** | 8,490.6 | 3.1 | 958.7 | 0.0 | 750.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.0 | 1,080.0 | 0.0 | 0.0 |
| ***EU*** | 8,884. | 2.4 | 1,003 | 0.0 | 750.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.0 | 1,08 | 0.0 | 0.0 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 9 | | .8 | | | | | | | | | 0.0 | | |
| ***World*** | 8,690.5 | 0.0 | 982.0 | 0.0 | 750.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.0 | 1,080.0 | 0.0 | 0.0 |
| **Sugar and sweeteners** | | | | | | | | | | | | | | |
| ***Syria*** | 3,493.0 | 0.0 | 0.0 | 928.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| ***Egypt*** | 3,617.0 | 0.0 | 0.0 | 928.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| ***Jordan*** | 3,589.6 | 0.0 | 0.0 | 928.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| ***Kuwait*** | 3,570.5 | 0.0 | 0.0 | 928.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| ***Lebanon*** | 3,554.3 | 0.0 | 0.0 | 928.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| ***Morocco*** | 3,543.7 | 0.0 | 0.0 | 928.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| ***Saudi Arabia*** | 3,611.4 | 0.0 | 0.0 | 928.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| ***Tunisia*** | 3,521.7 | 0.0 | 0.0 | 928.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| ***USA*** | 3,405.4 | 0.0 | 0.0 | 928.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| ***EU*** | 3,542.1 | 0.0 | 0.0 | 928.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| ***World*** | 3,516.5 | 0.0 | 0.0 | 928.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| **Alcoholic beverages** | | | | | | | | | | | | | | |
| ***Syria*** | 912.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ***Egypt*** | 405.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ***Jordan*** | 576.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ***Kuwait*** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ***Lebanon*** | 892.2 | 4.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ***Morocco*** | 497.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ***Saudi Arabia*** | 486.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ***Tunisia*** | 550.0 | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ***USA*** | 576.3 | 2.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ***EU*** | 660.3 | 3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| ***World*** | 765.5 | 3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Others** | | | | | | | | | | | | | | |
| ***Syria*** | 2,149.7 | 100.8 | 179.1 | 124.0 | 40.0 | 5.3 | 0.1 | 1.2 | 1.7 | 0.0 | 370.0 | 1,000.0 | 16.0 | 17.3 |
| ***Egypt*** | 552.0 | 27.0 | 18.0 | 124.0 | 40.0 | 5.3 | 0.1 | 1.2 | 1.7 | 0.0 | 370.0 | 1,000.0 | 16.0 | 17.3 |
| ***Jordan*** | 2,241.2 | 96.1 | 185.7 | 124.0 | 40.0 | 5.3 | 0.1 | 1.2 | 1.7 | 0.0 | 370.0 | 1,000.0 | 16.0 | 17.3 |
| ***Kuwait*** | 2,148.0 | 87.2 | 159.9 | 124.0 | 40.0 | 5.3 | 0.1 | 1.2 | 1.7 | 0.0 | 370.0 | 1,000.0 | 16.0 | 17.3 |
| ***Lebanon*** | 1,653.9 | 70.3 | 131.2 | 124.0 | 40.0 | 5.3 | 0.1 | 1.2 | 1.7 | 0.0 | 370.0 | 1,000.0 | 16.0 | 17.3 |
| ***Morocco*** | 2,010.1 | 84.6 | 137.5 | 124.0 | 40.0 | 5.3 | 0.1 | 1.2 | 1.7 | 0.0 | 370.0 | 1,000.0 | 16.0 | 17.3 |
| ***Saudi Arabia*** | 1,868.8 | 96.4 | 119.7 | 124.0 | 100.0 | 5.3 | 0.1 | 1.2 | 1.7 | 0.0 | 370.0 | 1,000.0 | 16.0 | 17.3 |
| ***Tunisia*** | 2,033.6 | 99.1 | 146.0 | 124.0 | 40.0 | 5.3 | 0.1 | 1.2 | 1.7 | 0.0 | 370.0 | 1,000.0 | 16.0 | 17.3 |
| ***USA*** | 2,420.1 | 119.0 | 184.5 | 124.0 | 40.0 | 5.3 | 0.1 | 1.2 | 1.7 | 0.0 | 370.0 | 1,000.0 | 16.0 | 17.3 |
| ***EU*** | 1,133.7 | 118.9 | 49.8 | 124.0 | 40.0 | 5.3 | 0.1 | 1.2 | 1.7 | 0.0 | 370.0 | 1,000.0 | 16.0 | 17.3 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***World*** | 1,317.1 | 48.0 | 48.0 | 124.0 | 40.0 | 5.3 | 0.1 | 1.2 | 1.7 | 0.0 | 370.0 | 1,000.0 | 16.0 | 17.3 |

Source: Elaborated from FAO and USDA *statistics*. kcal: kilocalorie; g: gram; mg: milligram; microg: micro gram; RE: retinol equivalent.

**Table A4-5 Food Composition Per 1000 g by Commodities**

| Item | Energy | Protein | Fat | Carbo-hydrate | Vitamin A | Vitamin C | Vitamin B1 | Vitamin B2 | Vitamin B6 | Vitamin B12 | Calcium | Sodium | Iron | Iodine |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kcal | g | g | g | I.E | mg | mg | mg | mg | microg | mg | mg | mg | microg |
| **Grains** | | | | | | | | | | | | | | |
| Bread | 2,490.0 | 82.0 | 12.0 | 480.0 | 0.0 | 0.0 | 2.6 | 2.1 | 1.8 | 0.0 | 360.0 | 5,200.0 | 24.0 | 172.9 |
| Wheat | 3,340.0 | 120.0 | 23.0 | 610.0 | 0.0 | 0.0 | 6.0 | 0.5 | 0.5 | 0.0 | 440.0 | 78.0 | 30.0 | 15.4 |
| Flour | 3,640.0 | 109.0 | 11.0 | 710.0 | 0.0 | 0.0 | 4.0 | 3.2 | 4.0 | 0.0 | 380.0 | 20.0 | 46.7 | 15.4 |
| Bulgur | 3,450.0 | 123.0 | 20.0 | 700.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 700.0 | 260.0 | 40.0 | 15.4 |
| Free rice | 3,570.0 | 75.0 | 18.0 | 790.0 | 0.0 | 0.0 | 0.5 | 0.7 | 1.5 | 0.0 | 240.0 | 51.1 | 10.0 | 146.5 |
| Freekeh [11] | 3,550.0 | 102.0 | 22.5 | 716.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 700.0 | 260.0 | 40.0 | 15.4 |
| Macaroni | 3,670.0 | 110.0 | 11.0 | 725.0 | 0.0 | 0.0 | 1.3 | 0.7 | 0.0 | 0.0 | 220.0 | 120.0 | 10.0 | 34.8 |
| Noodles | 3,670.0 | 110.0 | 11.0 | 725.0 | 0.0 | 0.0 | 1.3 | 0.7 | 0.0 | 0.0 | 220.0 | 120.0 | 10.0 | 34.8 |
| Grain cake | 3,860.0 | 92.0 | 55.0 | 729.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.9 | 0.0 | 500.0 | 2,500.0 | 16.0 | 172.9 |
| Maize | 3,560.0 | 95.0 | 43.0 | 630.0 | 5,000.0 | 0.0 | 2.5 | 2.4 | 0.0 | 0.0 | 190.0 | 100.0 | 70.0 | 0.0 |
| Coupon rice | 3,570.0 | 75.0 | 18.0 | 790.0 | 0.0 | 0.0 | 0.5 | 0.7 | 1.5 | 0.0 | 240.0 | 51.1 | 10.0 | 146.5 |
| Semolina | 3,470.0 | 96.0 | 5.0 | 720.0 | 0.0 | 0.0 | 1.5 | 0.4 | 0.8 | 0.0 | 700.0 | 10.0 | 10.0 | 15.4 |
| Starch | 3,620.0 | 5.0 | 3.0 | 840.0 | 0.0 | 0.0 | 4.0 | 3.2 | 4.0 | 0.0 | 380.0 | 50.0 | 47.0 | 15.4 |
| **Legumes** | | | | | | | | | | | | | | |
| Lentils | 3,460.0 | 242.0 | 18.0 | 520.0 | 1,750.0 | 0.0 | 5.0 | 3.2 | 0.0 | 0.0 | 1,000.0 | 30.0 | 90.0 | 7.0 |
| Crushed lentils | 3,642.1 | 254.7 | 18.9 | 547.4 | 1,750.0 | 0.0 | 5.0 | 3.2 | 0.0 | 0.0 | 1,000.0 | 30.0 | 90.0 | 7.0 |
| Dry broad beans | 3,430.0 | 234.0 | 20.0 | 440.0 | 0.0 | 15.0 | 0.0 | 2.5 | 0.0 | 0.0 | 1,100.0 | 250.0 | 100.0 | 7.0 |
| Chickpeas | 3,580.0 | 201.0 | 45.0 | 226.7 | 4,000.0 | 20.0 | 2.0 | 3.0 | 0.0 | 0.0 | 800.0 | 500.0 | 100.0 | 7.0 |
| Dry haricot beans | 3,410.0 | 221.0 | 17.0 | 520.0 | 0.0 | 20.0 | 6.0 | 2.4 | 2.8 | 0.0 | 1,500.0 | 10.0 | 100.0 | 7.0 |
| **Meat** | | | | | | | | | | | | | | |
| Sheep | 2,630 | 135.0 | 228. | 3.0 | 500.0 | 20.0 | 2.0 | 2.7 | 2.0 | 20.9 | 110.0 | 840.0 | 30.0 | 26.0 |

