

ORIGINAL PAPER

Interventions for Childhood Obesity Control in Cyprus: An analysis and Evaluation of Programmes and Protocols

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Abstract

In the last twenty years, there has been an increase in the prevalence of obesity with a simultaneous increase in chronic diseases.

Aim: The aim of this literature review is to discuss available interventions for childhood obesity (2-11 years) and to propose effective prevention policies for the Republic of Cyprus.

Methods: Childhood obesity prevention and intervention programs in Cyprus were analysed using SWOT analysis and evaluation protocols for compatibility and sustainability among health professionals and government partners.

Results: The preliminary literature review reveals that there are specific short comings with regards to the existing NHS and public health. The sustainability of existing health policies and implemented programs is questionable as there are no coherent monitoring systems in place. There are many worthwhile programs and organizations that are often delayed due to conflict of interest.

Conclusions: Analysis shows that the implementation, via a Cypriot National Health System, of public health strategies could be effective means of addressing specifically childhood obesity. This includes a more active role for the family physician and policies of a multi- level strategy, aiming as fostering innovative public-private healthcare collaborations, supported by educational institutions, infrastructure, legislation and the wider society.

However, such strategies are needed on a long-term basis and throughout a person's life span.

Keywords childhood obesity, chronic diseases, prevention, Cyprus, innovative interventions, primary care, National Health System

Introduction

Obesity is a disease of the 21st century (International Obesity Task Force (IOTF) 2010) characterised by the accumulation of fat in the body, thereby increasing the risk of chronic diseases, including type 2 Diabetes Mellitus (T2DM), cardiovascular disease, hypertension, stroke and even various forms of cancer (Garrow 2000, Astrup 2005, Thomas and Bishop 2007a, World Cancer Research Fund International 2007a, 2007b, Pappas and Karaouli 2010, WHO 2011a, Escott-Stump 2008a,).

Factors leading to obesity are mainly metabolic and environmental, such as increased consumption of foods rich in calories and lack of physical exercise (Astrup 2005, Thomas and Bishop 2007b, Rekliti and Sapountzi-Krepia 2009). Obesity in adults is primarily identified and measured by the Body Mass Index (BMI) (Escott-Stump 2008b, WHO 2011b). It has been associated with increased risk of chronic pain, it is a leading cause of mortality, morbidity and disability, and it imparts a substantial economic burden on societies (Wang and Dietz 2002, Human Development Agency –HDA- 2003, Finkelstein et al. 2009,). Other obesity-related diseases include sleep apnea, asthma, polycystic ovaries, mature early onset diabetes in children and non-alcoholic fatty liver disease (Garrow 2000, Escott-Stump 2008c).

Obesity can also affect children younger than five years old (WHO 2003), with later puberty symptoms of chronic diseases (Escott-Stump 2008c, Gonzalez et al.2010, NBC 2010). Dr Robert Beaglehole, former World Health Organization (WHO) Director of Chronic Diseases and Health Promotion, notes that many heart diseases (80%), strokes (80%), T2DM (80%) and types of cancer (40%) could be prevented with healthy diet, physical activity and avoidance of tobacco use (WHO 2011f).

Environmental influences on foetal programming, the main stage of development,

have lasting effects. Neonatal weight influences body composition at a later age. There is also a link between breastfeeding and later obesity (Dietz, 1998, Von Kries et al. 1999, Epiphaniou and Savvas 2000, Rogers et al. 2004, Gibbs and Phillips 2007).

Childhood obesity is classified differently from obesity in adults. It is assessed by the BMI z-score (standard deviation score) at any age in relation to the reference population that, if continued after 18 years of age, will result in adult overweight (25 kg/m^2) or obesity (30 kg/m^2) (Poskitt et al. 2005).

Classification of childhood obesity is rather complex. Various health organisations have different growth charts for different age groups, for example WHO has different charts for children under 5 years and for children between 5 to 19 years old (WHO 2011d, Royal College of Pediatrics and Child Health 2011).

Growth charts consist of specific percentile categories (e.g. 85th, 90th and 95th, 97th, 99th, 99.6th). Based on their sensitivity and specificity (Poskitt et al. 2005), the child is identified as having an increased risk of being overweight or obese (Cole et al.2000, CDC 2011, WHO 2011c, Jelastopulu et al. 2012). Criteria include child's length, weight and BMI according to age. The most recent percentile for Growth Charts, which is considered the most accurate, is the 99th from Centre of Disease Control (CDC) (Barlow 2007).

In addition, several studies have found that sharp fluctuations in body weight, T2DM pregnancy and growth spurts (following malnutrition) may later lead to obesity and chronic diseases (Von Kries et al. 1999, Garrow 2000, Epiphaniou and Savvas 2000, Gibbs and Phillips 2007, Escott-Stump 2008b, Dunger et al. 2007, European Childhood Obesity Group 2007, Victora et al. 2008). A bigger cohort study conducted in the Netherlands confirms these findings, adding that this depends on the trimester of pregnancy (Roseboom et al. 2006).

The psychological effect of obesity in children has also been highlighted (Schwimmer et al. 2003). Studies have shown that these children are more prone to depression, low self-esteem, low quality of life and stigmatisation (Dietz 1998, Schwimmer et al. 2003, Schwartz and Puhl 2003, Strauss and Pollack 2003, AHA 2010). Therefore, it is important to address childhood obesity early on. It is believed that the best time interval for intervention is 4-7 years of age and during pregnancy

(Epiphaniou and Savvas 2000, Magarey et al. 2003, Kvaavik et al.2003,Escott-Stump 2008b, Escott-Stump 2008c, Bharati et al. 2008).

Compared to any other population group, children can easily adapt and change their eating habits (Hoddinott et al.2008). In fact, they constitute the best long scale nutritional or educational intervention group. As a result, interventions at an early age may reduce the long-term effects of overweight and obesity (CDC 2009).

Table 1: Effects on Health in Adulthood depending on exposure period to famine, during pregnancy.

EXPOSURE TO FAMINE		
3 rd trimester of pregnancy	2 nd trimester of pregnancy	1st trimester of pregnancy
Glucose Intolerance	Glucose Intolerance	Glucose Intolerance
	Microalbuminouria	Breast Cancer
	Obstructive airway disease	Atherosclerotic lipid profiles
		Change in blood clotting
		Sensitivity to stress
		Obesity (women only)
		Heart Disease

Source: Roseboom et al. 2006

CDC considers the main constrains for interventions to reduce incidence of childhood obesity to be:

- “levels of physical activity
- marketing directed at children
- exposure to television and social media
- exposure to video games” (CDC 2008).

A national health system (NHS) can support better structured interventions aiming at these constrains. Examples from around the world (US and EU) show that they work best when they target obesity through their integration with the wider society and infrastructure in education and health organisations as well as with public-private partnerships supported by

legislation (Pietinen et al.2001, Theodorou et al. 2001, NHS 2009, NHS and NICE 2010, KiGGS 2010, Ogden et al.2010, Let’s go 2011).

Cyprus still lacks a fully developed NHS, although relevant legislation has been adopted based on the actions of the Health Insurance Organisation (HIO) (HIO 2012).

However, there are many significant, public health, programs developed by several organisations to tackle childhood obesity, such as National strategy for sustainable development regarding health (ACCA), School Health Services and Home Economics (HIO 2008, MoH 2008, MoE 2011a, MoH 2011b.),

from the Ministry of Health and Education of Cyprus (MoH, MoE respectively). Cyprus between 2000-2010 has risen from 5.9% to 8.1% (Hadjigeorgiou et al. 2012).

On the other hand, it seems they are not adequate as prevalence of childhood obesity in

Table 2. Percentage turnover for prevalence of overweight and obese children, aged 6-15 years during 1999-2000 and 2009-2010.

Variable	Overweight Children (%)		Obese Children (%)	
	1999-2000	2009-2010	1999-2000	2009-2010
Total percentage	16.5	20.1	5.9	8.1
Boys	18.3	21.9	6.4	9.4
Girls	14.7	18.6	5.5	7.0
Urban Areas	16.5	19.8	6.0	7.1
Rural Areas	16.6	20.6	5.8	10.0
Age groups 6.0-8.9	14.7	17.6	7.4	10.7
9.0-11.9	17.0	24.7	7.6	9.6
12.0-14.9	19.2	17.2	4.5	5.9

Source: Hadjigeorgiou et al. 2012

Materials and Methods

We present a descriptive literature review in childhood obesity. We searched for relevant books, journal articles and conference material in accredited organisations and scientific databases (MEDLINE, PubMed, Science Direct, British Medical Journal -BMJ-, IOFT, WHO, American Heart Association –AHA- and NHS).

