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## Abstract

Avoidant/restrictive food intake disorder (ARFID) is an eating disorder in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), and is a “fairly frequent presenting feature of autism.”<sup>1</sup> In order to qualify for a diagnosis of ARFID, the sufferer must persistently fail to meet nutritional or energy needs through the oral intake of food due to self-imposed dietary restrictions.<sup>2</sup> A systematic review was conducted on Scopus to determine the nutrition-related illnesses which occurred in persons with comorbid ARFID and autism. The purpose of this research is to determine who manifests these deficiencies, which nutrients are frequently deficient, and what factors might be used as preventative measures to reduce the occurrence in the population going forward. This data also helps answer the question of how long a person can safely engage in extreme dietary restriction before physical damage occurs.

Results showed a total of 62 cases (ages 1.5-17) from 52 articles. The largest percentage of published cases (64.5%) involved scurvy, a vitamin C deficiency. Scurvy developed in as little as four weeks devoid of ascorbic acid. In 70% of the cases where a BMI percentile was provided, these children were within normal weight parameters. Practical applications include encouraging multivitamin use, extended breastfeeding, or formula for children at risk. The next step is the validation of a nutritional screener which can detect ARFID when the child is not failure to thrive. Funding provided by a grant to the UConn School of Medicine for Leadership Training in Neurodevelopmental Disabilities Program.

## Objective

Build awareness in the health and parenting communities that ARFID is not just “picky eating.” Registered dietitians need to be able to distinguish ARFID from typical picky eating in order to provide the correct information regarding appropriate interventions, and to help families make informed choices regarding the care of their child.

## Background

- Up to 90% of children with autism exhibit extreme food selectivity,<sup>3</sup> while only 25-35% of typically developing children are picky eaters.<sup>4</sup>
- The official position of the Academy of Nutrition and Dietetics is that parents are not to blame for eating disorder etiology.<sup>5</sup>
- Studies concur; lack of food acceptance by autistic children was not associated with family food preferences,<sup>6</sup> and was not being caused by household factors.<sup>7</sup>
- In order to be family advocates and maintain our obligation to be non-maleficent, dietitians play a role in educating and improving health care systems to ensure that patients benefit from safe, quality care.
- There is disagreement in the autism community over whether it is preferable to use person-first language, or identity-first language; I will use them interchangeably here.

## Methods

### Search Strategy:

- SCOPUS was used to acquire articles. The basic key words used to search for the topics on the database were “autis\* AND deficiency”.
- Based on the results of this first search, a second search was conducted on Scopus, using the keywords “autis\* AND scurvy”.
- Records were searched from 1958 to the present.

### Inclusion Criteria:

- Person of any age who has been identified as having autistic traits or autism and an illness of nutritional deficiency were included.
- Five cases were included where the person had no noted autism or autistic traits: two were just reaching the age of initial autism screening, two had unidentified psychological issues at the time of deficiency illness, and one was diagnosed with autism after being hospitalized for ARFID.

### Exclusion Criteria:

- Nutritional deficiency, but no nutrition-related disease
- Studies of non-human biota, anemia, other EDs, orthorexia (which can be included in ARFID), and food phobias
- Self-imposed restrictive diets due to physical or mechanical cause (e.g. GI disease, oropharyngeal malformations)
- Caregiver-imposed restrictive diets
- Cases of poverty or neglect

## Results

Figure 1. Flow Chart of Articles Selected.