[11] Crushed wheat.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| meat | .0 | | 0 | | | | | | | | | | | |
| Goat meat | 1,230.0 | 140.0 | 70.0 | 10.0 | 0.0 | 0.0 | 2.5 | 2.5 | 0.9 | 20.9 | 110.0 | 700.0 | 100.0 | 26.0 |
| Cattle meat | 2,645.9 | 169.0 | 210.0 | 0.0 | 0.0 | 0.0 | 1.0 | 1.2 | 2.9 | 23.3 | 90.0 | 0.0 | 30.0 | 26.0 |
| Camel meat | 1,740.0 | 127.0 | 132.0 | 0.0 | 0.0 | 0.0 | 2.5 | 2.5 | 0.9 | 20.9 | 110.0 | 700.0 | 30.0 | 26.0 |
| Canned red meat | 2,330.0 | 250.0 | 140.0 | 0.0 | 0.0 | 0.0 | 0.2 | 1.9 | 0.9 | 23.3 | 71.1 | 17,000.0 | 40.0 | 147.4 |
| Poultry meat | 1,220.0 | 123.0 | 77.0 | 0.0 | 280.0 | 10.9 | 0.4 | 0.9 | 2.4 | 2.2 | 75.6 | 480.0 | 30.0 | 29.0 |
| Turkey meat | 1,260.0 | 161.0 | 63.0 | 0.7 | 813.3 | 1.6 | 0.4 | 1.6 | 3.3 | 12.9 | 120.0 | 660.0 | 40.0 | 29.0 |
| Bird meat | 1,905.0 | 205.0 | 113.3 | 3.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.2 | 0.0 | 0.0 | 0.0 | 15.0 |
| Canned poultry meat | 1,650.0 | 218.0 | 80.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.5 | 1.2 | 2.2 | 59.7 | 17,000.0 | 30.0 | 164.9 |
| Fresh fish | 1,131.1 | 194.7 | 33.3 | 0.0 | 851.1 | 5.1 | 0.9 | 1.1 | 2.9 | 31.6 | 224.4 | 800.0 | 13.6 | 165.0 |
| Frozen fish | 1,131.1 | 194.7 | 33.3 | 0.0 | 851.1 | 5.1 | 0.9 | 1.1 | 2.9 | 31.6 | 224.4 | 800.0 | 13.6 | 165.0 |
| Canned fish | 1,575.6 | 252.7 | 55.1 | 0.0 | 202.2 | 0.4 | 0.2 | 0.9 | 2.7 | 27.3 | 426.7 | 3,904.4 | 13.6 | 929.3 |
| **Eggs** | 1,580.0 | 121.0 | 112.0 | 6.5 | 11,400.0 | 3.0 | 1.4 | 3.2 | 1.1 | 9.8 | 420.0 | 1,300.0 | 12.4 | 715.0 |

Source: Elaborated from FAO statistics, Mahmalji Rateb (1981-1982) and Aljabery Lamia (1984). kcal: kilocalorie; g: gram; mg: milligram; microg: micro gram; I.E = International Equivalent = 0.03 RE: retinol equivalent.

**Table A4-5** Continued

| **Item** | **Energy** | **Protein** | **Fat** | **Carbo-hydrate** | **Vitamin A** | **Vitamin C** | **Vitamin B1** | **Vitamin B2** | **Vitamin B6** | **Vitamin B12** | **Calcium** | **Sodium** | **Iron** | **Iodine** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kcal | g | g | g | I.E | mg | mg | mg | mg | microg | mg | mg | mg | microg |
| **Milk products** | | | | | | | | | | | | | | |
| Fresh milk | 750.0 | 41.0 | 48.2 | 46.9 | 2,100.0 | 11.0 | 0.4 | 1.7 | 0.5 | 3.6 | 1,230.0 | 540.0 | 1.0 | 303.6 |
| Milk powder | 4,960.0 | 263.0 | 267.0 | 280.0 | 500,000.0 | 100.0 | 3.0 | 12.0 | 2.0 | 12.9 | 9,000.0 | 4,000.0 | 6.0 | 208.1 |
| Children powder milk | 4,960.0 | 263.0 | 267.0 | 280.0 | 500,000.0 | 100.0 | 3.0 | 12.0 | 2.0 | 12.9 | 9,000.0 | 4,000.0 | 6.0 | 208.1 |
| Pasteurized canned milk | 750.0 | 41.0 | 48.2 | 46.9 | 2,100.0 | 11.0 | 0.4 | 1.7 | 0.5 | 3.6 | 1,230.0 | 540.0 | 1.0 | 303.6 |
| Yogurt | 750.0 | 41.0 | 48.2 | 46.9 | 2,800.0 | 20.0 | 0.4 | 1.7 | 0.5 | 3.6 | 1,230.0 | 500.0 | 1.0 | 294.8 |
| Labneh | 1,875.0 | 102.5 | 120.6 | 117.2 | 7,000.0 | 50.0 | 1.1 | 4.1 | 1.3 | 8.9 | 3,075.0 | 1,250.0 | 2.5 | 208.1 |
| Other dairies | 610.0 | 35.0 | 33.0 | 39.0 | 2,450.0 | 11.0 | 0.4 | 1.7 | 0.5 | 3.6 | 1,230.0 | 540.0 | 1.0 | 294.8 |
| White cheese | 3,833.3 | 233.1 | 310.9 | 26.9 | 40,000.0 | 0.0 | 0.3 | 5.0 | 1.0 | 8.7 | 11,000.0 | 4,200.0 | 6.7 | 208.1 |
| Kashkaval cheese | 4,200.0 | 274.0 | 343.0 | 20.0 | 40,000.0 | 0.0 | 0.3 | 5.0 | 1.0 | 8.7 | 11,000.0 | 4,200.0 | 6.7 | 208.1 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kareesheh (ricotta) | 1,860.0 | 205.0 | 150.0 | 40.0 | 450.0 | 10.0 | 0.4 | 3.1 | 0.0 | 8.7 | 600.0 | 300.0 | 6.6 | 208.1 |
| Foreign cheese | 3,200.0 | 187.0 | 228.0 | 20.0 | 40,000.0 | 0.0 | 0.5 | 4.5 | 2.5 | 8.7 | 6,800.0 | 3,400.0 | 10.0 | 208.1 |
| Other cheeses | 3,833.3 | 233.1 | 310.9 | 26.9 | 40,000.0 | 0.0 | 0.5 | 4.5 | 2.5 | 8.7 | 6,800.0 | 3,400.0 | 10.0 | 208.1 |
| Butter | 7,170.0 | 9.0 | 811.0 | 0.7 | 40,000.0 | 3.0 | 0.1 | 0.1 | 0.4 | 1.3 | 200.0 | 111.1 | 1.6 | 0.0 |
| Local ghee | 8,730.0 | 3.0 | 991.0 | 0.6 | 40,000.0 | 3.0 | 0.1 | 0.1 | 0.4 | 8.7 | 200.0 | 100.0 | 1.5 | 0.0 |
| Cattle ghee | 8,730.0 | 3.0 | 991.0 | 0.6 | 40,000.0 | 3.0 | 0.1 | 0.1 | 0.4 | 8.7 | 200.0 | 100.0 | 1.5 | 0.0 |
| Baby foods | 3,770.0 | 75.0 | 27.0 | 280.0 | 2,450.0 | 11.0 | 0.4 | 1.7 | 0.5 | 3.6 | 1,230.0 | 540.0 | 1.0 | 0.0 |
| Other animal ghee | 8,730.0 | 3.0 | 991.0 | 0.6 | 40,000.0 | 3.0 | 0.1 | 0.1 | 0.4 | 8.7 | 200.0 | 100.0 | 1.5 | 0.0 |
| Ice cream | 2,026.7 | 35.3 | 110.9 | 237.8 | 12,500.0 | 5.0 | 0.2 | 0.7 | 0.2 | 4.4 | 600.0 | 250.0 | 0.5 | 0.0 |
| **Vegetal oils and ghee** | | | | | | | | | | | | | | |
| Olive oil | 8,840.0 | 0.0 | 1,000.0 | 0.0 | 3,000.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Cotton seed oil | 8,840.0 | 0.0 | 1,000.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Corn oil | 8,840.0 | 0.0 | 1,000.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other vegetal oils | 8,840.0 | 0.0 | 1,000.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Vegetal ghee | 7,900.0 | 5.1 | 850.0 | 5.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4,500.0 | 0.0 | 0.0 |

