

The Prevalence
of
Symptoms of Constipation
in
an Irish school-aged population

A dissertation prepared during studies for the MSc. in Community Paediatrics

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“Man should strive to have his intestines relax all the days of his life.”

Moses Maimonides. AD 1135-1204

“A good set of bowels is worth more to a man than any quantity of brains.”

Josh Billings (Henry Wheeler Shaw), AD 1818-1885

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Introduction

“In a rural community in Ireland, 600 parents of children who attend primary school completed a questionnaire about their children’s bowel habits in May 2003, which concluded that 12% of the surveyed children were constipated during the preceding 4 weeks.” At first glance a statement like this might appear clear, but it requires closer inspection in order to judge the meaning and accuracy of this conclusion. The following dissertation will explore this by reviewing the available literature on studies done on the prevalence constipation in childhood and outline the details of how the study was performed and the results it produced. The dissertation will conclude with an interpretation of the results of this study in light of the literature studies done and present suggestions for future studies on this subject.

Nick van der Spek,

September 2003

The Prevalence of Symptoms of Constipation in an Irish school-aged population

PART I

THE THEORIES OF DIAGNOSING CONSTIPATION IN CHILDREN

1.1 Background to the study and outline of the dissertation

It is my subjective opinion that I don't have to open any reference book or article, to know that constipation is encountered frequently in general paediatric practice, because I see children suffering from this distressing medical problem in the hospital wards and clinics on a daily basis. I honestly believe most paediatricians share this opinion. There is growing consensus amongst Paediatricians with and without a special interest in bowel pathology, about the medical treatment of constipation, including the role of dedicated constipation clinics for children. After my arrival in Cavan General Hospital as Consultant Paediatrician in May 2002, I drew up plans for the development of such a constipation clinic for the children of the counties of Cavan and Monaghan in the Republic of Ireland. One aspect of this service development was to estimate the number of children who were expected to attend this clinic. To make a reliable prediction of this number, I needed several data including the prevalence of childhood constipation in the community. The prevalence of a disorder in the local population would also be helpful to determine the pre-test probability of any child walking into the clinic of having the condition in our local population. To know the pre-test probability of constipation could help making clinical decisions about diagnosing constipation. Because an initial quick search in the literature for prevalence figures did not reveal any reliable data, I decided to conduct a survey among a sample of the local childhood population to establish the prevalence of childhood constipation in our community.

Based on an initially brief literature search, my own clinical experience and the need to get results over a short period, I made the decision to design a 3 page postal questionnaire containing questions, which looked for some demographic data and self-reported constipation as well as a variety of symptoms indicating constipation. The questionnaire was distributed amongst parents of children attending 5 non-randomly chosen local schools. Predetermined diagnostic criteria, designed by our own Paediatric Team showed that when the data from the completed questionnaires were analysed, that about 12% of the children were constipated. Only after I conducted the study, I looked critically at the result of 12% and tried to determine exactly what conclusions I could draw from this. I then came up against a number of important questions, which required a further and more detailed literature study.

Two of these questions were:

1. What is the best method to identify a large number of children with constipation in the community?
2. What is the gold standard test to confirm a diagnosis of constipation in a child?

The above introduction forms the essence of my dissertation and will consist of:

- A. Details of a literature review, trying to answer the above two questions.
- B. Description of my prevalence study: methods and results.
- C. Discussion of the study and suggestions for other prevalence studies.

1.2 Considerations

There are many different ways of trying to determine how common childhood constipation is in our local population. I could have retrospectively counted the number of codes recorded in our hospital in-patient database for children with an existing and newly made diagnosis of constipation compared to all childhood admissions. This might have given me an impression of how frequent constipation would be in the population of children admitted to our hospital. Although no paediatric data are published, if you rely on adult data, the primary or secondary adult discharge diagnosis in the USA represents only a small fraction of patients discharged from hospital, which correlates poorly with data from the National Health Interview Survey, which gives a 2% prevalence of self-reported frequent constipation in the community ¹.

Prospectively or retrospectively counting the number of children with e.g. a newly made diagnosis of constipation or new referral with constipation in our paediatric clinics might have given me the incidence of this disorder in our general paediatric clinic population. A large number of articles which deal with constipation ²⁻²², refer to a non-substantiated claim by Loening-Baucke made in 1993 that 3% of visits to the Paediatric Outpatient Clinic in the hospital she works in - the University of Iowa Hospital - have a (not defined) diagnosis of constipation ²³. A similar figure of 3% is quoted for children, who were diagnosed with encopresis between 1972 and 1974 in a large general paediatric clinic in Boston – the Children’s Hospital Medical Centre ²⁴. As detailed later in this dissertation, figures quoted for the prevalence of constipation in children in the community are said to be 3 to 10 times higher than this reported 3%.

Because the case definition, the characteristics of the population from which the cases were taken as well as the case ascertainment play such an important role in the quality

of the found prevalence or incidence figure, looking at the hospital population as suggested above would unlikely have been a good reflection of what is out there in the community.

1.3 A screening test for constipation?

The ideal way to find out the exact prevalence of childhood constipation in the community is to test every child in a defined population on one day, with the gold standard tests for constipation. As a practical compromise I planned to apply a reliable and simple test on a sample of the representative sample of the population to get an estimated figure. To identify which test to use for the study, it is useful to consider this test to have similar characteristics of a tool used for screening a population for a disorder. Screening however is defined as, *“The systematic application of a test or inquiry, to identify individuals at sufficient risk of a specific disorder to warrant further investigations or direct preventative action, amongst persons who have not sought medical attention on account of symptoms of that disorder”*²⁵, and is a process and very different from only establishing the prevalence of the disorder.

Nevertheless, my working theory is that you should be able to estimate the prevalence of constipation in a defined population by using a “screening” test for constipation on a sample of that population in the community. I therefore first looked at the criteria for a good screening test to help deciding on the test method of estimating the prevalence of constipation in children.

The screening test criteria are ²⁶:

1. The test should be simple, safe, precise and validated.
2. The distribution of the test values in the target population should be known and a suitable cut-off level defined and agreed.
3. The test should be acceptable to the population.
4. There should be an agreed policy on further diagnostic investigations of individuals with a positive test result and on the choices available to those individuals.

1.4 Diagnostic and Screening Test for Constipation

To decide on the most appropriate “screening” test, I did a literature search to find all available tests for diagnosing constipation in children, and determine which of those might fulfil the requirements of a screening test for the proposed prevalence study:

1. To be practical enough to use as a screening tool (point 1: *simple and safe*);
2. To be precise and validated to identify constipation accurately and reliably in children in the community (point 1: *precise and validated*);
3. To be able to clearly classify all tested children as either constipated or non-constipated (point 2: *to have a defined and agreed cut-off of the test values*), which require a clearly defined and agreed definition of constipation.
4. To be acceptable to the study population (point 3: *The test should be acceptable to the population*).

In relation to the other criteria in point 2 “*The distribution of the test values in the target population should be known*” it would be very difficult to fulfil this because this is in essence establishing the prevalence of the disorder and could therefore not be a prerequisite of studying the prevalence of the disorder in this case.

The last point in relation to the policy about further diagnosis is not relevant as individual diagnosis and treatment was not the aim of this study, but could be of clinical relevance in the future.

Diagnostic testing methods: To find all available tests to identify constipation in children, I did the following search on PubMed (on-line version; 1966 – June 2003): constipation, classification, diagnosis, epidemiology, etiology, prevention, control, radiography, radionuclide, imaging, ultrasonography, screening, questionnaire, test, prevalence with Limits: All Child: 0-18 years. The Boolean AND and OR operators were used to combine these terms as appropriate. **Table 1** summarizes the result of all diagnostic testing methods identified in 1652 abstracts of 2157 articles that come up following the above PubMed search.

None of the methods in table 1 establish an actual diagnosis of “Constipation”. The bulk of all these tests (B, D, E, F, G, H) provide either information about the severity of an aspect of constipation or examine a possible organic cause of the constipation or are helpful in guiding the best therapy. Some physical findings (as mentioned in Group C) or the plain abdominal radiograph (measuring faecal retention) or the tests which establish bowel transit times and in some situations the anal manometry tests can provide support for a symptom-based diagnosis of functional constipation. For instance colonic transit time with radio-opaque markers can give an objective evaluation of bowel movement frequency or colonic scintigraphy, which can “confirm the symptom of constipation” if history is not reliable. For adults, reference values are available for some of tests outlined in table 1, but are generally very scanty for children and are not practical for use in the planned prevalence study.

