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Research Article

Comparative Analysis of Risk Factors for the Burden of Oncological Diseases in men in Muslim and Christian Countries with the Same Economic and Geographical Location

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Abstract

Objective: To study risk factors for the burden of cancer in Muslim and Christian countries in 2004.

Methods and Results: Mann-Whitney U test. 33 Muslim countries and 33 Christian countries were matched with the same Economic-Geographical position.

The "quality of life" for Muslims and Christians did not have a statistical difference. Muslims had 2 times less than Christians the burden of Esophageal, Melanoma, Breast and Prostate cancer ($p \leq 0.022$) and 3 times less than the burden of Alcoholism. But Muslims had a 1.4 times higher burden of Bladder cancer and Lymphoma than Christians ($p \leq 0.023$).

The burden of the remaining 8 types of cancer was not statistically significantly different between Muslims and Christians. It was established that Muslims and Christians chose different food products from the same daily set of products in terms of volume and composition (Medians: 1185 and 1064 g/person/day, 45 types). So, Muslims consumed 2 times less Christian Pigmeat, 3 times less Fats Animals, Maize, Beans, Beverages, Alcoholic, Wine, 6 times less Beer.

But Muslims consumed 3-4 times more than Christians Mutton and Goat Meat, Wheat, Nuts, Onions, Vegetables and 1.4 times the total amount of Grains and legumes. For the remaining 30 types of products, the daily consumption of Muslims and Christians did not differ statistically significantly. It has been established that the intake of macronutrients of animal origin (Energy, Proteins and Fats) in 1990 and 2005 for Muslims was 33% lower than for Christians ($p \leq 0.024$). At the same time, Total Energy and its percentage composition (Carbohydrates, Proteins and Fats) did not have statistically significant differences between Muslims and Christians in 1990 and 2005.

Conclusions: The results suggest differences in cancer burden risk factors between Muslims and Christians and suggest a continuation of the study.

Keywords: Muslims; Christians; Quality of Life; Metabolic Syndrome; Cancer Risk Factors; Levels of Consumption of Foods; Alcoholic Beverages; Nutrients

Abbreviations

AB: Alcoholic Beverage; AP: Animal Products; BMI: Body Mass Index; BP: Blood Pressure; CD: Communicable; Maternal; Perinatal Diseases; Chol: Blood Cholesterol; FAO: Food and Agriculture Organization of the United Nations; COPD: Chronic Obstructive Pulmonary Disease; FS: Fruits and Sweeteners; GDP: Domestic Gross Product; Glu: Blood Glucose; HPI: Happiness Index; IHD: Index of Human Development; LPA: Low Physical Activity; NCD: Noncommunicable Diseases; CV: Cereals and Vegetables; TCL: Total Daily Consumption; UV: Ultraviolet Level

Introduction

The available literature lacks information on risk factors for NCDs in Muslims and Christians. Therefore, we focused the review on a known risk factor for NCDs, alcohol. This is the main risk factor separating Muslims and Christians. The World Health Organization (WHO), using the STEPS tool, has established that all risk factors for non-communicable chronic diseases (NCDs) are markedly higher among the adults in the urban slums of Bangladesh. The main risk factors for NCDs according to WHO are obesity, hypertension, hyperglycemia, physical inactivity, alcohol and tobacco smoking [1,2]. The health benefits of moderate wine consumption have been studied for decades. The alcohol and polyphenolic components of wine are believed to contribute to beneficial effects on adult health. However, there are no definitive recommendations for moderate wine consumption [3]. An inverse relationship has been established between alcohol consumption and the risk of diabetes. The amount of low-risk alcohol consumption varied between women and men. This association was stronger among participants with a high Body Mass Index (BMI) [4]. Researches show, that social and environmental factors may contribute to systemic chronic inflammation. Inflammation can lead to several diseases that represent the leading causes of disability and death worldwide. These include cardiovascular disease, cancer, diabetes, chronic kidney disease, non-alcoholic fatty liver disease and autoimmune diseases. The paper describes the mechanisms underlying these diseases [5]. Alcohol can have both positive and negative effects on the cardiovascular system. These effects can be modulated by several factors: daily dose and intake patterns. Epidemiological studies have shown a J-curve, with a higher risk of cardiovascular disease in abstainers, compared to mild to moderate regular drinkers. Higher risk in heavy drinkers. This article analyzes the complex relationship between alcohol consumption and the risk of coronary and cerebrovascular disease, including cardiovascular mortality. However, it is not yet recommended to consume alcohol to protect the cardiovascular system [6-8]. Metabolic factors (41.2%) are considered risk factors for cardiovascular diseases. Hypertension was the largest (22.3%). Behavioral risk factors contributed the most to mortality (26.3%). The biggest risk factor was low education (12.5%). While some factors have broad global implications (hypertension and education), others (household air pollution and poor nutrition) vary by country's economic level [9-12]. Studies show that there is no safe low limit for alcohol consumption. The risk increases with the amount of alcohol, and in most studies, all types of alcohol, such as wine, beer, and spirits, increase the risk of NCDs. A significant number of cancer cases can be prevented by reducing alcohol consumption [13]. Globally, 741 300 (95% UI 558 500-951 200), or 4.1% (3.1-5.3), of all new cancer cases in 2020 were associated with alcohol use. Men accounted for 568,700 (76.7%; 95% UI 422,500-731,100) of all cancers. The results highlight the need for effective policies and interventions to raise awareness of cancer risks, associated with alcohol use and reducing total alcohol consumption to prevent the burden of alcohol-related cancers [14]. Alcohol is widely consumed and is known to be a major risk factor for several types of cancer. However, it is unclear whether alcohol consumption is associated with the risk of developing prostate cancer. Linear and non-linear dose-response meta-analyses were performed. Total alcohol consumption was not associated with both types of pancreatic cancer. In this study, heterogeneous associations were found between alcohol consumption and PCa by type of alcohol and PCa [15]. Alcohol consumption is associated with an increased risk of gastric cancer among Japanese men, regardless of the anatomical location of the cancer [16]. It remains unclear whether there are points of increased sensitivity to the effects of alcohol on the mammary glands during life. The more alcohol accumulated during a lifetime, the higher the risk of breast cancer, especially in postmenopausal women [17]. Fasting during the holy month of Ramadan is a religious obligation for all Muslims, which make up 1.8 billion people in the world (24%). The effects of Ramadan fasting on blood glucose levels, glycated hemoglobin (HbA1c), lipid profile, sleep quality, and key lifestyle parameters were studied. The safety of fasting for a month among patients with diabetes was also studied. In one of the largest studies, the authors show that fasting Ramadan has a positive effect on patients with type 2 diabetes, as it reduces blood pressure, blood glucose, HbA1C, and BMI. In addition, there is an improvement in sleep duration and physical activ-

ity. The positive role of Ramadan fasting in the treatment of diabetes mellitus has been confirmed [18]. Fasting is a religious practice strictly observed by believers. The longest period of fasting in the Orthodox religion is Lent (known as "hudade" in Ethiopia). According to the doctrine of Ethiopian Orthodox Christianity, fasting people must strictly avoid all animal products and skip breakfast for at least before lunch. HDL was significantly higher (P = 0.001) among those who were fasting (68.29 mg/dL) compared to those who were not fasting (57.24 mg/dL). Total cholesterol (T.chol) was also higher in those who did not fast (181.01 mg/dl) than those who fasted (173.80 mg/dl, P = 0.035). Mean triglyceride levels were significantly higher (P = 0, 035) among non-fasters (142.76 mg/dl) compared to fasting people (129.39 mg/dl) [19].

