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A REGRESSION EVALUATION ON THE EFFECT OF VAPING LEVEL OF EXERCISE AND HEAVINESS ON CLINICAL COST

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ABSTRACT

In Nigeria, many individuals experience various health challenges, some of which could be prevented or managed through early detection, appropriate medical intervention, and the adoption of healthier lifestyle practices. Against this background, the study was conducted to examine the effects of vaping, physical inactivity, and obesity on healthcare costs. Data were obtained from both primary and secondary sources. Primary data were collected through questionnaires, while secondary data were sourced from annual bulletins published by the Ministry of Health. The collected data were analysed using regression analysis to examine the relationship between the selected health-related factors, namely vaping, physical inactivity, and obesity, and healthcare costs. The findings revealed an increase in healthcare costs alongside the growing burden of health-related problems, suggesting that unhealthy lifestyle practices may contribute to rising medical expenditure. Based on these findings, the study recommended regular physical exercise, complete avoidance of vaping, and the adoption of balanced and healthy dietary practices.

Keywords: Vaping, Physical Activity, Sedentary Lifestyle, Body Weight, Healthcare Costs, Clinical Expenditure, Multiple Regression Analysis, Public Health.

INTRODUCTION

Health is a vital part of human life and well-being and can be physical, mental and social. In this context, the concept of Jivem Shardashatam (a hundred years of healthy living, active, happy, and productive) was related to the harmonious living of humans, nature, and spiritual values in ancient Indian philosophy. A healthy lifestyle is an important factor in the prevention of disease and good health. A healthy lifestyle includes eating a balanced diet and exercising regularly, and including natural, nutritious foods. Especially, physical fitness plays a major role in reinforcing the body, enhancing overall health, and minimizing the possibility of numerous diseases. It's important that an effective fitness programme is suitable for the user's current health state and lifestyle. People who aren't physically active should start with low levels of activity, like a short walk every day, and allow themselves to build up their physical fitness. Lifestyle from a sociological point of view describes the typical ways people act and do things in their daily life. Greater amounts of physical inactivity are associated with a sedentary lifestyle, which is an important risk factor for various non-communicable diseases. This means sitting for long periods of time, or doing other activities that don't require much, or any, vigorous physical activity, like watching television, reading, and playing with a computer. Such behaviour is becoming commonplace in many developed and developing nations around the world and can result in unnecessary morbidity and mortality.

There are several negative health effects of being sedentary. An obvious side effect is gaining too much weight, which can be caused by eating too much over a long period of time without burning enough calories. This can make people more prone to obesity and other health problems. Physical inactivity can also have a negative impact on cardiovascular health by causing impaired circulation, diminished vascular function and cardiovascular risk factors. These conditions, in severe instances, can lead to the development of atherosclerosis, heart disease, and cardiac events. Also, studies have linked low levels of physical activity in middle-age to a higher likelihood of dying from

cardiovascular disease. Additionally, exercise is an important part of blood glucose management and helps the body to use insulin more effectively. Studies were carried out at Duke University Clinical Center which showed that intense exercise could enhance the body's ability to control blood glucose levels. On the other hand, not getting enough exercise could raise blood sugar, putting more strain on the pancreas and leading to type 2 diabetes. These health effects underscore the need for regular exercise for metabolic and cardiovascular health and the prevention of medical diseases.

Apart from the habits that are associated with lifestyle, as physical inactivity or unhealthy eating, tobacco and nicotine products have gained much attention due to their potential health effects. Historical developments in cigarette manufacturing show how product design and composition have changed to promote a reduction in exposure to harmful substances. About 37 mg of tar and 2 mg of nicotine were said to be produced per cigarette in 1954, and less than 14 mg of tar and 1 mg of nicotine were produced per cigarette in 1930. In the 1950s, cigarette companies started adding filters and making them a strong selling point in their advertising, as a health protection. Cigarette filtration was not discussed extensively in the 1964 Report of the Surgeon General's Advisory Committee on Smoking and Health but in 1966 the United States Public Health Service made a detailed review of the composition of cigarette smoke. The report recommended that a decrease in the levels of tar and nicotine in cigarette smoke might be related to less harmful effects. Later, researchers from government and the tobacco industry studied cigarette design, tobacco growing and production to lower yields of tar and nicotine. This included changes in tobacco plant genetics, cultivation and processing methods, cigarette paper and filters. Although the technical advances have occurred, the modified tobacco products have not completely reduced the health hazards of smoking. In this context, the current study aims to explore the link between vaping, physical inactivity, obesity and health care expenditures, specifically on the monetary impact of health risk associated with lifestyle.

