



**Research Brief,  
Short Paper**

ISSN 2687-8844

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# Nutritional Guidance on Fitness Centers' Websites in Illinois: An Automated Content Analysis

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## Abstract

In Illinois, a license is required for a person to offer dietetics and nutrition services or to practice medical nutrition therapy. However, exercise professionals can provide general nonmedical nutrition information to clients either personally or indirectly through websites. This research content analyzed websites of fitness businesses in Illinois to gauge the extent to which they offer nutritional information. Results suggest that fitness businesses in Illinois are not making use of their webpages to promote healthy eating.

## Introduction

More than one in four Illinoisans are physically inactive<sup>2</sup>. A salient deterrent of physical activity is obesity<sup>3</sup>. Table 1 shows the prevalence of obesity in Illinois by metro and nonmetro geographies; a majority of the population is overweight.

**Table 1: Adults with Body Mass Index (BMI) Greater than 25<sup>4</sup> , Metro and Nonmetro Illinois**

BMI	Metro	Nonmetro
Less than 25	33%	31%
Greater than or equal to 25	67%	69%
N, Weighted	8,652,521	395,597

**Source:** Behavioral Risk Factor Surveillance System, 2022. Microdata were used in the analysis; see [https://www.cdc.gov/brfss/annual\\_data/annual\\_2022.html](https://www.cdc.gov/brfss/annual_data/annual_2022.html).

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<sup>2</sup> Athiyaman, A. (2023). Physical activity of Illinoisans in the metro and the nonmetro. *Research Brief*, 5(2), January 31. Available: [https://iira.org/wp-content/uploads/2023/07/RB5\\_2-Physical-Activity-of-Illinoisans-in-the-Metro-and-the-Nonmetro.pdf](https://iira.org/wp-content/uploads/2023/07/RB5_2-Physical-Activity-of-Illinoisans-in-the-Metro-and-the-Nonmetro.pdf).

<sup>3</sup> Pietiläinen, K. H., Kaprio, J., Borg, P., Plasqui, G., Yki-Järvinen, H., Kujala, U. M., ... & Rissanen, A. (2008). Physical inactivity and obesity: a vicious circle. *Obesity*, 16(2), 409-414.

Among the many “modifiable risk factors” for obesity, dietary habits are considered salient; for example, a diet rich in fruits and vegetables is shown to decrease body weight and sagittal abdominal diameter of obese persons<sup>5</sup>.

Table 2 shows dietary guidelines for the nation<sup>6</sup>; it consists of foods that provide vitamins and minerals with little or no added sugars, saturated fats, and sodium.

**Table 2: Healthy Diet, Nutrient-Dense Foods**

Category of Food	Examples of Food Items
Vegetables	Beans, peas, and lentils.
Fruits	Oranges, bananas, and apples.
Grains	Barley, millet, and brown rice.
Dairy	Low-fat milk, yogurt, and cheese.
Protein	Nuts, seeds, and soy products.
Oils	Olive, avocado, and sesame.

How does the diet of Midwesterners compare to the prescriptions given in Table 2? Eight percent do not eat fruits; 37% eat, on average, four fruits per day, 35% eat four fruits per week, and 20% of the Midwesterners report eating four fruits per month. Vegetables in salad form are not eaten by 12% of the Midwesterners;

48% eat salad once a week. Unhealthy beverages like soda is consumed everyday by 15% of the metro population and 22% of the nonmetro population (Figure 1 and Table 3).

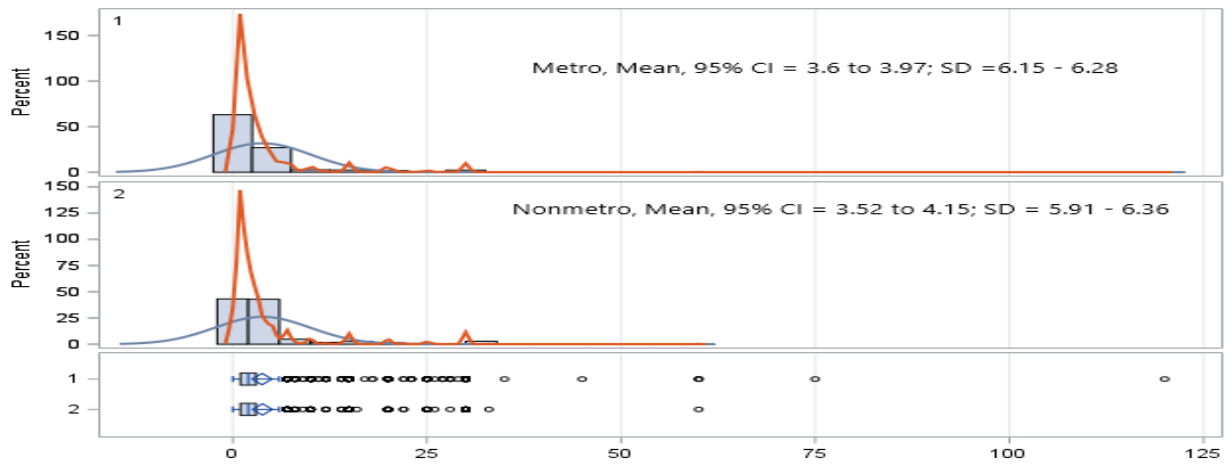
<sup>4</sup> According to the CDC, BMI in the range of 25 to less than 30 is “overweight”; BMI  $\geq$  30 is “obese”. See, <https://www.cdc.gov/obesity/basics/adult-defining.html>.

