

## The prevalence of parent reported food hypersensitivity at school entry in Malta

Mariella Porter, Stephen Fallows

Food hypersensitivity refers to an adverse reaction to food at a dose which is tolerated by the majority of individuals<sup>1</sup>, which is further classified into allergic and non-allergic food-hypersensitivity.<sup>2</sup>

Research on food hypersensitivity in young children is minimal, with countries like Malta lacking research on this topic. The reported prevalence of food hypersensitivity worldwide for the paediatric population to date in the 21<sup>st</sup> century ranges from 1% in Denmark to 38.4% in Germany.<sup>3-4</sup> With regards to available research on food hypersensitivity for the age group 4 to 6 years, parent reported prevalence ranges from 4.2 to 11.8%<sup>5-6</sup>, with the value going down to 2.5% when including research that reports a point prevalence based on food challenge and/or suggestive history and skin tests.<sup>6</sup>

The main food group causing food hypersensitivity worldwide in the paediatric population aged eighteen and under is reported to be cow's milk and milk products, with other food groups being country specific.<sup>7</sup>

This research aimed to provide local statistics in food hypersensitivity in the paediatric population, as the prevalence of such allergic and non-allergic food hypersensitivity (intolerance) to food in Malta was not previously documented. This research has found a 2.5%-point prevalence of food hypersensitivity in the 5-to 6yr-old population under study.

Milk and milk products followed by tree nuts have been identified as the main hypersensitivity causing food in this study.

The statistics and recommendations of this study provide an opportunity to the Maltese Healthcare system to start providing a holistic service which deals with food hypersensitivity.

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## INTRODUCTION

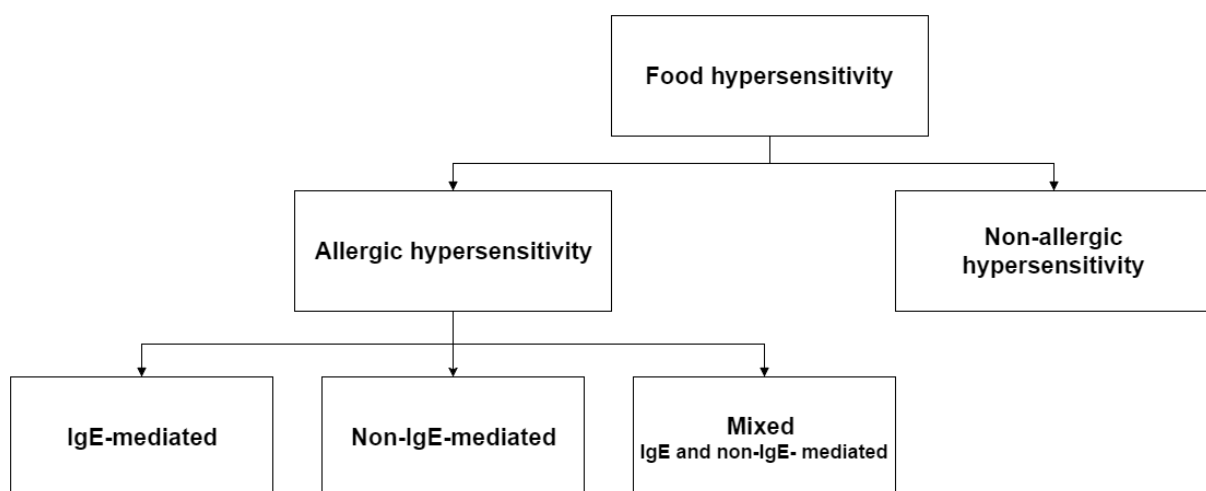
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According to the nomenclature from the European Academy of Allergy and Clinical Immunology Task Force the term food hypersensitivity is the general term used to refer to any adverse reaction to food (figure 1).<sup>1</sup> This can be further classified into allergic and non-allergic food hypersensitivity<sup>2</sup>, more commonly referred to as food intolerance. Madsen<sup>7</sup> also includes food aversion under the umbrella term of hypersensitivity, which is a psychological repulsion to food rather than a reaction to any chemical properties in the food itself.