Table 1 – Diagnostic test methods for Constipation (Medline search result)

A. History: to make a diagnosis or establish the severity of constipation:
- Parent completed / Self administered postal Questionnaire
- Semi-structured Clinical Interview
- Psychometric self-assessments: PAC (QOL+SYM); KESS; CCS
B. History: to identify an organic cause or sub-group of constipation:
- Parent completed postal Questionnaire
- Semi-structured Clinical Interview
- Psychological assessments
C. Physical examination: to support a diagnosis of constipation:
- Abdominal examination including rectal examination and inspection of perineum and perianal area
D. Physical examination: to identify an organic cause or sub-group of constipation:
- Anal position or anogenital index; Spine and neurological system; Dysmorphic features; Dermatoglyphics
E. Bowel function / Physiologic tests:
- Colonic and Anorectal Manometry (<i>incl. thresholds for Recto anal inhibitory reflex, Recto rectal reflex and Conscious Rectal Sensitivity and Maximal Rectal Tolerable Pressure, Volume and Compliance</i>)
- Total Gastro-Intestinal and Colorectal Transit Time (using radiopaque markers or scintigraphy)
- Retrograde colonic washout with a scintigraphic technique
- Cinedefecography and Fluoroscopic x-ray or Magnetic Resonance (MRI) defecography
- Fecoflowmetry with saline enema (REF141)
- Scintigraphically determined evacuation fraction (EVF)
- Rectal mucosal blood flow (with laser Doppler flowmetry)
- Nerve and muscle testing: Electromyography, Pudendal nerve latency, Cerebrospinal evoked potentials legs and anal canal.
F. Imaging of anatomy:
- MRI: Pelvic and Hydro-MRI of abdomen
- Colono-Proctography
- Plain abdominal radiography and Lateral radiographs of the rectum and anus
- Irrigography
- Ano-endo-rectal ultrasonography
- Barium enema
G. Blood or biochemistry tests:
- Breath methane testing
- Thyroid function tests, Calcium and Lead levels
- Chromosomes
H. Immuno-histo-chemistry and immunofluorescence testing on colonic or rectal muscle biopsy:
- Acetyl cholinesterase (AchE) activity
- Antibodies to Substance P or vasoactive intestinal peptide (VIP)
- Distribution of Interstitial cells of Cajal

The tests and test methods mentioned in B, D, E, F, G, H of table 1 neither are able to serve on their own to diagnose constipation, nor are they suitable as a “screening test” to pick-up constipation in the community because these tests are not *precise and validated* to detect constipation in isolation from the symptoms. Apart from not being able to identify constipation accurately and reliably in children in the community, in relation to the tests B to H:

- These tests are not *simple and safe*, and
- None of *the test values have a defined and agreed cut-off* for constipation, and
- I would expect these tests not to be *acceptable to the population* for screening purposes.

1.5 Symptom based diagnosis

If laboratory test can't diagnose constipation, can constipation be diagnosed without such tests? Drossman et al. in “*The Functional Gastrointestinal Disorders*”¹⁸ explains that constipation with normal laboratory tests and without an organic cause as outlined above is called Functional Constipation. This disorder is common in both children and adults and constitutes only one of the many Functional Gastrointestinal Disorders. The Functional Gastrointestinal Disorders have probably existed throughout recorded history but have not been not categorized as diseases, because test results were normal and causes could not be found. The first report of a functional Gastro Intestinal disorder was published 180 years ago by Robert Powell, in “*On certain painful afflictions of the intestinal canal*”²⁷. Apart from very scanty publications in the mid-1900s since, these functional disorders received little attention until the 1970s. Since then the Functional GI disorders have received significant attention, which is still growing. In adults particularly Irritable Bowel Syndrome as

well as Functional Constipation are common and troublesome conditions. Drossman et al. in *The Functional Gastrointestinal Disorders* outlines a wide range of different Functional Disorders in adults and children. See **APPENDIX 1**.

Drossman et al ¹⁸ states that **Functional gastrointestinal disorders are defined as conditions in which a variable combination of chronic or recurrent gastrointestinal symptoms are present in the absence of demonstrable – organic - disease. A diagnosis is reached when the criteria of a symptom-based definition are fulfilled.** The definitions of these disorders are still evolving and there is no worldwide consensus yet. A multinational group established some level of consensus about most adult functional gastrointestinal disorders in Rome in 1993 (Rome I criteria), and modified them and added some paediatric definitions to it in 1999 (Rome II criteria). In *The Functional Gastrointestinal Disorders* ¹⁸ Drossman et al explains all the Rome II consensus reached conclusions.

Other groups have been working on their own definitions as well like Hyams et al ²⁸ while many individual experts stick to their own definitions. They all agree however that functional GI disorders like “constipation without organic cause” (Functional Constipation) is a disease entity. Hyams ²⁹ states “*We make a diagnosis based on symptoms, not on demonstrable abnormalities in physical examination or laboratory tests. A number of common pediatric diagnoses fall into this category, including infant regurgitation, chronic non-specific diarrhea, irritable bowel syndrome, non-ulcer dyspepsia, infant dyschezia, and **functional constipation**. There may indeed be physiologic abnormalities underlying the symptoms, but at the present time we are unable to detect them*”.

The ideal test - “Gold standard” test - for Functional Constipation is therefore not a laboratory test, but based on a combination of chronic or recurrent symptoms of constipation, as can be detected by means mentioned in Group A of table 1. To determine which of these constipation symptoms constitutes a diagnosis of Functional Constipation, the right definition of constipation has to be found first.

1.6 The search for a definition of constipation

An initial literature search done on PubMed, 1966 – June 2003 for **Constipation AND symptom AND (definition OR criteria)**, identified initially 56 articles (with abstracts), where 8 contained a definition: 3 for *Functional Constipation* in adults; 1 for *Chronic Constipation* in adults; 2 for *Constipation* in children and 1 for *Functional Constipation* and 1 for *Faecal Retention with Soiling* in children. See **APPENDIX 3**.

A further literature search done on PubMed, 1966 – June 2003 for **Constipation AND (prevalence OR incidence OR frequency)**, showed an initial 1717 articles (1609 with abstracts), which resulted in 35 adult studies of prevalence of constipation. After reading the abstracts, 11 articles made direct reference to a definition of constipation and were reasonably easy to obtain from the available libraries. After reading the articles and cross-referencing, an additional 8 articles were obtained, giving a total of 19 adult original articles, which were studied.

It also identified 6 articles, which examined the prevalence of constipation in children. All articles were obtained and studied. The same search (but limited to child) was also run on a Latin-American database called LILACS³⁰ (= Literatura Latino-Americana e do Caribe em Ciências da Saúde, which can be accessed on <http://www.bireme.br/bvs/P/pbd.htm>). This search identified another 4 articles of

prevalence of constipation in children. After studying the 10 identified articles and the adult articles and the review articles following searches, an additional 12 articles were found with details about the prevalence of constipation in children (of the total the published 22 articles, 21 were obtained). The details and results of the relevant studies of the obtained articles, which examined the prevalence of constipation in adults and children are summarised in **Tables 2a and 2b** on pages 22 to 25.

Additional definitions were taken from several review-articles or from books which were identified during the previous two and subsequent searches or during cross-referencing of articles. A further 18 definitions in children were identified which had not been mentioned in the above searches. See **APPENDIX 4**.

Further details of the methodologies of the Prevalence studies, as well as the reported prevalence figures (as per three types of definition of constipation: Self-reported, Symptom-based and Consensus definition) are summarized in the two tables. Table 2a gives an overview of the adult studies and table 2b for the children's.

The prevalence studies and the review articles about constipation identified above, highlighted the following issues in relation to determining the definition of Functional Constipation in children – the required ideal test needed to determine the prevalence of constipation in a community based childhood population:

1. In the older articles, self-reported constipation (asking the patient: “Are you constipated?”) was more common, but over time a more symptom-based definition was agreed upon.
2. The symptom-based definitions differed considerably between:

- a. All the identified articles, in relation to the number of symptoms included as well as the clarity of the symptoms and extent to which the duration, quantity and quality of the symptoms were specified.
 - b. The type of article studied (e.g. prevalence study, review article, diagnostic studies, treatment study, descriptive study about normal bowel habits etc.)
 - c. Adults and children.
3. Some consensus (South American Group, NASPGN, Rome II, Academic Medical Centre definitions are mentioned, but they don't agree with each other. See **APPENDIX 5** for details.
 4. Recent adult prevalence studies mention the Rome consensus criteria, but none of the children prevalence studies use a consensus definition.
 5. The following names for Functional Constipation in children are used:
 - a. Constipation
 - b. Chronic Constipation
 - c. Functional Constipation
 - d. Faecal Retention.
 6. The prevalence figures of constipation vary greatly for both adults and children.
 7. The different prevalence studies are difficult to compare because of great variability in not only the case definition and name used for Functional Constipation but also the methodologies in relation to differences in:
 - a. Sample Selection methods.
 - b. Population sample characteristics.
 - c. Age of population both for adults and children.
 - d. Country: Particularly Brazil is over represented in the children's studies.

1.7 Conclusions about the definition of constipation

In order to decide on the most appropriate set of symptoms to use for the definition of the planned prevalence study in Ireland, taking into account the above outlined multitude of differences between the identified definitions, I isolated those studies, which only involved:

1. The establishment of the prevalence of non-organic constipation in children.
2. The use of a pure symptom-based definition of constipation, excluding therefore those studies, which relied wholly or partially on laboratory tests (e.g. X-rays) or signs found on physical examination (e.g. signs of faecal retention).

The details of the isolated studies are summarized in **table 2c** on page 26. For additional methodological details of these studies see table 2b. The 15 publications are actually based on 12 original studies and are ordered in table 2c by the value of the established prevalence figure. It also displays a column, which represents a value for the number of symptoms used in the definition, reflecting the width of the definition. **This gives the impression that the wider the definition used, the higher the prevalence figure.**

The conclusions drawn from those 15 studies incorporating 12 definitions are:

1. The symptom of infrequent bowel movements was used in the definition of most studies. “Less than 3 bowel movements per week” appears to be an acceptable cut off point.
2. Hardened consistency was used in most studies. Either the description “Hard stool” or “scybalous stool” was used most commonly. Neither was defined

³¹ and 50-100% ³² of the bowel actions and once a week ³³.