It can be concluded that NCD risk factors are being intensively studied. Much work has been devoted to the role of alcohol as a modifiable risk factor for NCDs. However, the threshold safe dose of alcohol is still under debate. Drinking high doses of alcohol (more than 30 g/day) is considered a high risk factor for cardiovascular disease, cancer and diabetes.

- **The purpose of the study:** to study the risk factors for NCDs in countries with Muslim and Christian faiths in the same eco-geographical conditions.

Materials and Methods

- **Study design:** statistical analysis of observations. For the purposes of this study, two groups of countries were prepared.
- **Group 1:** 33 countries in which more than 50% of the male population professes the Muslim religion.
- **Group 2:** 33 countries in which more than 50% of the male population professes the Christian religion.

The second condition of the research: groups 1 and 2 of countries should not have statistically significant differences in economic and geographical conditions. Namely, Income, latitude, longitude and Ultraviolet of the 1st group of countries (Muslims) did not differ statistically significantly from Income, latitude, longitude and Ultraviolet of the 2nd group of countries (Christians). From the GBD 2004 Geneva, 2009 [20] database, sex- and age-standardized total burden (DALE) data were selected for NCDs, cardiovascular disease, diabetes mellitus, alcoholism, bipolar depression, chronic obstructive pulmonary disease, nephritis, lung cancer, pancreatic gland, melanoma and colorectal cancer (ICD-10 codes -10-10) (Table 1 - List of countries).

Male age st 2004	% Muslim	IPC 2000	IPC 2016	lat°	UV rad J/m2 2004	lon°
Albania	58,8	4027	11929	41,2	2542	20,1
Algeria	99	8093	15075	36,4	3253	3,1
Azerbaijan	96,9	3534	17253	40,2	2702	47,5
Bangladesh	90,4	1301	3581	22,8	4029	88,6
Burkina Faso	61,5	829	1720	12,2	5567	1,3
Côte d'Ivoire	97	2336	3720	5,2	4931	2,5
Djibouti	94,7	1678	3551	11,6	5461	43,1
Egypt	51,6	5856	11132	27,9	4202	31,2
Eritrea	89,1	1331	1510	15,4	5914	39,3
Guinea	45,1	896	1311	10,2	5391	165,3
Guinea-Bissau	87,2	1078	1582	11,8	5319	15,7
Indonesia	99,4	4602	11612	6,3	5220	106,5
Iran	42,9	9436	24244	35,7	4038	59,3
Jordan	97,2	5735	9050	31,9	4026	35,4
Kazakhstan	70,2	7888	25264	43,2	2257	71,3
Kuwait	74,6	55421	73817	29,2	4214	47,6

Kyrgyzstan	80	1644	3551	43,2	3094	74,5
Lebanon	57,7	9936	13996	33,5	2953	35,3
Malaysia	61,3	12928	27681	5,3	5225	100,2
Mauritania	99,9	2181	3854	19,4	5547	15,6
Morocco	99	5998	16854	34,1	3568	6,5
Niger	98,3	597	978	13,3	5811	2,1
Nigeria	51,6	2258	5867	6,3	5251	7,4
Pakistan	96,5	2770	5249	31,2	4227	73,1
Saudi Arabia	98,2	34140	54431	21,3	5384	39,5
Senegal	96,1	1512	2568	14,4	5356	17,3
Sierra Leone	78,6	723	1473	8,3	5087	13,1
Sudan	97	1812	4730	19,3	5783	37,1
Syrian AR	87	3497	7236	35,3	3501	37,1
Tunisia	99,8	6003	11599	36,5	3262	10,1
Turkey	89,5	9576	24244	41,1	2924	30,3
Uzbekistan	88,7	1984	6514	41,2	3172	66,6
Yemen	99,2	3086	2508	12,5	6089	44,1
Male age st 2004	% Christians	IPC 2000	IPC 2016	lat°	UV rad J/m2 2004	lon°
Argentina	85,2	11810	19934	34,2	3476	68,5
Armenia	98,5	2318	8818	39,5	2899	30,1
Belarus	71,2	5995	18061	53,5	1795	26,0
Bolivia	93,9	3497	7236	16,3	5344	68,2
Botswana	72,1	8252	16735	24,4	4868	25,6
Brazil	90,2	9013	15128	23,3	4552	60,0
Burundi	94,1	598	778	3,4	5111	29,2
Cape Verde	89,1	3040	6553	14,5	5372	22,9
Chile	89,5	9608	23960	33,3	3982	70,8
Congo R	85,9	3551	5719	4,3	4943	15,0
Costa Rica	90,9	7830	16614	9,6	4884	84,2
Ecuador	94,1	5856	11286	1,9	4929	89,4
Eritrea	62,9	1331	1510	15,4	5914	39,3
Guyana	64,9	3577	7819	6,5	5203	58,2
Haiti	86,8	1379	1784	18,1	5016	72,6
Jamaica	77,1	6287	8835	17,6	4942	77,1
Kenya	84,8	1690	3156	1,2	5803	36,5
Lesotho	96,8	1412	3029	29,2	4439	27,3
Luxembourg	70,4	55306	105882	49,6	1687	6,1
Madagascar	74,5	1145	1506	18,5	4771	50,2

Malawi	82,7	686	1169	13,9	5019	33,5
Mexico	95,0	10429	17862	19,3	4974	119,0
Nicaragua	85,9	2739	5541	12,1	5078	86,2
R Moldova	97,5	1840	5334	46,8	1910	27,2
Serbia and M	93,5	5722	14512	44,5	2257	20,7
Solomon Islands	97,5	1371	2236	9,3	4071	160,0
Swaziland	82,9	4628	8343	26,3	3900	31,1
Switzerland	82,9	35675	62881	46,7	2158	6,1
Uganda	86,7	846	1849	0,2	5499	32,4
Ukraine	83,8	3803	8272	50,2	1843	36,8
Vanuatu	93,3	2238	3081	15,3	4555	167,5
Zambia	97,5	1667	3922	15,2	5265	28,1
Zimbabwe	78,2	2038	2006	20,1	4918	31,0

Table 1: List of Muslim and Christian countries.

Legend

PCI: Per Capita Income (GDP); Lat: Geographical Latitude; UV: Ultraviolet Rad (J/m2); Lon: Geographical Longitude

1 group: Countries with a Muslim religion (> 50% of the population).

2 group: Countries with a Christian denomination (> 50% of the population).

To characterize the "quality of life" (QoL) in countries, a number of indicators were used: per capita income? or gross domestic product 2000 - 2016 (USD per person per year) [21]; geographical position of countries by latitude and level of ultraviolet radiation in the capital of countries (UV) (J/m2 2004) [22]; Prosperity Rating: Rating Educations, Rating of the Social capital [23], Rank of corruption 2016 [24], Rating of peacefulness [25], Happiness Index HPI 2016 [26], Index of human development[26], Ecological efficiency index [26], Life expectancy for men and women (LE) [27]; Access to health care, Clean water and Clean air [28].