Keywords used were:

- Obesity
- Childhood Obesity
- Prevalence
- Interventions
- Public Health
- Effectiveness
- National Health System

Inclusion criteria included:

- Sample of children aged 0-11 years or 12-15 years

- Size of the sample is at least 500 and above from various social classes (Comfrey and Lee 1992)
- Quantitative studies
- Focus on prevalence and incidence of childhood obesity
- Use of appropriate indicators of obesity (BMI, waist circumference, fat mass)
- The level of implementation of interventional strategies (national scale, multi-level basis)
- The presence of recorded outcomes from interventions
- Furthermore, interventions which have been found effective
- Interventions that could be adopted in Cyprus.

Existing policies and important interventions for tackling obesity are analysed, first by Strengths, Weakness, Opportunities, Threats (SWOT) analysis and then by relevant

compatibility and sustainability questionnaires (Table 3, Fig.1).

SWOT analysis is a method for planning clear and organised strategies. It identifies internal and external factors that influence each

intervention either positively or negatively. This analytical technique was developed by Humphrey Stanford University between 1960 and 1970 (Armstrong 2006).

Table 3: Questionnaire 1, Compatibility

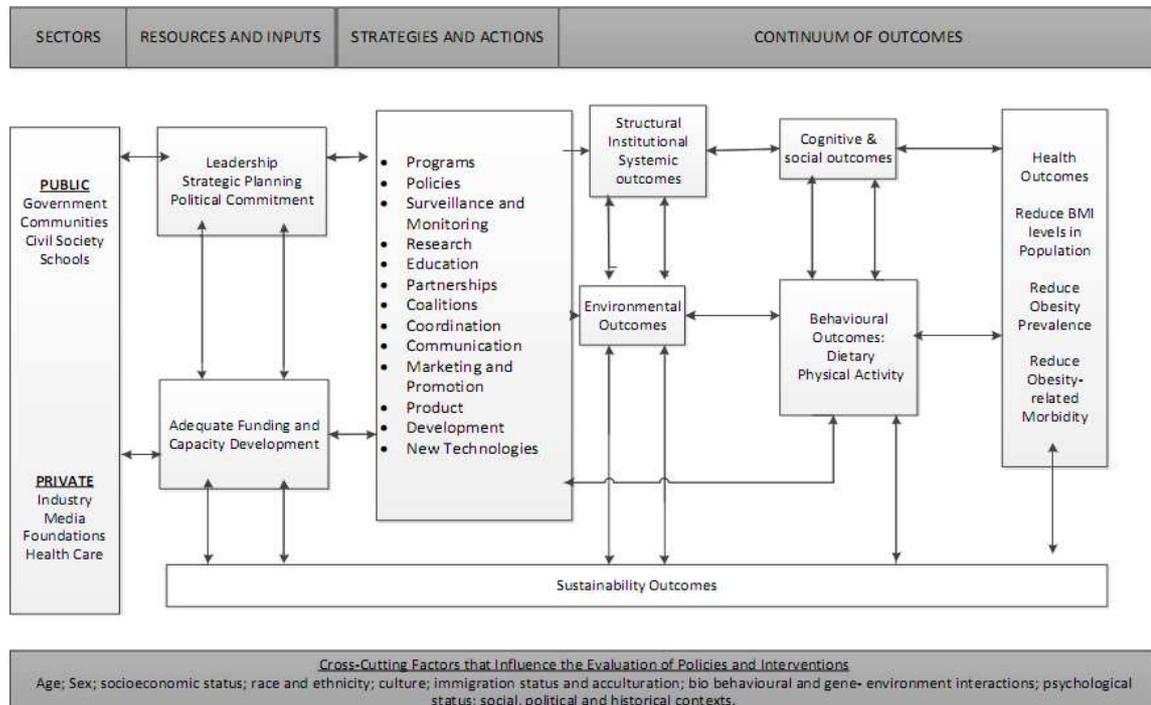
<i>Dimension</i>	<i>Assess Partnership Compatibility</i>	<i>Potential Benefits</i>
Mission	Is involvement in a partnership or social alliance the company's vision?	Shared priorities
Resources	Is the cause addressed by the partnership part of the non-profit organisation (NPO)'s core mission? Are resources vital to create an advantage for the other partner?	Dependence and Differential advantage
Management	Do the leaders of the company and NPO have personal chemistry?	Managerial engagement and support
Workforce	Do strong personal bonds exist among counterparts at multiple levels? Is there a fit between the company's workforce and the cause such that they have or will develop an affinity for the cause and become involved in grassroots efforts?	Enhancing organizational identification Providing volunteer support
Target Market	Is there a demographic, geographic and or psychographic fit among the members of the target market such that they have or will develop an affinity for the cause? Are the NPO's constituents able to influence the company's product?	Creating differential advantage Providing volunteer support
Product or cause	Can an endorsement by the non-profit be created and is it beneficial for both partners?	Creating value through co-branding
Cultural fit Cycle	Are the organizational values of the partners compatible? Are the business cycles of the company and fundraising cycles of the NPO aligned?	Ease of implementation and management Timing congruence
Evaluation	Have both partners specified how they will measure the effectiveness of the alliance? Have mutual or joint measures of success been created for the partnership? Can each support the other's primary measure of success?	Shared perception of success

Source: U.N. Standing Committee on Nutrition 2009

To analyse interventions, we adopted two questionnaires. The first questionnaire is used to evaluate compatibility as well as government partners and their role in preventing childhood obesity (U.N. Standing Committee on Nutrition 2009, Berger et al 2004). The second questionnaire is used to

evaluate the sustainability of the associated interventions above for preventing childhood obesity. Questionnaires are registered with the American Academy of Sciences and Institute of Medicine, US (2007). All the studies included in this review obtained appropriate ethical approval.

Figure 1: Questionnaire-Diagram 2, Sustainability



Source: Institute of Medicine 2007

Results

The preliminary analysis was a SWOT analysis on policies and programs involved in childhood obesity treatment-prevention, such as ACCA, MSSPS, ARDFV, IDEFICS, Polmark and PolGrow in Cyprus.

The ACCA is an EU Policy, which emphasises on public health consisting from educational programs, practical work-up in schools, as well as community work, has resulted in non-compliance among the various programs, it is responsible for (MoH 2008).

Cyprus has also been trying to implement innovative EU programs to enhance healthy nutrition. These include the Agriculture and Rural Development: Fruit and Vegetables (ARDFV) program, to promote fruit and vegetable in schools and homes (E.C 2011c), and the Milk Subsidy Scheme and certain milk Products to Schools (MSSPS) program, to

promote the consumption of low fat milk products to children (E. C 2011b, CAPO and CMIO 2007).

The Identification and prevention of Dietary- and lifestyle-induced health Effects In Children and infants (IDEFICS) Study, was designed for health promotion and prevention in kindergartens and schools, since 2006. The programme is under the coordination of the Bremen Institute for Prevention Research and Social Medicine Germany and is funded by the European Commission (E.C). Cyprus also adopted this programme for the prevention of obesity (IDEFICS 2006, Sixth Framework Programme 2011).

Pomark and PorGrow are two other examples of new exemplary interventions that have to more with implementation within the Cypriot society and governmental entity (REIHC 2009, Gonzalez et al.2008). The first intervention

contributes to our understanding of the nutritional habits of EU children and the role of food and drinks marketing to childhood obesity (REIHC 2009, Savva et al. 2009). The second intervention explores the possibility for

applying a consolidated public health policy in preventing and treating obesity (Gonzalez et al. 2008, Savvas et al. 2007). The results of the SWOT analysis for these interventions are shown below:

Table 4: ACCA SWOT analysis

<p><u>Macro environment:</u> Strengths(S): Compliance with the EU policy and MoE, development at international level, funded by WHO, improvement of public health information systems, implementation programs, mutual aid between Cyprus and EU, improvement of health services (quality / effectiveness), cooperation between the public and the private sector ⇒ NHS</p>
<p>Weakness (W): bureaucracy, uneven allocation and distribution of resources, influences by conflicting interests of organisations (PDA, MoH, CAPO), current structure of health services, lack of quality control for health services, increased health care costs, absence of managerial culture</p>
<p>Opportunities (O): Consolidation of the NHS and Primary Care (PC), international and European cohesion in preventive protocol (diseases), decision making in innovative projects, autonomy of hospitals and health regions (HR), control of expenditure growth</p>
<p>Threats (T): Quick environmental changes, economic and political intrigues, delayed NHS consolidation (political instability), political apathy, economic crisis, challenging sustainability of NHS</p>
<p><u>Microenvironment:</u> S: Finds threats for health (i.e. obesity), development of preventive programs, health care equality, emphasis on the implementation of the Cypriot NHS (collaboration of public and private sectors)</p>
<p>W: Uneven distribution of resources, influences of organisational interests, absence of structure of the health system, increased costs of care, staff shortages, inequality potential medical specialties, nursing staff shortages especially in the private sector, lack of research</p>
<p>O: Monitoring population's health, development of PC / new units of HS (School of Medicine), new methods of prevention (Biomedical / Nanotechnology), new patient referrals</p>
<p>T: Increased deployment of clinical technology, installment of an unhealthy lifestyle, delayed consolidation of NHS Source: MoH 2011b, Pancyprian Diabetic Association (PDA) 2006</p>