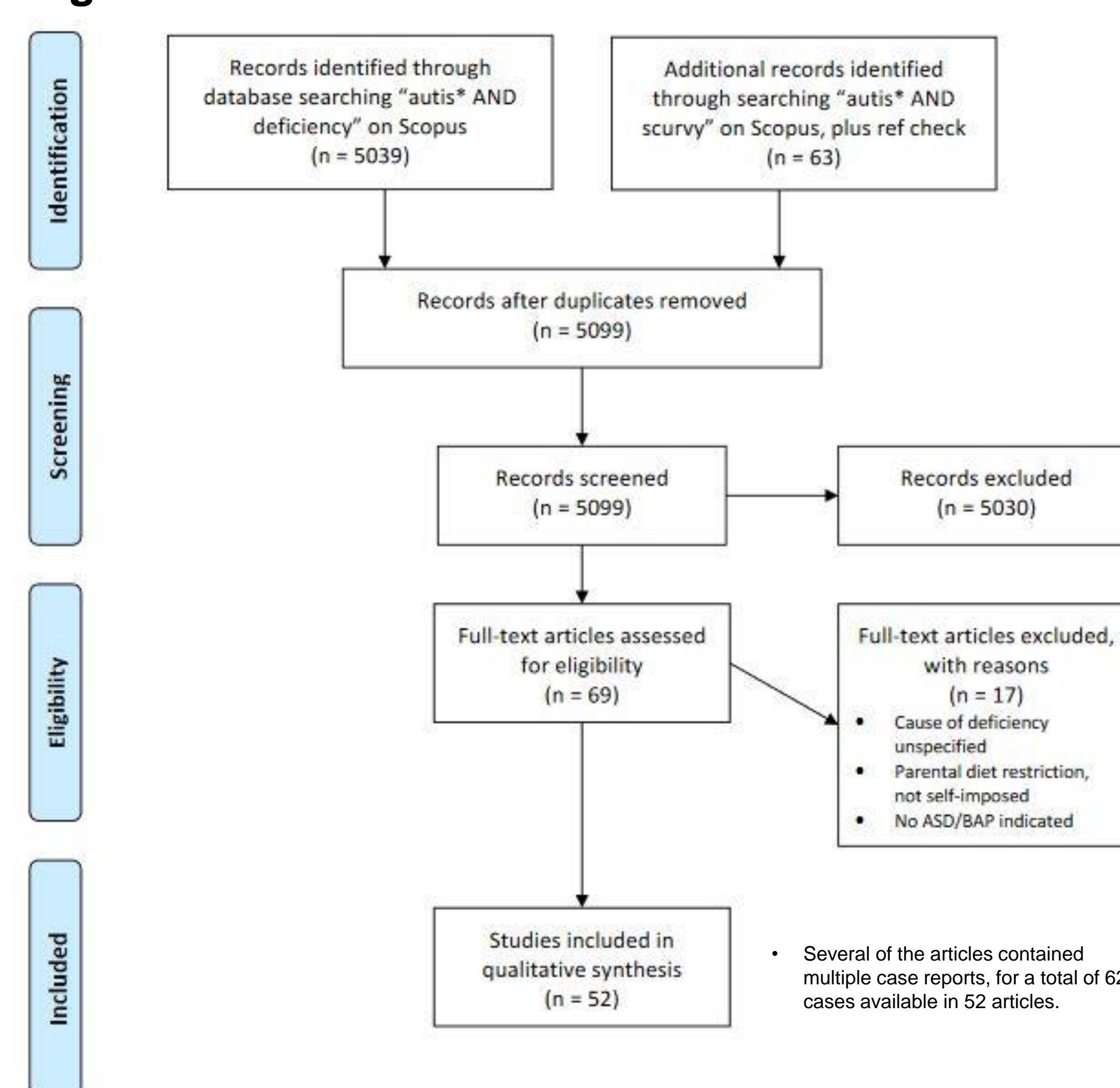
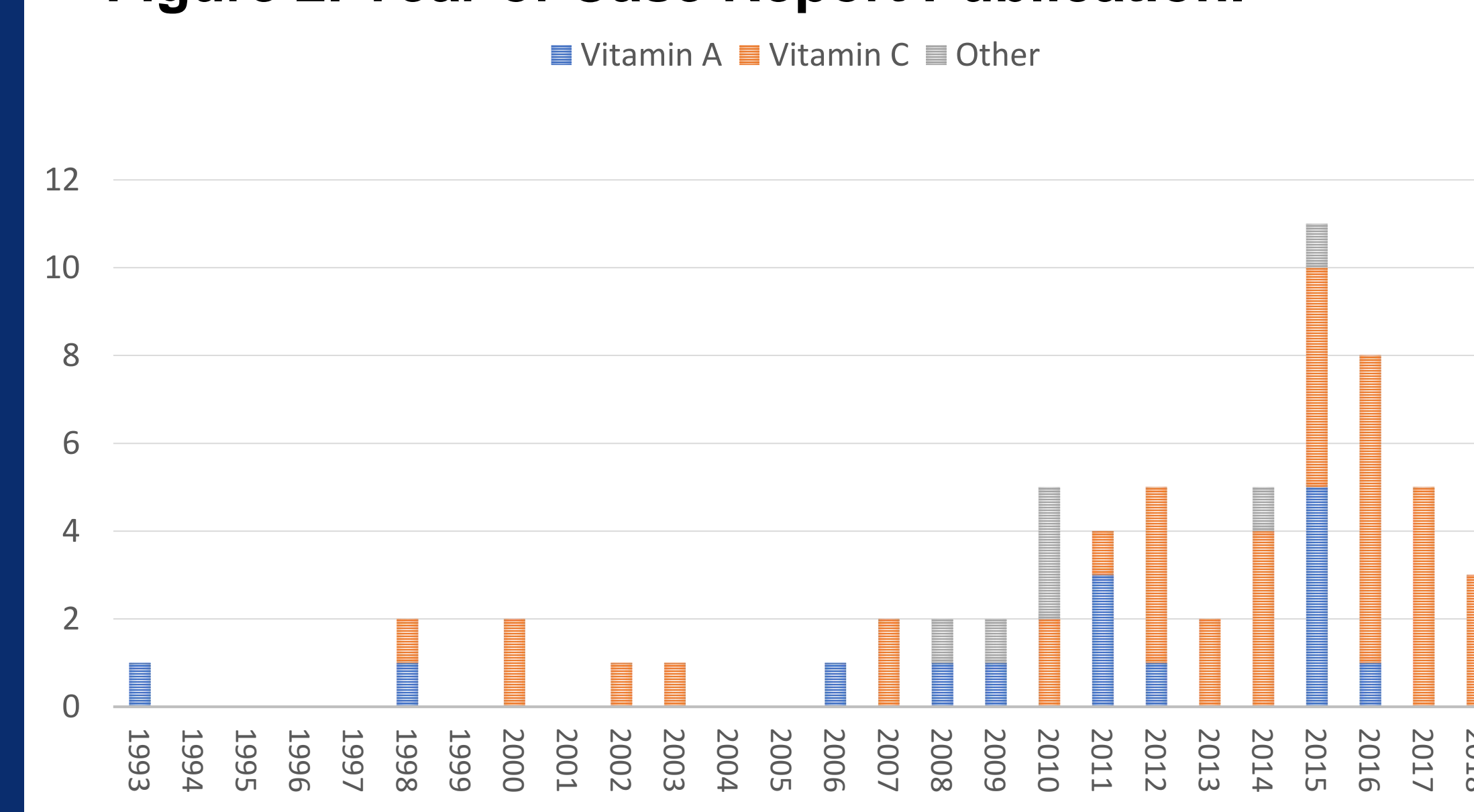