<sup>5</sup> Järvi, A., Karlström, B., Vessby, B., & Becker, W. (2016). Increased intake of fruits and vegetables in overweight subjects: effects on body weight, body composition, metabolic risk factors and dietary intake. *British Journal of Nutrition*, 115(10), 1760-1768.

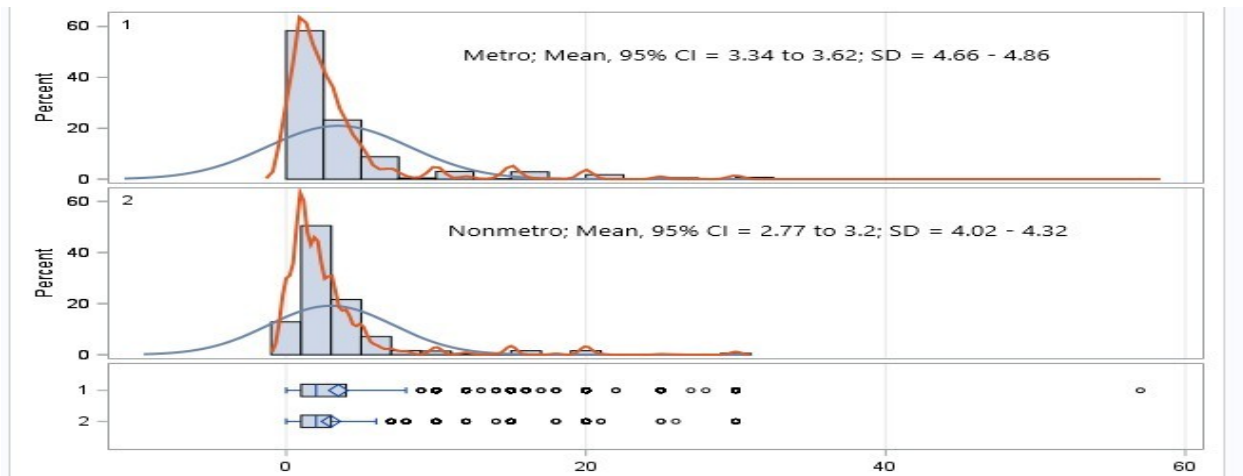
<sup>6</sup> Adapted from Dietary Guidelines for Americans, 2020-2025; available: <https://www.dietaryguidelines.gov/resources/2020-2025-dietary-guidelines-online-materials>.

**Figure 1: Midwesterners' Diet, Average Dietary Intake; Metro and Nonmetro**

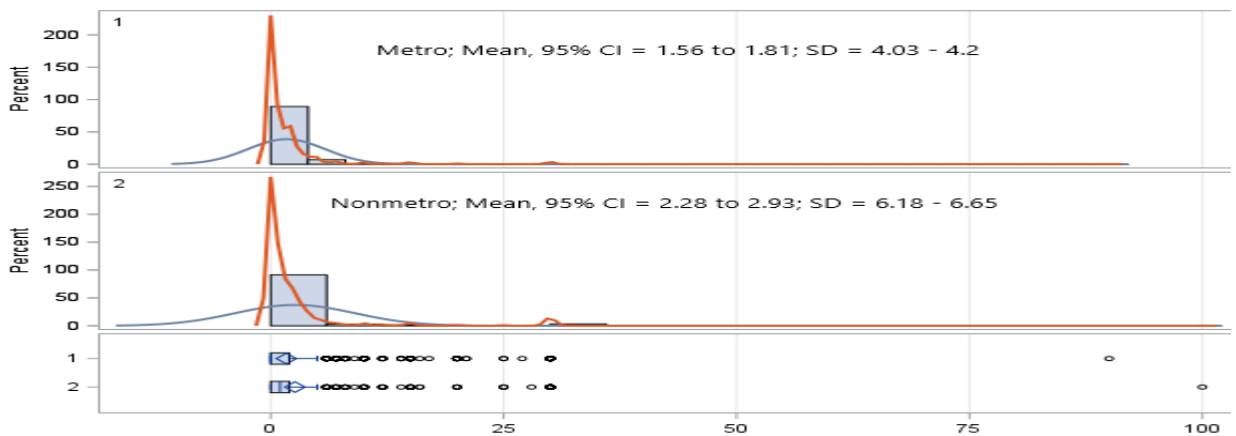
(i) Fruits



(ii) Salad



(iii) Soda



**Table 3: Diets of Metro and Nonmetro Midwesterners, Consumption Time Period**

Food	Metro				Nonmetro				$\chi^2, p$
	Never	Day	Week	Month	Never	Day	Week	Month	
Fruits	8%	39%	34%	19%	8%	31%	37%	24%	289k, <.05
Salads, vegetables	11%	15%	48%	25%	14%	12%	47%	28%	153k, <.05
Soda	47%	15%	16%	23%	39%	22%	15%	23%	402k, <.05
<b>N</b>	37,940,000				11,160,000				