3. “Discomfort during a bowel movement” was considered an important feature of Functional Constipation in children but clarity about which type of discomfort was most important was lacking. “Pain” and “straining” were the most unambiguous symptoms and were commonly mentioned. Difficulty passing stool was rather defined unclear but often used.
4. Other symptoms were mentioned uncommonly, including soiling, blood per rectum and incomplete emptying.
5. Most studies defined constipation by having a number of single symptoms, e.g. “Less than 3 stool per week” or “Passing hard stool” etc. Some definitions required a combination of single symptoms, e.g. “Hard and Painful stool” to be labelled as having constipation.

The selected definitions showed wide variation and it was very difficult to “pick and mix”. However, Functional Constipation as defined by Drossman et al in Rome II criteria of 1999 ^{8;18}, which is a consensus based definition, seemed to cover most of the relevant symptoms as I identified them in the 12 definitions used in Table 2c.

I therefore conclude that the Rome II criteria for functional constipation in children is currently the most appropriate definition to be used when estimating the prevalence of constipation amongst school-aged children.

1.8 The Rome II criteria for constipation in children

Text box 1: The Rome II criteria for constipation in children

The Rome II criteria	
FUNCTIONAL CONSTIPATION (G4b)	
Definition:	In infants and children, at least two weeks of: <ol style="list-style-type: none">1. Scybalous, pebble-like, hard stools for a majority of stools OR2. Firm stools, passed 2 or less times per week <p style="text-align: center;">AND</p> <ol style="list-style-type: none">3. There is no evidence of structural, endocrine or metabolic disease. <p><i>“These diagnostic criteria were reached by consensus of experts based on experience rather than by data analysis and the applicability of these criteria need to be determined in the near future by epidemiological community based studies as well as populations to be at risk.” See page 569 of reference 18 .</i></p>

*(All the four Functional disorders of defecation in children as defined in the Rome II criteria are outlined in **APPENDIX 2**.)*

In the Rome II definition, the term *majority* is not clearly defined, but assumed to be >50% of the bowel motions. However, in those studies, which specified the frequency of these symptoms, 25% has been most commonly used. In the adults Rome II definition, 25% has been used as well.

The symptom of straining or the inclusion of any other variable to reflect discomfort is not part of the Rome II definition of constipation in children, in contrast to the 11 out of 12 of the prevalence studies (see table 2c) as well as the adult Rome II criteria.

Interestingly, the term Chronic Constipation is not used in the Paediatric Rome II definitions Functional Gastrointestinal disorders. If the constipation is long standing (> 2weeks) and there is no retention it is still called “Functional Constipation”; if “Functional Constipation” has also signs of retention it is called “Functional Faecal Retention.”

In 1993 the first definitions of Functional Gastrointestinal disorders were established. In 1999, the Rome II criteria improved standardisation for adults and included the Paediatric Functional Gastrointestinal disorders. However, 4 years on there are no published paediatric studies yet which use this definition.

1.9 Finding the symptoms to fulfil the symptom-based definition

After having identified that a diagnosis of constipation is made based on a defined combination of a number of symptoms, the final requirement is to be able to diagnose an individual child with constipation reliably by eliciting those symptoms in the child. There are no studies, which compare different ways of doing this, to inform us what the best method of eliciting those symptoms is.

The most comprehensive way (“Gold Standard”) would be to meet the child and parent and to ask them both all the Rome II or other symptoms. This can be done in a **free or structured interview** where the answers can be collected in the form of a questionnaire or other standard manner of collecting data. A subsequent physical examination would be recommended to confirm a diagnosis of constipation (as mentioned in the G4b Rome II criteria). The physical signs you should look for however are predominantly those, if found, would lead to a different diagnosis (Functional Faecal Retention).

Another method of finding the symptoms, more for larger numbers, is by **postal questionnaire**. This requires extra skills from the respondent but has the advantage of reaching a larger audience. This method has been used successfully in several adult prevalence studies ³⁴⁻⁴³, where the validation process proved that it was a reliable method. In children studies this has been used less frequently; most using an interview. Only 4 prevalence studies in children employed the parent completed postal questionnaire method. Two of them asked for self-reported constipation only ^{44;45}, while of the other two studies, one was an enuresis study ⁴⁶ only asking for the bowel frequency, while the other study was a bowel clinic follow up study ²³, but where a symptom based definition of constipation (soiling and bowel frequency) was used. None of those studies examined the validity, reproducibility or reliability of the questionnaires, which is an essential requirement if any test, whether used for diagnostic or screening purposes.

1.10 Answers to the two questions

Earlier in Part I asked two questions:

1. *What is the best method is to identify a large number of children with constipation in the community?* I conclude that a validated questionnaire or structured interview which uses the consensus Rome II symptom-based definition of Functional Constipation, as the best method to do this.
2. *What is the gold standard test to confirm a diagnosis of constipation in a child?*
The gold standard test to confirm a diagnosis of constipation is a direct interview with the child and parent, followed by a physical examination of the abdomen and anus, looking for signs of faecal masses or signs to support the passage of large stool.

Table 2a. Definition of constipation in 19 published studies, which determined the prevalence of constipation which include adults:

Pub Year & Author (Year of study)	Country	Study details						% Constipation		
		Name used	Data Collection method	Population (n)	Age (years)	Selection procedure	Response Rate (%)	Self-reported	Symptom based	Consensus definition (origin)
1987, Sandler ⁴¹	USA	Constipation	Postal Questionnaire	1,128	Young adults	Non-random	80%	7.3	x	x
1989, Sonnenberg ¹	USA	Constipation	Diagnosis Register	Nation wide	All ages	Doctor visits	Not stated	1.2	x	x
1989, Sonnenberg ⁴⁷	USA	Frequent Constipation	4 National surveys	Nation wide	All ages	Random households	Not stated	2.0	x	x
1989, Everhart ⁴⁸ (1971 - 1975)	USA	Constipation	Interview questionnaire	11,204	24 - 74	Random households	Not stated	20.8% (women) 8.0% (men)	x	x
1993, Talley ³⁷	USA	Functional Constipation	Postal Questionnaire	1,021	30 - 64	Random	82%	12.5	19.2	x
1993, Drossman ⁴³	USA	Functional Constipation	Postal Questionnaire	5430	>18	Random households	65.8	x	x	3.6 (Rome I)
1994, Agreus ⁴² (1988)	Sweden	Constipation	Postal Questionnaire	1,290	>18	Random	89.6%	8.0	x	x
1998, Han ⁴⁹	Korea	Constipation in Spinal Injury	Interview	72	>18	Selective (spinal injury patients only)	Not stated	62.5	x	x
1998, Marshall ⁵⁰	Ireland	Constipation in pregnancy	Interview Questionnaire	7771	Young women	Selective (postnatal)	Not stated	9.6 – 16.2 (Primi - Multi)	x	x
1998, Ho ⁵¹	Singapore	Chronic Constipation	Interview questionnaire	706	2 - 95	Random households	74%	x	3.9	x

Pub Year & Author (Year of study)	Country	Study details						% Constipation		
		Name used	Data Collection method	Population (n)	Age (years)	Selection procedure	Response Rate (%)	Self-reported	Symptom based	Consensus definition (origin)
1999, Stewart ⁵²	USA	Functional Constipation	Interview questionnaire	10,018	>18	Random households	53%	x	x	4.6 (Rome I)
2000, Chen ⁵³	Singapore	Chronic Constipation	Interview questionnaire	271	>16	Random households	70%	x	7.3	x
2000, Chiarelli ⁴⁰	Australia	Constipation	Postal Questionnaire	14,659; 13,910; 11,918	18 - 23; 45 - 50; 70 - 75	Random women 3 age groups	41; 37; 54	14.1; 26.6; 27.0	x	x
2001, Lynch ³⁵	New Zealand	Constipation	Postal Questionnaire	717	>18	Random population	48	4.9	x	x
2001, Pare ³⁶	Canada	Functional Constipation	Postal Questionnaire	1149	>18	Random population	57 (of the 19% who agreed to participate)	27.2	x	16.7 (Rome I); 14.9 (Rome II)
2001, Bytzer ³⁸	Australia	Functional Constipation	Postal Questionnaire	8657	18 -101	Random population	60	x	9.2	x
2001, Bohmer ⁵⁴ (1994-1996)	Netherlands	Constipation	Direct observation	215	6 - 80	Selective: IQ<50	Not stated	x	69.9	x
2002, Ferrazzi ³⁴	Canada	Functional Constipation	Postal Questionnaire + diary x 4wks	220	>18	Selective: GP diagnosed constipation	70.7%	x	x	37.3 (Rome II)
2002, Walter ³⁹	Sweden	Constipated - often/always	Postal Questionnaire	1610	31 - 76	Random population	80.5	5.7 (women); 2.1 (men)	x	x

Table 2b. Definition of constipation in 18 published studies, which contain the prevalence of constipation in children:

Pub Year & Author (Year of study)	Country	Study details						% Constipation		
		Name used	Data Collection method	Population (n)	Age (years)	Selection procedure	Response Rate (%)	Self-reported	Symptom based	Consensus definition (origin)
1971, Bakwin ⁵⁵	USA	Constipation	NR	676	NR	Selective: Twins	Not stated	x	8.7	x
1987, Issenman ⁵⁶	Canada	Chronic constipation	Interview	149; 74	22/12; 40/12	Random: Birth cohort	95; 94	16; 3	x	x
1988, Zaslavsky ⁵⁷	Brazil	Constipation	Interview Questionnaire	1005	0 - 12	Selective: OPD + poor	Not stated	x	36.5	x
1993, Loening- Baucke ²³	USA	Chronic Constipation	Postal Questionnaire	174	0 - 4	Selective: Constipation follow-up	52	x	37.0	x
1997, Maffei ³²	Brazil	Constipation	Interview Questionnaire	1145	7 - 17	Selective: School + poor	Not stated	x	28.8 (strict) 35.3 (soft)	x
1997, Motta ⁵⁸⁻⁶⁰	Brazil	Chronic Functional Constipation	Interview Questionnaire	536	0 - 2; 3 - 5; 6 - 11	Random	Not stated	x	21.8 18.3 14.7	x
1997, Berti ⁶¹	Brazil	Constipation	Interview Questionnaire	252	<18	Selective: OPD	Not stated	20.6	x	x
1998, Yong ⁴⁴	England	Constipation	Questionnaire	487	4 - 11	Selective Schools	43	34.0 (>6 months:5%)	x	x
1998, Aguirre ^{62,63}	Brazil	Constipation	Questionnaire + stool form chart	277	<2	Selective: Healthcare Unit	100	x	25.1	x

Pub Year & Author (Year of study)	Country	Study details						% Constipation		
		Name used	Data Collection method	Population (n)	Age (years)	Selection procedure	Response Rate (%)	Self-reported	Symptom based	Consensus definition (origin)
1998, Borgo ³¹	Brazil	Constipation	Questionnaire	57	0.5-3.3	Selective; Kindergarten	Not stated	x	24.6	x
1999, Araujo ³³ (1993)	Brazil	Constipation	Interview Questionnaire	391	8 - 10	Selective: 3 Schools	90%	x	28.0	x
1999, Roma ⁶⁴	Greece	Chronic Constipation	Interview Questionnaire	1975	2 - 14	Random population	Not stated	x	6.0	x
1999, Roma ⁶⁵	Greece	Chronic Constipation	Interview Questionnaire	1975	2 - 14	Random population	74.1	x	15.0	x
1999, Del Giudice ⁶⁶	Italy	Constipation	Interview Questionnaire	58	5.2 (mean)	Selective: Cerebral Palsy	Not stated	x	74.0	x
2001, Souza ⁶⁷	Brazil	Chronic constipation	Interview Questionnaire	Not stated	0 - 14; 0 - 2; 3 - 5; 6 - 11	Selective: OPD	Not stated	x	15.9 15.3 17.3 13.2	x
2002, Del Ciampo ¹⁴	Brazil	Constipation	Structured interview	313	1 - 10	Selective: Prim. Health Care Unit	Not stated	x	26.8	x
2002, Cayan ⁴⁶	Turkey	Constipation	Postal Questionnaire	5350	5 - 19	Selective: schools	82.3	x	2.2	x
2003, Proctor ⁴⁵	UK	Constipation	Postal Questionnaire	125	5 - 22	Selective: Constipation follow-up	61	36.0	x	x

Table 2c. Symptom-based Constipation Prevalence Studies (12 in 15 publications) per age group, ranked per number of symptoms used in the definition

No	Year and Study	No of Symp-toms	Symptoms used in the definition				% constipated				Duration of symptoms	Other/note		
			stool / week	Consistency/size	Discomfort	Other symptoms	0-12	0-2	3-5	6-12				
1	2001 ⁴⁶	1	< 3						2.2	For > 6 months	Turkey			
2	1999 ⁶⁴	2+	< 3	Hard +Painful					6.0	For > 2 months	Greece			
3	1974 ⁵⁵	3+	Infrequent +Hard +Painful						8.7	Consistent sympt.	USA			
4	1999 ⁶⁵	2+	< 3	Hard +Painful					15.0	For > 2 months	Greece			
5	2001 ⁶⁷	2/4	< 3	Hard	Painful; Straining				15.9	15.3	17.3	13.2		Brazil. 2 out of 4 sympt required
6	2002 ¹⁴	2/4		Hard (= cylindrical/ fragmented/pebbles)	Painful; Difficult	Faecal soiling	26.8			For > 1 month	Brazil. 2 major OR 1 major + 2 minor symptoms required.			
		3/4	< 4	Large stool	Delay	Blood								
7	1997 ⁵⁹ 1998 ⁶⁰ 2000 ⁵⁸	3+	< 3	Hard +Straining	Painful					21.8	18.3	14.7	> 1 month	Brazil
8	1998 ³¹	3	< 3	Hard; Scybalous						24.6			In >25% of defecations	Brazil
9	1988 ⁵⁷	4	< 3	Hard	Difficult	Incomplete emptying	36.5							Brazil
10	1999 ³³	4		Scybalous	Straining; Painful; Delay							28.0	Symptoms >1/wk	Brazil
11	1997 ³²	4		Scybalous	Straining; Painful; Delay							28.8	Always/ usually discomfort	Brazil
12	1998 ⁶³ 2002 ⁶²	7	< 3	Hard (essential); scybalous; cylindrical +cracks; large stool	Painful; Difficult					25.1				Brazil

The Prevalence of Symptoms of Constipation in an Irish school-aged population

PART II

THE STUDY OF CONSTIPATION IN CHILDREN

2.1 Aim

This study was a cross-sectional, descriptive study, with the aim to determine the prevalence of Functional Constipation in the school-aged population in a rural community in Ireland.

2.2 Methodology

The population was selected from five primary schools in and around the town of Cavan. Cavan is a rural town of approximately 6,000 people, in Ireland where Cavan General Hospital is situated. Cavan General Hospital is the only secondary level paediatric service for a local population of 110,000 people, living in a radius of approximately 45 kilometres around the hospital. (See appendix 9). Cavan General Hospital is the hospital where the author is based. The five schools were selected because staff members of the Paediatric Department of Cavan General Hospital had one or more of their children attending the school. The reason for this selection was that this was expected to aid the school's cooperation with the study. Some of the other schools located in more rural areas of the hospital's catchment area are smaller than the schools, which participated in this study. Otherwise the five participating schools appeared comparable to other schools in the area. Two schools were in the town of Cavan, while the other three schools were just outside the town in a slightly more rural setting. A total of 696 children were enrolled in the five schools at the time of the study in May 2003. Five children did not attend the week the children were

recruited for the study; so only 691 children were asked to join the study. The information about the characteristics of the bowel motions of the children was obtained by means of a questionnaire, which was completed by one of the parents with help of the child. The four-page questionnaire consisted of five sections (See appendix 11). Recommendations in relation to designing a questionnaire were used, in order to achieve a high response rate^{68;69}.

Section one asked for the child's age and gender and the parent's profession. Section two asked for the respondent's understanding of constipation (Q2a) and for Self-reported constipation in the child. Section three and four asked for the symptoms of constipation, on which a pre-determined symptom-based diagnosis of constipation could be made. A wide range of bowel questions was asked for based on other studies and several different definitions used in the literature. See the deliberations in section 1.5 to 1.7.

Section five looked for exclusion criteria for Functional Constipation, including underlying illness as well laxative use. At the end of the questionnaire the parents were asked to provide contact details only if they would agree to being contacted for additional questions in the future. The questionnaire was not validated at the time of writing this dissertation but this is intended at a later stage, which is outside the remit of this dissertation.

The questionnaire was modified following a pilot study of 20 parents. The questionnaires were given a code, to identify the school in which it was distributed. After obtaining verbal permission from the school management to distribute the questionnaires, every school secretary of the school received written instruction about the method of distribution and collection. The secretary was given a number of questionnaires equal to the number of pupils enrolled in the school plus a recorded number of extra copies. Every child present in the school received one questionnaire

on a Tuesday morning and they were told to give it to their parents to complete. Children who were absent that day received a questionnaire later if they returned to school that week. All the questionnaires were collected on the Friday, including the unused questionnaires. A second collection was held the following week. The school secretary sent the remainder of questionnaires to the Hospital if they were received more than two weeks after distribution. The questionnaire was provided in an envelope, which was marked on the outside with "*There is a questionnaire inside. Please complete and return to school in this envelope*". Every envelope was marked with an identification of the school. The envelope contained also a parent and patient information leaflet as can be found in Appendix 12. As the emphasis of this study was on the symptom-based prevalence of constipation, inclusion in the study of the prevalence did not depend on the completion of the questions in sections 1 and 2 and question 5c. If only one or less of the symptom questions was left unanswered, the questionnaire was still included in the study, because of the large number of symptoms available. A child was excluded from the study if the child had a medical condition, which could cause constipation See for a non-exhaustive list of such conditions **APPENDIX 7**.

After obtaining all the questionnaires, the available details and variables of the research questionnaire were fed into a Microsoft Access database. For statistical analysis, the data were converted into a Microsoft Excel Spreadsheet.

Following the detailed exploration of all the relevant definitions of constipation used in the literature, the author concluded on page 19 and 20 of this dissertation that the Rome II consensus criteria outlines the most appropriate definition of Functional Constipation in children. However the questionnaire's design, distribution and data

collection had already taken place before this final conclusion about the best definition was reached. Therefore I did not consider a child to have Functional Constipation based on the Rome II criteria for Functional Constipation as defined in Appendix 2, G4b, but on a – **pre-defined** - wider formulated definition as detailed in **textbox 2**. With the help of the stored data in the Access database, each subject was checked if they would fulfil the pre-defined constipation criteria or not.