Table 5: ARDFV SWOT analysis

<u>Macro environment:</u>
S: Direct prevention of childhood obesity (scientific evidence), interventions with specific goals and outcomes, combination with nutritional education, funded by EU health policy, monitoring by MoH and MoE
W: Pilot application of program (Larnaca, Paphos), free fruit and vegetables only once a week, influence of child and home environment, no practical effects included (2010 only)
O: Development of the program across all schools, development of program for restaurants across the community, financial support of the program by MoH , public advertising by the media
T: Decrease in financial resources, impact of political instability and political intervention, increasing prevalence of obesity, failure to respond to the public demand, increase of chronic diseases
<u>Microenvironment:</u>
S: Promotes correct nutritional intake, feedback loop (evaluation, development), support by practise and education
W: Lack of available staff, centralized decision-making (EU)
O: Integration of parents in the program, support in the countryside (school yard), provide across all classes, intensify the availability of fruits in schools (> 2 times a week)
T: Decrease in financial resources and supplies due to crisis, political intervention, lack of support and self-preservation Source: E.C 2011c

Table 6: MSSPS SWOT analysis

<u>Macro environment:</u>
S: Interventions with specific goals and outcomes, program available worldwide, funded by EU health policy, monitoring by MoE and CAPO
W: Reduced prices only (not free), affected child and the home environment, no practical applications included
O: Development of the program across all schools, support the program financially (MoH), health controls for pandemics, (i.e. aflatoxins), public information distributed by the media to prevent obesity
T: Reduced grant from CAPO and EU, impact of political instability and political interference, increasing prevalence of obesity and chronic diseases, attack by pathogenic organisms in dairy products
<u>Microenvironment:</u>
S: Direct prevention of obesity and chronic diseases, promotion of a healthy nutritional intake, cooperative interventions (MSSPS), cooperation of ministries (MoH and MoE) with the EU
W: Lack of available staff, viability exist only with other programs, children susceptible to influence from nutritional habits at home
O: Integration of parents with the program, support in the countryside (school yard), provided across all classes, intensify the availability of low fat milk products, available information through the media and distribution of flyers
T: Reduction of financial resources and supplies due to crisis, community and political interferences with the program, lack of support and self-maintenance from MoE and MoH Source: E.C 2011b, CAPO & CMIO 2007

Table 7: IDEFICS SWOT analysis

<p><u>Macro environment</u> S: Supportive towards public health policy of the EU, development of a unified health database, strengthened scientific and cultural bonds, identification of all scientific research, targeted results</p>
<p>W: Difficulty adopting the criteria by all EU countries (only 11 countries), major operational problems (bureaucracy), deviation of minorities in broad specificities population increase health costs (research)</p>
<p>O: Program development in other EU countries (high prevalence), specific lessons in nutrition and habits for students, program support by EU and the government, information available through the media</p>
<p>T: Reduction of financial resources, absence of students during research programs, operational problems, invalid results, continuous use of different BMI criteria</p>
<p><u>Microenvironment</u> S: Directly linked to obesity prevention, a unified manner of collecting and storing data, target polls, ability to compare</p>
<p>W: Difficulty adopting criteria by all countries, project delays no provision for the future (after recognition, then what kind of treatment)</p>
<p>O: Program development in other EU countries (high prevalence), legislation and trainee common recognition criteria, intern staff per module, inform public</p>
<p>T: Invalid results, continuous use of different BMI criteria, intransigence of some countries to change (criteria), possibility of separation criteria in many groups, specialisation may make things worse, difficulty in adoption of wider interventions Source: IDEFICS 2006</p>

Table 8: Polmark SWOT analysis

<u>Macro environment:</u>
S: Indirect prevention of childhood obesity, sets fundamentals for a new policy (prevention), reinforcement by scientific and political parties, recognition of the necessity by strategic shareholders, well-targeted outcomes and goals
W: Difficulty in adoption of the marketing policy by all EU countries, operational problems such as bureaucracy, delays in legislation, influences from political / personal interests, possibility to challenge its significance
O: Development program in all EU countries, support education in schools, program support by EU and special programs i.e. IDEFICS (unified criteria databases), public awareness of program's significance
T: Decrease in financial resources from EU to Research & Education Institute for Health of Children (REIHC), changing attitude, stakeholders due to new interests, operational problems (invalid results), circumventing legislation, indirect marketing, affected by the economic crisis
<u>Microenvironment:</u>
S: Immediate recognition of nutritional habits in Cyprus and EU, adopted effective legislation against advertising to children, funded by EU and WHO, targeted outcomes and specific objectives
W: Dependence on politics and personal gains, long process of implementing a strategy, high expenditure, possibility to challenge the significance of the program by the stakeholders / public
O: Development of an informative program across all schools and parents, financial support by the MoE, supervision of the implementation by independent scientists, consolidation of program with adolescent life (e.g. 14 years), development of a feedback system
T: Reduced program resources (e.g. stakeholders, staff), influenced by political apathy and political interventions, increasing prevalence of obesity, non-compliance with European guidelines and criteria
Source: REIHC 2009

Table 9: PorGrow SWOT analysis

<u>Macro environment:</u> S: Direct prevention of obesity in Cyprus and EU, strengthening scientific and political parties, recommending new innovative strategies by stakeholders, experts included from all sectors
W: Difficulties in adopting policy (only 9 countries joined), operational problems due to bureaucracy, delayed NHS implementation, influences by political and individual interests (stakeholders)
O: Development of program across all EU countries, application of recommended interventions from an early age, evaluation system, public awareness (media), significance of implementation
T: Decrease in EU financial resources, operational problems, questioning the sustainability of the program (e.g. supported evidence, economic crisis)
<u>Microenvironment:</u> S: prevention of childhood obesity, funded by WHO, best strategies of political sector / science, recognition of the need for action (high prevalence), target specific policy = specific objectives giving specific results
W: Implementation depends on the political situation and personal interests, long process of implementation, high expenditure, chance to challenge the significance of the program, bureaucracy, delayed implementation of legislation, necessity for a NHS
O: Oversee the implementation by experts, consolidation of the program until adulthood (i.e. 22 years), development of a feedback system, application of recommended interventions
T: Reduction in resources (e.g. stakeholders, staff), influence of political apathy, increasing prevalence of obesity and chronic diseases, noncompliance with all laws and interventions, influence of children from home Source: Gonzalez et al.2008, Savvas et al. 2007

The results of the secondary analysis of the most recent interventions for childhood obesity in Cyprus are seen below.

These were derived from the questionnaire presented in Table 3 (Assess of Partnership Compatibility for each program).

1. ACCA

As a part of the EU strategy for the development of Public Health (Commission of the European communities 2007, E.C 2011a), the main objective of the public health program 2008-2013 is the greater efficiency of operations in key health sectors (E.C 2011a). MoH's strategy for ACCA shares the EU objectives which involve the collaboration of

all relevant stakeholders in the private sector (MoH 2008, HIO 2012).

This collaboration strengthens its strategic partnerships for efficient interventions (Commission of the European communities 2007, HIO 2012). While WHO provides funding, MoH collects data, implements legislation and deploys interventions so as to achieve the goals with the help of the private sector.

Problems such as the uneven distribution and shortage of staff are resolved through various proposed procedures by the EU and other member countries (Commission of the European communities 2007).

A cultural fit between the members of the project can happen with the identification of the partners with the project's necessity. This can occur if they have to follow E.U legislation and to feel the need to ensure international and national health (develop an affinity for the cause). As well as the presence of personal benefit which is important for any organization, profit and active participation in the implementation of programs.

The progress of implementation is inspected by the EU and the respective Government (evaluation process). Assessment can be complete by measurement of prevalence and frequency of each disease every decade, as well as mortality rates.

2. MSSPS

For this intervention, cooperation between the EU, Cypriot Government, Cypriot Agriculture Payments Organization (CAPO) and Cypriot Milk Industry Organization (CMIO), was established. CAPO is an autonomous organisation not obliged to report to the MoH [law 64 (I) / 2003] and therefore has significant flexibility in its operations (CAPO and CMIO 2007).

It applies the latest organisational and management standards as well as modern and sophisticated processes of automation and computerisation for ensuring optimal efficiency (CAPO and CMIO 2007).

The aim of this non-profit project is the prevention of chronic diseases and obesity. This collaboration involves each partner contributing to the project the use of its (necessary) resources: EU provides funding, the Republic of Cyprus legislates and CAPO provides equipment for food production.

The identification of the partners with the existing goal may be present in this project if the partners have indirect personal interests (development of an affinity for the cause). Also they could identify with contributing to the fact that they contribute to national health and individual health safety.

A possible inspection by the EU could be in place (evaluation system), between the public and private sectors, to better achieve effectiveness of the intervention. Although regarding this European strategy, organisations and governments are forced to have the same agenda and maybe an evaluation system could be involved if EU demands it.