**Source:** NHIS, 2022; see <https://www.cdc.gov/nchs/nhis/2022nhis.htm>. Microdata were used in the analysis.

The Office of Disease Prevention and Health Promotion, a unit of the US Department of Health and Human Services, recommends that health professionals guide patients to make healthier food choices<sup>7</sup>. From a marketing communications perspective, health professionals can be thought of as the ‘audience’s answer to the question “Who say’s so?”<sup>8</sup>. In fact, the entities that can be perceived as presenters of health messages can be the industry: for example, fitness industry, offices of physicians; and/or the company: for example, 1<sup>st</sup> Planet Business, Southern Illinois Healthcare; and/or any person involved in the communications: for example, exercise professional, primary care physician.

Any of these sources can produce predisposing attitude towards the behavior, eating healthy foods. In this paper our focus is on fitness centers,

specifically nutritional guidance offered on business websites. In Illinois, a license is required for a person to offer dietetics and nutrition services or to practice medical nutrition therapy<sup>9</sup>. However, exercise professionals can provide general nonmedical nutrition information to clients either personally or indirectly through websites<sup>10</sup>. Thus, an exercise professional in a fitness center could be a salient influencer of a client’s dietary choices; 23% of those who exercise in Illinois use a fitness center for the activity (Table 4).

What are the characteristics of fitness businesses in Illinois? How much space do fitness businesses allocate to nutrition information on their websites? What are the collocations for categories of foods such as dairy, grain, and protein? What are the prominent topics on the website of fitness businesses? How are the topics related to terms or words that appear on the websites? This paper addresses these and other related questions.

<sup>7</sup> <https://health.gov/our-work/nutrition-physical-activity/dietary-guidelines/current-dietary-guidelines/toolkit-professionals>.

<sup>8</sup> Hong, S. J., & Low, B. Y. F. (2023). Use of Internet Memes in PSAs: Roles of Perceived Emotion, Involvement with Memes, and Attitudes Toward the Issuing Organization in Perceived PSA Effectiveness. *Health Communication*, 1-13.

<sup>9</sup> <https://ilga.gov/legislation/ilcs/ilcs3.asp?ActID=1297&ChapterID=24>.

<sup>10</sup> <https://www.acsm.org/blog-detail/acsm-certified-blog/2019/09/09/nutrition-scope-of-practice>.

**Table 4: Physical Activity of Metro and Nonmetro Illinoisans, Time Duration and Place of Exercise**

(i) Metro, Time Duration

Percentile	Value (Exercise Minutes)
95 <sup>th</sup>	120
90 <sup>th</sup>	60
50 <sup>th</sup>	0

(ii) Nonmetro, Time Duration

Percentile	Value (Exercise Minutes)
95 <sup>th</sup>	95
90 <sup>th</sup>	45
50 <sup>th</sup>	0

(iii) Place of Exercise, Metro versus Nonmetro

Place	Metro	Nonmetro	$\phi$ , Correlation
Residence	75%	100%	
Fitness center / Gym	25%	<1%	0.46
N, Weighted	8.821mil	1.159mil	

**Note:** Data are from the American Time Use Survey, 2022; see <https://www.bls.gov/tus/data.htm>. Micro-data were used in data analysis.

## Methodology

The PrivCo database was used to identify fitness businesses in Illinois<sup>11</sup>; keyword search on PrivCo included terms such as fitness, gym, leisure facilities, sports, and training. To ensure coverage of all “active” fitness firms in Illinois, the online firm

registry maintained by the Office of the Illinois Secretary of State<sup>12</sup> was also searched. Information extracted from the databases include website address, geographical location of the business, and size of the business.

<sup>11</sup> <https://www.privco.com/>

<sup>12</sup> <https://apps.ilsos.gov/businessentitysearch/>.

The research question about the characteristics or attributes of fitness businesses were addressed using descriptive measures, measures of central tendency and dispersion. The question about space on webpages of businesses dedicated to nutrition were assessed using a variation of the TF.IDF scores; the “metric” involved the use of WordNet<sup>13</sup> to explore synonym, hyponym, and meronym terms related to the concept ‘nutrition’<sup>14</sup>. Natural language processing methods were used to address research questions about collo-

cation of food category terms on websites; the NLTK and GENSIM packages for Python<sup>15</sup> were used for text processing and topic modeling<sup>16</sup>.

## Findings

### Profile of Fitness Businesses

Firm search in PrivCo resulted in 96 hits or fitness businesses with an average valuation of \$11.75mil. A majority of the firms were located in the metro, 96% (Table 5).

**Table 5: Profile of Fitness Firms, Illinois, n = 96**

Variable	Typical Values	
Valuation	\$11.75mil, Median \$13.5mil, Mode	Range: \$298.7mil Interquartile range: \$13.3mil
EBITDA	\$665,000, Median \$1.15mil, Mode	Range: \$4.5mil Interquartile range: \$925,000
One-year revenue growth	13.5%, Median 13.04%, Mode	Range: 64.66% Interquartile range: 2.46%
Metro location	96%	

**Note:** Physical location of firms, metro and nonmetro, were established based on zip addresses.

<sup>13</sup> <https://wordnet.princeton.edu/>.