Text box 2. Pre-defined Definition of constipation.

<p>DEFINITION OF FUNCTIONAL CONSTIPATION FOR THIS STUDY:</p> <p>Any child, as described on the parents' completed questionnaire, is considered suffering from Functional Constipation if he or she has experienced - on average over the previous four weeks - ANY OF the following 6 symptoms in combination with or without a number of MINOR Symptoms:</p> <ol style="list-style-type: none">1. Bowel frequency of one per week or less, OR2. Bowel frequency of twice or three times a week AND at least ONE of the MINOR Symptoms, OR3. Soiling once a week or more often, OR4. Soiling once a month AND at least TWO of the MINOR Symptoms, OR5. Using laxatives, OR6. Straining AND at least TWO of the MINOR Symptoms.
<p>MINOR Symptoms are:</p> <ol style="list-style-type: none">1. Cucumber size stool, OR2. Firm stool, OR3. Hard stool, OR4. Blood in/on stool, OR5. Straining, OR6. Abdominal pain, OR7. Bowel frequency every other day or less often, OR8. Soiling once a month or once a week.

Statistical analysis was performed using the analysis package of Microsoft Excel as well as manual calculations for the “Calculated approximation of the 95% confidence Intervals” when sample size (n) was larger than 75. To calculate the trend for prevalence of constipation (trend in a binominal proportion) for the different ages, the *Chi-square test for trend* was used.

2.3 Results

At the time of the study 696 children were enrolled in the five schools. The secretaries of the five schools received a total of 846 questionnaires; 155 returned unused and therefore 691 children were given a questionnaire. The total number of questionnaires returned from the parents was 596 after the 4-week collection period. This gives a crude response rate of all returned questionnaires of $(596/691 \times 100\%)$ 86.3%. After checking the provided data details and assembling the database, 583 questionnaires were satisfactorily completed to be included in the prevalence study. A total of 13 questionnaire were excluded it had more than 1 answer missing in sections 3 and 4 or Questions 5b or had a condition predisposing to constipation. Effectively, 583 out of 696 children provided useful data (83.8%). Only the Confidence Interval of the response rate of school D was outside that of the CI of all schools, indicating a significant difference of this school’s response rate ($p < 0.05$). **See table 3.**

The study population consisted of 303 boys (52.1%) and 278 girls (47.8%). 2 children didn’t have their gender recorded. The prevalence of constipation does not significantly differ between boys and girls ($p < 0.05$). **See table 4.**

The age distribution is shown in **table 5**. The age range was between 4 and 13 years.

Table 3: Response Rates per school and total with 95% CI.

School	<i>Enrolled in school</i>	<i>Enrolled in study</i>	<i>Returned Question- naire</i>	Response Rate	95% CI
A	125	124	104	83.9%	77.4% - 90.3%
B	166	166	143	86.1%	80.9% - 91.4%
C	93	92	75	81.5%	73.6% - 89.5%
D	168	166	161	96.9%	94.4% - 99.6%
E	144	143	113	79.0%	72.3% - 85.7%
Total	696	691	596	86.3%	83.7% - 88.8%

Table 4: Gender distribution of study population with gender specific prevalence of constipation (with 95% CI).

Gender	<i>n</i>	%	Constipated (per age group)		
			<i>n</i>	%	95% Confidence Interval
Male	303	52.1	41	13.5	11.8 – 19.5**
Female	278	47.8	31	11.2	8.9 – 16.3**
Not recorded	2	0.3	0	0	-
All	583	100.0	72	12.3	9.7 – 15.0**

*** Exact CI read from a table ⁷⁰

** Approximated CI, all requirements are all right: $n \times p$ lower limit ; $n \times (1-p)$ lower limit);
 $n \times p$ upper limit ; $n \times (1-p)$ upper limit) are all > 5 .

* Approximated CI calculated, but $n \times p$ lower limit < 5 , rest requirements OK.

Table 5: Age distribution of study population with age specific prevalence of constipation (with 95% CI).

Age (years)	n	%	Constipated (per age group)		
			n	%	95% Confidence Interval
4	8	1.4	0	0.0	-
5	69	11.8	12	17.4	9.3 – 28.4***
6	78	13.4	10	12.8	5.4 – 20.2*
7	97	16.6	13	13.4	6.6 – 20.2**
8	56	9.6	9	16.1	7.62 – 28.3***
9	63	10.8	7	11.1	4.6 – 21.6***
10	81	13.9	6	7.4	1.7 – 13.1*
11	55	9.4	5	9.1	3.0 – 20.0***
12	63	10.8	8	12.7	5.7 – 23.5***
13	10	1.7	2	20.0	2.5 – 55.6***
Not recorded	3	0.5	0	0.0	-
Total	583	100.0	72	12.3	9.7 – 15.0**

*** Exact CI read from a table (REF 164).

** Approximated CI, all requirements are all right: $n \times p_{\text{lower limit}}$; $n \times (1-p_{\text{lower limit}})$; $n \times p_{\text{upper limit}}$; $n \times (1-p_{\text{upper limit}})$ are all > 5 .

* Approximated CI calculated, but $n \times p_{\text{lower limit}} < 5$, rest requirements OK.

The prevalence of constipation did not significantly differ between the different ages.

The correlation between age and prevalence of constipation was not significant, using the Chi-square test for trend.

Based on our Pre-determined definition of constipation, the prevalence of Functional Constipation in our population is defined as “*The number of children included in the study (who responded to the questionnaire and had provided sufficient information) who fulfilled the definition of Functional Constipation as detailed in Textbox 2, based on their bowel habits as reported by their parents during the previous four-week-period in May 2003, divided by the number of children included in the studied population (583) at that time, expressed as the number of children per 1000 children population.*”

The prevalence found in our study for the children in all schools and of all ages and gender is 123.4 per 1000, or 12.3% (95% CI: 9.7% – 15.0%).

Five schools participated in the study. Per school the prevalence of constipation is detailed in **table 6**, which does not show a significant difference between the five schools.

Table 6: Prevalence of constipation (with 95% CI) specified per school.

School	Valid	<i>n</i>	% Constipated	95% CI
A	102	9	8.8%	3.3% - 14.3%
B	140	20	14.3%	8.5% - 20.1%
C	72	8	11.1%	3.9% - 18.4%
D	156	24	15.4%	9.7% - 21.0%
E	113	11	9.7%	4.3% - 15.2%
All	583	72	12.3%	9.7% - 15.0%

Other results:

1. Only 11 parents answered that they felt that their child was constipated at the time of the study (Self-reported constipation). Therefore the self-reported prevalence of constipation was only 1.9%. (95% CI: 0.8% - 3.0%). See **table 7** for details.

Table 7: Self-reported prevalence of constipation (with 95% CI).

Answer Q 2a	<i>n</i>	Proportion (out of 583)	% (out of 583)	95% Confidence Interval
Never constipated	515	0.883	88.3%	85.7% - 90.9%
Ever constipated	66	0.113	11.3%	8.7% - 13.9%
Constipated in past only	55	0.094	9.4%	7.1% - 11.8%
Still / Now constipated	11	0.019	1.9%	0.8% - 3.0%
Not completed	2	0.040	0.4%	0% - 0.8%
Total answered Question	581			

2. In Question 2, 94.5% of the parents expressed an opinion of what they felt constitutes constipation. They most commonly answered straining and hard stool, followed by use of laxatives, infrequent stool and pain passing stool. See table 8 for details.
3. In the list of other medical illnesses, 56 parents mentioned that their child has asthma (9.6%). 77% of parents provided contact details and agreed to be contacted later if required.

Table 8: Parent’s opinion of what they feel constipation is:

Parental Constipation Criterion	Number ticked	% ticked
Straining	389	69.1%
Hard Stool	339	60.2%
Use of Laxatives	297	52.8%
Infrequent Motions	282	50.1%
Pain passing stool	256	45.5%
Other ideas	19	3.4%
Not recorded any definition	33	5.9%
Number recorded definition	563	94.5%

4. Soiling is a problem for any child who suffers from it no matter the cause and is considered a sign of constipation in 90% of the cases ¹⁸. This study revealed that 11% of all children of all ages soil at least once a month. Some soil on a daily basis. **See Table 9** for details.

Table 9: Frequency of soiling in 583 school aged children in Cavan (with 95% CI)

Soiling once a	<i>n</i>	%	95% Confidence Interval
month	35	6.0%	4.1% - 7.9%
week	24	4.1%	2.5% - 5.7%
day	5	0.9%	0.1% - 1.6%
Total	583		
month or more	64	11.0%	8.4% – 13.5%

2.4 Summary and Discussion

Medical Practitioners who see children in their clinics generally consider constipation a common problem, because large numbers fill their waiting rooms (Loening-Baucke and many others see page 8 of the dissertation). It fortunately has a low mortality rate⁴⁷. There is remarkably little data available on how common this disorder is in the whole childhood population. A detailed search only revealed 18 studies, which had provided some data on the prevalence of constipation in children. The studies however differ greatly in relation to sample selection and ages, definition and methodologies, and produce widely variable prevalence figures. There seems to be a correlation between the number of symptoms asked for and the prevalence figure found (see table 2c on page 27).

Some studies asked for self-reported constipation. Several adult and child studies have convincingly argued that this is an unreliable method of establishing constipation due to variable perception by the adult/parent of what constipation constitutes, as well as a proven poor correlation between self-reported constipation and the more accurate symptom-based constipation.