Evaluation of these partners can be achieved with the use of measurable results, such as audits, grants by various contributors, special forms from each procedure- quality control (CAPO and CMIO 2007), legislation with deadlines.

3. ARDFV

This intervention is promoted throughout the EU due to the increase of the number of obese children (E.C 2011c). CAPO as the payment authority has been delegated the intervention from the MoH (E.C 2011c). The purpose of this program is to promote fruit and vegetable consumption among children, to fight child obesity with primarily involves, the government and the EU and with the abstention of the private sector (E.C 2011c).

The parties' actions aim at meeting the goal of this project which is the prevention of obesity and the promotion of a healthy lifestyle. This collaboration is strengthened by parties complementing each other, for the fulfillment of various aspects of the project. For example, EU provides funding to Ministry of Agriculture (MoA) to distribute food and the MoE for applying the intervention to schools.

The cultural fit cycle is different for each partner, thus they are more prone to conflict of interest (semi-compatibility).

There is also the possibility of inspection by the EU to monitor progress in implementing the various aspects of the intervention with partners, since they follow in the same legislation.

Partners are evaluated indirectly; every 5 years prevalence and incidence of childhood obesity are measured (REIHC and MoH).

4. Polmark

This is an innovative project between the EU, the MoH and the REIHC (Savva et al. 2009). It helps us understand the effects of dietary habits of children (REIHC 2009) by placing an emphasis on the marketing of food to children. Both the public and the private sector work on preventing chronic diseases and safeguarding the rights of children.

This program has been cleverly designed to allocate specific resources towards the meeting of specific goals (Savva et al. 2009). In Cyprus, the MoH and the REIHC met with various relevant stakeholders (food industry and health service providers) to formulate targeted policies.

Participation of stakeholders is strong in this program as their opinions matter and it will be taken into consideration during formulation of policy. Their involvement offers them an opportunity to defend their interests in the matter and benefiting from the boom of their business. Formal inspection by the EU and the government is achieved with the use of data collected from interviews with the participants to further assess the effects of food marketing (REIHC 2009).

5. PorGrow

This is an innovative program in public health for treating and preventing obesity that can be of use to the future Cypriot NHS. The program is funded by the WHO and its main objectives include the identification of best strategies and

stakeholders that should get involved in policy-making (Gonzalez et al. 2008, Savvas et al. 2007)

These stakeholders are mostly non-profit organisations such as the REICH (in cooperation with the EU). EU provides the multi-criteria mapping (MCM) identification system of strategies along with funding. The MCM and REIHC identified all the appropriate participants in the policy on obesity (Savvas et al. 2007).

Subsequently, identifying with the purpose of the program is very easy since the stakeholders that are involved; have to nominate a mix of possible strategies, which is then evaluated. The evaluation was made with the evaluation criteria, with a scale for relative importance (Gonzalez et al. 2008).

Thus, because they are the creators of the possible mix used in the future for implementation, they can reflect their goal and interest, in relation with public appeal of the project (improvement of health).

The availability of a feedback mechanism for the application of this policy will have more effectiveness and responsiveness from the public. Strategies have been identified, but the implementation process has just started (Polinikis 2009).

The analysis based on Figure 1 (Sustainability of programs) of the most important interventions for childhood obesity is presented below in Figures 2,3,4,5.