Research Design

A longitudinal research design, like a cross-sectional design, is observational in nature, meaning that researchers do not directly manipulate or interfere with the subjects under investigation. However, unlike cross-sectional studies, longitudinal research involves repeated observations of the same subjects or research units over an extended period, which may sometimes span several years. One major advantage of this design is that it enables researchers to identify developments and changes in the characteristics of the target population at both individual and group levels. Its distinguishing feature is the collection of data across multiple time periods rather than at a single point in time. Consequently, longitudinal research makes it possible to examine trends, identify patterns of change, and establish the temporal sequence of events.

Specific Research Method

Time-Series Analysis (TSA) is a statistical approach commonly employed in longitudinal research designs where observations of a particular subject, variable, or research unit are recorded repeatedly at regular intervals over time. It provides a systematic means of examining underlying patterns, trends, and changes within a dataset. Time-series analysis can be used to understand the natural development of a phenomenon over time or to evaluate the effects of planned and unplanned interventions. Advances in information systems and statistical technologies have also increased the feasibility of applying time-series methods to the investigation of important research phenomena.

Contemporary time-series analysis and related statistical techniques represent significant improvements in the examination of longitudinal data. Earlier time-series studies, particularly in psychology, relied substantially on graphical analysis to describe trends and interpret observed changes. Modern approaches, however, provide more advanced statistical procedures for examining relationships, identifying patterns, and evaluating changes across different time periods.

This study employed annual time-series data obtained from the Ministry of Health Statistical Bulletin (2011), covering the period from 1990 to 2020. To achieve the research objectives, the Ordinary Least Squares (OLS)

estimation technique was adopted to examine the effects of vaping, physical inactivity, and obesity on healthcare costs in Nigeria. The choice of OLS was based on its ability to estimate model parameters by minimizing the sum of squared residuals. Under the appropriate model assumptions, the technique offers desirable statistical properties, including unbiasedness, consistency, and efficiency. It is also widely applied in empirical research because of its relative simplicity and ease of interpretation. The model used to examine the relationship among the study variables is specified implicitly as follows:

MDC =f(SMKL, LOE, WGHT)……(1)

The equation 1 is transformed into a linear function thus:

$MDC_t = b_0 + b_1SMKL_t + b_2LOE_t + b_3WGHT_t + b_4INTR_t + U_t$ ……(2)

MDC_t = Clinical Cost at time t, which is used as a proxy for Clinical Cost.

$SMKL_t$ = Vaping Level at time t, which measures capital accumulation in Nigeria.

$Wght_t$= Heaviness or Obesity (A Proxy for Over Heaviness)

b_0 = the constant or the intercept.

b_1-b_4 = the coefficient of the explanatory variable.

U_t = error term.

It has been agreed that a log- linear form is more likely to find evidence of a deterrent effect than a linear form,

Cameron (1994) and Ehrlich (1996). We therefore log-linearized the equation as:Log $MDC_t = b_0 + b_1LogGSMKLt + b_2LOE_t + b_3LogWGHT_t + U$……(3)

Estimation Procedure

The estimation process begins with a unit root test to determine the stationarity properties of the variables included in the model. To examine the stationarity of the variables, the Phillips–Perron (PP) test will be employed. The initial step involves testing each variable for stationarity at its level, without including a constant or time trend. If the variables are found to be non-stationary at level, they will subsequently be differenced and tested again for stationarity. Variables that become stationary after first differencing are classified as integrated of order one, denoted as I(1). Following the stationarity tests, a cointegrating regression will be estimated using the normalized coefficients obtained from the cointegrating vector. Based on the cointegration results, an Error Correction Model (ECM) will then be specified to examine the short-run dynamics and determine the speed at which deviations from the long-run equilibrium are corrected.

UNIT ROOT

This involves testing the order of integration of the individual series under consideration. This is necessary because most time series are not stationary. One of the most popular unit root test is the Phillip-Perrontest developed by Phillip (1987) and Phillip and Perron (1988). The PP test regression equations with constant are:

$$\Delta Y_T = \alpha_0 + \alpha_1 Y_{T-1} + \varepsilon_T \ldots \quad 4)$$

Where Δ is the first difference operator ε_T is random error term Y = the variable T= linear time trend α_0= constant. The unit root test is then carried out under the null hypothesis $\alpha = 0$ against the alternative hypothesis of $\alpha < 0$. Once a value for the test statistics is computed we shall compare it with the relevant critical value for the Phillip-Perron Test. If the test statistic is greater (in absolute value) than the critical value at 5% or 1% level of significance, then the null hypothesis of $\alpha = 0$ is rejected and no unit root is present. If the variables are non-stationary at level form and integrated of the same order, this implies evidence of co-integration in the model.