The work analyzed the predictors of the Metabolic syndrome - the percentage (%) in the country of men with a Body Mass Index (BMI) ≥ 30 kg/m2); The level of cholesterol in the blood (CholL. ≥ 6.2 mmol/l); The level of glucose in the blood (Glu. ≥ 7.0 mmol/l); Blood pressure (BP ≥ 140/90 mm Hg); Low physical activity (LPhA) ≤ 60 min/day walking [29].

We studied the Total Food Consumption Level (TCL) (g/person/day) (50 types of food). Data on food consumption for each country was selected from the FAO database for 1992-2005 [30].

The structure of nutrition (SN) of countries is presented in the form of 6 blocks in absolute and percentage terms: 1 - products of animal origin (AP); 2 - cereals and vegetables (GV); 3 - fruits and sweeteners (FS); 4 - alcoholic drinks (AB); 5 - Vegetable fats (Oil); 6 - Fish (Fish) [30].

Statistical analysis of the study results was performed using the nonparametric Mann-Whitney-Wilcoxon U test. The U indicator is the numerical value of the Mann-Whitney test. The central trend in the distribution of the sample data was represented by the Median with a Quartile Range and the Mean with a Standard Deviation. The variance of the data in the samples was estimated using the quartile range (QR) between the first and third quartiles, i.e., between the 25^{th} and 75^{th} percentiles.

The level of statistical significance, which reflects the degree of reliability of the conclusion about the differences in the indicators of countries of groups 1 and 2: two levels of accuracy were assessed: (1) $p \leq 0.01$, error probability 1%; (2) $p \leq 0.05$, error probability 5%. In addition, we used Bonferoni correction to as-

sess the significance of the study results, taking into account two hypotheses $p \leq 0.025$ for multiple comparisons. All calculations were carried out using the STATISTICA program (version 13).

Results

The quality of life

For our research, we have chosen countries of the Muslim and Christian worlds that do not have statistically significant differences in income, geographic latitude, longitude and Ultraviolet. Median income, latitude, longitude and UV for Muslims were not statistically significantly different from Christians ($p > 0.1$) (Table 2 and Figure 1).

But the 33 countries of both Muslims and Christians included countries of different levels of income, latitude, longitude and Ultraviolet (Table 1). It is well known that economic and geographi-

				Muslim	Muslim	Muslim	Muslim	Christians	Christians	Christians	Christians
	U	Z	p-value	Mean 1	Median1	Quartile1	Std.Dev.1	Mean2	Median2	Quartile2	Std.Dev.2
The quality of life											
IPC 2000	529,50	- 0,19	0,8525	6506	3086	4359	10710	6594	3497	4597	10776
IPC 2016	537,50	0,08	0,9336	12415	6514	11524	15612	12858	7236	12046	20215
Gini Index 2021	459,50	- 0,49	0,6206	0,728	0,712	0,090	0,059	0,734	0,740	0,085	0,059
lat°	501,00	0,55	0,5813	24	23	24	13	22	19	21	16
UV rad J/m2 2004	499,50	0,57	0,5682	4403	4227	2122	1151	4307	4884	1211	1298
lon°	478,00	- 0,85	0,3973	42	37	44	36	52	36	41	39
Prosperity Rating	395,50	1,90	0,0569	94	98	48	29	78	72	26	33
Rating Educations	392,50	1,94	0,0520	93	89	53	33	78	72	31	29
Rating of the Social capital	471,50	0,93	0,3525	85	82	69	40	77	72	31	30
Rank of corruption 2016	419,00	1,24	0,2165	115	119	51	36	99	103	73	47
Rating of peacefulness	284,00	1,93	0,0541	99	109	61	36	81	84	51	34
Index of Happiness HPI 2016	337,00	- 1,08	0,2807	4,876	4,960	1,113	0,878	5,284	5,177	2,457	1,266
Index of human development IHD	455,50	- 1,13	0,2564	0,638	0,703	0,271	0,165	0,687	0,708	0,272	0,160
IEE Ecological efficiency index IEE	484,00	- 0,77	0,4416	44	43	20	13	48	49	20	16
Access to the street. medicine1990	439,50	- 0,35	0,7289	72	75	35	21	73	78	30	21
Access to clean water1990	389,50	- 0,24	0,8105	53	57	60	33	54	43	58	30

Air pollution for children under 5 years old 2004	272,50	3,35	0,0008	225	123	338	246	90	22	106	131
CCR5 rs333-	193,00	- 0,38	0,7072	0,017	0,010	0,025	0,021	0,028	0,015	0,033	0,040
% NAT2 5/7ba	12,00	0,81	0,4168	60	65	13	14	54	60	19	13
female life expectancy LE 2000	494,00	- 0,64	0,5214	65	71	23	12	65	73	24	15
male life expectancy LE 2000	533,00	- 0,14	0,8878	61	63	22	11	61	64	20	13
Gender difference LE 2000	497,00	- 0,60	0,5467	4,1	3,9	2	2	4,2	5,2	5	4
female life expectancy LE 2019	411,00	- 0,36	0,7216	71	73	11	8	71	73	13	9
male life expectancy LE 2019	399,50	0,53	0,5956	66	68	11	8	66	67	10	8
Gender difference LE 2019	278,50	- 2,37	0,0180	4,1	3,7	3	2	5,3	5,2	3	2
Population ('000) (e)	374,00	2,18	0,0292	18753	7226	13682	27155	9454	3688	6662	17644
M Death	501,00	- 0,55	0,5813	1434	1289	818	599	2004	1408	1171	2762
All Causes	537,00	0,09	0,9285	30349	25872	17138	14336	31552	25505	22980	17834
CD: Communicable conditions	523,00	0,27	0,7877	11684	6794	13657	10766	14125	5468	21372	16167
NCD: Noncommunicable diseases	417,00	1,63	0,1034	14355	14077	3049	2599	13236	13105	2734	2314
Metabolic syndrome MS											
BMI ≥ 25 (kg / m2)	530,50	- 0,17	0,8625	37	39	35	21	38	39	43	21
BMI ≥ 30(kg / m2)	526,50	- 0,22	0,8224	11	10	16	10	12	10	18	9
Chol. ≥ 5.0 (mmol / L)	477,00	- 0,86	0,3902	31	33	17	12	34	32	20	13

Chol. ≥ 6.2(mmol / L)	466,00	- 1,00	0,3172	6	6	4	3	8	6	6	5
Glu. ≥ 7.0 (mmol / L)	501,50	0,55	0,5857	9	8	3	3	9	9	4	2
AD1 ≥ 140/90(mm Hg	352,00	- 2,46	0,0138	31	30	8	6	34	34	6	6
AD2≥140/90(mm Hg	329,50	- 2,75	0,0059	39	39	7	5	43	42	5	5
LPHact ≤ 60 minutes / day walking	179,50	- 0,28	0,7787	31	30	23	17	33	36	30	19

Table 2: Comparative analysis of indicators of quality of life and metabolic syndrome in Muslim and Christian countries. Criterion U - Mann-Whitney.