Figure 2: Sustainability of ARDFV

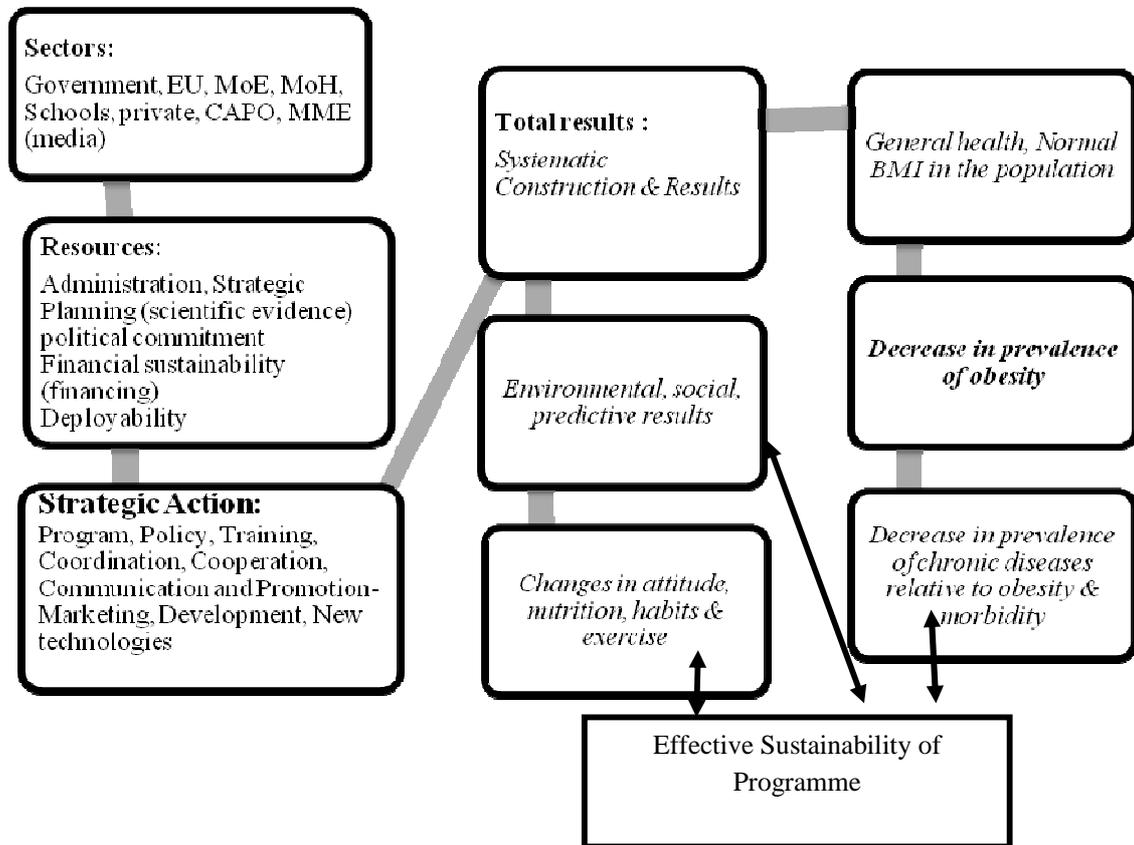


Figure 3: Sustainability of ACCA

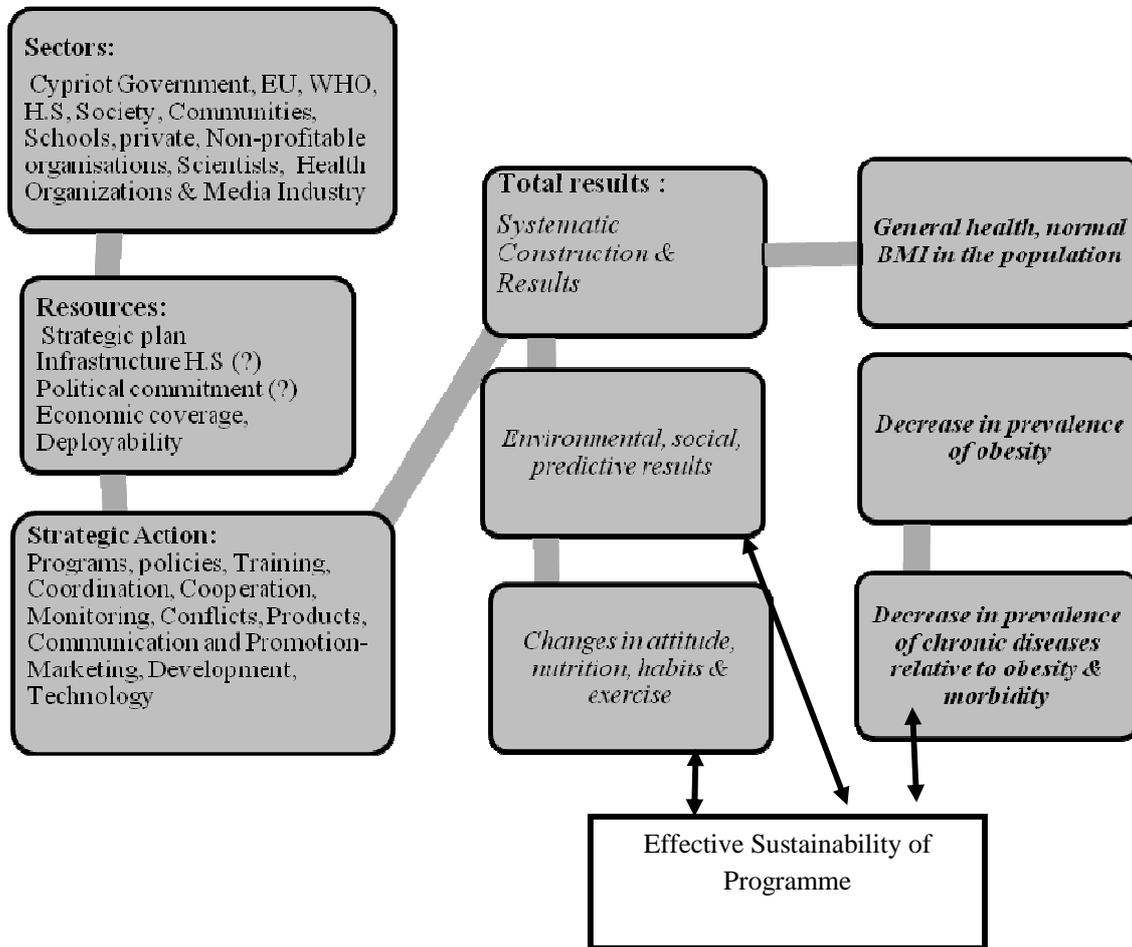


Figure 4: Sustainability of Polmark

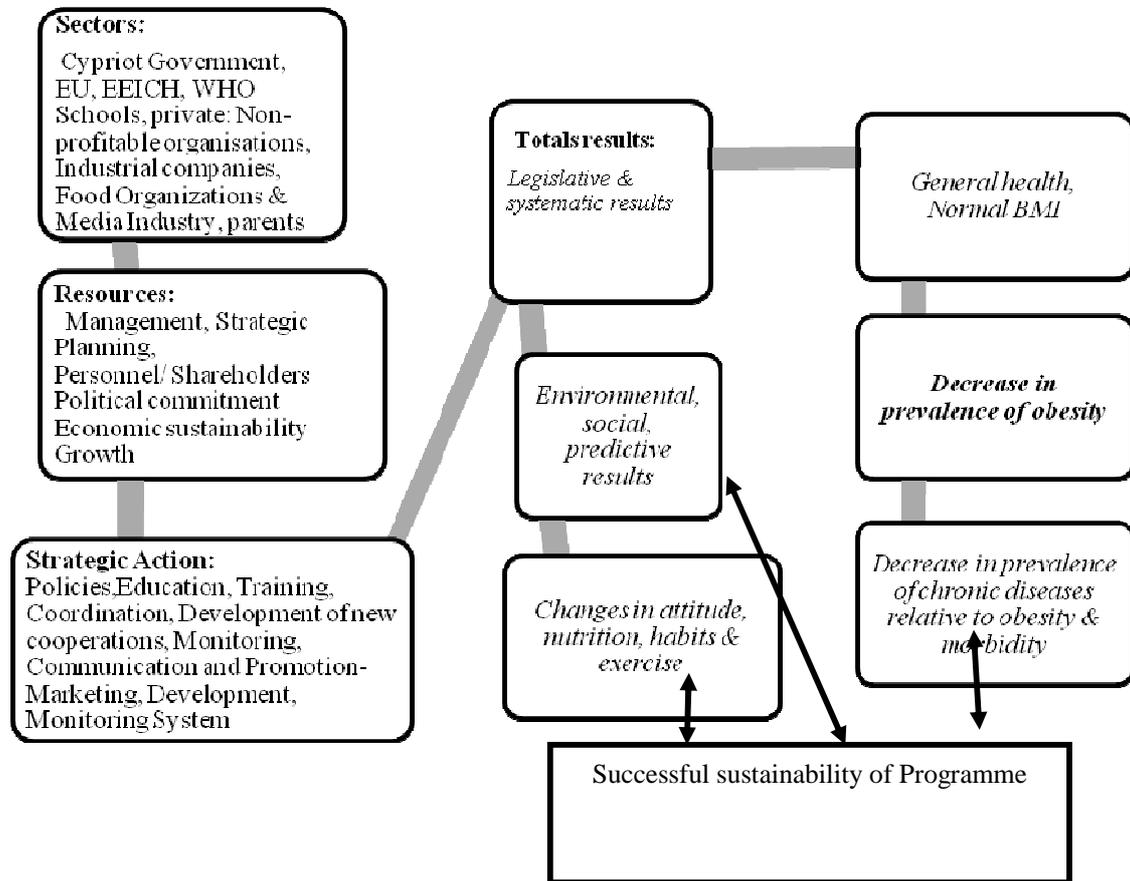
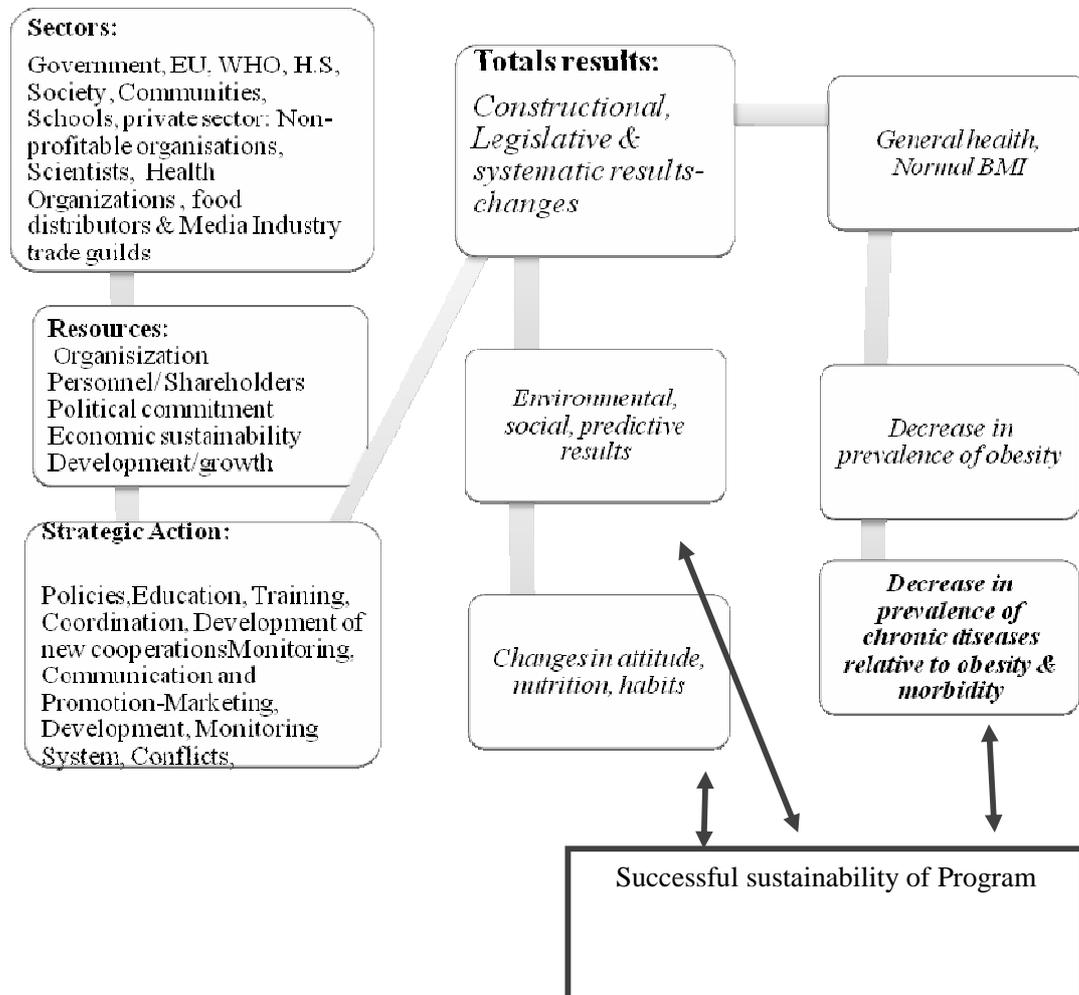


Figure 5: Sustainability of PorGrow



Discussion

The preliminary literature review revealed that there are specific shortcomings with regards to the Cypriot NHS and public health. The sustainability of existing health policies and implemented programs is questionable as there are no coherent monitoring systems in place (Polinikis 2009, MoH 2011a, HIO 2012). There are many worthwhile programs and organizations that are pushing for a strong public health, but many others are often delayed due to conflict of interests involved (MoH 2008, HIO 2008).

For example, the application of the ACCA policy, which emphasises on public health, has resulted in non-compliance among the various programs, it is responsible for. In addition, private sector's failures to comply with the EU objectives as well as the ongoing disagreements with the public sector have caused considerable delays (MoH 2008, HIO 2012).

Another important issue is the absence of an investigation Committee to validate the continuation of programs implemented in schools and communities of Cyprus. This Committee would assess the effectiveness of these programs and whether they have achieved their targets in prevention in areas such as health, safety and health and EU living (MoE 2010, MoE2011b).