<sup>14</sup> TF.IDF refers to the product of ‘Term Frequency’ and ‘Inverse Document Frequency’. I adapted this measure to indicate the extent to which businesses emphasized information about diet and nutrition on their websites; the “new” measure explores the fraction of size of content of terms in Figure 2 on firms’ websites to the size of all the content.

<sup>15</sup> See, <https://www.nltk.org/api/nltk.html>.

<sup>16</sup> See Athiyaman, A. (2019). Thirty years of IIRA’s rural research reports. *Research Brief*, 1(1). Available: [https://iira.org/wp-content/uploads/2023/10/Topic\\_Model\\_RRR\\_v1\\_1.pdf](https://iira.org/wp-content/uploads/2023/10/Topic_Model_RRR_v1_1.pdf).

Not all businesses had a website, so a Google search was performed to populate missing values of the 'website' variable. Appendix 1 lists businesses that had websites, a total of 33 firms. However, the contents of only nine websites could be scraped<sup>17</sup> and they were used to address the research questions.

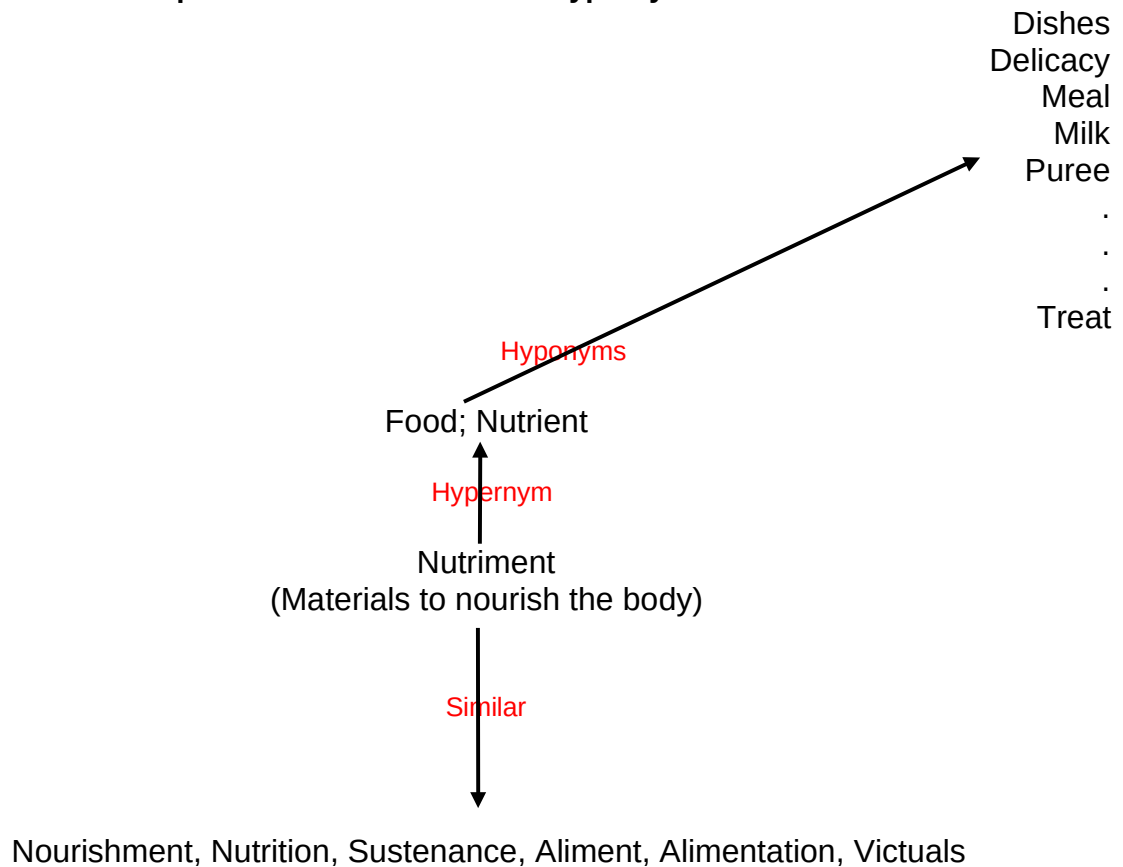
- 1) Nutrition: the process by which an organism assimilates food and uses it for growth and maintenance;
- 2) Nutriment: a source of materials to nourish the body, and
- 3) Nutrition: the scientific study of food and drink.

How much space do fitness businesses allocate to nutrition information on their websites?

Since materials that nourish the body is the focus of this research, nutriment, the terms shown in Figure 2 were used to measure space allocated to nutritional information on fitness business websites; Appendix 2 contains the complete list of terms.

The 'synset' for the word nutrition in WordNet includes:

**Figure 2: WordNet Graph for "Nutriment" and its Hypernyms**



<sup>17</sup> The Python package "Beautiful Soup" couldn't be deployed; most businesses block the scraping attempt.