**Table A4-5** Continued

| Item | Energy | Protein | Fat | Carbo-hydrate | Vitamin A | Vitamin C | Vitamin B1 | Vitamin B2 | Vitamin B6 | Vitamin B12 | Calcium | Sodium | Iron | Iodine |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kcal | g | g | g | I.E | mg | mg | mg | mg | microg | mg | mg | mg | microg |
| **Vegetables** | | | | | | | | | | | | | | |
| Tomatoes | 170.0 | 8.0 | 2.0 | 42.7 | 11,000.0 | 230.0 | 0.6 | 0.4 | 0.7 | 0.0 | 120.0 | 82.2 | 6.0 | 20.7 |
| Potatoes | 670.0 | 16.0 | 1.0 | 181.3 | 400.0 | 230.0 | 1.0 | 0.4 | 2.7 | 0.0 | 170.0 | 60.0 | 7.6 | 7.0 |
| Green haricot beans | 500.0 | 30.0 | 4.0 | 70.0 | 10,000.0 | 120.0 | 0.7 | 1.0 | 2.0 | 0.0 | 400.0 | 12.0 | 10.0 | 20.7 |
| Green okra | 310.0 | 16.0 | 3.0 | 42.7 | 11,000.0 | 230.0 | 0.6 | 0.4 | 0.7 | 0.0 | 120.0 | 82.2 | 6.0 | 20.7 |
| Green kidney beans | 310.0 | 21.0 | 2.0 | 170.0 | 5,500.0 | 230.0 | 3.0 | 1.8 | 1.8 | 0.0 | 250.0 | 9.0 | 20.0 | 20.7 |
| Squash | 190.0 | 9.0 | 1.0 | 8.9 | 80,514.1 | 70.0 | 0.7 | 0.5 | 3.0 | 0.0 | 100.0 | 50.0 | 3.0 | 20.7 |
| Eggplants | 210.0 | 9.0 | 1.0 | 42.7 | 11,000.0 | 230.0 | 0.6 | 0.4 | 0.7 | 0.0 | 120.0 | 82.2 | 6.0 | 20.7 |
| Green broad beans | 882.0 | 63.0 | 10.0 | 144.0 | 0.0 | 188.0 | 0.0 | 2.0 | 0.0 | 0.0 | 344.0 | 5.0 | 31.0 | 0.0 |
| Cabbage | 220.0 | 14.0 | 5.0 | 30.0 | 1,000.0 | 200.0 | 0.6 | 2.0 | 0.0 | 0.0 | 500.0 | 730.0 | 5.0 | 20.7 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cauliflowers | 310.0 | 25.0 | 3.4 | 45.5 | 900.0 | 600.0 | 1.5 | 1.3 | 2.0 | 0.0 | 400.0 | 200.0 | 10.0 | 20.7 |
| Green peas | 310.0 | 21.0 | 2.0 | 45.5 | 700.0 | 250.0 | 3.0 | 1.8 | 1.8 | 0.0 | 250.0 | 9.0 | 20.0 | 20.7 |
| Dry onion | 310.0 | 11.0 | 2.0 | 78.2 | 500.0 | 120.0 | 0.4 | 0.2 | 0.6 | 0.0 | 320.0 | 26.7 | 5.0 | 20.7 |
| Green pepper | 240.0 | 12.0 | 2.0 | 53.0 | 6,300.0 | 1,200.0 | 0.7 | 0.4 | 0.0 | 0.0 | 110.0 | 10.0 | 4.0 | 20.7 |
| Cucumber | 130.0 | 5.0 | 1.0 | 8.9 | 2,000.0 | 70.0 | 0.7 | 0.5 | 3.0 | 0.0 | 100.0 | 50.0 | 3.0 | 20.7 |
| Carrots | 380.0 | 9.0 | 2.0 | 90.9 | 120,000.0 | 83.3 | 0.9 | 0.4 | 2.0 | 0.0 | 400.0 | 480.0 | 4.4 | 20.7 |
| Spinach | 160.0 | 21.0 | 3.0 | 39.0 | 80,000.0 | 200.0 | 0.8 | 2.0 | 8.0 | 0.0 | 900.0 | 850.0 | 30.0 | 103.8 |
| Jew's mallow | 320.0 | 10.0 | 3.0 | 65.0 | 0.0 | 60.0 | 0.6 | 0.5 | 0.0 | 0.0 | 320.0 | 1,100.0 | 10.0 | 103.8 |
| Beet | 350.0 | 12.0 | 1.0 | 70.0 | 500.0 | 80.0 | 0.5 | 1.1 | 1.0 | 0.0 | 300.0 | 110.0 | 30.0 | 20.7 |
| Turnip | 380.0 | 27.0 | 2.0 | 63.0 | 0.0 | 280.0 | 0.6 | 0.6 | 1.0 | 0.0 | 740.0 | 385.0 | 10.0 | 20.7 |
| Dry garlic | 1,300.0 | 55.0 | 4.0 | 769.2 | 500.0 | 120.0 | 0.4 | 0.2 | 0.6 | 0.0 | 320.0 | 26.7 | 5.0 | 20.7 |
| Green onion | 240.0 | 17.0 | 1.0 | 78.2 | 500.0 | 120.0 | 0.3 | 0.2 | 1.1 | 0.0 | 182.2 | 26.7 | 2.0 | 20.7 |
| Radish | 325.0 | 19.0 | 1.0 | 55.0 | 300.0 | 240.0 | 1.0 | 1.1 | 1.8 | 0.0 | 1,000.0 | 80.0 | 20.0 | 20.7 |
| Lettuce | 120.0 | 11.0 | 2.0 | 20.0 | 5,400.0 | 80.0 | 0.6 | 1.0 | 2.0 | 0.0 | 300.0 | 120.0 | 5.0 | 103.8 |
| Green mint | 270.0 | 23.0 | 3.5 | 34.0 | 0.0 | 0.0 | 0.2 | 2.3 | 0.0 | 0.0 | 70.0 | 180.0 | 0.0 | 103.8 |
| Parsley | 144.4 | 6.7 | 1.3 | 32.7 | 180,000.0 | 62.9 | 0.4 | 0.4 | 0.9 | 0.0 | 357.8 | 780.0 | 3.6 | 103.8 |
| Green coriander | 270.0 | 23.0 | 3.5 | 34.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 70.0 | 180.0 | 0.0 | 103.8 |
| Endive (chicory) | 195.0 | 16.5 | 1.0 | 33.0 | 30,000.0 | 150.0 | 0.1 | 0.1 | 0.0 | 0.0 | 1,000.0 | 200.0 | 250.0 | 103.8 |
| Pumpkin | 190.0 | 9.0 | 1.0 | 69.0 | 80,514.1 | 50.1 | 0.5 | 0.1 | 0.4 | 0.0 | 69.4 | 358.0 | 2.1 | 103.8 |
| Leaf beet | 320.0 | 10.0 | 3.0 | 65.0 | 0.0 | 60.0 | 0.6 | 0.5 | 0.0 | 0.0 | 320.0 | 1,100.0 | 10.0 | 103.8 |
| Dried vegetables | 1,525.5 | 75.6 | 16.0 | 239.9 | 4,375.0 | 0.0 | 1.9 | 1.9 | 0.2 | 0.0 | 1,316.0 | 6,170.1 | 58.1 | 529.3 |
| Canned vegetables | 360.0 | 14.0 | 3.0 | 59.8 | 16,625.0 | 102.5 | 0.7 | 0.5 | 0.6 | 0.0 | 202.5 | 2,420.0 | 10.5 | 529.3 |
| Tomato paste | 840.0 | 38.0 | 9.0 | 192.0 | 88,000.0 | 1,035.0 | 2.7 | 1.8 | 3.0 | 0.0 | 540.0 | 657.8 | 27.0 | 529.3 |
| Water melon | 170.0 | 3.0 | 2.0 | 69.0 | 5,900.0 | 60.0 | 0.5 | 0.5 | 0.0 | 0.0 | 120.0 | 358.0 | 6.0 | 20.7 |
| Musk melon | 170.0 | 4.0 | 1.0 | 69.0 | 5,900.0 | 60.0 | 0.5 | 0.5 | 0.0 | 0.0 | 120.0 | 358.0 | 6.0 | 20.7 |
| Pickles | 360.0 | 14.0 | 3.0 | 59.8 | 16,625.0 | 102.5 | 0.7 | 0.5 | 0.6 | 0.0 | 202.5 | 2,420.0 | 10.5 | 529.3 |