Figure 2. Year of Case Report Publication.



## Results

Figure 3. Country-Based Case Distribution.

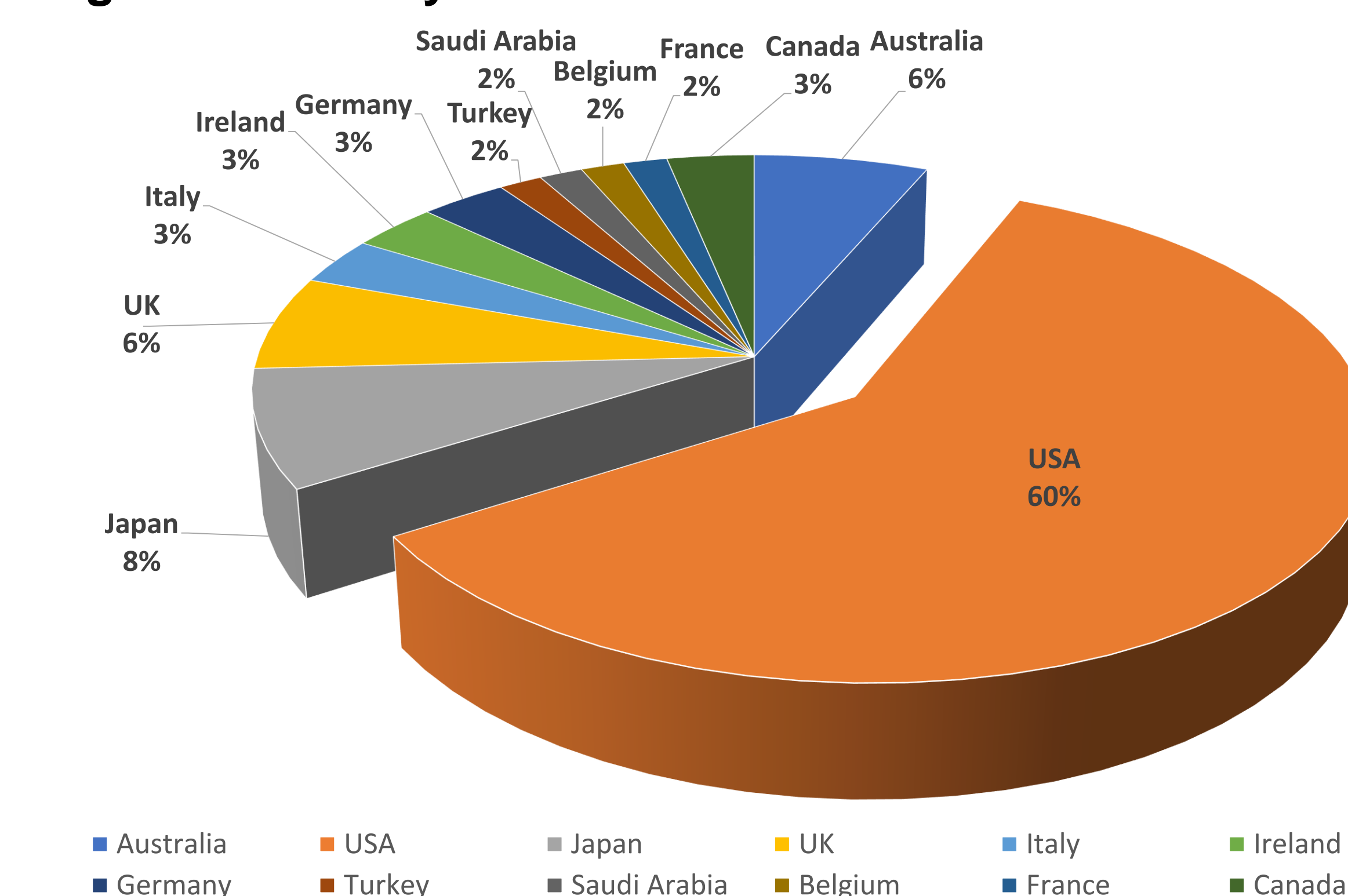


Table 1. Major Findings from Systematic Review

Characteristic	Vitamin A Deficiency (%)	Vitamin C Deficiency (%)	Vitamin B12 Deficiency (%)	Vitamin D Deficiency (%)	Vitamin B1 Deficiency (%)	Vitamin A Excess (%)
Sample Size n	15	40	4	1	1	1
(%)	(24.2%)	(64.5%)	(6.5%)	(1.6%)	(1.6%)	(1.6%)
Male	15	36	4	1	1	1
Female	0	4	0	0	0	0
Median age (SD)	11 (3.8)	6.5 (3.6)	10 (5.2)	15	3	4
Age range (years)	5-17	1.5-17	6-17	-	-	-
ASD	15	30	3	1	1	1
BAP	0	5	1	0	0	0
None	0	5	0	0	0	0
FTT	1	3	0	1	-	0
Normal	3	16	1	0	-	1
Obese	1	3	0	0	-	0
Breads	6	32	3	0	0	1
Cereals	0	6	1	0	0	0
Dairy	0	23	0	0	0	0
Potatoes	10	4	3	1	0	0
Chicken nuggets	4	9	2	0	0	1
Median diet time in months (SD)	24 (15.6)	9 (15.3)	24* (-)	-	0.75 (-)	-
Diet time range	6-36 mon.	1-36 mon.	-	-	-	-

\*This is the length of time that the child had stopped taking a multivitamin. He had been on the restrictive diet for a total of 144 months. ASD = Autism Spectrum Disorder, BAP = Broad Autism Phenotype (i.e. autistic traits), FTT = Failure to thrive

- Children (ages 1.5-17) only.** No adults, and only two females who had formally been diagnosed with an ASD.
- Vitamin C Deficiency:** The largest percentage of published cases (64.5%) involved scurvy.
  - Scurvy developed in as little as 4 weeks.
  - Potatoes (in any form) appeared to help prevent scurvy.
- Vitamin A Deficiency:** Second largest percentage of cases (24.2%) involved eye disorders.
  - Vitamin A deficiencies developed in as little as 6 months.
  - Dairy appeared to help prevent vitamin A deficiencies.
- Normal BMI 70%** of the time.
- No multivitamins** taken by these children. In at least 7 cases, the child explicitly refused vitamins.
- Limited food group consumption,** and most were consuming 5-10 or fewer types of food.