With regards to the implementation of new European research methods and reviews, Cyprus is still in the process of consultation with relevant agencies (HIO 2008), mainly on the policy level and not on the deployment of these strategies (HIO 2012). Although there is a sense of certain developments taking place, for example certain health strategies, new health professional roles and preventive action programs, there is still a lack of a complete multi-sectoral consolidation of a cluster of strategies to address the important environmental factors mentioned above (CDC 2008).

Exemplary strategies include legislation against food marketing to children (Polmark), infrastructure promoting sports and physical activity to community members, standardised criteria for the identification of childhood obesity (Savva et al. 2009, REIHC 2009, Sixth Framework Programme 2011) and specific protocols by the Ministry of Health for the treatment of obesity (MoH 2011a).

On the other hand, Cyprus has been trying to implement innovative EU programs to enhance healthy nutrition. These include the Agriculture and Rural Development: Fruit and Vegetables (ARDFV) program, to promote fruit and vegetable in schools and homes (E.C 2011c), and the Milk Subsidy Scheme and certain milk Products to Schools (MSSPS) program, to promote the consumption of low fat milk products to children (CAPO and CMIO 2007, E.C 2011b). Polmark and PorGrow are two other examples of new exemplary interventions (Gonzalez et al.2008, REIHC 2009). The first intervention contributes to our understanding of the nutritional habits of EU children and the role of food and drinks marketing to childhood obesity (REIHC 2009, Savva et al. 2009). The second intervention explores the possibility for applying a consolidated public health policy in preventing and treating obesity (Savvas et al. 2007, Gonzalez et al.2008).

Furthermore, based on Compatibility Analysis on the various outstanding programs, there is mainly a lack of evaluation systems in place for feedback and conflict of interest between partners. For example, the progress of implementation of ACCA is inspected by the EU and the respective Government (evaluation process). Even though, assessment can be enhanced by measurement of prevalence and frequency of each disease every decade, as well as mortality rates, the lack of a feedback system does not produce a complete picture only fragments of it, resulting in inaccurate allocation of resources.

Similarly, the evaluation of the partners of the MSSPS program can be achieved with the use of measurable results as mentioned above (CAPO and CMIO 2007).

However, there is no project effectiveness evaluation system, such as on milk availability. Therefore, whether there is an actual prevention in place (i.e. lower incidence of obesity or of some chronic diseases), the responsibility is shared to all relevant programs involved, without a distribution-outcome, such as pie chart to see how each one contributed to the prevention (E. C 2011b).

In addition, the identification of partners of the ARDFV program with the existing planned strategy is difficult to occur, due to the presence of personal gain of the authority, which overcomes the public advantage it provides (awareness of fruit and vegetables, downsizing obesity).

As a natural result, the cultural fit cycle of the partners is different, thus they are more prone to conflict of interest (semi-compatibility). Regarding the evaluation of this program, it occurs indirectly; every 5 years prevalence and incidence of childhood obesity are measured (Research/Educational Institute for Children's Health and MoH).

On the other hand, in the end of this process, there will be no direct answer with regards to success rates of this intervention. Polmark is one of first innovative programs, where its formal inspection by the EU and the government is achieved with the use of data collected from interviews with the participants to further assess the effects of food marketing to children (REIHC 2009).

Results remain to be seen when consolidated sets of strategies are in place, as shown in U.S. data i.e. Communities Putting Prevention to Work (CPPW) (DeBate and Thompson 2005, Ogden et al. 2010, SCOAP South Carolina 2005, CPPW 2010).

In Cyprus, all that remains is the implementation of the policies as all participants have agreed to adopt the new

regulations and work towards a long lasting cooperation (Savva et al. 2009).

PolGrow in the second innovative program, with finding policies that could benefit both public health and development of the private sector. The availability of a feedback mechanism for the application of this policy will have more effectiveness and responsiveness from the public. Strategies have been identified, but the implementation process has just started (Polinikis 2009). One of the main disadvantages of this program is the conflict of interest of the parties involved (Gonzalez et al. 2008). This juxtaposition retains new design strategies (posing threats of implementation) and immediate implementation of the NHS, which is not yet in place, resulting in lapse of the project (Polinikis 2009).

The analysis based on the Sustainability Questionnaire of the most important interventions for childhood obesity in Cyprus, showed a few facts that need attention. Based on figure 2, the sustainability of ARDFV program is threatened by the defective operation of this program when there is an environmental threat to the products or downsizing and lack of funding. The main threat is the absence of direct combination between prevention programs, centralised decision-making and lack of measurable outcomes of success.

Regarding figure 3, problems will occur regarding the functionality of the ACCA program due to bureaucracy, poor coordination and resource allocation imbalances. One major threat is the absence of monitoring systems for most included programs. One of the biggest drawbacks is increased expenditure, absence of a managerial culture and the delayed implementation of a NHS (Polinikis 2009).

Based on figure 4 the Polmark program has been promoted by health stakeholders, but there was a breach of promises due to change in their interests. Another major threat is the absence of implemented legislation (REIHC 2009, Savva et al. 2009). One of the biggest

drawbacks is the lack of measurable outcomes of successful achievement of goals.

Based on figure 5, the research of the PorGrow program has been promoted largely by the public sector, but the breach of promises by stakeholders' interests is a big threat. One threat to sustainability is the lack of applied consolidation strategies (Savvas et al. 2007, Gonzalez et al. 2008, REIHC 2009). Other determinants include the age of the targeted population as well as culture, religion and ethnicity (Institute of Medicine 2007). As in every country, certain minorities exist in Cyprus which should have been included in the research.

Conclusions

This literature review found that it is difficult to detect prevalence of obesity for some age groups (2-4 years) due to lack of data, although interventions which target children could help reducing long-term effects of chronic diseases in the treatment of obesity (CDC 2009).

SWOT analysis demonstrated the ineffectiveness of existing policies and interventions in Cyprus. Subsequently, the compatibility and sustainability assessments of public-private partnerships (Berger et al. 2004, U.N. Standing Committee on Nutrition 2009, Institute of Medicine 2007) showed that if individual interests are set aside, these partnerships could be very effective (Savvas et al. 2007, Gonzalez et al. 2008). They could reduce health costs (Theodorou et al. 2001, MoH 2011a, HIO 2012), through better allocation of resources, prevent premature deaths and improve overall quality of life of the Cypriot population.

Towards this, a developed NHS would focus on Primary Care and place family physician at the centre of policy-making and interventions (Theodorou et al. 2001, MoH 2004, HIO 2008, MoH 2011a). Unfortunately, current health policy can be characterised as rather chaotic. The absence of a fully-developed NHS (PDA 2006, HIO 2008, REIHC 2009) hinders the

development and implementation of programs in effective prevention of childhood obesity and promotion of healthy lifestyles, supported by appropriate legislation. Worldwide, innovative collaborations between the public and private sector have shown that it is possible to improve access to healthy food and physical exercise through multiple community services.

Last and not least, further research is needed to show a more accurate picture of the prevalence of childhood obesity. The development of open-access databases with homogeneous classification criteria for high BMI and metabolic syndromes, especially for children, will allow comparisons among countries, highlighting health status for each individual country. Furthermore, suitable, internationally established, protocols for better preventive measures could also be developed.

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References

- AHA (2010). Overweight in Children Updated: Thursday, 10 June 2010. (online) Available at: http://www.heart.org/HEARTORG/GettingHealthy/WeightManagement/Obesity/Overweight-in-Children_UCM_304054_Article.jsp (accessed 04/10/2010)
- Armstrong M. (2006) A handbook of Human Resource Management Practice. 10th Edition Kogan Page, London.
- Berger, I. E., Cunningham, P.H., Drumwright, M.E. (2004) Social alliances: company/nonprofit collaboration. *California Management Review* 47(1), 58-90
- Astrup A. (2005), Obesity. In: Geissler C. and Powers H. editors. Human Nutrition . 11th Edition London Churchill Livingstone, 379-399