Table 6 shows the results of the content analysis that measures webspace allocated to nutrition information. Typically, firms have less than 1% of

webspace allocated to nutrition information, the median amount of webspace dedicated to nutrition is 0.39%.

**Table 6: Salience of Nutritional Information**

Firm	Lexical Diversity	Nonstop Words in Webpages, %	Space of Nutrition Info on Website, %
Fitness-A-Go-Go	1.22	74.5%	None
PDHP	1.73	74.1%	None
Fitness Formula	1.41	62.8%	0.26%
Fitness Squared	1.67	71.9%	4.73%
Oak Park Fitness	1.86	62.1%	0.77%
HTSW	1.38	86.0%	0.39%
Perfection Fitness	1.22	60.8%	None
Lakeview Fitness	1.62	72.9%	None
Chicago Center for Wellbeing	2.34	71.8%	0.16%

**Note:** Lexical Diversity =  $\text{Unique Words} \div \text{Total Number of Words}$  Stop-words are common words, for example, “and”, “the”, etc. Nutrition-information space on website = size of content of terms in Figure 2 / the size of all the content.

### Collocations of Nutriment Terms

A collocation is a sequence of words that occur together. Table 7 shows the collocation for terms, tokens, in Figure 2. The term “nutrition” had the most cooccurrences.



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**Table 7: Collocation for Nutrient Terms, Some Examples**

Token	Collocation
Nutrition	supplemental <b>nutrition</b> must support your workouts ... cardiovascular exercise and <b>nutrition</b> that places one in ... our own eDiets <b>nutrition</b> program ... but the big message in the <b>nutrition</b> and personal training world today is ... The infomercials barely mention <b>nutrition</b> when attempting to sell their ... <b>Nutrition</b> is a huge component of attaining a ... you think eDiets has a plethora of <b>nutrition</b> programs to get you to your goal ... key to a flatter stomach is proper <b>nutrition</b> , resistance exercise to increase ...
Food	... to lose body fat, not simply more <b>food</b> . The infomercial that has that ...
Meal	... high glycemic carbohydrates at one <b>meal</b> , the body's blood sugar rises ...
Treat	I consider this a nice <b>treat</b> to an already fun and very worthwhile ...

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### Salient Topics

An interactive Python program was used to visualize topics and associated terms<sup>18</sup>. The program plots the topics as circles on a two-dimensional plane whose centers are computed using distance measures; multidimensional scaling is used to project inter-topic distances. The prevalence of topics is denoted by areas of the circles. To define the topics, frequencies of terms relevant to the topics are explored.

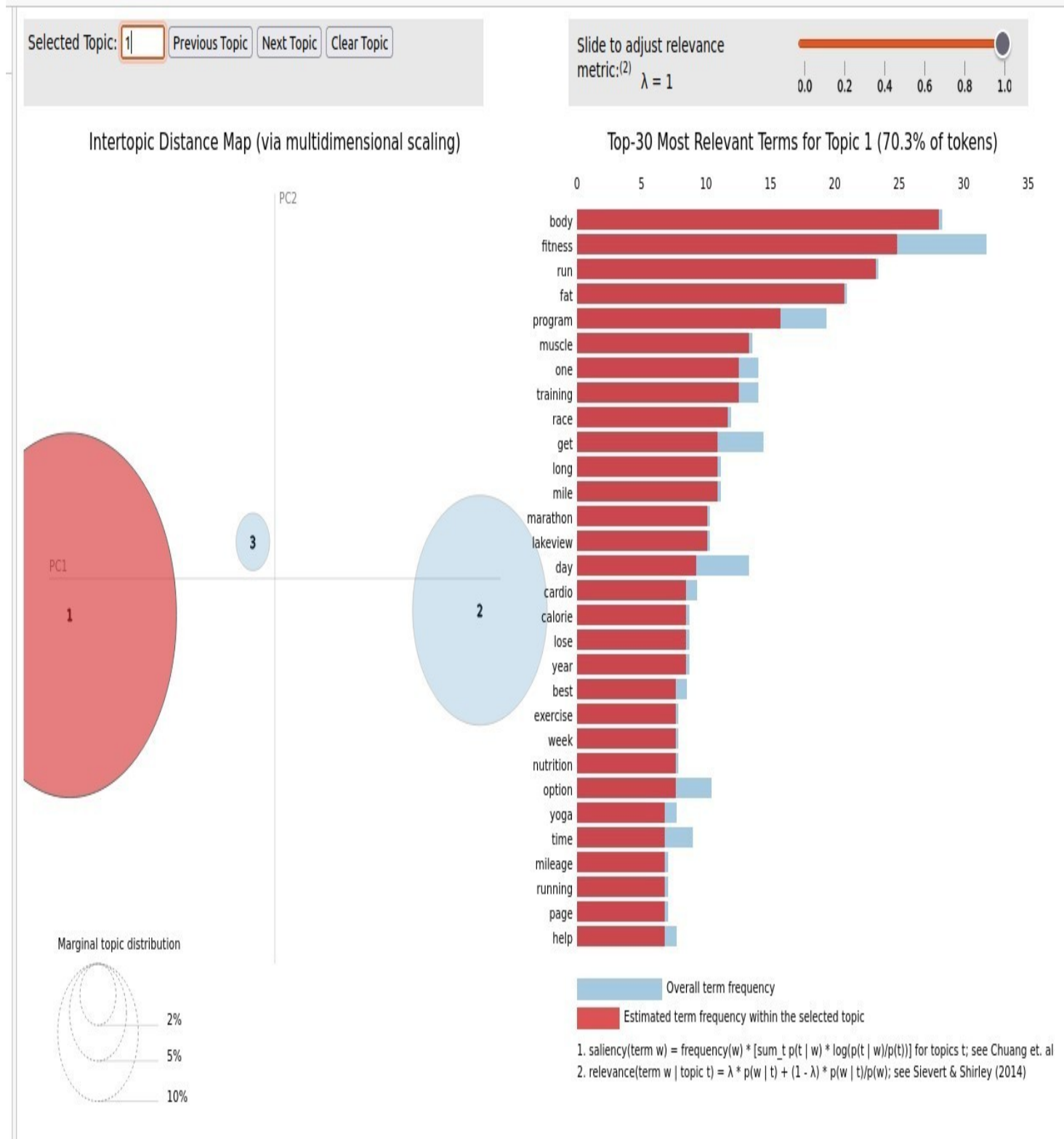
Figures 3 – 5 show the topics mined from the webpages of the businesses. Topic 1