Reported prevalence of food hypersensitivity depends on various factors, including the age bracket, methodology, food items considered, the country where the study is being conducted, and whether lifetime or point prevalence is researched.<sup>8</sup> Another influencing factor is the nomenclature used by various studies in this field. Whilst terms like 'allergy', 'perceived allergy' or 'food hypersensitivity' have specific scientific definitions, the general public often fails to distinguish between these terms.<sup>9</sup>

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**Figure 1** Classification of food hypersensitivity. Adapted from Johansson et al.<sup>1</sup>



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## OBJECTIVES

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This research aimed to provide local statistics in food hypersensitivity in the paediatric population, by analysing the age group 5-to 6-year olds at compulsory school entry. The food which is reported to cause hypersensitivity locally has been analysed through this study and compared to the main causes of food induced hypersensitivities in other countries.

The term 'food hypersensitivity' has been used in this study in order to incorporate all reactions to food and to prevent having the participants misdiagnose non-allergic food hypersensitivity or aversion with the much - misused term 'food allergy'.

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## METHODS

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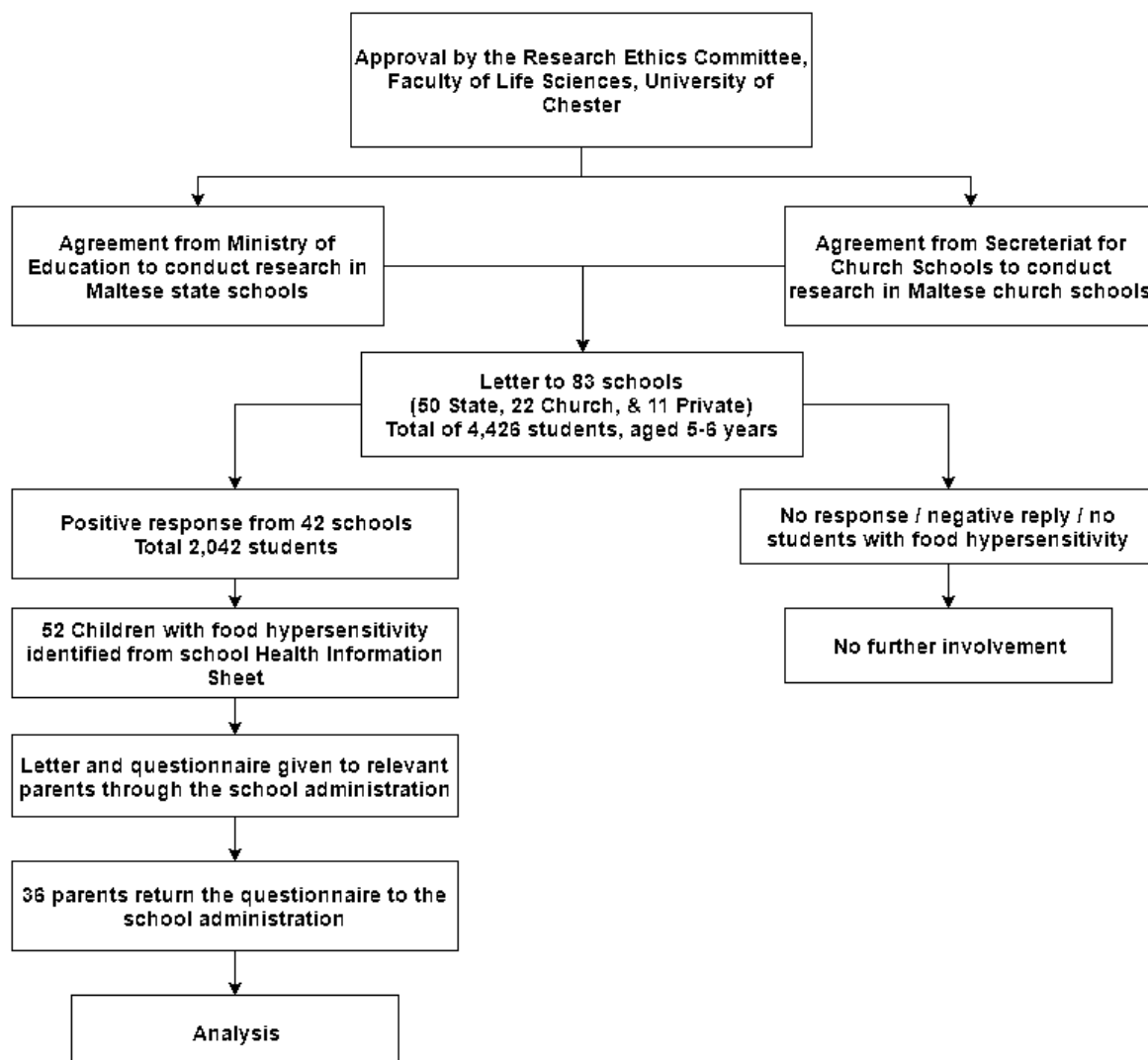
Following approval by the Research Ethics Committee, Faculty of Life Sciences at the University of Chester; Research and