Legend.

- **1 group:** Countries with a Muslim religion (> 50% of the population).
- **2 group:** Countries with a Christian denomination (> 50% of the population).

Gini Coefficient Measure of Inequality

PCI: Per Capita Income (GDP); Lat: Geographical Latitude; UV: Ultraviolet Rad (J/m2); lon: Geographical Longitude; QL: The quality of life; HI: Happiness Index; MSP: Metabolic Syndrome Predictors (% in population); BMI: Body Mass Index; Chol: Blood Cholesterol Level; Glu: Blood Glucose Level; BP: Systolic and Diastolic Blood Pressure; LphA: Low Physical Activity

P > 0.025 According to the Bonferroni rule, do not consider statistically significant.

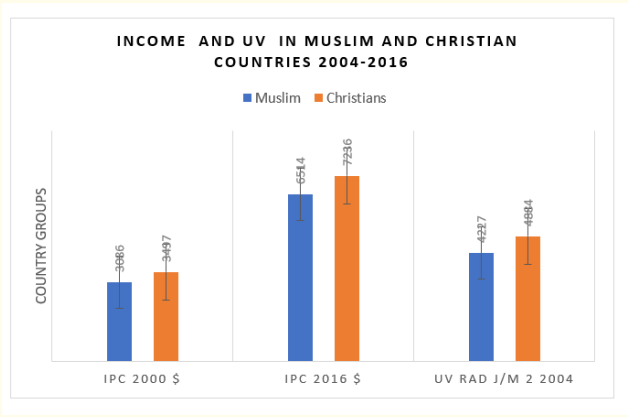

Figure 1: Income and UV in Muslim and Christian countries 2004-2016.

cal factors have a significant impact on all aspects of life, including morbidity.

Median characteristics of success, education, security of personal capital, corruption, peacefulness, Happiness Index, Human Development Index and Environmental Security, Muslims and Christians do not statistically differ in access to medicine and clean water (p = 0.1). However, Muslim air pollution was significantly higher than Christians (p ≤ 0.0008).

Life expectancy (LE) for Muslim women and men did not differ from Christians in 2019 (p = 0.2). However, the gender difference in LE was statistically significantly higher by 1.5 years for Christians (p ≤ 0.018) (Table 2).

Metabolic syndrome predictors (% in population) in men

Median body mass index (BMI ≥25 and 30 kg/m2), blood cholesterol (Chol. ≥ 5.0 and 6.2 mmol/L), blood glucose (Glu. ≥ 7.0

mmol/L) did not differ statistically significantly in Muslim men and Christian (p = 0.8) (Table 2). Median elevated blood pressure (BP ≥140/90 mm Hg without correction and BP ≥140/90 mm Hg with correction) in Christian men was statistically significantly higher by 1.5 times compared with Muslim men (p ≤ 0.014) and (p ≤ 0.006) respectively (Table 2). Physical activity was not statistically significantly different between Muslim and Christian men (p = 0.8) (Table 2).

Burden of disease (Daly/100,000) in Muslim and Christian men

The median burden of esophageal cancer, melanoma, breast and prostate cancer in Muslim men was statistically significantly 2 times lower than in Christian men (p ≤ 0.036), (p ≤ 0.013), (p ≤ 0.035) and (p ≤ 0.008), respectively (Table 3 and Figure 2).

The median burden of bladder cancer and lymphoma in Muslim men was 1.4 times significantly higher than in Christian men (p ≤ 0.003) and (p ≤ 0.023), respectively (Table 3 and Figure 2).

				Muslim	**Muslim**	**Muslim**	**Muslim**	**Christians**	**Christians**	**Christians**	**Christians**
	U	Z	p-value	Mean 1	Median1	Quartile1	Std.Dev.1	Mean2	Median2	Quartile2	Std.Dev.2
Alcohol use disorders	209,00	- 4,30	0,0000	200	**125**	191	234	590	380	677	466
Malignant neoplasms	538,00	- 0,08	0,9387	1336	1410	564	414	1376	1320	572	425
Oesophagus cancer	383,00	- 2,06	0,0389	59	33	68	60	97	60	120	96
Melanoma and other skin cancers	350,00	- 2,49	0,0128	13	10	14	13	20	19	17	13
Breast cancer	379,50	- 2,11	0,0349	0,000	0,000	0	0	0,866	0,000	1	2
Prostate cancer	337,00	- 2,65	0,0079	120	56	97	130	146	134	98	73
Bladder cancer	313,00	2,96	0,0031	69	56	36	57	45	40	30	33
Lymphomas, multiple myeloma	367,00	2,27	0,0232	134	115	75	63	104	93	44	50
Leukaemia	489,00	0,71	0,4806	79	66	50	38	70	68	45	34
Mouth and oropharynx cancers	468,00	0,97	0,3297	96	89	51	56	86	78	57	56
Stomach cancer	452,00	- 1,18	0,2381	104	73	62	89	128	108	139	86
Colon and rectum cancers	489,00	- 0,71	0,4806	79	67	60	44	94	77	55	61
Liver cancer	529,00	- 0,19	0,8475	164	107	199	178	116	77	138	86
Pancreas cancer	398,00	- 1,87	0,0612	30	26	15	18	41	37	29	25
Trachea, bronchus, lung cancers	487,00	0,73	0,4648	214	157	176	161	207	132	156	190

Other neoplasms	438,00	1,36	0,1740	65	53	60	60	39	35	22	21
Hepatitis B (g)	208,00	4,31	0,0000	57	38	65	54	17	11	18	21
Hepatitis C (g)	260,00	3,64	0,0003	23	14	17	26	8	5	8	9
Cirrhosis of the liver	529,00	- 0,19	0,8475	293	220	140	262	360	188	365	318

Table 3: Cancer burden analysis in Muslim and Christian countries. Criterion U - Mann-Whitney.

Legend

- **1 group:** Countries with a Muslim religion (>50% of the population)
- **2 group:** Countries with a Christian denomination (>50% of the population)

BNID: Burden of Non-Injectable Disease (DALY); DALY: Disability-Adjusted Life Years (DALYs)

P > 0.025 According to the Bonferroni rule, do not consider statistically significant.

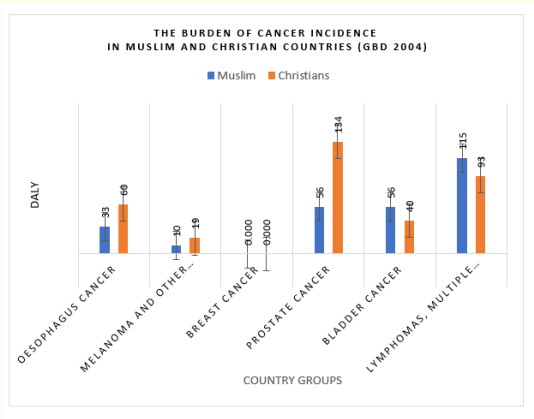

Figure 2: The burden of cancer incidence in Muslim and Christian countries (GBD 2004).