is concerned with body building or muscle training programs. Terms such as body, run, fat, and program account for 70.3% of the 'tokens', words, associated with all the webpages. Topic 2 is about the location and the processes of fitness business; terms such as park, beach, club, service, and payment account for 27.9% of the tokens. Topic 3 is mostly about user interactions with the business website; it is irrelevant for this research.

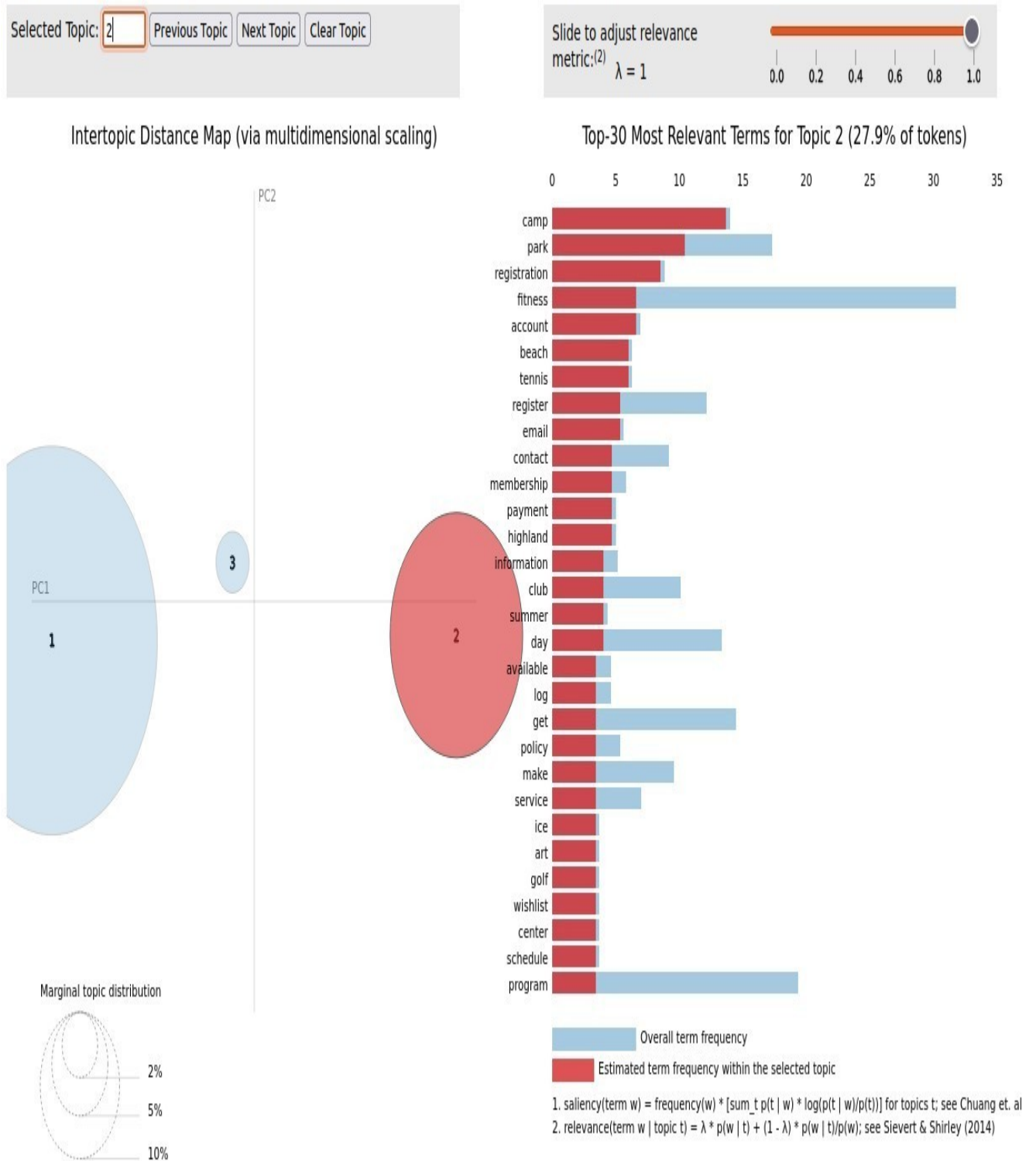
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<sup>18</sup> The program is called LDAvis.