Development department at the Ministry of Education and Employment in Malta, and Secretariat for Maltese Catholic Education to carry out research in Maltese schools, between January and March 2015, every school in Malta which includes children aged 5-to 6 years ( $N=83$ ) was invited to participate in this research study. Each school was provided with an electronic letter of invitation, together with a participant school information sheet. This included all state ( $n=50$ ), church ( $n=22$ ) and independent schools ( $n=11$ ) on the island, with a total of 4,426 5-to 6-yr-olds in Year 1. Out of this total, 2,274 were boys (51.4%) and 2,152 girls (48.6%). The Heads of Schools who

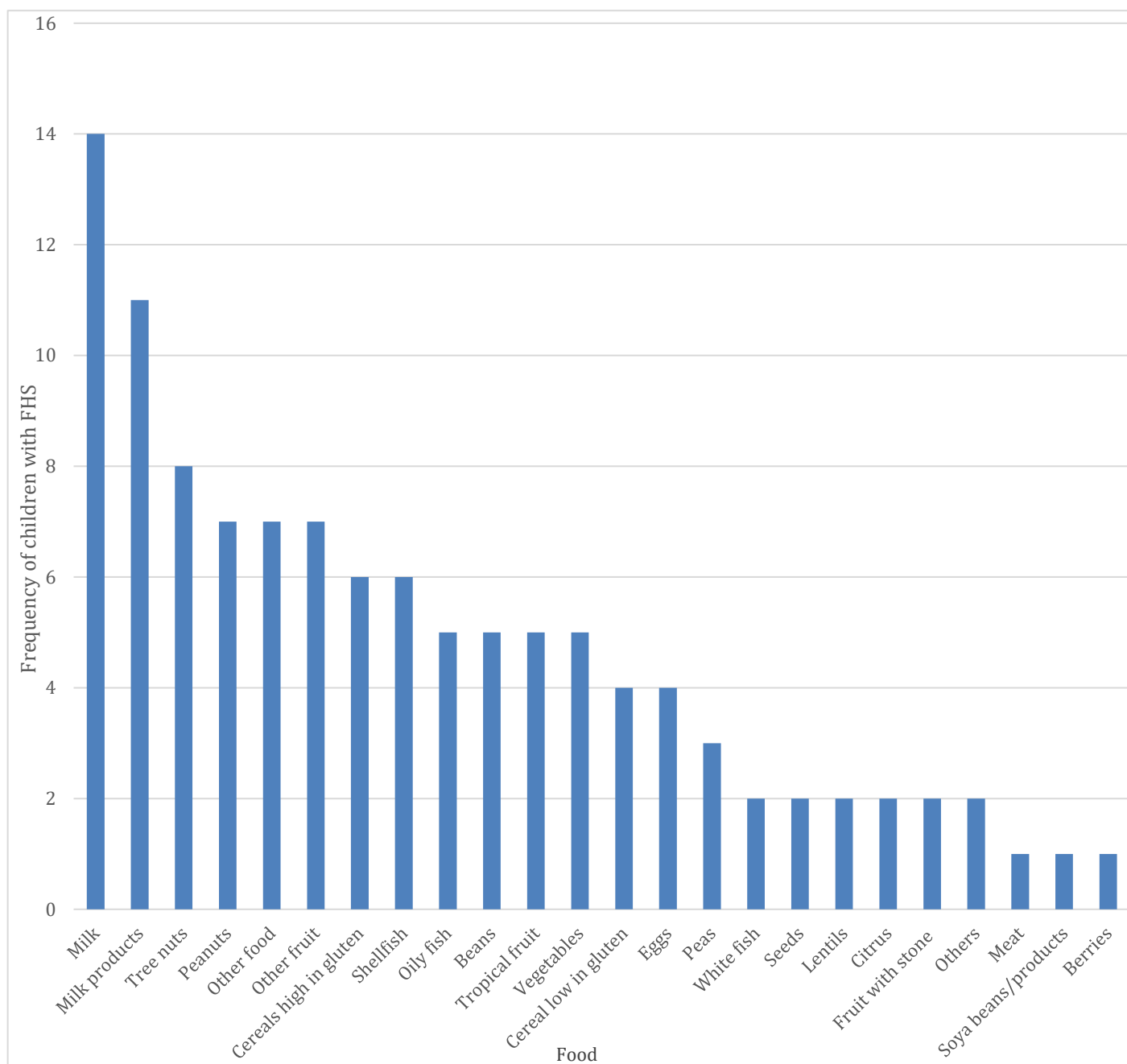
decided to participate in the study were asked to provide the number of Year (Grade) 1 students or equivalent (aged 5-to 6years), who have reported food hypersensitivity on the mandatory Health Information Sheet provided by the school at the beginning of the scholastic year.