The definition of symptom-based constipation varies considerably in the various prevalence and other constipation studies. The author feels that after exploring many definitions in both children and adults that the consensus definition formed by the Rome II group probably represents the latest and most appropriate definition available. See appendix 2.

The author has been able to identify only 5 (3 in Brazil, 1 in Greece, 1 in Turkey) other original studies (in 8 publications)^{32;33;46;58-60;64;65}, which examined the prevalence of constipation in a community based school-aged population. The study

in Turkey is essentially an enuresis study but also asks the parents for bowel frequency and had a frequency based definition of constipation. The 3 Brazilian studies created more than 1 publication per study but prevalence rates given were the same. The Greek study, gives two different prevalence rates (respectively 6 and 15%) for exactly the same population study and definition/exclusions. A request for clarification (see **APPENDIX 8**) has not been replied to yet. Other prevalence studies had a highly selective population like twins ⁵⁵ or infants ³¹, or were attending a hospital clinic for either constipation ²³ or another condition ^{14;57;62;63;67} or the child had a particular condition predisposing the child to constipation like Cerebral Palsy ⁶⁶. Other paediatric prevalence studies defined constipation only as self-reported constipation ^{44;45;56;61}.

In relation to “screening” for constipation in the community, the deliberations in part I conclude that a validated questionnaire or structured interview which uses the consensus Rome II symptom-based definition of Functional Constipation, is the best method to identify large number of children with constipation in the community, because this test is *simple and safe*, and has *a defined and agreed cut-off of the test values* (Rome II definition). The points of being *precise and validated*, are not clarified yet for postal questionnaires in children.

Although there is no easy Gold Standard test to diagnose constipation objectively, most clinicians agree that the combination of a detailed history about the child’s bowel habits and associated symptoms (including stool retention behaviour), similar to what was asked in the questionnaire as found in Appendix 11, combined with a physical examination of the abdomen and rectum and in selected cases the performance of a plain abdominal X-ray, the diagnosis of Functional Constipation in

children can be reliably made. This exercise would also identify Functional Faecal Retention, the G4c definition in the Rome II Childhood Criteria (See Appendix) 2.

The symptoms asked in this study differed slightly from what should have been asked for if the Rome II criteria were used as the pre-defined criteria of constipation. Separate from the type of questions asked or definitions used, in order to use a parent completed questionnaire as a reliable surrogate diagnostic test – screening tool – for constipation in a sample of the childhood community, the validity of the questionnaire has to be proven before the results and the interpretation of the questionnaire can be made and extrapolated to the wider population. This should be done by selecting a number of subjects who complete the questionnaire and to do the following:

1. Let the parent repeat completing the same questionnaire (Check for reproducibility) and compare this with the initially completed questionnaire
2. To apply the “Gold standard”, being the interview and examination as explained above, and compare the outcome of this assessment with the conclusion of the second completed questionnaire. (Check for validity)

This is planned in the second phase of this study, but is not part of this dissertation.

The methodology of this study relies on parents answering a list of questions about the characteristics of their child’s bowel habits. Although the parents are advised to go over the questions with their children, this might not have happened and there is a chance that the parents might not have an accurate account of what the youngster produces in the toilet – especially the older children. Some issues like soiling would be more noticeable to the parent however. This might have lead to either an under- or over detection of constipation, the former being more likely.

This study's population is not randomly chosen, but the author feels is reasonably representative of the whole school aged population in our community. The definition used is symptom-based but is like the other studies made up according to the authors believes of what constipation constitutes. Because the questionnaire asked for a rather large number of details of constipation related symptoms, the obtained data would lend itself to explore the prevalence of constipation using different criteria of constipation. Recalculating the prevalence using definitions from similar studies as the Pre-defined Definition used in this dissertation as well as using the Rome II criteria results in the following figures:

This shows that the prevalence is less variable if similar definitions are used. I therefore would recommend that in future studies of prevalence, the consensus definitions for the Rome II group is used.

Table 10: Calculated Prevalence figures of constipation in children using different definitions applied to data in the Cavan study. NEED TO CALCULATE.

Based on criteria used in (Reference)	Number of Symptoms	% school aged children constipated (6-12 yr) in original study	% school aged children constipated (6-12 yr) in Cavan with other study criteria
Cayan, 2001 ⁴⁶	1	2.2	
This study		12.4	12.3%
Motta, 1997, 1998, 2000 ⁵⁸⁻⁶⁰	3+	14.7	
de Araujo, 1999 ³³	4	28.0	
Maffei, 1997 ³²	4	28.8	
Rome II criteria, 1999 ¹⁸	4+	NA	

A total of 66 parents reported that their child was ever constipated (see table 7). If this figure is reliable, this would indicate that during the first 13 years of childhood, 11.3% of children suffer from constipation as defined and remembered by the parents – and therefore might look for medical help if it continuous beyond the parents expectations.

Another important issue in relation to this study is that the selection of the population was not random and certain bias could have been introduced. In particular the fact that the schools were chosen because the schools had children of staff members of the Paediatric Department as one or more of their pupils, a selection on social status could have been made. For this reason the profession of the parents was asked for but this information was obtained insufficiently to clearly group the children in appropriate groups to see if this population would differ from the whole population. The questions in relation to socio-economic status in Ireland are best based on the 2000 British Standard Occupational Classification ^{71;72}. The questions in the questionnaire used for this study as outlined in Appendix 11, need modification in order to use this classification.

Overall however, the author feels that despite the above limitations that the sample used in this study probably is representative of the Cavan school-aged population it has been taken from.

Taking the above critical considerations of the questionnaire used into account, the next version of the questionnaire therefore needs:

1. Adjustments in relation to the questions about symptoms of constipation, to fully encompass the definition of Rome II, for Functional Constipation, a time interval of two weeks, ask specifically for scybalous and pebble-like, the requirement of passage of hardened stool for a majority of stools (although not specified, assumed to be more than half of all stools passed).
2. Adjustments in relation to the questions about symptoms of constipation, to include also the definition of Rome II, for Functional Faecal Retention, including questions about Faecal Retention Behaviour, Passage of very large stools, which can clog the toilet, and accompanying symptoms disappear quickly after passage of large stool: a) Faecal Soiling; b) Irritability; c) Abdominal cramps; d) Decreased appetite; e) Eating small amounts (full very quickly).
3. Adjustments in relation to the questions about socio-economic status, to enable to make calculations as detailed in the 2000 British Standard Occupational Classification.
4. Adjustments of the wording of some questions, which didn't appear clear enough in Question 2a.
5. To be applied on a random group of school-aged children, in a repeat of this study. Suggested is to randomly choose a number of primary schools located in the catchment areas of Cavan and Monaghan Hospitals.
6. Include more children if possible. Although the number of nearly 600 children favours positively in comparison with some of the other prevalence studies done, increasing the number would increase the possibility further to detect a possible significant difference in constipation in e.g. age, sex and socio-economic status.
7. To be validated as briefly outlined on page 41.

2.5 Final conclusion

- A. Constipation in children appears common, both clinically and in most published studies, but “hard and reliable data are hard to come by” because of the lack of a universally agreed definition and examples of validation of prevalence determining methodologies.
- B. In Part I of this dissertation the issues in relation to the definition of constipation in children are outlined in detail. No previous overview on this topic has been published to the best of my knowledge.
- C. In Part II the use of a definition is illustrated by a (pilot type of) prevalence study and produced a Functional Constipation prevalence figure of 12.3%.
- D. The discussion resulted in suggestions to produce a better questionnaire as well as an introduction to the essential validation process required for this “screening tool” for constipation in the community.

The Prevalence of Symptoms of Constipation in an Irish school-aged population

PART III

APPENDICES

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APPENDIX 3.1

Overview of the Rome II, Functional Gastrointestinal Disorders¹⁸ :

(More details on <http://www.romecriteria.org>)

- A. Oesophageal disorders
- B. Gastro-duodenal disorders
- C. Bowel disorders:
 - C1. Irritable Bowel Syndrome
 - C2. Functional Abdominal Bloating
 - C3. Functional Constipation
 - C4. Functional Diarrhoea
 - C5. Unspecified Functional Bowel disorder
- D. Functional Abdominal Pain
- E. Functional Disorders of the Biliary Tract and Pancreas
- F. Anorectal Disorders
- G. Functional Paediatric Disorders:
 - G1. Vomiting
 - G2. Abdominal pain
 - G3. Functional diarrhoea
 - G4. Disorders of defecation:
 - G4a. Infant dyschezia
 - G4b. Functional Constipation
 - G4c. Functional Faecal Retention
 - G4d. Functional Non-Retentive Faecal Soiling

Definition of **Functional Constipation** in **adults** according to the Rome II:

At least 12 weeks, which need not be consecutive, in the preceding 12 months of two or more of:

1. Straining >25% of defecations;
2. Lumpy or hard stools >25% of defecations;
3. Sensation of incomplete evacuation >25% of defecations;
4. Sensation of anorectal obstruction/blockage >25% of defecations;
5. Manual manoeuvres to facilitate >25% of defecations (e.g. digital evacuations, support of the pelvic floor); **AND/OR**
6. <3 defecations per week.

Exclusion criteria: loose stool or sufficient criteria to fulfil criteria for IBS.

“These diagnostic criteria were reached by consensus of experts based on experience rather than by data analysis and the applicability of these criteria need to be determined in the near future by epidemiological community based studies as well as populations to be at risk.” See reference 18 - page 569.