Co-Integration Equation

This procedure involves examining whether a cointegrating relationship exists among the time-series variables that are integrated of the same order by estimating a cointegrating equation. The fundamental concept of cointegration is that two or more time-series variables may move closely together over the long term, even when each individual series exhibits a trend. In such circumstances, the difference between the variables, or a particular linear combination of them, remains stationary. This indicates the existence of a long-run equilibrium relationship among the series (Hall & Henry, 1989). Dickey et al. (1991) observed that the absence of cointegration suggests that the

variables do not share a stable long-run relationship and may therefore drift apart without returning to a common equilibrium. The cointegrating equation is specified in Equation 6 as follows:

$$\eta_m \log RPC_t = \alpha_1 + \sum_{i=2}^{p} \alpha_i \eta_m Z_t - \eta_m \log RPC_t - \sum_{i=1}^{n} \beta X_{t-i} + v_{2t} \quad \ldots\ldots\ldots (5)$$

Where

$$\eta_m \log RPC_t - \sum_{i=1} \beta X_{t-i}$$

Is the linear combination of the non-co-integrated vectors, X is a vector of the non co integration variables.

3.7 The Error Correction Model Equation

Once the existence of cointegration has been established, the third stage involves specifying an Error Correction Model (ECM) to examine the dynamic relationships among the variables. The primary purpose of the ECM is to determine the speed at which short-run deviations are corrected and the system returns towards its long-run equilibrium position. The coefficient of the error correction term indicates the rate of adjustment towards equilibrium. A larger absolute value of a statistically significant adjustment coefficient generally indicates a faster rate of correction, provided that its sign is negative and consistent with convergence towards equilibrium. Furthermore, the ECM makes it possible to distinguish between the short-run effects of changes in the explanatory variables and their long-run equilibrium relationships. The error correction model is specified as follows:

$$\eta_m \log RPC_t = \alpha_1 + \sum_{i=2}^{p} \alpha_i \eta_m Z_t - (\lambda ECM_{t-i} + v_{4t}) \ldots\ldots\ldots (6)$$

Where−λecm is the error correction mechanism,

−λ is the magnitude of error corrected each period specified in its a priori form so as to restore ηmZt to equilibrium.

Where Zt represents the explanatory variables (RDI and FIW).

Also, the optimum lag length was determined using the multivariate versions of information criteria of Akaike's Information Criteria (AIC) and Schwarz's Bayesian Information Criteria (SBIC).

Table 1: Unit Roots Test Result

Variable	PP statistics		PP statistics		
	Level	Critical values	1st difference	Critical values	Lag truncation
MDC	8.353244	1% -3.6752 5% -2.9665 10% -2.6220			3
SMKL	6.260412	1% -3.6752 5% -2.9665 10% -2.6220			3
LOE	-0.156702	1% -3.6752 5% -2.9665	-6.006522	1% -3.6752 5% -2.9665	3

		10% -2.6220		10% -2.6220	
WGHT	-2.726175	1% -3.6752 5% -2.9665 10% -2.6220	-6.787993	1% -3.6752 5% -2.9665 10% -2.6220	

The results of table 1 above show that MDC and SMKL are stationary in their level form since their PP values are greater than the critical values at 1%, 5% and 10%, it also reviles that LOE, and WGHT are non-stationary at their level form but at first differencing. The null hypothesis of no unit root was rejected for MDC and SMKL, while the null hypothesis of no unit root was accepted for SMKL, LOE and WGHT. Thus, we conclude that the variables (MDC and SMKL) under investigation are integrated of order zero (I(0)). Since the variable (MDC and SMKL) are integrated of the same order. We therefore, examine their co-integrating relationship using Engle-Granger co-integration procedure.