- Eating disorder not identified** by caregiver, and health providers only used the words “eating disorder” as a descriptive in 2 cases.
- White flour protected against B vitamin deficiencies.** Flour is enriched with vitamins B1, B2, B3, and B9, which likely protected the children from deficiency in these nutrients.

## Conclusions and Discussion

- Emerging issue, 84% of cases were published in the past decade.
- Rapidly changing recommendations and lack of centralized evidence-based practice guidelines challenge healthcare providers.
- Most case reports involved multiple vitamin and mineral deficiencies. Data cleaned to reveal the dietary issues which most need to change in order to keep these children safe in the immediate future.
- Persons at risk (not consuming from all food groups, or fewer than 3 foods from each group) should be placed on a multivitamin or nutritional supplement drink until they can increase their dietary variety.
- Extending length of time breastfeeding or formula feeding provides nutrition safety net and gives children extra time to adapt to a varied diet of solid foods.
- A screening tool is needed to identify nutritional risk in this population.<sup>8</sup> Children with autism should receive regular nutritional monitoring.<sup>9,10</sup>

### Limitations:

- Lack of use of standardized language related to ARFID.
- Missing nutrition related data in case reports, such as diet duration, and BMI.
- Many of the patients in these case reports were not followed up on. It's unclear if the interventions used to help them improved their dietary habits.

## Future Implication

These findings demonstrate that there may be a need for an improved protocol to identify children, particularly those with autism, who are at nutritional risk from restrictive eating. As Keown et al. (2014) reminds us, "a normal growth chart does not necessarily indicate that a child is adequately nourished."<sup>11</sup>

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