**Table A4-5** Continued

| **Item** | **Energy** | **Protein** | **Fat** | **Carbo-hydrate** | **Vitamin A** | **Vitamin C** | **Vitamin B1** | **Vitamin B2** | **Vitamin B6** | **Vitamin B12** | **Calcium** | **Sodium** | **Iron** | **Iodine** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kcal | g | g | g | I.E | mg | mg | mg | mg | microg | mg | mg | mg | microg |

| **Fruits** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Orange | 340.0 | 7.0 | 1.0 | 86.4 | 1,900.0 | 391.6 | 0.7 | 0.2 | 1.2 | 0.0 | 293.3 | 1,331.1 | 0.7 | 7.9 |
| Mandarin | 400.0 | 8.0 | 1.0 | 54.0 | 5,200.0 | 250.0 | 0.7 | 0.3 | 1.2 | 0.0 | 1,200.0 | 4,600.0 | 0.6 | 7.9 |
| Clementine | 400.0 | 8.0 | 1.0 | 54.0 | 5,200.0 | 250.0 | 0.7 | 0.3 | 1.2 | 0.0 | 1,200.0 | 4,600.0 | 0.6 | 7.9 |
| Lemon | 400.0 | 8.0 | 1.0 | 86.4 | 1,900.0 | 0.0 | 0.7 | 0.3 | 1.2 | 0.0 | 1,200.0 | 1,331.1 | 0.6 | 7.9 |
| Grapefruit | 160.0 | 3.0 | 1.0 | 40.0 | 600.0 | 170.0 | 0.2 | 0.2 | 0.4 | 0.0 | 150.0 | 20.0 | 0.4 | 7.9 |
| Pomegranates | 160.0 | 3.0 | 1.0 | 40.0 | 600.0 | 0.0 | 0.2 | 0.2 | 0.4 | 0.0 | 150.0 | 358.0 | 0.4 | 7.9 |
| Grapes | 530.0 | 5.0 | 4.0 | 129.8 | 800.0 | 60.2 | 0.7 | 0.4 | 0.9 | 0.0 | 170.0 | 20.0 | 2.0 | 7.9 |
| Figs | 730.0 | 8.0 | 3.0 | 161.0 | 750.0 | 20.0 | 0.4 | 0.3 | 1.0 | 0.0 | 425.5 | 21.9 | 6.1 | 7.9 |
| Apricots | 450.0 | 13.0 | 4.0 | 92.5 | 27,900.0 | 80.0 | 0.3 | 0.5 | 0.0 | 0.0 | 150.0 | 6.0 | 20.0 | 7.9 |
| Plums | 520.0 | 7.0 | 6.0 | 123.0 | 3,500.0 | 50.0 | 1.5 | 0.4 | 0.0 | 0.0 | 200.0 | 0.0 | 30.0 | 7.9 |
| Peaches | 330.0 | 5.0 | 1.0 | 81.0 | 8,800.0 | 85.0 | 0.2 | 0.5 | 0.3 | 0.0 | 80.0 | 5.0 | 6.0 | 7.9 |
| Pears | 540.0 | 4.0 | 4.0 | 145.0 | 200.0 | 45.0 | 0.3 | 0.5 | 1.5 | 0.0 | 150.0 | 30.0 | 20.0 | 7.9 |
| Cherries | 650.0 | 11.0 | 9.0 | 135.0 | 10,000.0 | 80.0 | 0.5 | 0.6 | 0.2 | 0.0 | 130.0 | 20.0 | 15.0 | 7.9 |
| Bananas | 600.0 | 7.0 | 3.0 | 185.0 | 4,300.0 | 59.6 | 0.9 | 0.7 | 5.0 | 0.0 | 90.0 | 7.5 | 2.0 | 7.9 |
| Apples | 480.0 | 1.0 | 3.0 | 141.3 | 1,050.0 | 52.9 | 0.2 | 0.2 | 1.6 | 0.0 | 80.0 | 20.0 | 1.8 | 7.9 |
| Japanese quince | 350.0 | 2.0 | 1.0 | 81.0 | 8,800.0 | 85.0 | 0.2 | 0.5 | 0.3 | 0.0 | 80.0 | 5.0 | 6.0 | 7.9 |
| Dates | 2,800.0 | 16.0 | 4.0 | 660.0 | 2,000.0 | 0.0 | 0.6 | 0.5 | 1.3 | 0.0 | 500.0 | 9.0 | 20.0 | 7.9 |
| Canned fruits | 360.0 | 5.0 | 2.0 | 40.0 | 3,000.0 | 0.0 | 0.3 | 0.8 | 0.0 | 0.0 | 870.0 | 24,000.0 | 0.0 | 7.9 |
| Dried fruits | 2,670.0 | 28.0 | 6.0 | 646.5 | 550.0 | 25.0 | 1.4 | 0.8 | 2.0 | 0.0 | 1,400.0 | 325.0 | 40.0 | 7.9 |
| Pistachios | 2,890.0 | 103.0 | 242.0 | 146.0 | 3,600.0 | 0.0 | 0.0 | 1.5 | 0.0 | 0.0 | 877.8 | 151.1 | 20.0 | 95.9 |
| Peanut | 5,024.4 | 224.2 | 436.7 | 146.0 | 3,600.0 | 2.9 | 3.0 | 1.5 | 2.9 | 0.0 | 877.8 | 151.1 | 20.0 | 95.9 |
| Almonds | 2,360.0 | 80.0 | 209.0 | 196.0 | 0.0 | 0.0 | 2.5 | 6.7 | 0.0 | 0.0 | 877.8 | 151.1 | 40.7 | 95.9 |
| Walnuts | 2,890.0 | 64.0 | 278.0 | 156.0 | 300.0 | 30.0 | 2.6 | 1.4 | 10.0 | 0.0 | 830.0 | 20.0 | 21.0 | 95.9 |
| Marmalade and jams | 2,800.0 | 5.0 | 0.0 | 700.0 | 100.0 | 60.0 | 0.2 | 0.2 | 0.0 | 0.0 | 120.0 | 130.0 | 3.0 | 7.9 |
| Treacle | 2,800.0 | 10.0 | 0.0 | 700.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2,000.0 | 430.0 | 0.0 | 7.9 |
| Olives | 1,750.0 | 13.0 | 175.0 | 40.0 | 3,000.0 | 0.0 | 0.3 | 0.8 | 0.0 | 0.0 | 870.0 | 24,000.0 | 0.0 | 7.9 |
| Juice | 600.0 | 5.0 | 1.0 | 132.2 | 1,000.0 | 291.8 | 0.4 | 0.2 | 0.7 | 0.0 | 124.0 | 24.0 | 1.3 | 7.9 |
| Condensed juice | 1,200.0 | 10.0 | 2.0 | 264.4 | 2,000.0 | 583.6 | 0.8 | 0.4 | 1.5 | 0.0 | 248.0 | 48.0 | 2.7 | 7.9 |
| Dried juice | 2,400.0 | 20.0 | 4.0 | 528.8 | 4,000.0 | 1,167.1 | 1.6 | 0.8 | 3.0 | 0.0 | 496.0 | 96.0 | 5.3 | 7.9 |