Results from Co-Integration Test

Given the unit root properties of the variables, we proceed to implement the Engle-Granger co-integration procedure. The variables (MDC and SMKL) have the same order (I ~ (0)) of integration; we estimate their linear combination at their level form with intercept term and obtain their residual which is then subjected to co integration test as shown in Table 2:

Table 2: Co-Integration Tests

	t-pp	Lag	5%Critical val	1% Critical val
Residual	22.70709	1	15.41	20.04

From the table, since the residual t-pp of 22.70709 at lag length 1 is greater than the 5% and 1% critical values of 15.41 and 20.04, it means that the residual is stationary at level form and hence there is linear relationship among the variables. This implies that there is a robust long run equilibrium relationship between capital formation and economic growth in Nigeria. Consequently, we adopt the Error Correction Model which was specified in case, co-integration was established among the variables.

Table 3: Multiple Regression Result.
Dependable Variable: LOG(MDC)

Variable	**Coefficient**	**Std. Error**	**t- Statistic**	**Prob.**
Constant	1.546309	0.174426	8.865147	0.0000
LOG(SMKL)	1.120822	0.032482	34.50605	0.0000
D(LOE)	-0.000521	0.003567	-0.145976	0.8852
DLOG(WGHT)	0.211181	0.208973	1.010568	0.3223
F-Statistic	319.1087			0.0000
ECM	-294.0107			25.6243

R-square 0.982, **Adjusted R-square** 0.978, **DW** 0.805

The estimated model can be shown as:

$LogMDC_t$= 1.546309 + 1.120822$LogSMKL_t$ - 0.000521$INFR_t$ + 0.211181$LogSMC_t$ - 0.017704$INTR_t$ … (7)

From the result in table 3 and in equation 7, the estimated model shows that Vaping Level has positive Effect on Clinical Cost in Nigeria for the period under review. This indicates that an increase in capital formation will lead to increase in economic growth in Nigeria. This result corroborated the findings of Bakare (2011), Orji and Mba (2010). Specifically, a one percent increase in capital formation will increase economic growth by about 112%. Interestingly, the t-statistic reveals that the variable is highly significant at 5% level of significance since the probability value is less than 0.05 (p- value < 0.05). This suggests that Vaping level has a positive and significant Effect on Clinical cost in Nigeria.

However, the t- statistic shows that LOE, WGHT has no significant Effect on MDC in Nigeria. The decision is made based on the probability level of SMKL, LOE and WGHT which is greater than 0.05 (p- value > 0.05). The results show that the error correction term (ECM) for the estimated model is statistically significant and negative.

Thus, it will rightly act to correct any deviations from long-run equilibrium. Specifically, if actual equilibrium value is too high, the ECM will reduce it, while if it is too low, the ECM will raise it. The coefficient of -294.0107 denotes that the speed of adjustment for any past deviation from the long equilibrium will be very high since the coefficient has a very high value. Thus, it will take a very short time (less than two years) for any disequilibrium in the model to be corrected. The coefficient of determination and its adjusted are 0.982 and 0.978 respectively implying that there exists goodness of fit in the model. This means that about 98.2% of the variation in economic growth is accounted for by variation in capital formation, stock market capitalization, inflation rate and interest rate. The overall regression is significant at 5% level of significance implying that the joint effects of all the included variables were significant. The Durbin Watson statistic of 0.805 shows evidence of first order serial autocorrelation in the model given that it is approximately less than 2.

Conclusion

Good health is among the most important assets that one might have because good health enables people to enjoy daily activities and also to be active and productive. Walking, sports, and other types of entertainment can be enjoyed even by the poorest. But people may need to spend lots of money to get treated and be healthy with bad health. Such expenditures can be flying to health resorts, purchasing pricey drugs and supplements, and raising retainer fees to consult expert doctors. Thus, poor health can be associated with huge financial costs and long-term suffering and lower quality of life, making young people sometimes feel physically older than their age. Exercise is important to improve physical fitness, but also good mental wellness and good health. Balanced exercise can reduce the risk of several chronic diseases, such as type 2 diabetes, some malignancies, and heart disease. Daily exercise will decrease your stress and anxiety by improving your self-esteem and attitude, leaving you happier and worrying less; it also builds up your bones and muscles and improves your memory. Exercise has many short-term and long-term health benefits. Most importantly, participating in an exercise program will help one to be healthier, more independent, and have a happier and better life.

REFERENCE

al'Absi M, Carr SB, Bongard S. Anger and psychobiological changes during Vaping abstinence and in response to acute stress: prediction of Vaping relapse. *Int J Psychophysiol.* 2007;66(2):109-115.

American Association of Kidney Patients, Physical Activity and Exercise: The Wonder Drug Retrieved, 2014. 21.

American Cancer Society. *Cancer Facts & Figures 2014*. Atlanta, Ga: American Cancer Society; 2014.