The burden of other cancers had no statistical differences between Muslims and Christians (Mouth and oropharynx cancers, Stomach cancer, Colon and rectum cancers, Liver cancer, Pancreas cancer, Trachea, bronchus, lung cancers, Leukaemia, Other neoplasms) (Table 3). The median burden of viral hepatitis B and C was statistically significantly 3 times higher in Muslims compared to Christians ($p \leq 0.0001$), ($p \leq 0.0001$), respectively.

The burden of Alcoholism among Muslims was 3 times lower than among Christians ($p \leq 0.0001$) (Table 3 and Figure 3). The burden of liver cirrhosis was not statistically significantly different between Muslims and Christians. The median burden of non-communicable diseases in men did not differ significantly between Muslims and Christians ($p = 0.1$) (Table 3).

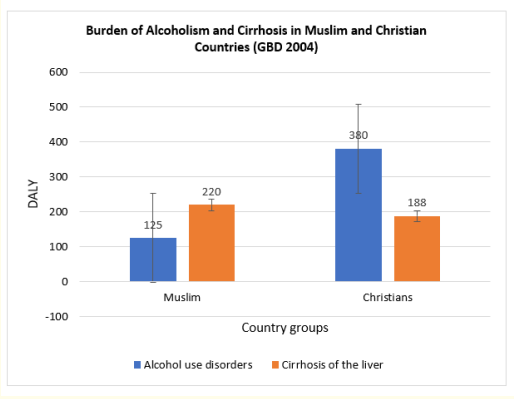

Figure 3: Burden of Alcoholism and Cirrhosis in Muslim and Christian Countries (GBD 2004.

Daily food intake DFI (g/person/day) Total CL

The median total food intake had no statistically significant difference between Muslims and Christians ($p = 0.9$): 1185 ± 971 and 1064 ± 941, respectively (Table 4, The burden of Alcoholism among Muslims was 3 times lower than among Christians ($p \leq 0.0001$) (Table 3 and Figure 4).

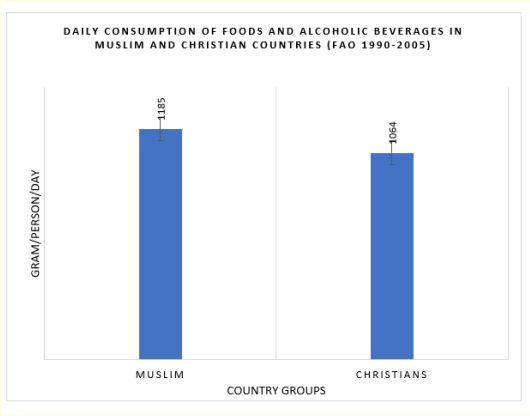

Figure 4: Daily Consumption of Foods and Alcoholic Beverages in Muslim and Christian Countries (FAO 1990-2005).

Daily intake of animal products (g/person/day)

The median consumption of Bovine Meat among Muslims was 1.5 times lower, but not statistically significant, than among Christians ($p \leq 0.054$). The median consumption of Pigmeat among Muslims was 2.2 times significantly lower than among Christians ($p \leq 0.0021$) (Table 4). The median consumption of Mutton and Goat Meat was 3. 5 times higher for Muslims than for Christians ($p \leq 0.0001$). The consumption of Fats Animals in Muslims was 3 times lower than in Christians ($p \leq 0.014$) (Table 4, The burden of Alcoholism among Muslims was 3 times lower than among Christians ($p \leq 0.0001$) (Table 3 and Figure 5).

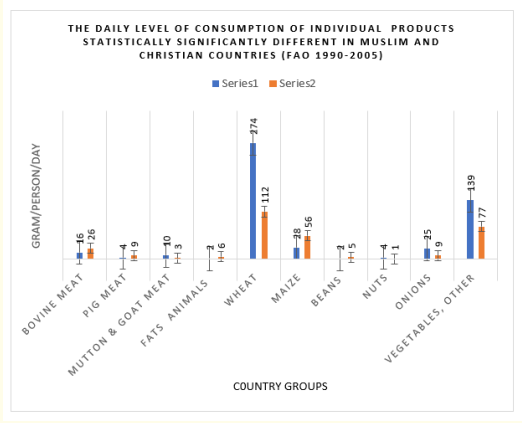

Figure 5: The daily level of consumption of individual products statistically significantly different in Muslim and Christian countries (FAO 1990-2005).

Median consumption of Poultry Meat, Meat, Othe, Milk, Whole and Milk, Skimmed, Eggs, Cheese and Butter, Ghee, Freshwater Fish, Demersal Fish, Pelagic Fish, Marine Fish and Molluscs had no difference between Muslims and Christians ($p = 0.8$) (Table 4).

Daily intake of plant foods (g/person/day)

Median consumption of Wheat, Nuts, Onions, Vegetables Other and total Grains and legumes were statistically significantly 3 times higher in Muslims than in Christians ($p \leq 0.015$) (Table 4 and Figure 5). The median consumption of Maize and Beans was 2 and 5 times statistically significantly higher for Christians than Muslims ($p \leq 0.009$).

Median consumption of Rice, Barley, Rye, Potatoes, Tomatoes, Soyabean Oil, Sunflowe rseed Oil and Olive Oil had no statistically significant difference between Muslims and Christians ($p = 0.6$) (Table 4).

Daily intake of fruits and sweeteners (g/person/day)

Median consumption of Oranges, Lemons, Limes, Apples, Honey, Sugar, Coffee and Tea did not differ significantly between Muslims and Christians ($p = 0.8$) (Table 4).

Daily consumption of alcoholic beverages (g/person/day)

Mean consumption for Muslims Beverages, Alcoholic was 4.5 times, Wine 8 times and Beer 6 times lower than for Christians ($p \leq 0.0002$), ($p \leq 0.048$), ($p \leq 0.0001$) respectively (Table 4 and Figure 6).

Annual level of alcohol consumption (L/day)

The median consumption of alcohol both sexes was 6 times lower than men is 4 times lower in Muslims compared to Christians ($p \leq 0.0001$) (Table 4 and Figure 6).

Buying cigarettes (cigarettes/person/day)

For men, there are no statistically significant differences between Muslims and Christians in terms of cigarette consumption ($p = 0.2$) (Table 4).