APPENDIX 3.2

- Rome II, Childhood Functional Gastrointestinal Disorders - Definitions of Disorders of Defecation¹⁸

G4a. INFANT DYSCHEZIA:

Definition: In otherwise healthy infants less than 6 months of age, at least 10 minutes of straining and crying before successful passage of soft stool.

G4b. FUNCTIONAL CONSTIPATION:

Definition: In infants and children, at least two weeks of:

1. Scybalous, pebble-like, hard stools for a majority of stools **OR**
2. Firm stools, passed 2 or less times per week, **AND**
3. There is no evidence of structural, endocrine or metabolic disease.

Confirmation of diagnosis: Thorough history and physical examination. Functional constipation is important because it may predispose to Functional Faecal Retention.

G4c. FUNCTIONAL FAECAL RETENTION: Is the most common cause of constipation and soiling in children, where the child has repetitive attempts to avoid defecation because of fears associated with defecation.

Definition: From infancy to 16 years old, a history of at least 12 weeks of:

1. Passage of large diameter **OR** painful stools at intervals less than 2 times per week, **AND**
2. Retentive posturing, avoiding defecation by purposefully contracting the pelvic floor.
3. As pelvic floor muscles fatigue, the child uses the gluteal muscles, squeezing the buttocks together, **AND MAY ALSO HAVE SYMPTOMS OF** (and disappear quickly after passage of large stool): a) Faecal Soiling; b) Irritability; c) Abdominal cramps; d) Decreased appetite; e) Eating small amounts (full very quickly).

Confirmation of diagnosis: Thorough history with above symptoms and physical examination to confirm diagnosis by abdominal palpation of size of mass and detection of stool on rectal examination and to exclude pathology by looking at: signs of spinal dysraphism; diminished tactile sensitivity in sacral dermatomes; asymmetry of buttocks/calves/feet; brisk/absent Achilles tendon reflexes or up-going plantars; skin pigmentary abnormalities; abnormality over lumbo-sacral area; scoliosis

G4d. FUNCTIONAL NON-RETENTIVE FAECAL SOILING: Exclusion

criteria: Caused by anorectal surgery, diarrhoeal diseases, emotional disturbance, Spock-Bergen syndrome. 5-10% of children with encopresis (children who soil) have functional non-retentive soiling.

Definition: From 4 years to 16 years old, with a history of at least 12 weeks of once a week or more:

1. Defecation of small or large into places and at times inappropriate to the social context;
2. In the absence of structural or inflammatory disease, **AND**
3. In the absence of signs of faecal retention.

Confirmation of diagnosis: Thorough history with above symptoms and on physical or X-ray examination no masses of stool.

APPENDIX 3.3

Definitions of constipation found in the literature following search on PubMed, 1966 – June 2003 for **Constipation AND symptom AND (definition OR criteria)**:

ADULT:

1. Nyhlin, 2001⁷³: **Functional Constipation**
Definition: (Rome II criteria 1999) Two or more of (for >25% of the time in the last 3 month):
 - a. Stool frequency fewer than 3 per week
 - b. Hard or lumpy stools
 - c. Straining during bowel movement
 - d. Feeling of incomplete emptying after bowel movement
 - e. A sensation the stool can't be passed when having a bowel movement
 - f. A need to press bottom/vagina to pass stoolAND NOT having loose/mushy or watery stool.
2. Stewart, 1999⁵² and Drossman, 1993⁷⁴: **Functional Constipation**
Definition: (Rome I criteria 1993) Two or more of (for >25% of the time in the last 3 month):
 - a. Stool frequency fewer than 3 per week
 - b. Hard or lumpy stools
 - c. Straining during bowel movement
 - d. Feeling of incomplete emptying after bowel movementAND NOT having Irritable Bowel Syndrome.
3. Koch, 1997⁷⁵: **Chronic Constipation**
Definition: Infrequent bowel movements with a "necessity to strain" or sense of obstruction or digital manipulation for evacuation.

CHILD:

4. van Ginkel, 2001⁷⁶ and van der Plas 1996¹²: **Constipation**
Definition: (both based in one Dutch University Hospital - AMC) At least two of the following criteria must be present:
 - 1) Stool frequency less than 3 times per week, **OR**
 - 2) 1 or more episodes of soiling or encopresis per week, **OR**
 - 3) Very large calibre stool every 7 – 30 days, **OR**
 - 4) Palpable abdominal or rectal mass on examination.
5. Felt, 1999¹⁰: **Functional Constipation**
Definition: If for 14 days or more:
 - a. Stool frequency less than 3 times per week, **AND/OR**
 - b. Hard and painful passage of stool.
6. Rockney 1995⁷⁷: **Faecal Retention with Soiling**
Definition: Soiling AND one of:
 - a. Faecal loading on plain abdominal X-ray **OR**
 - b. Excessive (not specified how much) stool on rectal examination.

APPENDIX 3.4

18 Additional definitions of constipation

1. Baker, 1999³ and Loening-Baucke, 2002⁷⁸: **Constipation**
The North American Society of Pediatric Gastroenterology and Nutrition (NASPGN), definition: (1999) A delay or difficulty, present for two or more weeks, sufficient to cause significant distress to the patient.
2. Loening-Baucke, 1993⁵: **Constipation.**
 - a. Stool frequency less than 3 times per week, **OR**
 - b. Painful passage of stool, **OR**
 - c. Faecal retention with or without soiling.
3. Loening-Baucke, 2002⁷⁹: **Functional Constipation.**
 - a. Stool frequency less than 3 times per week, **OR**
 - b. Painful passage of stool, **OR**
 - c. Faecal retention with or without soiling, **AND**
 - d. No cause present.
4. Rasquin, 1999⁸: **Functional Constipation.**
Rome II criteria (1999): In infants and children, who have at least two weeks symptoms of:
 - a. Scybalous, pebble-like, hard stools for a majority of stools (>50% of the time?) **OR**
 - b. Firm stools 2 or less times per week **AND**
 - c. There is no evidence of structural, endocrine or metabolic disease, based on a thorough history and physical examination.
Rasquin 1999⁸: **Functional Faecal Retention.**
Rome II criteria (1999): From infancy to 16 years old, a history of at least 12 weeks of:
 - a. Passage of large diameter stool at intervals less than 2 times a week, **AND**
 - b. Retentive posturing, avoiding defecation by purposefully contracting the pelvic floor.
As pelvic muscles fatigue, the child uses the gluteal muscles, squeezing the buttocks together. Frequent accompanying symptoms are: soiling, irritability, abdominal pain and decreased appetite.
5. Felt 1999¹⁰: **Functional Constipation.**
If for 14 days or more:
 - a. Stool frequency less than 3 times per week, **OR**
 - b. Hard and painful passage of stool.
6. Benninga, 1994⁸⁰; Benninga, 1995⁸¹; Benninga, 1996⁸²; van der Plas, 2000⁸³: **Constipation.**
All based in one Dutch University Hospital (AMC): At least two of the following criteria must be present:
 - a. Stool frequency less than 3 times per week, **OR**
 - b. 1 or more episodes of soiling or encopresis per week, **OR**
 - c. Very large calibre stool every 7 – 30 days, **OR**
 - d. Palpable abdominal or rectal mass on examination.
7. Clayden⁸⁴: **Constipation.**
Painful and delayed defecation **OR** faecal retention.
8. Del Ciampo, 2002¹⁴: **Constipation.**
Brazilian Society for Paediatric Gastroenterology and Nutrition (SPGPN = Sociedade Paulista Gastroenterologia Pediatrica e Nutricao):

- a. 1984: a syndrome that consists of the elimination, with effort, of dry or overly dense stools, irrespective of the period of time between evacuations.
 - b. 2001: Any of the following:
 - i. Stool frequency less than 3 times per week (except breast fed infants), **OR**
 - ii. Elimination of stool which are either hard, scybalous, pebble-like or cylindrical with cleavage, **OR**
 - iii. Difficulty or pain when passing stool, **OR**
 - iv. Sporadic elimination of large calibre stool, which can block the toilet.
9. Gordon, 2002 ¹⁷: **Constipation.**
The subjective complaint of passage of abnormally delayed or infrequent passage of hardened faeces often accompanied by straining and/or pain.
10. Wounosz, 1983 ⁸⁵: **Chronic Constipation.**
- a. Difficulty passing stool, **AND**
 - b. Increased firmness **OR** decreased frequency of passing stool.
11. Leung, 1996 ²⁰: **Constipation.**
One of the following:
- a. Stool frequency less than 3 times per week, **OR**
 - b. Hard or dry or very large stool, **OR**
 - c. Difficult to pass stool.
12. Keuzek, 1996 ⁸⁶: **Chronic Functional Constipation.**
A condition were there is chronic faecal loading (without an anatomical abnormality) which gives abdominal or systemic symptoms, including decreased frequency, increased size and increased consistency of stool or pain.
13. de Morais, 2000 ²¹: **Constipation.**
International South American Group: Any of the following:
- a. Stool frequency less than 3 times per week (except breast fed infants), **OR**
 - b. Elimination of stool which are either hard, scybalous, pebble-like or cylindrical with cleavage, **OR**
 - c. Sporadic elimination of large calibre stool, which can block the toilet.
14. Maffei, 2002 ⁸⁷; Maffei, 2001 ⁸⁸: **Constipation.**
Similar to the International South American Group in REF 100 but also if there is difficulty or pain when passing stool.
15. Nurko, 2000 ⁸⁹: **Constipation.**
Stool frequency less than 3 times per week.
Nurko, 2000 ⁸⁹: **Chronic Constipation.**
Constipation lasting 6 months or more.
16. Blethyn, 1995 ⁹⁰: **Constipation.**
Stool frequency less than 3 times per week.
17. DSM IV TR, 2000 ⁹¹: **Constipation.**
- a. Stool frequency less than 3 times per week, **OR**
 - b. Large mass on abdominal or rectal examination.
18. Barclay, 2003 ⁹²: **Chronic Constipation.**
For at least 3 months, two or more of the following:
- a. Stool frequency less than 3 times per week, **OR**
 - b. Hard stool, **OR**
 - c. Painful defecation, **OR**
 - d. Encopresis.