**Table A4-5** Continued

| **Item** | **Energy** | **Protein** | **Fat** | **Carbo-** | **Vitamin** | **Vitamin** | **Vitamin** | **Vitamin** | **Vitamin** | **Vitamin** | **Calcium** | **Sodium** | **Iron** | **Iodine** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | hydrate | A | C | B1 | B2 | B6 | B12 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kcal | g | g | g | I.E | mg | mg | mg | mg | microg | mg | mg | mg | microg |
| **Sweets and sweeteners** | | | | | | | | | | | | | | |
| Free sugar | 3,870.0 | 0.0 | 0.0 | 996.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| Coupon sugar | 3,870.0 | 0.0 | 0.0 | 996.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 |
| Honey | 2,980.0 | 4.0 | 0.0 | 700.0 | 0.0 | 0.0 | 1.2 | 0.4 | 0.0 | 0.0 | 2,000.0 | 430.0 | 0.0 | 0.0 |
| Halawa[12] | 4,669.7 | 76.6 | 257.3 | 441.1 | 534.3 | 0.0 | 2.3 | 1.6 | 1.9 | 0.0 | 425.1 | 225.5 | 40.0 | 0.0 |
| Chocolate | 5,400.0 | 64.0 | 37.0 | 585.0 | 45.0 | 0.0 | 0.2 | 2.8 | 0.0 | 0.0 | 800.0 | 560.0 | 9.0 | 0.0 |
| Candies (confectionaries) | 2,840.0 | 0.0 | 0.0 | 770.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| Raha (starch and sugar) | 3,745.0 | 2.5 | 1.5 | 923.4 | 0.0 | 0.0 | 2.0 | 1.6 | 2.0 | 0.0 | 190.0 | 26.5 | 23.5 | 0.0 |
| Mlabas (sugar and almonds) | 4,880.0 | 100.0 | 261.0 | 808.4 | 0.0 | 10.0 | 2.0 | 1.1 | 5.0 | 0.0 | 1,435.6 | 100.6 | 25.3 | 0.0 |
| Mabromeh (pistachios and others) | 5,400.0 | 100.0 | 402.0 | 808.4 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| Buklawa | 5,400.0 | 100.0 | 402.0 | 808.4 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| Kataief | 3,690.0 | 74.0 | 17.0 | 770.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| Awameh | 3,690.0 | 74.0 | 17.0 | 770.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| Knafeh with cheese | 3,690.0 | 74.0 | 17.0 | 770.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| Shaibiat | 3,690.0 | 74.0 | 17.0 | 770.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| Kraibeh | 3,690.0 | 74.0 | 17.0 | 770.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| Barazek | 3,690.0 | 74.0 | 17.0 | 770.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| Akras with dates | 3,690.0 | 74.0 | 17.0 | 770.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| Maamoul with nuts | 3,690.0 | 74.0 | 17.0 | 770.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| Other Arabic sweets | 3,690.0 | 74.0 | 17.0 | 770.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| Kato (round cake) | 3,690.0 | 74.0 | 17.0 | 770.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| Bitifour | 3,690.0 | 74.0 | 17.0 | 770.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| Foreign sweets | 3,690.0 | 74.0 | 17.0 | 770.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 71.1 | 933.3 | 1.6 | 0.0 |
| **Others** | | | | | | | | | | | | | | |
| Sesame | 4,465.0 | 104.0 | 320.0 | 120.0 | 50.0 | 0.0 | 1.2 | 0.4 | 0.1 | 0.0 | 64.0 | 680.0 | 75.0 | 0.0 |

[12] Or halva: sweet made of TAHINI (sesame paste) and sugar.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tahini | 4,465.0 | 104.0 | 320.0 | 120.0 | 50.0 | 0.0 | 1.2 | 0.4 | 0.1 | 0.0 | 64.0 | 680.0 | 75.0 | 0.0 |
| Zaatar | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Tea | 560.0 | 8.0 | 0.0 | 100.0 | 0.2 | 1.5 | 2.5 | 0.1 | 0.0 | 0.0 | 20.0 | 20.0 | 0.4 | 0.0 |
| Coffee | 560.0 | 80.0 | 0.0 | 18.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.0 | 20.0 | 0.4 | 0.0 |
| Mate | 400.0 | 100.0 | 0.0 | 18.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.0 | 20.0 | 0.4 | 0.0 |
| Cocoa | 4,000.0 | 90.0 | 188.0 | 310.0 | 0.0 | 0.0 | 0.9 | 4.5 | 0.0 | 0.0 | 1,100.0 | 570.0 | 25.0 | 0.0 |
| Salt | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 290 | 373,504.3 | 0.0 | 1,000.0 |