The participant schools were then provided with letters of invitation, participant parent information sheets and questionnaires to be distributed to the parents who had reported food hypersensitivity. Figure 2 shows a flow chart for the methodology followed in this study.

**Figure 2** Study flow chart.



**Figure 3** Frequency of food causing hypersensitivity in the 5-to-6-yr-old group.



The questionnaire used for this study was validated by using past research on parent reported food induced hypersensitivity. All communication with parents including the questionnaires, was provided in both English and Maltese in order to facilitate understanding. This should have increased the rate of questionnaire content understanding.

All questionnaire data was entered into SPSS Version 22, where percentages were used to

calculate the overall prevalence of food hypersensitivity in Malta, whilst frequencies were used to calculate the number of children showing hypersensitivity to each questioned food.

## RESULTS

A total of 42 schools (50.6%) accepted to participate. This included 48% of the state,

59% of church and 45.5% of private schools. The cohort of students from participant schools was 2,042 tallying to 46.1% of the total Year 1 population in Malta for the scholastic year under study. School administration from the participating schools reported a total of 52 food hypersensitivity cases. This indicates a 2.5%-point prevalence for food hypersensitivity in the 5-to 6-yr-old population. Out of the 52 cases, 36 (69%) questionnaires were completed and returned by the parents. The sample of reported students with food hypersensitivity included 21 (58.3%) boys and 15 (41.7%) girls.

When it comes to the main food causing hypersensitivity in the 5-to 6-yr-old sample, milk and milk products were the main causes, affecting 14 (38.9%) and 11 (30.6%) participants respectively, followed by tree nuts affecting 8(22.2%). Peanuts, other fruit and the 'other food' category all showed a prevalence of 19.4%. The prevalence of food hypersensitivity for the various food included in this study is shown in Figure 3.

When asked how much of the food causing hypersensitivity can the child tolerate before a reaction is observed it resulted that 20 (55.6%) of the students could not have any of the food causing hypersensitivity.

**Table 1** Frequency and percentage of children showing different levels of reaction when exposed to the food causing hypersensitivity

Level of reaction to food	Number of children	Percentage of children (%)
Swollen lips, face, eyes	10	27.8
Itchy or tingling mouth	6	16.7
Hives (allergic urticaria) or Itchy skin rash	9	25
Eyes symptoms	1	2.8
Atopic rash or worsening of atopic skin (infantile/atopic eczema)	11	30.6
Itching in the outer ear	1	2.8
Anal rash or itching	5	13.9
Hoarse voice, difficulty swallowing, swollen tongue	4	11.1
Difficult or noisy breathing, wheeze or persistent cough	7	19.4
Nausea or vomiting	10	27.8
Diarrhoea	6	16.7
Persistent dizziness / pale or floppy	3	8.3
Suddenly sleepy or collapse	6	16.7
Unconscious	1	2.8
Tummy Ache	1	2.8
Other swollen body parts	1	2.8

Note: Percentage values do not add up to 100% due to the possibility to choose multiple responses from the questionnaire.

In order to obtain feedback on the level of reaction these children have to the hypersensitivity causing food, the parents were asked to mark the reactions observed when the child was exposed to the food. Table 1 shows the frequency of children showing different levels of reaction when exposed to the food causing hypersensitivity.

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## DISCUSSION

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The 2.5 %-point prevalence of food hypersensitivity at school entry in Malta has been found to be equivalent to the prevalence in a study by Venter et al.<sup>6</sup> on the Isle of Wight, following food challenge and/or suggestive history. These two studies have various similarities in that both include a study on an island, both research the prevalence at school entry where the target population was approached via schools, and all the schools on each island were invited to participate. Other studies with similar prevalence include those in Tampere, Finland by Jarpenpaa et al.<sup>10</sup> and Kallio et al.<sup>11</sup>, where a parent reported point prevalence of food hypersensitivity to basic food of 2.5% and 2.7% were reported respectively. Like the Maltese study, these researches were also carried out on first graders.