- Barlow SE (2007), Expert Committee, Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. *Pediatrics*. 120:S164-S192.
- Bharati DR, Deshmukh PR, Garg BS (2008) Correlates of overweight and obesity among school going children of Wardha city, Central India. *Indian J Med Res*; 127 : 539-43.
- CAPO, CMIO (2007). Newsletter for Milk Subsidy Scheme in Schools. (online) Available at: [http://www.capo.gov.cy/capo/capo.nsf/0/dc7b441e7a502a7cc2257933002dd031/\\$FILE/manual_ver1.5_JAN2010.pdf](http://www.capo.gov.cy/capo/capo.nsf/0/dc7b441e7a502a7cc2257933002dd031/$FILE/manual_ver1.5_JAN2010.pdf) (accessed 21/07/2012)
- CDC (2008), NHANES II (ages 6-11) and NHANES III (12-19). National Health and Examination Surveys I,II,III 1999-2008. (online) Available at: www.cdc.gov/nchs/data/hestat/obesity_child_07_08/obesity_child_07_08.htm (accessed 08/08/2010)
- CDC (2009) Healthy aging: Improving and Extending Quality of Life Among Older Americans, At A Glance 2009: The Health and economic effects of an aging society (online) Available at: <http://www.cdc.gov/NCCdphp/publications/aag/aging.html>. (Accessed 24 March 2010)
- CDC (2011), CDC Growth Charts: Clinical growth Charts. (online) Available at: http://www.cdc.gov/growthcharts/clinical_charts.htm (accessed 02/01/2011)
- Cole TJ, Bellizzi MC, Flegal M, Dietz WH (2000). Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ* 320 :1240 –1243
- Comfrey A. L & Lee HB (1992). *A First Course in Factor Analysis*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Commission of the European communities (2007). White Paper: Together for Health: A Strategic Approach for the EU 2008-2013 Brussels, 630. (online) Available at: <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0630:FIN:EN:PDF> (accessed 20/12/2010)
- CPPW (2010) King County Communities Putting Prevention to Work. Lessons Learned from the Request For Proposals Process. Group Health Research Institute.
- DeBate RD, & Thompson SH(2005) Girls on the Run: improvements in self-esteem, body size satisfaction and eating attitudes/behaviors. *Eat Weight Disorders* . 10(1):25-32.
- Dietz WH. (1998). "Health consequences of obesity in youth: childhood predictors of adult disease." *Pediatrics* 101, 3 Pt 2:518-525.
- Dunger DB, Salgin B, Ong KK (2007). Session 7: early nutrition and later health early developmental pathways of obesity and diabetes risk. *Proc Nutr Soc*; 66: 451–457.
- E.C (2011a), Public health Lifestyle: Nutrition. The EU Platform for Action on Diet, Physical Activity and Health. (online) Available at: http://ec.europa.eu/health/ph_determinants/life_style/nutrition/platform/platform_en.htm (accessed 15/01/2011)
- E. C (2011b), The European School Milk Programme. (online) Available at: http://ec.europa.eu/agriculture/drinkitup/index_en.htm (accessed 16/01/2011)
- E.C (2011c), Agriculture and rural Development: Fruit and vegetables: The School Fruit Scheme- group of experts for technical advice - call for application. (online) Available at: <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:338:0099:0100:EL:PDF> (accessed 15 January 2011)
- Epiphaniou SM & Savvas X (2000). Childhood Obesity – Critical periods for its appearance. REIHC. Childhood Education. 4:1-6 pdf. (online) Available at: <http://www.childhealth.ac.cy/Abstracts/Obesity%20Rebound.pdf> (accessed 22/08/2012)
- Escott-Stump S (2008a). Section 3. Pediatrics: Birth defects and Acquired Disorders, Childhood Obesity. In. Escott-Stump S., Nutrition and Diagnosis Related care 6th Edition. Lippinott Williams & Wilkins, Philadelphia ; 183-187
- Escott-Stump S (2008b). Section 10. Weight management, undernutrition and malnutrition. In. Escott-Stump S., Nutrition and Diagnosis Related care 6th Edition. Lippinott Williams & Wilkins, Philadelphia ; 550-567
- Escott-Stump S(2008c). Section 09. Metabolic Syndrome, Prediabetes. In. Escott-Stump S., Nutrition and Diagnosis Related care 6th Edition. Lippinott Williams & Wilkins, Philadelphia. 2008; 496-499
- European Childhood Obesity Group (2007), 17th Annual European Conference for Childhood Obesity. 5-7th July 2007, Athens. Hellenic Medical Association for Obesity.
- Finkelstein EA, Trogon JG, Dietz W (2009). Annual Medical Spending Attributable To Obesity: Payer-And Service-Specific Estimates. *Health Affairs* 28:w822.
- Garrow JS (2000), Obesity. In. Garrow JS, James WPT & Ralph A. Human Nutrition and Dietetics. 10th Edition. Churchill Livingstone London. 527-542.
- Gibbs M. & Phillips D. (2007), BS319 Growth and Development class: Foetal Origins of Later Disease. University of Surrey.
- Gonzalez DA, Nazmi A, Victora CG (2010), "Growth from birth to adulthood and abdominal obesity in a Brazilian birth cohort", *International Journal of Obesity*, 34: 195–202.
- Gonzalez-Zapata LI, Alvarez-Dardet C, Ortiz-Moncada R, Clemente R, Millstone E., Holdsworth M, Sarri K, Tarla G, Horvath Z, Lobstein T, Savva SC (2008), Policy options for obesity in Europe: a comparison of public health specialists with other stakeholders. *Public Health Nutrition*: 12(7), 896–908.

- Hadjigeorgiou C, Tornaritis M, Savva SC, Solea A, Kafatos A (2012) Secular trends in eating attitudes and behaviours in children and adolescents aged 10-18 years in Cyprus: A 6-year follow-up, school-based study, Public Health. doi:10.1016/j.puhe.2012.04.014
- HIO (2012), Mission of Health Insurance Organisation. (online) Available at: <http://www.hio.org.cy/>. (accessed 23/06/2012)
- HIO (2008), March's newsletter. (online) Available at: http://www.hio.org.cy/docs/deltio_typou_10032011.pdf (accessed 11/03/2011)
- HIO (2012) . Publishings. Annual Report 2009. (online) Available at: <http://www.hio.org.cy/gr/annualreport.html> (accessed 11/03/2011)
- Hoddinott J, Maluccio JA, Behrman JR, Flores R and Dr. Martorell R (2008) Effect of a nutrition intervention during early childhood on economic productivity in Guatemalan adults. *The Lancet*, 371 (9610); 411-416.
- Human Development Agency (2003). Obesity & Overweight in Children and Adolescents, HDA Evidence Summary Briefing. (online) Available at: http://www.northcumbriahealth.nhs.uk/include/get_file.php?id=2426 (accessed 01/11/2010)
- IDEFICS (2006) The project (online) Available at: <http://www.ideficsstudy.eu/idefics/webcontent?cmd=innerDoc&path=234&back=true> (accessed 16/12/2010)
- Institute of Medicine (2007), Progress in Preventing Childhood Obesity: How Do We Measure Up?, The National Academies Press, Washington DC .
- IOTF (2010). The Millennium disease (online). Available at: <http://www.iotf.org/millennium.asp> (accessed 15/10/2010)
- Jelastopulu E, Kallianezos P, Merikoulias G, Alexopoulos EC, Sapountzi-Krepia D. Prevalence and risk factors of excess weight in school children in West Greece. *Nursing & Health Sciences*, 14 (3): 372-380
- KiGGS (2010) The German Health Interview and Examination Survey for Children and Adolescents. <http://www.kiggs.de/service/english/index.html> Πρόσβαση (22/08/ 2010)
- Kvaavik E, Tell GS, Klepp KI (2003). Predictors and tracking of body mass index from adolescence into adulthood: follow-up of 18 to 20 years in the Oslo Youth Study. *Arch Pediatr Adolesc Med*; 157: 1212–1218
- Let's go (2011), The 5-2-1-0 Initiative. Home page.(online) Available: www.lets-go.org (05/01/2011).
- Magarey AM, Daniels LA, Boulton TJ, Cockington RA (2003). Predicting obesity in early adulthood from childhood and parental obesity. *Int J Obes Relat Metab Disord*; 27: 505– 513.(online) Available at: <http://www.moh.gov.cy/Moh/moh.nsf/All/CEC689242A49030A42257535003D3ACC?OpenDocument> (16/01/2011)
- MoE (2010). Health Education Programs: Eu-Zin. (online) Available at: http://www.moec.gov.cy/agogi_ygeias/pro_ev_zin_index.html (accessed 24/04/2010).
- MoE (2011a). Educational Material for Primary schools: Home economics Nutrition. (online) Available at: http://www.schools.ac.cy/klimakio/Themata/Oikiaki/Oikonomia/diatrofi/mesogiako_geuma.html (accessed 05/01/2011)
- MoE (2011b). Health & Safety. 2011a (online) Available at: <http://www.schools.ac.cy/programmes/asfaleiayeia/index.html> . (accessed 18/01/2011).
- MoH (2004). Speeches: Archived Speeches 2004 on Greek menu. Update for Health Services of Primary Care. 31 March. (online) Available at: <http://www.moh.gov.cy/MOH/MOH.nsf/All/2FC7088CA4BA4FF9C2257869002E3370?OpenDocument> (accessed 23/10/2011)
- MoH (2008) , ACCA Policy, Public Health 2007-2013. (online) Available at: [http://www.moa.gov.cy/moa/environment/environment.nsf/4E01B48B28F1C471C225793C0033AA4A/\\$file/D2010_07.pdf](http://www.moa.gov.cy/moa/environment/environment.nsf/4E01B48B28F1C471C225793C0033AA4A/$file/D2010_07.pdf) (accessed 10/12/2010).
- MoH (2011a), Health Monitoring Unit. (online) Available at: http://www.moh.gov.cy/moh/moh.nsf/page70_en/page70_en?OpenDocument (accessed 4/01/2011).
- MoH (2011b), Promoting and Protecting Health: School Health Services [http://www.moh.gov.cy/moh/moh.nsf/All/9C00CE29ACE114EDC225786C006E1722/\\$FILE/School%20Health%20Services.pdf?OpenElement](http://www.moh.gov.cy/moh/moh.nsf/All/9C00CE29ACE114EDC225786C006E1722/$FILE/School%20Health%20Services.pdf?OpenElement) (04/01/2012)
- NBC (2010), Rehema Lewis. “Precocious puberty strikes more 7-years old-girls-Today health. Dr. Alanna Leviline American Academy of Pediatrics New York 09/08/10”. NBC News, http://today.msnbc.msn.com/id/38600414/ns/health-kids_and_parenting/ (accessed 09/08/2010)
- NHS (2009), Health Survey for England: Volume 1 Physical activity and fitness. NHS Information Centre. National Centre for Social Research.
- NHS and NICE (2010) Obesity: guidance on the prevention, identification, assessment and management of overweight and obesity in adults and children. Costing report. Implementing NICE guidance in England.(online) Available: <http://www.nice.org.uk/nicemedia/live/11000/48323/48323.pdf> (14/12/2010)
- Ogden LC., Carroll MD., Curtin LR, Lamb MM., Flegal M.(2010). Original Contribution Prevalence of High Body Mass Index in US Children and Adolescents, 2007-2008 *JAMA*.303(3):242-249.
- PDA (2006) Cypriot Plans for Dealing with Diabetes: Action plan for Diabetes.