Groups of daily consumption of products (g/person/day)

Total consumption levels of animal products (AP), grains and vegetables (GV), fruits and sweeteners (FS),

vegetable oils (Oil) and fish (Fish) did not differ between Muslims and Christians ($p = 0.8$). But the total level of consumption of

				Muslim	Muslim	Muslim	Muslim	Christians	Christians	Christians	Christians
	U	Z	p-value	Mean 1	Median1	Quartile1	Std.Dev.1	Mean2	Median2	Quartile2	Std.Dev.2
Total CL	538,00	0,08	0,9387	1245	1185	971	605	1243	1064	941	612
Animal Products AP											
Bovine Mea	394,00	- 1,92	0,0544	19	16	12	15	35	26	34	34
Pigmeat	304,00	- 3,08	0,0021	10	4	6	15	28	9	30	37
Mutton & Goat Meat	216,50	4,08	0,0000	12	10	14	10	4	3	4	4
Poultry Meat	405,50	- 1,42	0,1547	28	13	27	37	36	29	40	35
Meat, Other	409,00	- 1,73	0,0834	23	22	20	12	30	32	23	16
Offals, Edible	476,50	- 0,87	0,3867	7	6	5	4	7	7	4	4
Red meat	429,00	- 1,47	0,1403	41	35	30	27	67	55	64	60
Milk, Whole	462,00	- 1,05	0,2930	173	116	205	184	194	208	215	150
Milk, Skimmed	407,50	1,75	0,0800	27	12	42	34	19	7	14	34
Eggs	541,00	- 0,04	0,9693	11	9	11	9	13	10	15	12
Cheese	531,00	- 0,17	0,8676	5	2	7	7	6	3	7	10
Butter, Ghee	478,50	0,64	0,5203	2	1	5	3	2	1	3	3
Fats, Animals	352,00	- 2,46	0,0138	3	2	3	2	6	6	6	5
Freshwater	499,50	- 0,57	0,5682	5	2	6	7	5	3	6	7
Demersal Fish	481,50	0,80	0,4228	4	2	6	5	3	1	4	5
Pelagic Fish	500,50	0,56	0,5769	12	7	10	13	12	6	13	15
Marine Fish, Othe	513,00	0,40	0,6910	5	2	5	9	7	2	5	13
Molluscs, Othe	509,00	- 0,45	0,6535	1	0	0	2	1	0	1	3
AP amount	472,50	- 0,92	0,3592	346	339	333	227	407	401	434	268
% AP	425,00	- 1,53	0,1270	27	24	13	12	31	32	14	12
Grains and vegetables GV											
Wheat	349,50	2,49	0,0126	266	274	381	183	141	112	118	100
Rice	424,00	1,54	0,1238	93	56	107	105	59	15	100	76
Maize	284,50	- 2,60	0,0094	37	28	49	39	114	56	164	127
Barley	538,00	0,08	0,9387	7	0	3	21	4	0	3	10
Beans	372,50	- 2,20	0,0279	3	2	3	4	12	5	11	18
Rye	223,00	- 0,81	0,4186	1	0	1	2	6	0	2	18
Nuts	347,00	2,53	0,0115	6	4	7	8	3	1	4	5

Grains and legumes	357,00	2,40	0,0165	410	401	184	156	328	335	132	103
Potatoes	428,00	- 1,31	0,1917	75	46	77	94	99	62	102	112
Tomatoes	387,00	1,84	0,0652	72	37	114	74	35	33	47	37
Onions	327,50	2,78	0,0055	27	25	41	21	13	9	17	14
Vegetables, Other	380,50	2,10	0,0360	157	139	167	104	102	77	112	78
Soyabean Oil	524,50	- 0,25	0,8025	6	3	7	8	7	3	9	8
Sunflowerseed Oil	480,00	- 0,82	0,4118	3	1	5	5	6	1	7	9
Olive Oil	470,50	0,75	0,4545	2	0	1	4	0	0	0	1
GV amount	427,00	1,50	0,1335	751	608	712	390	586	543	306	258
% GV	333,00	2,71	0,0068	61	62	11	11	52	51	22	17
Fruits and sweeteners FS											
Oranges	339,00	0,43	0,6654	32	24	50	30	36	13	33	54
Lemons, Limes	436,50	0,61	0,5447	7	4	6	12	5	2	5	8
Apples	494,00	0,64	0,5214	20	17	30	23	16	7	22	25
Honey	438,50	- 1,35	0,1761	0	0	0	1	1	0	1	1
Sugar	517,00	- 0,35	0,7291	61	68	60	34	66	61	60	41
Coffee	425,50	- 1,52	0,1286	3	1	3	5	5	2	5	9
Tea	505,50	0,49	0,6215	3	2	2	2	3	3	2	3
FS amount	530,50	0,17	0,8625	119	118	113	76	125	108	111	100
% FS	537,50	0,08	0,9336	9	10	6	4	9	8	7	5
Alcoholic Beverages AB											
both sexes'	179,00	- 4,57	0,0000	2	1	2	3	6	6	5	4
men	182,50	- 4,53	0,0000	4	2	4	5	10	9	7	6
Beverages, Alcoholic	248,50	- 3,79	0,0002	2	0,000	2	4	9	3	9	14
Wine	389,50	- 1,98	0,0475	2	0,000	2	3	16	2	12	37
Beer	216,00	- 4,21	0,0000	14	8	15	17	60	50	54	63
AB amount	199,50	- 4,42	0,0000	18	12	18	21	85	58	96	103
% AB	169,50	- 4,80	0,0000	2	1	2	2	6	5	5	4
mDailyAge	263,50	0,49	0,6207	28	25	28	16	26	20	25	16
fDailyAge	139,50	- 3,05	0,0023	2	1	2	4	10	4	17	11

Macronutrients of animal products MAP											
AP Energy%1990-92	354,50	- 1,94	0,0526	12	11	11	6	16	17	8	9
AP Energy%2003-05	387,00	- 2,01	0,0441	12	11	12	7	16	18	14	9
AP Protein%1990-92	298,00	- 2,72	0,0066	28	28	15	11	36	38	17	14
AP Protein%2003-05	367,00	- 2,27	0,0232	29	27	19	12	38	40	23	17
AP Fat%1990-92	303,50	- 2,64	0,0083	32	30	24	17	43	39	25	17
AP Fat%2003-05	347,00	- 2,53	0,0115	31	26	22	16	41	43	28	16
Percentage of Macronutrients Total Energy			0,0244	24	22			32	33		
Carboh%E 1990-92	490,00	0,08	0,9397	68	67	8	5	67	68	10	8
Carboh%E 2003-05	520,00	0,31	0,7582	67	67	9	6	66	66	11	8
Proteins%E 1990-92	476,00	0,27	0,7886	11	11	3	1	11	10	2	1
Proteins%E 2003-05	519,50	0,31	0,7534	11	11	2	1	11	11	1	1
Fats%E 1990-92	486,00	- 0,13	0,8961	22	23	7	5	22	22	12	8
Fats%E 2003-05	519,00	- 0,32	0,7485	23	23	7	5	23	24	10	8
Macronutrients Total Energy											
Energy (kcal/person/day)1990-92	262,50	1,75	0,0804	2537	2450	690	453	2322	2250	540	406
Energy (kcal/person/day)2003-05	445,50	1,26	0,2065	2656	2620	810	473	2527	2380	640	506
Proteins (g/person/day) 1990-02	290,50	1,26	0,2063	66	69	27	16	61	60	18	13

Proteins (g/ person/day) 2003-05	471,50	0,93	0,3525	72	75	33	18	69	66	23	18
Fats (g/person/ day) 1990-02	307,50	0,97	0,3323	61	58	27	19	59	49	38	29
Fats (g/person/ day) 2003-05	514,00	0,38	0,7004	68	63	34	22	69	59	45	34
Diversifying Total Macronutrients											
2003-05 E%	379,50	- 2,11	0,0349	42	40	15	10	49	49	16	15
2003-05 P%	306,50	- 3,05	0,0023	45	43	13	10	54	55	18	15
2003-05 F%	525,00	- 0,24	0,8075	88	90	8	6	86	91	13	13
Nutritional deficiencies	491,00	0,68	0,4967	635	495	415	457	542	502	527	375

Table 4: Analysis of levels of consumption of food, alcohol and macronutrients in Muslim and Christian countries Criterion U - Mann-Whitney.