Whilst the prevalence in this study focused on a specific age group, the putative rather low food hypersensitivity prevalence in Malta is worth speculating. As an island in the middle of the Mediterranean where locals traditionally follow a Mediterranean diet, this diet could be offering protection against hypersensitivity. Yet with the relatively recent added incorporation of a vast range of international foods into the Maltese diet, the protective effect of the Mediterranean diet in Malta could still be questioned.

A hypothetical protective factor for a low rate of hypersensitivity in Malta could be the early introduction of certain food during weaning. Maltese research by Buttigieg, Townsend-Rocchiccioli and Ellul<sup>12</sup> on maternal awareness of health promotion in preschool children, has revealed early introduction of food. In fact, a study by Toit et al.<sup>13</sup> has shown how the rate of peanut allergy in Jewish 4-to 12-yr-olds living in Israel and consuming peanut through traditional snacks from the first weaning months is 0.12%, compared to 2.05% for Jewish children in the same age group living in London and exposed to peanuts at a later age.

Another hypothetical protective factor is genetics. Since Malta is an island the rate of immigration could be relatively low, resulting in a lower rate of introduction of genes from other populations possibly responsible for food induced hypersensitivity.<sup>14</sup> Hence whilst the Maltese paediatric population could be already exposed to environmental factors known for triggering food hypersensitivity, genetic susceptibility<sup>15</sup> together with the traditional early introduction of basic food<sup>12</sup> could be putative causes for the lower rate of hypersensitivity on the island when compared to international levels.

When it comes to the main food that causes hypersensitivity, similarly to most other European and non-European countries, cow's milk followed by milk products, were found to be the main cause of hypersensitivity in Malta. Yet when it comes to another Mediterranean country, Greece, eggs and 'other food' category were the main foods causing hypersensitivity in a 2007 study by Steinke et al. In Italy research by Caffarelli et al.<sup>16</sup> shows eggs as the second most prevalent food causing hypersensitivity whilst in Malta eggs were reported as the seventh food causing heightened reaction.

Hypersensitivity to peanuts and nuts in Malta is higher than that resulting from studies in Europe by Nwaru et al.<sup>17</sup> and Steinke et al.<sup>5</sup>. Since these food groups have been part of this country's culinary culture for years, their high hypersensitivity prevalence seems puzzling. What could be the cause of such a high prevalence is the increased promoted use of nuts and peanuts in the main dishes due to the introduction of dishes from other countries, which together with the traditional amounts used, could be exposing children from a younger age to a much higher level of these food groups.

Based on the hypothesis that early introduction of food allergens lowers the risk of food allergy, since the Maltese study by Buttigieg et al.<sup>12</sup> does not refer to peanuts and nuts as food groups introduced before 12 months, the late introduction of such food in Maltese children's diet could also be another factor for peanuts and nuts to be reported as top foods causing hypersensitivity.

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### CONCLUSION

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What makes this study unique in the field of food hypersensitivity is the small size of the island Malta, where all the schools in this country were invited to participate. In addition, half the schools in Malta have participated in this study and they were evenly distributed around the island. Besides, the number of invited participants and the cohort participating in the Maltese study are amongst the highest when compared to all reviewed research on prevalence of reported food hypersensitivity in the paediatric population. In addition, the prevalence for parent reported hypersensitivity was based on communication with school administration about the reported cases on the Health Information Sheet rather than on returned questionnaires. Hence it can

be stated that the prevalence reported is a realistic outcome of the national food hypersensitivity prevalence in the age group studied.

The perceived food hypersensitivity in the age group under study can also be considered as a close measure of the demand for a hypersensitivity clinic in the paediatric population, which could be also applied to the whole Maltese population.<sup>5</sup>

A food hypersensitivity clinic should include a multidisciplinary approach which incorporates the clinical aspects which tests and analyses the hypersensitivity, the nutritional side which guides patients and their families with adjusting to a diet without the hypersensitivity causing food, and the psychological support to socially cope without the hypersensitivity causing food whilst dealing with possible anxiety especially resulting from IgE-mediated anaphylactic reaction risk.<sup>8</sup>

Whilst research in therapy that assists patients outgrow their food hypersensitivity is advancing, it would be beneficial to have local research in this field. This could include work on oral immunotherapy case studies followed by protocols which assist patients with allergies to outgrow their hypersensitivity.

As an outcome of this research, the Maltese Education division and all the participating schools have been provided with safety recommendations that not only will contribute to safeguarding the health of children with food hypersensitivity in Maltese schools, but will also provide the school management team, teachers and support assistants with the much needed strategies when faced with food hypersensitivity cases.

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