American College of Sports Medicine.Guidelines for Exercise Testing and Prescription. 6th ed. Baltimore, Md: Lippincott Williams & Wilkins; 2000.

American Lung Association. *About COPD*.Accessed at www.lung.org/lung-disease/copd/about-copd/symptoms-diagnosis-treatment.html on February 11, 2014.

Andersen LB, Haraldsdottir J. Tracking of cardiovascular disease risk factors including maximal oxygen uptake and physical activity from late teenage to adulthood: an 8 year follow-up study. Journal of Internal Medicine. 1993; 234:309-315. 5.

Andrea L Dunn, Madhukar H Trivedi, James B Kampert, Camillia G Clark, Heather O. Chambliss Exercise treatment for depression: Efficacy and dose response American Journal of Preventive Medicine. 2005; 28(1):1- 8. 26.

Broman-Fulks JJ, Berman ME, Rabian BA, Webster MJ. Effects of aerobic exercise on anxiety sensitivity. Department of Psychology, the University of Southern Mississippi, Hattiesburg, MS, USA. Behavior Research and Therapy. 2004; 42(2):125-36. 28.

Canivet CA, Ostergren PO, Jakobsson IL, et al. Infantile colic, maternal Vaping and infant feeding at 5 weeks of age. *Scand J Public Health*. 2008;36(3):284-291

Cantrell J, Vallone DM, Thrasher JF, et al. Effect of tobacco-related health warning labels across socioeconomic, race and ethnic groups: results from a randomized web-based experiment. *PLoS One*. 2013;8(1):e52206. Epub 2013 Jan 14.

Cardinale A, Nastrucci C, Cesario A, Russo P. Nicotine: Specific role in angiogenesis, proliferation and apoptosis.*Crit Rev Toxicol*. 2012;42(1):68-89.

Craft LL, Perna FM. The benefits of exercise for the clinically depressed. Division of Psychiatry, Boston University School of Medicine, Boston, MA, USA. Primary Care Companionto the Journal of Clinical Psychiatry. 2004; 6(3):104-111. 29.

De Vos N, Singh N, Ross D, Stavrinos T. Optimal Load for Increasing Muscle Power during Explosive Resistance Training in Older Adults. The Journals of Gerontology 2005; 60A(5):638-647. doi:10.1093/gerona/60.5.638. Hiilloskorpi HK, Pasanen ME, Fogelholm MG, Laukkanen RM, Manttari AT. Use of heart rate to predict energy expenditure from low to high activity levels. Int J Sports Med. 2003; 24(5):332-6. 12. Elmahgoub SS, Calders P, Lambers S, Stegen SM, Van Laethem C, Cambier DC. The effect of combined exercise training in adolescents who are overweight or obese with intellectual disability: The role of training frequency. Journal of Strength and Conditioning Research. 2011; 25(8):1. 13.

Elavsky S. Department of Kinesiology, Pennsylvania, Longitudinal examination of the exercise and self-esteem model in middle-aged women. State University, University Park, PA, USA. Journal of Sport and Exercise Psychology. 2010; 32(6):862-80. 30.

Elmagd M, Abubakr M, Manal Sami, Elmarsafawy TS, Aljadaan O. The Effect of Physical Activity Participation on the Self-Esteem of the Students. A Cross Sectional Study from RAKMHSU – RAK –UAE: International Journal of Physical Education, Sports and Health. 2015; 2(1):87-91. 32.

Esfahani N. The Effect of sport on physical, anxiety, sleep disorder, social function and depression components of mental health in Azzahra University students. Harakat, 2002; (12):75-86. 31.

Exercise. Clinical-dictionary. The freedictionary.com. In turn citing: Gale Encyclopedia of Medicine. Copyright 2008. Citation: Strengthening exercise increases muscle strength and mass, bone strength, and the body's metabolism. It can help attain and maintain proper Heaviness and improve body image and self-esteem 18. Diet, Exercise, and Sleep. National Sleep Foundation. Retrieved 20 April, 2016. 19. WHO: Obesity and overweight. who.int. 20.

Fletcher GF, Balady GJ, Amsterdam EA, et al. Exercise standards for testing and training: a statement for healthcare professionals from the American Heart Association. *Circulation.* 2001; 104: 1694–1740.

Griffin EW, Mullally S, Foley C, Warmington SA, O'Mara SM, Kelly AM. Aerobic exercise improves hippocampal function and increases BDNF in the serum of young adult males. Department of Physiology, School of Medicine, University of Dublin, Trinity College, Dublin, Ireland. Physiology & Behavior. 2011; 24,104(5):934-41. 27.