- http://www.diabetes.org.cy/index.php?option=com_content&task=category§ionid=13&id=41&Itemid=87 (Accessed 04/11/2008)
- Pappas P & Karaouli K. (2010) Health policy strategies for the treatment of obesity: a systematic review. *International Journal of Caring Sciences* 3, (3): 98-105
- Pietinen P, Lahti-Koski M, Vartiainen E, Puska P. (2001) Nutrition and cardiovascular disease in Finland since the early 1970's: A success story. *J Nutr Health Aging* 5:150-154
- Poskitt E.M.E & Morgan J.B. (2005), Chapter 14.3. Nutritional assessment in childhood. In: Geissler C. and Powers H. editors. *Human Nutrition*. 11th Edition London Churchill Livingstone, 277
- Polinikis A. (2009) Health Systems, teaching notes. Department of Health Services Management, Frederick University Cyprus.
- Rekliti M & Sapountzi-Krepia D. The Epidemic of Metabolic Syndrome: Health Promotion Strategies, *International Journal of Caring Sciences* 2(1): 1-10
- REIHC (2009). PolMark project: Assessment of Policy Options for Marketing Food and Beverages to Children, pdf. (online) Available at: http://www.childhealth.ac.cy/PolMark_CY_report.pdf (Accessed 15/09/2012)
- Rogers I., Emmett P, Ness A, Golding J (2004) ALSPAC Study Team. Fish intake during pregnancy and the frequency of low birth weight and intrauterine growth retardation in a cohort of British Infants. *Journal of Epidemiology and Community Health* 58:486-492
- Roseboom T & de Rooij S, Painter R. (2006) The Dutch famine and its long-term consequences for adult health *Early Human Development* 82, 485—491. (online) Available at: http://www.lorenzcenter.nl/lc/web/2008/319/CD%20LORENTZ%20CENTER%20WORKSHOP/AMC%20Roseboom%202006%20EHD_review.pdf (accessed 15/04/2010)
- Royal College of Pediatrics and Child Health (2011). U.K-WHO Growth Charts: Early Years. (online) Available at: <http://www.rcpch.ac.uk/Research/UK-WHO-Growth-Charts> (accessed 07/09/2010).
- Savvas SC, Chadjoannou M, Tornaritis MJ (2007) Policy options for responding to the growing challenge from obesity: Cyprus national settings. *Obesity reviews* 8 (2): 37-45.
- Savva CS, Shiakou M, Tornaritis MJ. (2009) PolMark Project: Cyprus national report. Research and Education Institute of Child health, Cyprus. (online) Available at: http://www.childhealth.ac.cy/PolMark_CY_report.pdf (accessed 10/08/2012)
- Schwartz MB and Puhl R (2003). Childhood obesity: a societal problem to solve. *Obesity Review* 4 (1) : 57-71.
- Schwimmer BJ, Burwinkle TM, Varni JW (2003). Health-Related Quality of Life of Severely Obese Children and Adolescents. *Journal of the American Medical Association*. 289(14):1813-1819.
- Sixth Framework Programme (2011), IDEFICS study: Design and baseline results of a European prospective intervention study in young children. Academy of Finland's research programmes, pdf. (online) Available at: http://www.aka.fi/Tiedostot/Tiedostot/LAPSET/Presentations%20of%20the%20annual%20seminar%2010-12%20May%202011/IDEFICS_AcadFiResProg-Naantali_11may10forweb.pdf (accessed 20/12/2011)
- SCOAP South Carolina (2005) South Carolina Obesity Assessment Project, Final report. BlueCross BlueShield of South Carolina Foundation & Southern Institute on Children and Families, Columbia.
- Strauss RS & Pollack HA (2003). Social marginalization of overweight children. *Arch Pediatrics Adolesc Med* 157 (8): 746-52
- Theodorou M, Sarris M, Soullis S (2001) Health Systems, Social Studies and Health. Papazisi Publishing, Athens.
- Thomas B & Bishop J. (2007a), 4.17 Management of Obesity and Overweight. In Thomas B., Bishop J. (Ed) Clayton DB, *Manual of dietetic Practice* 4th edition. British Dietetic Association. Blackwell Publishing, Oxford. 577-578.
- Thomas & Bishop (2007b), 3.7 Adults (19-64 years). In Thomas B. Bishop J. (Ed) Clayton DB, *Manual of dietetic Practice* 4th edition. British Dietetic Association. Blackwell Publishing, Oxford. 320.
- U.N. Standing Committee on Nutrition (2009) A Draft Proposal for Initiating SCN Private Sector Engagement. Published February 12, 2007. http://www.unsystem.org/SCN/Publications/html/private_sector.htm (accessed 10/09/2010)
- Victora CG, Adair L, Fall C, Hallal PC, Martorell R, Richter L, Sachdev HS and Maternal and Child Undernutrition Study Group. (2008). Maternal and child undernutrition: consequences for adult health and human capital. *Lancet* 371: 340-357.
- Von Kries, R, Koletzko, B, Sauerwald, T, von Mutius, E., Barnert D, Grunert, V. & von Voss, H. (1999) Breastfeeding and obesity: cross sectional study. *Br. Med. J.* 319: 147-150.
- Wang Y & Dietz WH (2002). Economic burden of obesity in youths aged 6 to 17 years. *Pediatrics Journal* ;109(6):1195: 1979-1999
- WHO (2003) Programmes and projects: Global strategy on diet, physical activity and health: Documents and publications: Chronic disease Information sheet on Obesity and overweight. <http://www.who.int/dietphysicalactivity/media/en/gsfsobesity.pdf> (18/03/2009)
- WHO (2011a), Media Centre: Obesity and overweight. (online) Available at:

- <http://www.who.int/mediacentre/factsheets/fs311/en/>
(accessed 12/12/2010)
- WHO (2011b) Health. Topics: Obesity and Overweight.
(online) Available at:
<http://www.who.int/topics/obesity/en/> (accessed
02/01/2011)
- WHO (2011c), Programmes and Projects. Child Growth
Standards: WHO reference Charts. Height –for-age (5-
19 years).
[http://www.who.int/growthref/who2007_height_for_ag
e/en/index.html](http://www.who.int/growthref/who2007_height_for_age/en/index.html) (02/01/2011)
- WHO (2011d) Programmes and Projects. Child Growth
Standards: The WHO Child Growth Standards.
<http://www.who.int/childgrowth/en/index.html>
(02/02/2011)
- WHO (2011f), Media Centre: The World Health
Organization warns of the rising threat of heart disease
and stroke as overweight and obesity rapidly increase.
(online) Available at:
[http://www.who.int/mediacentre/news/releases/2005/pr
44/en/](http://www.who.int/mediacentre/news/releases/2005/pr44/en/) (accessed 02/01/2011)
- World Cancer Research fund International (2007a) Food,
Nutrition, Physical Activity and the prevention of
Cancer: a global Perspective, Chapter 6: Body
composition, growth and development. p:221-228,
Washington: American Institute of Cancer Research.
- World Cancer Research fund International (2007b) Food,
Nutrition, Physical Activity and the prevention of
Cancer: a global Perspective, Chapter 8: Determinants
of weight gain, overweight and obesity. p: 322-329,
Washington: American Institute of Can