**Table A4-5** Continued

| Item | Energy | Protein | Fat | Carbo-hydrate | Vitamin A | Vitamin C | Vitamin B1 | Vitamin B2 | Vitamin B6 | Vitamin B12 | Calcium | Sodium | Iron | Iodine |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | kcal | g | g | g | I.E | mg | mg | mg | mg | microg | mg | mg | mg | microg |
| **Drinks** | | | | | | | | | | | | | | |
| Gaseous beverages | 500.0 | 5.0 | 0.0 | 120.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.0 | 0.0 | 0.0 |
| Mineral water | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 36.0 | 2.5 | 0.0 | 0.0 |
| Wine | 680.0 | 0.0 | 0.0 | 160.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.0 | 100.0 | 50.0 | 20.0 | 0.0 |
| Arak | 2,500.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Local drinks | 2,500.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Foreign drinks | 1,845.0 | 1.0 | 0.0 | 55.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 55.0 | 10.0 | 0.0 | 0.0 |
| Drink water | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Table A4-6 Calorie Intakes by Countries, 1999-2008 (kcal/person/day)**

| Item | 1999 | 2000 | 2001 | Average 1999-2001 | 2003 | 2004 | 2005 | Average 2003-2005 | 2006 | 2007 | 2008 | Average 2006-2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Syria** | **3,063** | **3,072** | **3,034** | **3,056** | **3,006** | **2,981** | **3,042** | **3,010** | **3,291** | **3,159** | **2,899** | **3,116** |
| **Egypt** | 3,378 | 3,375 | 3,408 | 3,387 | 3,375 | 3,241 | 3,334 | 3,317 | 3,466 | 3,396 | 3,431 | 3,431 |
| **Jordan** | 2,610 | 2,671 | 2,747 | 2,676 | 2,742 | 2,814 | 2,912 | 2,823 | 2,882 | 2,836 | 2,859 | 2,859 |
| **Kuwait** | 3,058 | 3,112 | 3,083 | 3,084 | 3,039 | 3,072 | 3,108 | 3,073 | 3,162 | 3,111 | 3,137 | 3,137 |
| **Lebanon** | 3,062 | 3,034 | 3,077 | 3,058 | 3,139 | 3,160 | 3,182 | 3,160 | 3,079 | 3,063 | 3,071 | 3,071 |
| **Morocco** | 3,070 | 3,050 | 3,103 | 3,074 | 3,181 | 3,234 | 3,168 | 3,194 | 3,331 | 3,369 | 3,350 | 3,350 |
| **Saudi Arabia** | 2,978 | 3,017 | 3,017 | 3,004 | 3,034 | 3,070 | 3,073 | 3,059 | 3,079 | 2,985 | 3,032 | 3,032 |
| **Tunisia** | 3,386 | 3,295 | 3,267 | 3,316 | 3,272 | 3,288 | 3,265 | 3,275 | 3,363 | 3,465 | 3,414 | 3,414 |
| **USA** | 3,683 | 3,789 | 3,764 | 3,745 | 3,795 | 3,829 | 3,855 | 3,826 | 3,985 | 3,981 | 3,983 | 3,983 |
| **EU** | 3,422 | 3,432 | 3,454 | 3,436 | 3,458 | 3,464 | 3,471 | 3,464 | 3,478 | 3,485 | 3,482 | 3,482 |
| **World** | **2,724** | **2,732** | **2,734** | **2,730** | **2,758** | **2,764** | **2,781** | **2,768** | **2,883** | **2,731** | **2,807** | **2,807** |

Source: NAPC elaboration based on FAO, USDA, AOAD and MAAR *Statistics.* Estimates of the countries excluding Syria for the 2006-2008 period are provisional because FAO and USDA estimates have been not published yet.

**Table A4-7 Protein Intakes by Countries, 1999-2008 (g/person/day)**

| Item | 1999 | 2000 | 2001 | Average 1999-2001 | 2003 | 2004 | 2005 | Average 2003-2005 | 2006 | 2007 | 2008 | Average 2006-2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Syria** | **74** | **74** | **74** | **74** | **79** | **79** | **80** | **79** | **86** | **86** | **74** | **82** |
| **Egypt** | 94 | 95 | 95 | 95 | 95 | 92 | 95 | 94 | 93 | 93 | 93 | 93 |
| **Jordan** | 69 | 71 | 71 | 70 | 72 | 71 | 74 | 72 | 72 | 72 | 72 | 72 |
| **Kuwait** | 89 | 89 | 88 | 89 | 83 | 86 | 92 | 87 | 106 | 104 | 105 | 105 |
| **Lebanon** | 82 | 83 | 84 | 83 | 86 | 86 | 86 | 86 | 83 | 83 | 83 | 83 |
| **Morocco** | 83 | 81 | 84 | 83 | 87 | 89 | 87 | 88 | 90 | 89 | 90 | 90 |
| **Saudi Arabia** | 83 | 81 | 81 | 82 | 82 | 85 | 86 | 84 | 83 | 82 | 83 | 83 |
| **Tunisia** | 91 | 90 | 91 | 91 | 89 | 89 | 91 | 90 | 85 | 90 | 87 | 87 |
| **USA** | 115 | 115 | 113 | 114 | 115 | 117 | 116 | 116 | 125 | 124 | 125 | 125 |
| **EU** | 104 | 105 | 106 | 105 | 106 | 105 | 105 | 105 | 116 | 115 | 115 | 115 |
| **World** | **75** | **75** | **75** | **75** | **76** | **76** | **76** | **76** | **80** | **76** | **78** | **78** |

Source: NAPC elaboration based on FAO, USDA, AOAD and MAAR *Statistics*. Estimates of the countries excluding Syria for the 2006-2008 period are provisional because FAO and USDA estimates have been not published yet.

**Table A4-8 Fat intakes by Countries, 1999-2008 (g/person/day)**

| Item | 1999 | 2000 | 2001 | Average 1999-2001 | 2003 | 2004 | 2005 | Average 2003-2005 | 2006 | 2007 | 2008 | Average 2006-2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Syria** | **108** | **109** | **104** | **107** | **100** | **100** | **104** | **101** | **105** | **93** | **94** | **98** |
| **Egypt** | 58 | 58 | 57 | 58 | 60 | 57 | 56 | 58 | 78 | 72 | 75 | 75 |
| **Jordan** | 71 | 78 | 85 | 78 | 79 | 92 | 90 | 87 | 92 | 94 | 93 | 93 |
| **Kuwait** | 109 | 114 | 117 | 113 | 108 | 110 | 116 | 111 | 109 | 107 | 108 | 108 |
| **Lebanon** | 107 | 110 | 112 | 110 | 109 | 113 | 117 | 113 | 111 | 110 | 110 | 110 |
| **Morocco** | 62 | 60 | 60 | 61 | 61 | 59 | 57 | 59 | 74 | 79 | 77 | 77 |
| **Saudi Arabia** | 81 | 88 | 88 | 86 | 89 | 83 | 85 | 85 | 96 | 94 | 95 | 95 |
| **Tunisia** | 103 | 100 | 96 | 100 | 93 | 98 | 90 | 93 | 101 | 101 | 101 | 101 |
| **USA** | 146 | 154 | 157 | 152 | 160 | 163 | 169 | 164 | 162 | 161 | 161 | 161 |
| **EU** | 141 | 141 | 141 | 141 | 141 | 140 | 141 | 141 | 126 | 125 | 126 | 126 |
| **World** | **74** | **75** | **75** | **75** | **77** | **77** | **79** | **78** | **73** | **72** | **72** | **72** |

Source: NAPC elaboration based on FAO, USDA, AOAD and MAAR *Statistics*. Estimates of the countries excluding Syria for the 2006-2008 period are provisional because FAO and USDA estimates have been not published yet.

**Table A4-9 Carbohydrate Intakes by Countries, 1999-2008 (g/person/day)**

| Item | 1999 | 2000 | 2001 | Average 1999-2001 | 2003 | 2004 | 2005 | Average 2003-2005 | 2006 | 2007 | 2008 | Average 2006-2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Syria** | **483** | **481** | **485** | **483** | **484** | **481** | **485** | **483** | **538** | **532** | **473** | **514** |
| **Egypt** | 628 | 627 | 635 | 630 | 619 | 594 | 618 | 610 | 604 | 600 | 602 | 602 |
| **Jordan** | 427 | 427 | 430 | 428 | 442 | 433 | 463 | 446 | 450 | 433 | 442 | 442 |
| **Kuwait** | 415 | 417 | 403 | 412 | 424 | 427 | 410 | 420 | 423 | 418 | 420 | 420 |
| **Lebanon** | 451 | 429 | 436 | 439 | 452 | 448 | 443 | 447 | 435 | 433 | 434 | 434 |
| **Morocco** | 601 | 599 | 610 | 604 | 623 | 643 | 629 | 632 | 627 | 623 | 625 | 625 |
| **Saudi Arabia** | 429 | 428 | 432 | 429 | 435 | 450 | 444 | 443 | 428 | 413 | 421 | 421 |
| **Tunisia** | 551 | 536 | 537 | 542 | 552 | 543 | 554 | 550 | 564 | 586 | 575 | 575 |
| **USA** | 498 | 497 | 508 | 501 | 482 | 481 | 479 | 481 | 522 | 525 | 523 | 523 |
| **EU** | 420 | 421 | 427 | 423 | 429 | 432 | 433 | 431 | 466 | 472 | 469 | 469 |
| **World** | **405** | **405** | **405** | **405** | **408** | **406** | **406** | **407** | **441** | **409** | **425** | **425** |

Source: NAPC elaboration based on FAO, USDA, AOAD and MAAR *Statistics*. Estimates of the countries excluding Syria for the 2006-2008 period are provisional because FAO and USDA estimates have been not published yet.