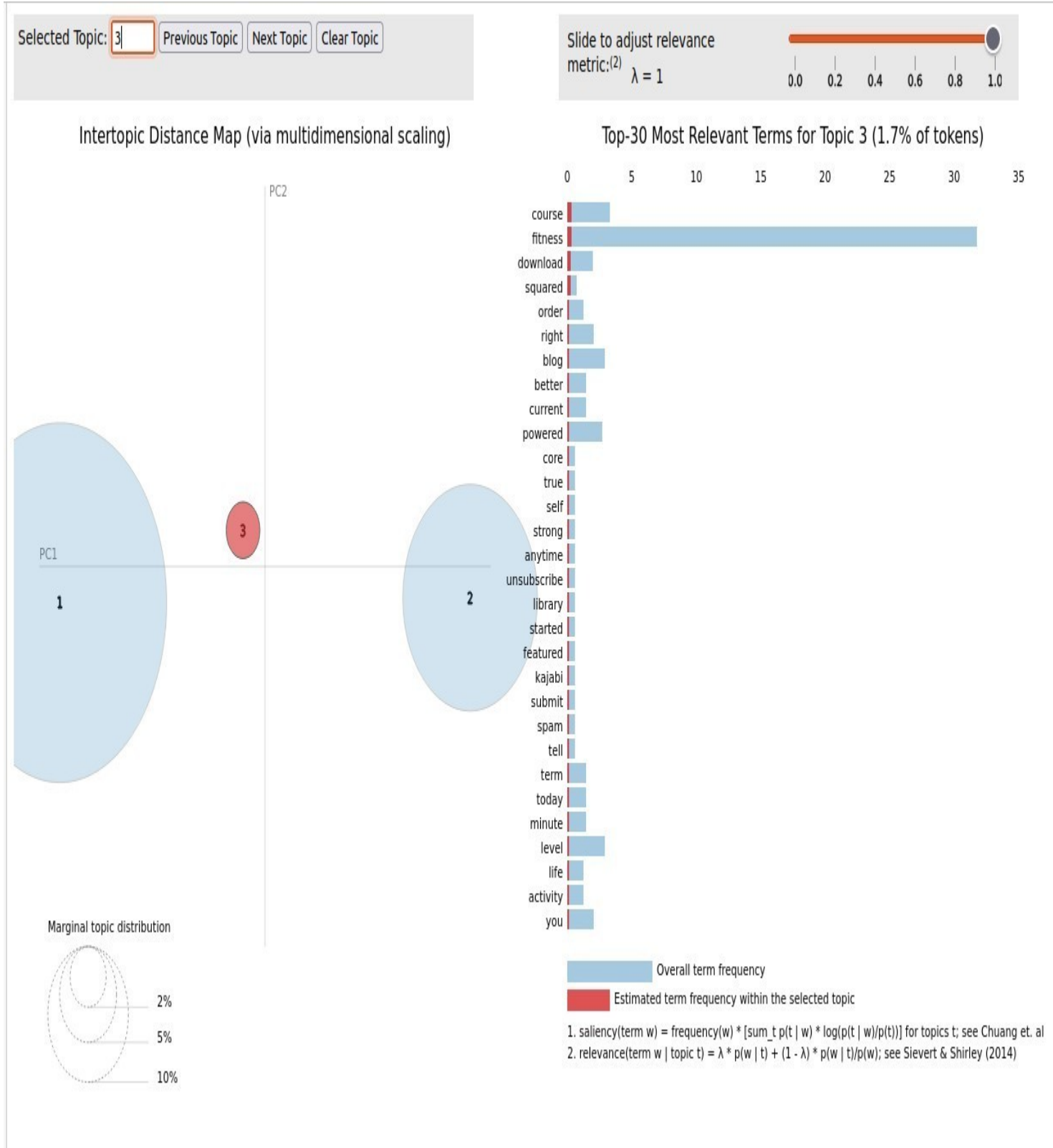
**Figure 3: Topic 1**



**Figure 4: Topic 2**



**Figure 5: Topic 3**



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## Summary and Conclusion

A majority of Illinoisans are obese. Although dietary habits are considered as an important modifiable risk factor for obesity, a majority of the population consume unhealthy beverages like soda.

The Office of Disease Prevention and Health Promotion, a unit of the US Department of Health and Human Services, recommends that health professionals guide patients to make healthier food choices. In Illinois, a license is required for a person to offer dietetics and nutrition services or to practice medical nutrition therapy; however, exercise professionals can provide general nonmedical nutrition information to clients either personally or indirectly through websites.