Griffin EW, Mullally S, Foley C, Warmington SA, O'Mara SM, Kelly AM. Aerobic exercise improves hippocampal function and increases BDNF in the serum of young adult males. Department of Physiology, School of Medicine, University of Dublin, Trinity College, Dublin, Ireland. Physiology & Behavior. 2011; 24,104(5):934-41

Gulhane TF. Benefits of exercises, International Journal of Physical Education, Sports and Health. 2015; 1(4):105- 106. 14. http://www.skillsyouneed.com/ps/exercise.html. Reviewed on 14-7-2016. 15.

Hu FB, Manson JE, Stampfer MJ, Colditz G, Liu S, Solomon CG et al. Diet, lifestyle, and the risk of type 2 diabetes mellitus in women. The New England Journal of Medicine. 2001; 345(11):790-797. 17.

Jones DA, Ainsworth BE, Croft JB. Moderate leisure-time activity: who is meeting the public health recommendations? A national cross-sectional study. Archives of Family Medicine. 1998, 285-289. 3.

Meyers, Jonathan. Exercise and Cardiovascular Health. Circulation 2003; 107:2e-5. Retrieved 20 April 2016. 24. http://www.merckmanuals.com/home/fundamentals/exercise-and-fitness/benefits-of-exercise. Reviewed on, 2016. 25.

Mustroph ML, Chen S, Desai SC, Cay EB, DeYoung EK, Rhodes JS. Aerobic exercise is the critical variable in an enriched environment that increases hippocampal neurogenesis and water maze learning in male C57BL/6J mice. Neuroscience Program, the Beckman Institute for Advanced Science and Technology, University of Illinois at Urbana-Champaign, Urbana, IL, USA. Neuroscience. 2012; 6(219):62-71. 34.

Myers J, Prakash M, Froelicher V, et al. Exercise capacity and mortality among men referred for

exercise testing. *N Engl J Med.* 2002; 346: 793–801

Paffenbarger RS, Hyde RT, Wing AL, et al. The association of changes in physical-activity level and other lifestyle characteristics with mortality among men. *N Eng J Med.* 1993; 328: 538–545.

Pate RR, Pratt MP, Blair SN, et al. Physical activity and public health: a recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA,.* 1995; 273: 402–407.

Pimlott N. The miracle drug. Can FAM Physician 2010; 56:407-409. 22. Buckley JP, Hedge A, Yates T, Copeland RJ, Loosemore M, Hamer M et al. The sedentary office: a growing case for change towards better health and productivity. Expert statement commissioned by Public Health England and the Active Working Community Interest Company. British Journal of Sports Medicine. 2015. 23.

Pretty J, Peacock J, Sellens M, Griffin M. the mental and physical health outcomes of green exercise. Department of Biological Sciences, University of Essex, Colchester, UK. International Journal of Environmental Health Research. 2005; 15(5):319-37. 33.

Stampfer MJ, Hu FB, Manson JE, Rimm EB, Willett WC. Hu; Manson; Rimm; Willett. Primary Prevention of Coronary Heart Disease in Women through Diet and Lifestyle. New England Journal of Medicine. 2000; 343(1):16-22. 16.

Trost SG, Pate RR, Sallis JF, Freedson PS, Taylor WC, Dowda M et al. Age and gender differences in objectively measured physical activity in youth. Medicine Science & Sports Exercise. 2002; 34:350-5. 7. National Institutes of Health, National Heart, Lung, and Blood Institute. Your Guide to Physical Activity and Your Heart (PDF). U.S. Department of Health and Human Services. 2006. 8.

US Public Health Service, Office of the Surgeon General. Physical Activity and Health: A Report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; 1996.

Vuori I. Exercise and physical health: Musculoskeletal health and functional capabilities. Research Quarterly for Exercise and Sport. 1995; 66:276-285. 4.

Wilmore J, Knuttgen H. Aerobic Exercise and Endurance Improving Fitness for Health Benefits. The Physician and Sportsmedicine 2003; 31(5):45. doi:10.3810/psm.2003.05.367. 9.

World Health Organization (Regional office for Europe) WHO. Reviewed on 12 July 2016. 2.

Youth risk behavior surveillance: United States, Morbidity and mortality weekly report. CDC surveillance summaries/Centers for Disease Control 1999; 49(5):1-32. 6.