**Table A4-10 Vitamin C Intakes by Countries, 1999-2008 (mg/person/day)**

| Item | 1999 | 2000 | 2001 | Average 1999-2001 | 2003 | 2004 | 2005 | Average 2003-2005 | 2006 | 2007 | 2008 | Average 2006-2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Syria** | **74** | **75** | **75** | **75** | **85** | **89** | **86** | **87** | **86** | **71** | **87** | **81** |
| **Egypt** | 114 | 118 | 112 | 115 | 117 | 119 | 118 | 118 | 124 | 123 | 123 | 123 |
| **Jordan** | 58 | 61 | 54 | 57 | 69 | 76 | 82 | 76 | 101 | 83 | 92 | 92 |
| **Kuwait** | 114 | 116 | 115 | 115 | 78 | 84 | 79 | 80 | 66 | 65 | 66 | 66 |
| **Lebanon** | 172 | 152 | 147 | 157 | 158 | 162 | 157 | 159 | 168 | 166 | 167 | 167 |
| **Morocco** | 72 | 70 | 68 | 70 | 87 | 98 | 90 | 92 | 95 | 102 | 98 | 98 |
| **Saudi Arabia** | 77 | 75 | 79 | 77 | 83 | 85 | 88 | 85 | 84 | 78 | 81 | 81 |
| **Tunisia** | 109 | 110 | 102 | 107 | 116 | 121 | 114 | 117 | 119 | 124 | 122 | 122 |
| **USA** | 130 | 130 | 119 | 126 | 118 | 119 | 113 | 117 | 114 | 113 | 113 | 113 |
| **EU** | 119 | 120 | 117 | 118 | 118 | 122 | 121 | 121 | 122 | 118 | 120 | 120 |
| **World** | **78** | **80** | **81** | **80** | **84** | **86** | **86** | **85** | **88** | **88** | **88** | **88** |

Source: NAPC elaboration based on FAO, USDA, AOAD and MAAR Statistics. Estimates of the countries excluding Syria for the 2006-2008 period are provisional because FAO and USDA estimates have been not published yet; mg: milligram.

**Table A4-11 Vitamin A Intakes by Countries, 1999-2008 (microg/person/day)**

| Item | 1999 | 2000 | 2001 | Average 1999-2001 | 2003 | 2004 | 2005 | Average 2003-2005 | 2006 | 2007 | 2008 | Average 2006-2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Syria** | **457** | **456** | **442** | **452** | **487** | **504** | **489** | **493** | **466** | **442** | **406** | **438** |
| **Egypt** | 538 | 550 | 530 | 539 | 551 | 538 | 546 | 545 | 532 | 532 | 532 | 532 |
| **Jordan** | 421 | 429 | 423 | 424 | 446 | 468 | 466 | 460 | 468 | 450 | 459 | 459 |
| **Kuwait** | 723 | 743 | 765 | 744 | 652 | 696 | 759 | 702 | 798 | 779 | 789 | 789 |
| **Lebanon** | 672 | 651 | 661 | 661 | 686 | 702 | 709 | 699 | 668 | 661 | 665 | 665 |
| **Morocco** | 465 | 455 | 460 | 460 | 502 | 517 | 505 | 508 | 516 | 504 | 510 | 510 |
| **Saudi Arabia** | 624 | 611 | 618 | 618 | 634 | 645 | 652 | 643 | 645 | 635 | 640 | 640 |
| **Tunisia** | 567 | 569 | 560 | 565 | 576 | 587 | 577 | 580 | 561 | 572 | 566 | 566 |
| **USA** | 1,250 | 1,250 | 1,080 | 1,193 | 1,080 | 1,080 | 1,097 | 1,086 | 1,051 | 1,040 | 1,045 | 1,045 |
| **EU** | 1,044 | 1,040 | 1,044 | 1,043 | 1,048 | 1,039 | 1,037 | 1,042 | 916 | 901 | 908 | 908 |
| **World** | **540** | **546** | **548** | **544** | **559** | **564** | **567** | **563** | **527** | **517** | **522** | **522** |

Source: NAPC elaboration based on FAO, USDA, AOAD and MAAR *Statistics*. Estimates of the countries excluding Syria for the 2006-2008 period are provisional because FAO and USDA estimates have been not published yet; microg: micro gram.

**Table A4-12 Vitamin B1 Intakes by Countries, 1999-2008 (mg/person/day)**

| Item | 1999 | 2000 | 2001 | Average 1999-2001 | 2003 | 2004 | 2005 | Average 2003-2005 | 2006 | 2007 | 2008 | Average 2006-2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Syria** | **2.0** | **2.0** | **2.0** | **2.0** | **2.1** | **2.1** | **2.1** | **2.1** | **2.3** | **2.3** | **2.0** | **2.2** |
| **Egypt** | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.8 | 2.9 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 |
| **Jordan** | 1.9 | 1.8 | 1.8 | 1.8 | 1.9 | 1.8 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| **Kuwait** | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.2 | 2.1 | 2.4 | 2.4 | 2.4 | 2.4 |
| **Lebanon** | 2.2 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| **Morocco** | 2.7 | 2.6 | 2.7 | 2.7 | 2.8 | 2.9 | 2.8 | 2.8 | 2.9 | 2.9 | 2.9 | 2.9 |
| **Saudi Arabia** | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 2.0 |
| **Tunisia** | 2.6 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.6 | 2.5 | 2.5 | 2.7 | 2.6 | 2.6 |
| **USA** | 3.0 | 3.0 | 3.1 | 3.0 | 2.9 | 2.9 | 2.4 | 2.7 | 2.5 | 2.5 | 2.5 | 2.5 |
| **EU** | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 |
| **World** | **2.0** | **2.0** | **2.0** | **2.0** | **2.0** | **2.0** | **2.0** | **2.0** | **2.2** | **2.0** | **2.1** | **2.1** |

Source: NAPC elaboration based on FAO, USDA, AOAD and MAAR *Statistics*. Estimates of the countries excluding Syria for the 2006-2008 period are provisional because FAO and USDA estimates have been not published yet.