This research content analyzed websites of fitness businesses in Illinois to gauge the extent to which they offer nutritional information. The results of the content analysis are summarized below along with the questions that guided data analysis.

Q1: What are the characteristics of fitness businesses in Illinois?

A typical firm is located in the metro and has an average valuation of \$11.75mil.

Q2: How much space do fitness businesses allocate to nutrition information on their websites?

Firms provide less than 1% of webspace to nutrition; the median amount of webspace dedicated to nutrition is 0.39%.

Q3: What are the prominent topics on the website of fitness businesses?

The most prominent topic is “body building or muscle training programs”; terms such as body, run, fat, and program account for 70.3% of the ‘tokens’, words, associated with all the webpages.

In conclusion, fitness businesses in Illinois are not making use of their webpages to promote healthy eating. Since business websites are accessible to a wider range of population groups, it is recommended that policymakers provide incentives for fitness businesses to provide evidence-based nutrition care information on their websites. As mentioned in the introductory section of the paper, an exercise professional in a fitness center could be a salient influencer of a client’s dietary choices; 23% of those who exercise in Illinois use a fitness center for the activity.

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## Appendix 1: List of Websites

<b>Firm</b>	<b>Website, URL</b>
Midtown Athletic Clubs	<a href="http://www.midtown.com">www.midtown.com</a>
East Bank Club	<a href="http://www.eastbankclub.com">www.eastbankclub.com</a>
Fitness Formula Ltd.	<a href="http://www.ffc.com">www.ffc.com</a>
Northwestern Medicine Lake Forest Health & Fitness	<a href="http://www.lakeforesthfc.com">www.lakeforesthfc.com</a>
Lakeshore Centre Holdings LLC, The	<a href="http://www.lakeshorechiropracticcenter.com">www.lakeshorechiropracticcenter.com</a>
Lakeshore Sport & Fitness	<a href="http://www.lakeshoresf.com/illinois-center">www.lakeshoresf.com/illinois-center</a>
Centegra HealthBridge Fitness Centers	<a href="http://www.healthbridgefitness.com">www.healthbridgefitness.com</a>
Connor Sports	<a href="http://www.connorsports.com">www.connorsports.com</a>
Don Carter Lanes, Inc.	<a href="http://www.doncarterlanes.com">www.doncarterlanes.com</a>
Joliet Town & Countrylanes, Inc.	<a href="http://www.joliettownandcountrylanes.com">www.joliettownandcountrylanes.com</a>
Xtreme Xperience	<a href="http://www.thextremexperience.com">www.thextremexperience.com</a>
Northwestern Medicine Delnor Health & Fitness Center	<a href="http://www.delnorhfc.com">www.delnorhfc.com</a>
Ivercrest, Inc.	<a href="http://www.dr Bowl.com">www.dr Bowl.com</a>
D.A. Matot, Inc.	<a href="http://www.matot.com">www.matot.com</a>
Soccer Enterprises, Inc.	<a href="http://soccercitypalatine.com">soccercitypalatine.com</a>
The Clubs at River City	<a href="http://clubsatrivercity.com">clubsatrivercity.com</a>
Nunnally Enterprises, Inc.	<a href="http://getvertigo.com">getvertigo.com</a>
Rosemont Exposition Services, Inc.	<a href="http://www.rosemont.com">www.rosemont.com</a>
Healthtrack Sports Wellness	<a href="http://www.htsw.net">www.htsw.net</a>
Autobahn Country Club LLC	<a href="http://autobahncc.com">autobahncc.com</a>
Wheaton Oaks Sport Center	<a href="http://www.wheatonsportcenter.com">www.wheatonsportcenter.com</a>
Plntf Holdings LLC	<a href="http://www.plntfholdings.com">www.plntfholdings.com</a>
LHC Operating LLC	<a href="http://www.lakeshoresf.com">www.lakeshoresf.com</a>
Chicago Indoor Sports LLC	<a href="http://razzmatazzchicago.com">razzmatazzchicago.com</a>
Five Star Tennis Company	<a href="http://fivestartennis.com">fivestartennis.com</a>
Habetler Bowl, Inc.	<a href="http://habetlerbowl.com">habetlerbowl.com</a>
Naperville Tennis Club, Inc.	<a href="http://napervilletennis.com">napervilletennis.com</a>
Puttshack	<a href="http://www.puttshack.com">www.puttshack.com</a>
Stone City Kitchen and Bath Design Center, Inc.	<a href="http://stonecity.com">stonecity.com</a>
Ultimate Gymnastics of Gurnee LLC	<a href="http://ultimategymnasticsinfo.com">ultimategymnasticsinfo.com</a>
Unicorn Club, Ltd.	<a href="http://steamworksonline.com steamworksbathts.com">steamworksonline.com steamworksbathts.com</a>
Chicagoland Skydiving Center	<a href="http://www.skyteam-aviation.com">www.skyteam-aviation.com</a>
Quad Indoor Sports	<a href="http://www.quadindoorsports.com">www.quadindoorsports.com</a>

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Appendix 2: Nutriment: Hypernyms, Hyponyms, and Synonyms