Legend

- **1 group:** Countries with a Muslim religion (>50% of the population)
- **2 group:** Countries with a Christian denomination (>50% of the population)

Total DFI: Daily Food Intake DFI (g/person/day)

DIAP: Daily Intake of Animal Products

DIPF: Daily Intake of Plant Foods

DIFS: Daily Intake of Fruits and Sweeteners

DCAB: Daily Consumption of Alcoholic Beverages

Groups of daily consumption of products g/person/day

AP amount: Animal Products Group

GV amount: Grains and Vegetables Group

FS amount: Group Fruits and Sweeteners

AB amount: Group Alcoholic Drinks

Oil amount: Group Vegetable Oils; Fish amount: Group Fish

Sa/wine: The ratio of strong alcohol consumption to wine

Red m/Gl: The ratio of red meat consumption to grains and legumes

Fat a/Vf: The ratio of consumption of animal fat to vegetable oils

P > 0.025 According to the Bonferroni rule, do not consider statistically significant

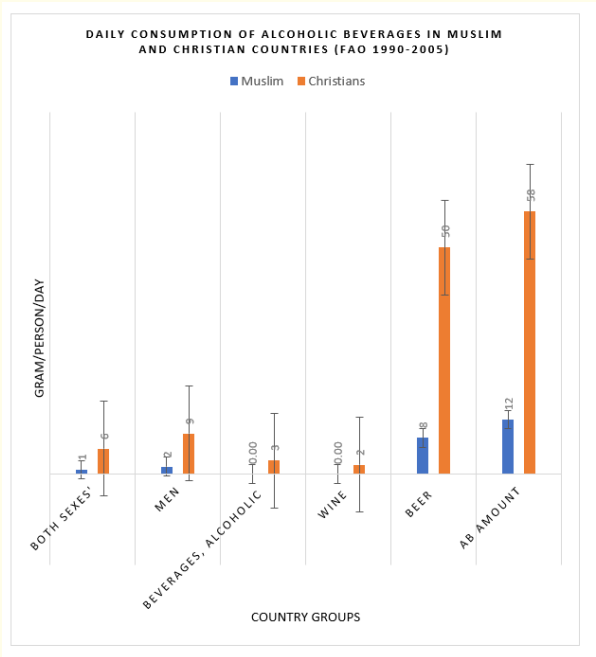

Figure 6: Daily consumption of alcoholic beverages in Muslim and Christian countries (FAO 1990-2005).

alcoholic beverages (AB) was 5 times lower in Muslims compared to Christians ($p \leq 0.0001$) (Table 4).

Macronutrients

Total Composition of Energy (TCE) (kcal/ person/day)

Median Total Composition of Energy had no statistically significant difference between Muslims and Christians in 1990: Muslims - 2450 ± 650 and Christians - 2250 ± 540; 2005: Muslims - 2620 ± 810 and Christians -2380 ± 640 (Table 4). It can be seen that Muslims' daily calorie intake was slightly higher than Christians in both 1990 and 2005. In addition, there is a 6% increase in Total Energy from 1990 to 2005 for Muslims and Christians (Table 4 and Figure 7).

% Composition of Total Energy

Median of Carbohydrates, Proteins and Fats, which are part of the Total Energy, had no statistically significant difference between Muslims and Christians in 1990 and 2005 ($p = 0.5$) (Table 4).

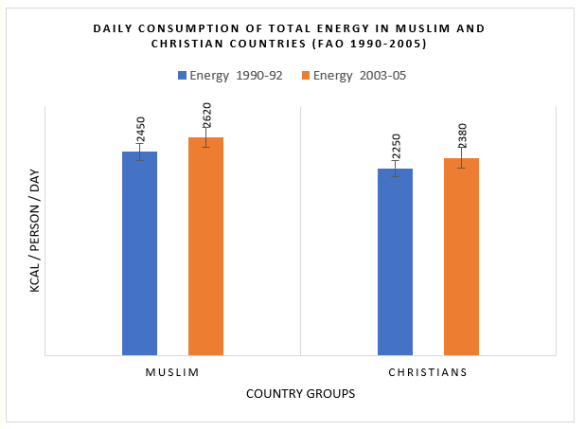

Figure 7: Daily consumption of Total Energy in Muslim and Christian countries (FAO 1990-2005).

% Composition of Energy Animal Products

The medians of Energy Animal Products, Protein Animal Products, and Fat Animal Products were statistically significantly lower in Mvulmans compared to Christians by 1.7 times in 1990 and 2005 ($p \leq 0.01$) (Table 4 and Figure 8).

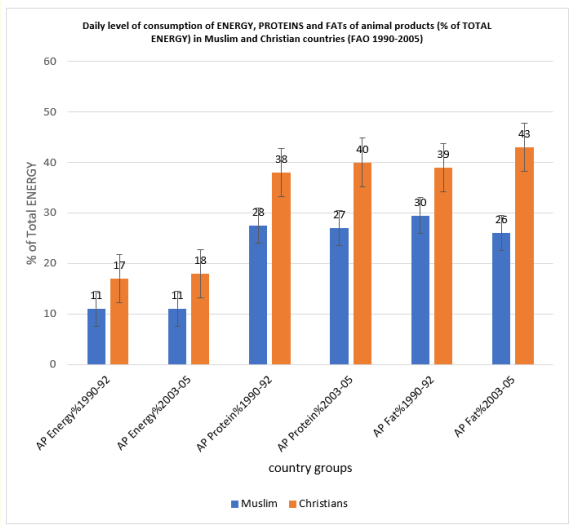

Figure 8: Daily level of consumption of ENERGY, Proteins and Fats of animal products (% of Total Energy) in Muslim and Christian countries (FAO 1990-2005).

Diversification of food consumption was statistically significantly 1.3 times higher in Christians ($p \leq 0.02$) (Table 4). Nutrient deficiencies were not statistically significantly different between Muslims and Christians.

Discussion

The World Health Organization (WHO) was established under the United Nations (UN) in 1948 (Geneva, Switzerland). WHO is the chief health care officer for 194 countries.

The 2000 WHO report presented 7 main risk factors for NCDs: obesity, hyperlipidemia, hyperglycemia, hypertension, physical inactivity, alcohol consumption and tobacco smoking [1,2]. Of the 70 types of NCDs, 80% are cardiovascular disease, cancer, diabetes and chronic obstructive pulmonary disease.

71% of deaths in the world in 2016 were due to NCDs. The lowest risk of dying from NCDs was in high-income countries in the Asia-Pacific region, Western Europe, Australasia and Canada. The highest risk of death from NCDs is in southern Africa, Central Asia and Eastern Europe [31,32].

In countries with low socioeconomic status, residents have a higher risk of dying from NCDs. Alcohol and tobacco consumption is often higher in populations with low socioeconomic status. NCD risk factors arise already at an early age and even during prenatal development and are transmitted through an epigenetic mechanism [32-35].