**Table A4-13 Vitamin B2 Intakes by Countries, 1999-2008 (mg/person/day)**

| Item | 1999 | 2000 | 2001 | Average 1999-2001 | 2003 | 2004 | 2005 | Average 2003-2005 | 2006 | 2007 | 2008 | Average 2006-2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Syria** | **1.3** | **1.3** | **1.3** | **1.3** | **1.3** | **1.4** | **1.4** | **1.4** | **1.5** | **1.5** | **1.3** | **1.4** |
| **Egypt** | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.6 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| **Jordan** | 1.1 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 1.3 |
| **Kuwait** | 1.7 | 1.6 | 1.6 | 1.7 | 1.4 | 1.5 | 1.6 | 1.5 | 1.9 | 1.9 | 1.9 | 1.9 |
| **Lebanon** | 1.6 | 1.5 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.8 | 1.8 | 1.8 | 1.8 |
| **Morocco** | 1.4 | 1.3 | 1.4 | 1.4 | 1.4 | 1.5 | 1.4 | 1.4 | 1.5 | 1.5 | 1.5 | 1.5 |
| **Saudi Arabia** | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| **Tunisia** | 1.5 | 1.5 | 1.5 | 1.5 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 | 1.5 | 1.5 | 1.5 |
| **USA** | 2.9 | 2.9 | 2.9 | 2.9 | 2.8 | 2.9 | 2.3 | 2.7 | 2.5 | 2.5 | 2.5 | 2.5 |
| **EU** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.3 | 2.3 | 2.3 | 2.3 |
| **World** | **1.4** | **1.4** | **1.4** | **1.4** | **1.4** | **1.4** | **1.4** | **1.4** | **1.5** | **1.4** | **1.4** | **1.4** |

Source: NAPC elaboration based on FAO, USDA, AOAD and MAAR *Statistics*. Estimates of the countries excluding Syria for the 2006-2008 period are provisional because FAO and USDA estimates have been not published yet.

**Table A4-14 Vitamin B12 Intakes by Countries, 1999-2008 (microg/person/day)**

| Item | 1999 | 2000 | 2001 | Average 1999-2001 | 2003 | 2004 | 2005 | Average 2003-2005 | 2006 | 2007 | 2008 | Average 2006-2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Syria** | **2.1** | **2.1** | **1.9** | **2.0** | **2.2** | **2.3** | **2.1** | **2.2** | **2.2** | **2.2** | **1.9** | **2.1** |
| **Egypt** | 2.4 | 2.6 | 2.4 | 2.5 | 2.6 | 2.5 | 2.6 | 2.6 | 2.4 | 2.5 | 2.5 | 2.5 |
| **Jordan** | 2.7 | 2.8 | 2.8 | 2.8 | 2.9 | 3.1 | 2.9 | 3.0 | 2.7 | 3.0 | 2.9 | 2.9 |
| **Kuwait** | 5.5 | 5.5 | 5.7 | 5.6 | 5.1 | 5.8 | 6.8 | 5.9 | 8.4 | 8.2 | 8.3 | 8.3 |
| **Lebanon** | 3.7 | 3.9 | 4.0 | 3.9 | 4.2 | 4.3 | 4.4 | 4.3 | 4.1 | 4.1 | 4.1 | 4.1 |
| **Morocco** | 2.1 | 2.0 | 2.0 | 2.0 | 2.2 | 2.2 | 2.3 | 2.2 | 2.5 | 2.3 | 2.4 | 2.4 |
| **Saudi Arabia** | 4.0 | 4.0 | 3.9 | 3.9 | 4.0 | 4.0 | 4.3 | 4.1 | 4.1 | 4.2 | 4.2 | 4.2 |
| **Tunisia** | 2.8 | 2.9 | 2.9 | 2.8 | 2.9 | 3.0 | 3.0 | 2.9 | 2.6 | 2.5 | 2.5 | 2.5 |
| **USA** | 8.0 | 8.2 | 8.2 | 8.1 | 8.2 | 8.2 | 10.6 | 9.0 | 10.7 | 10.5 | 10.6 | 10.6 |
| **EU** | 7.9 | 7.9 | 8.0 | 7.9 | 8.0 | 7.9 | 7.9 | 7.9 | 8.4 | 8.1 | 8.3 | 8.3 |
| **World** | **3.7** | **3.8** | **3.8** | **3.8** | **3.9** | **3.9** | **3.9** | **3.9** | **3.8** | **3.9** | **3.9** | **3.9** |

Source: NAPC elaboration based on FAO, USDA, AOAD and MAAR *Statistics*. Estimates of the countries excluding Syria for the 2006-2008 period are provisional because FAO and USDA estimates have been not published yet.

**Table A4-15 Iron Intakes by Countries, 1999-2008 (mg/person/day)**

| Item | 1999 | 2000 | 2001 | Average 1999-2001 | 2003 | 2004 | 2005 | Average 2003-2005 | 2006 | 2007 | 2008 | Average 2006-2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Syria** | **25** | **25** | **25** | **25** | **26** | **26** | **25** | **26** | **29** | **29** | **24** | **27** |
| **Egypt** | 37 | 38 | 38 | 38 | 37 | 36 | 37 | 37 | 36 | 36 | 36 | 36 |
| **Jordan** | 23 | 22 | 22 | 22 | 22 | 22 | 24 | 23 | 22 | 22 | 22 | 22 |
| **Kuwait** | 23 | 23 | 23 | 23 | 24 | 24 | 24 | 24 | 27 | 26 | 26 | 26 |
| **Lebanon** | 24 | 23 | 24 | 24 | 24 | 25 | 25 | 25 | 24 | 24 | 24 | 24 |
| **Morocco** | 34 | 33 | 35 | 34 | 35 | 36 | 35 | 36 | 36 | 35 | 36 | 36 |
| **Saudi Arabia** | 24 | 24 | 24 | 24 | 24 | 25 | 25 | 24 | 23 | 23 | 23 | 23 |
| **Tunisia** | 31 | 31 | 31 | 31 | 31 | 30 | 31 | 31 | 31 | 32 | 32 | 32 |
| **USA** | 24 | 24 | 24 | 24 | 23 | 23 | 23 | 23 | 26 | 26 | 26 | 26 |
| **EU** | 23 | 23 | 24 | 23 | 23 | 24 | 24 | 24 | 25 | 26 | 26 | 26 |
| **World** | **24** | **24** | **24** | **24** | **25** | **24** | **24** | **24** | **26** | **24** | **25** | **25** |

Source: NAPC elaboration based on FAO, USDA, AOAD and MAAR *Statistics*. Estimates of the countries excluding Syria for the 2006-2008 period are provisional because FAO and USDA estimates have been not published yet.

**Table A4-16 Iodine Intakes by Countries, 1999-2008 (microg/person/day)**

| Item | 1999 | 2000 | 2001 | Average 1999-2001 | 2003 | 2004 | 2005 | Average 2003-2005 | 2006 | 2007 | 2008 | Average 2006-2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Syria** | **88** | **87** | **83** | **86** | **93** | **97** | **99** | **96** | **105** | **104** | **94** | **101** |
| **Egypt** | 89 | 90 | 89 | 90 | 95 | 89 | 90 | 92 | 98 | 100 | 99 | 99 |
| **Jordan** | 77 | 80 | 79 | 79 | 91 | 89 | 81 | 87 | 93 | 93 | 93 | 93 |
| **Kuwait** | 143 | 132 | 135 | 137 | 108 | 108 | 115 | 110 | 158 | 154 | 156 | 156 |
| **Lebanon** | 113 | 113 | 114 | 113 | 119 | 120 | 121 | 120 | 147 | 146 | 146 | 146 |
| **Morocco** | 76 | 73 | 75 | 75 | 80 | 83 | 81 | 81 | 92 | 90 | 91 | 91 |
| **Saudi Arabia** | 96 | 90 | 91 | 92 | 93 | 99 | 96 | 96 | 109 | 108 | 109 | 109 |
| **Tunisia** | 105 | 107 | 107 | 107 | 110 | 108 | 109 | 109 | 105 | 106 | 105 | 105 |
| **USA** | 205 | 206 | 206 | 206 | 208 | 208 | 207 | 207 | 234 | 230 | 232 | 232 |
| **EU** | 184 | 184 | 184 | 184 | 187 | 186 | 186 | 186 | 227 | 224 | 226 | 226 |
| **World** | **93** | **93** | **94** | **93** | **96** | **96** | **97** | **96** | **100** | **98** | **99** | **99** |

Source: NAPC elaboration based on FAO, USDA, AOAD and MAAR *Statistics*. Estimates of the countries excluding Syria for the 2006-2008 period are provisional because FAO and USDA estimates have been not published yet.