Due to population growth, food production will increase by 60% by 2050 [36]. This will lead to a significant increase in the burden of four types of diseases: cardiovascular, respiratory, type 2 diabetes and cancer [36]. At a joint meeting of the UN and WHO in 2014 adopted a declaration on the need to reduce the burden of NCDs by 1 third by 2030 [37].

In this work, in accordance with the set goal, a comparative analysis of NCD risk factors in countries with Muslim (Group 1) and Christian (Group 2) religions was carried out. There were 33 countries in each group (Table 1).

Countries 1 and 2 groups were deliberately selected as follows: 1 and 2 groups of countries did not have a statistically significant difference in economic and geographical indicators (income, latitude, longitude and UV in the capitals of countries). But in groups 1 and 2 there were countries with high, middle and low income. The same was true for geographic features.

Thus, we excluded two important NCD risk factors from comparison: a modifiable factor, income, and non-modifiable factors, geographic characteristics. It should be noted that we were unable to find studies on NCD risk factors in Muslim and Christian countries from 2000 to 2022 in the PubMed databases. However, we found several studies pointing to the positive and safe impact of religious fasting in Muslim and Christian countries on diabetes and cardiovascular disease [18,19,38,39].

As a result of the research, no significant differences were found in the "Quality of Life" and Metabolic syndrome predictors between Muslims and Christians. However, out of 15 "Quality of Life" indicators, a higher level of air pollution was found in Muslim countries.

Among the 8 predictors of Metabolic Syndrome, 2 measures of elevated blood pressure (uncorrected and corrected) were statistically significantly higher in Christians.

Christians had a statistically significant 3 times higher burden of Alcoholism. Muslims had 2 times less than Christians the burden of esophageal cancer, melanoma, breast and prostate cancer. But Muslims had a 1.4 times higher burden of bladder cancer and lymphoma than Christians.

The burden of the remaining 8 types of cancer was not statistically significantly different between Muslims and Christians.

It was established that Muslims and Christians chose different food products from a daily set equal in volume and composition (1185 and 1064 g/person/day - 45 types). The same daily level of food consumption was due, apparently, to an equal economic and geographical condition. So, Muslims consumed 2 times less Pig meat, 3 times less than Fats Animals, 3 times less than Maize, Beans, Beverages, Alcoholic, Wine, 6 times less than Beer. But Muslims consumed 3-4 times more than Christians Mutton and Goat Meat, Wheat, Nuts, Onions, Vegetables and 1.4 times Grains and legumes. For the remaining 30 types of products, the consumption of Muslims and Christians did not differ statistically significantly.

Predictably, different attitudes towards the consumption of alcoholic beverages were revealed [41,42].

The level of General Energy had no statistically significant differences between Muslims and Christians in 1990 and 2005. Both Muslims and Christians have seen an increase in total calories (Energy), averaging 5-10% from 1990 to 2005.

However, it has been established that the consumption of macronutrients of animal origin (Energy, Proteins and Fats) in 1990 and 2005 among Muslims was 33% lower than among Christians ($p \leq 0.024$). This confirmed that Muslims and Christians chose different animal foods in terms of calories. Muslims consumed more legumes and vegetables than Christians.

These differences between Muslims and Christians were consistent with our previous data. High consumption of alcohol and animal products are important risk factors for cancer predisposition [40-47]. Our "Muslim-Christian" research model revealed interesting facts about the priority of food and alcohol choices among Muslims and Christians. Muslims and Christians chose different foods, according to centuries-old traditions. As a result of the selective choice of food, it turned out that that Christians, in comparison with Muslims, consume 1.5 times statistically significantly higher Energy, Proteins and Fats of animal products. At the same time, the amount of Total Energy, Proteins and Fats in absolute quantity and percentage did not differ between Muslims and Christians. Wherein, noticeable dynamics of growth in consumption of macronutrients from 1992 to 2005, approximately 5-7%. We previously showed that the minimum level of consumption of alcoholic beverages (strong spirits, wine and beer) in 158 countries in 2004 was 0.76% of the maximum (342 g/person/day) ($p \leq 0.001$). Moreover, countries with minimal consumption were represented mainly by Muslims [47].

Much research has focused on the role of alcohol dose as a risk factor for NCDs. But the protective properties of low doses of alcohol against NCDs have also received much research. However, the minimum safe dose of alcohol has not been established [48-51]. Papadopoulos V., *et al*. reported that there are few data on the incidence of NCDs in the Muslim population worldwide. Muslims in Thrace, Greece show a lower incidence of stroke compared to Christians (87.2 versus 173.9 cases/100,000 person-years). Muslims have lower rates of diabetes ($p = 0.019$) and atrial fibrillation.

The contribution of cultural habits (diet, occupation) remains to be explored in further studies [52]. Arterial hypertension and cancer are the most important causes of death in the world. Systemic hypertension is the most common comorbidity in cancer patients. Cancer and hypertension share common risk factors.

Hypertension and cancer have overlapping pathophysiological mechanisms. Many cancer treatments cause hypertensive effects [53-58]. In 2017 and 2019 there were 24.5 and 23.6 million new cancer cases worldwide. Since 2010, the increase in the number of new cancer cases in the world has increased by 26.3% [59,60].

Conclusion

In undertaking this study, it was no secret to us that Muslims and Christians have age-old differences in cultural traditions, attitudes towards diets and alcohol. However, we did not have knowledge about the incidence of both infectious and non-infectious. We also had no knowledge of quantitative and qualitative differences in diets.

Therefore, for the first study, we chose the countries of Muslims and Christians with the same economic and geographical position. In this way, we deliberately equalized Muslims and Christians on two important risk factors: income and geography.

As a result of research, it was found that Muslims had a 2 times lower burden of esophageal cancer, Melanoma, Christians, Breast and Prostate ($p \leq 0.022$) and 3 times lower burden of Alcoholism. But Muslims had a 1.4 times higher burden of Bladder cancer and Lymphoma than Christians ($p \leq 0.023$). The burden of the remaining 8 types of cancer was not statistically significantly different between Muslims and Christians.

Established, that Muslims and Christians chose different foodstuffs from a daily set of products equal in volume and composition (1185 and 1064 g/person/day, 45 types). Thus, Muslims consumed 2 times less Pigmeat, 3 times less Fats Animals, 3 times less than Maize, Beans, Beverages, Alcoholic, Wine, 6 times less than Beer.

But Muslims consumed 3-4 times more than Christians Mutton and Goat Meat, Wheat, Nuts, Onions, Vegetables and 1.4 times the total amount of Grains and legumes. For the remaining 30 types of products, the daily consumption of Muslims and Christians did not differ statistically significantly. It has been established that the intake of macronutrients of animal origin (Energy, Protein and Fat) in 1990 and 2005 was 33% lower for Muslims than for Christians ($p \leq 0.024$).

At the same time, Total Energy and its percentage composition (Carbohydrates, Proteins and Fats) did not have statistically significant differences between Muslims and Christians in 1990 and 2005. The results obtained require further research.

Conflict of Interest

The authors have no conflict of interest.

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