APPENDIX 3.5

Consensus Definitions of constipation in Children

- A. Brazilian Society for Paediatric Gastroenterology and Nutrition (Sociedade Paulista Gastroenterologia Pediatrica e Nutricao - SPGPN):

Intestinal Constipation (1984)¹⁴: a syndrome that consists of the elimination, with effort, of dry or overly dense stools, irrespective of the period of time between evacuations.

Intestinal Constipation (2001)^{14;88}: Any one of the following (irrespective of frequency):

1. Passage of hard or scybalous stools
2. Flint-shaped or cylindrical shaped stool with fissures
3. Difficulty or pain when passing stool
4. Sporadic passage of large calibre stool (clogging the toilet)
5. Stool frequency < 3 times per week, except infant fully breastfed.

- B. North American Society for Pediatric Gastroenterology and Nutrition (NASPGN):

Intestinal Constipation (1999)⁹: Retardation of or difficulty with defecation for two or more weeks, sufficient to cause significant discomfort to the patient.

- C. Rome II Criteria: **Functional Constipation (1999)**: See **APPENDIX 2**

- D. The Department of Paediatric Gastroenterology and Nutrition of the Academic Medical Centre in Amsterdam, the Netherlands, has over the years (1994-2001) published several studies (mainly about interventions) in relation to constipation in children and used consistently the following definition of constipation: AMC criteria:

Constipation (2001)^{12;76;80-83} if at least two of the following are present:

1. Stool frequency < 3 times per week, **OR**
2. More than 1 soiling or encopresis episodes per week, **OR**
3. Passing very large calibre stool every 7-30 days, **OR**
4. Palpable abdominal or rectal mass.

APPENDIX 3.6

Tests to investigate constipation

B. History of symptoms supporting a diagnosis of functional constipation:

- i. Parent completed (postal) Questionnaires.
- ii. Semi-structured interview asking for patterns of bowel motions/infrequent defecation/the intervals between bowel movements, soiling, pain, distress, straining, prolonged stool expulsion, refusal to defecate/faecal retention behaviour, laxative dependence, the size and consistency of stools deposited into the toilet.
- iii. Self-reported constipation.
- iv. Definitions based on symptoms:
 1. Less than 3 bowel movements per week
 2. A history of painful elimination of hard stools for at least 1 month, whether or not associated with a reduced frequency of stools or soiling.
 3. Rome I-defined constipation
 4. Rome II-defined constipation.
 5. At least 2 of the following: abdominal pain, infrequent bowel movements, hard faeces, faecal soiling, pain on defecation, and/or clinical evidence of excessively retained faeces.
 6. A delay or difficulty in defecation, present for 2 or more weeks.
 7. Constipation is a functional gastrointestinal disorder defined as conditions in which a variable combination of chronic or recurrent gastrointestinal symptoms is present in the absence of demonstrable disease. We make a diagnosis based on symptoms, not on demonstrable abnormalities in physical examination or laboratory tests.
 8. Severe chronic constipation in adults: 2 or less defecations per week and delayed colonic transit time⁹³.
 9. Complete recovery, of childhood constipation: Defined as three or more bowel movements per week with no soiling while off laxatives
 10. Infants and toddlers with constipation usually have a history of infrequent, hard and painful bowel movements, often accompanied by screaming and stool holding manoeuvres.

11. Encopresis, the intermittent and involuntary passage of formed-to-liquid faeces, is common.
 12. Constipated patients have a history of hard stools and at least one of the following symptoms: infrequent defecation (not defined), dyschezia, hematochezia, difficult stool expulsion, or abdominal pain during bowel movements.
- v. Psychometric self-assessments: PAC-SYM - A constipation symptom assessment to addresses the patient perspective on the disorder to assess the effectiveness of treatment ¹⁹.

C. Findings on physical examination supporting a diagnosis of functional constipation:

Clinical examination to confirm a diagnosis of constipation:

1. Abdominal examination: palpable abdominal mass
2. Digital rectal examination: presence of stool
3. Inspection of perineum and perianal area: tags, fissures, redness, warts, perianal oedema, venous congestion, reflex anal dilatation. There are no pathognomonic perianal signs in childhood constipation.

D. Findings on physical examination identifying an underlying cause for the constipation:

- Digital rectal examination is often not performed in the examination of the child with chronic constipation. The digital examination can help differentiate functional constipation from an organic process and may alter the course of therapy.
- Constipation and fecal soiling is caused in fewer than 10% of patients by anatomic, neurologic, endocrine, or metabolic conditions. No specific organic cause can be found in more than 90% of affected children, but anorectal functions--such as rectal sensation, rectal contractility, and relaxation of the external anal sphincter and pelvic floor muscles during straining for defecation--are impaired.

E. Bowel function / Physiologic tests:

- Electromanometry of the anorectum. Helps in making the diagnosis of functional constipation, by excluding aganglionosis.
- Colorectal/Colonic transit time (using radiopaque markers or scintigraphy). The definite diagnosis of constipation (in predominately adults) is relied on total intestinal transit times (TITT) and Total Gastro-Intestinal Transit Time

⁹⁴. Fecoflowmetry with saline enema. A technique by which the faecal flow rate is studied through recorded curves representing the changes that occur in the flow against time. Faecal flow rate is the product of rectal detrusor action against outlet resistance. A saline (or paste) enema is given to the individual. Upon feeling the desire to defecate, he or she was placed on a fecoflowmeter commode and was asked to defecate. Evaluation of the obtained defecation flow curve comprises the reporting on the defecated volume, flow time, mean and maximum flow rates, time to maximum flow, and shape of the curve. The fecoflowmetric studies could differentiate between defecation of normal and constipated subjects, and in the latter between the obstructive and inertia types of constipation. No sensitivity known. The technique is simple, easy, non-invasive, and non-radiologic. It can be used as a screening tool in defecation disorders but is not a confirmatory test for constipation ⁹⁵.

F. Anatomical tests:

- Plain abdominal radiography:

1. Simple scoring system ⁹⁶
2. Using the plain abdominal roentgenogram as the gold standard, the rectal examination showed a positive predictive value of 84.8% and a negative predictive value of 50% in assessing faecal retention ⁷⁷.
3. Barr-scores. To assess the severity of stool retention using plain abdominal radiographs.

APPENDIX 3.7

Organic causes of constipation ⁹⁷

Diagnosis and types of constipation or underlying causes of constipation towards most of the tests in Appendix 6 are aimed at:

1. Hirschsprung's disease.
2. Dysganglionosis.
3. Intestinal Neuronal Dysplasia (IND): See also Slow Transit Constipation
4. Significant rectocele.
5. Slow-transit constipation (STC): Common features of slow transit are: delayed passage of the first meconium stool beyond 24 h of age, symptoms of severe constipation within a year, or treatment-resistant 'encopresis' at 2-3 years, soft stools despite infrequent bowel actions, and delay in colonic transit on a transit study. A proportion of children with slow transit constipation have an abnormality of intestinal innervation associated with the dysfunctional colonic motility, recognized as intestinal neuronal dysplasia (IND). Intestinal neuronal dysplasia type B, the most common variant of IND, is defined on rectal biopsy by hyperplasia of the submucosal plexus. On laparoscopic colon muscle biopsy, many specimens show reduced numbers of excitatory substance P-immunoreactive nerve fibres in the circular muscle ⁹⁸.
6. Hypothyroidism.
7. Drugs and intoxications, e.g. vincristine, opiates, antihistamines, phenothiazines and lead.
8. Conditions which can feature chronic dehydration and electrolyte disturbances, including hyper/hypocalcaemia, hypokalaemia, diabetes insipidus, diabetes mellitus and some types of renal tubular acidosis.
9. Immobility, including Cerebral palsy
10. Neurological conditions, including spina bifida, sacral agenesis, spinal cord injury, diastematomyelia
11. Certain other syndromes and conditions: Down syndrome, scleroderma, dolichocolon, congenital ano-rectal anomalies with or without rectal surgery

APPENDIX 3.8

Letter asking for Clarification of Prevalence Figures

Paediatric Department
Cavan General Hospital
Cavan, Co. Cavan
Republic of Ireland
Tel: +353 (0)49 437 6474
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09 August 2003

Dr Eleftheria Roma-Giannikou MD
Associate Professor of Paediatric Gastroenterology and Nutrition
Aghia Sofia Children's Hospital
Athens
11527
Greece

Dear Dr Roma-Giannikou,

I would be grateful if you would be able to clarify an important issue in relation to two papers you published.

In "Epidemiology of chronic constipation in Greek Children" published in the Hellenic Journal of Gastro-enterology in 1999, you describe an excellent and detailed study done on a randomly selected population of Greek children. One of its conclusions is that the prevalence of chronic constipation in 2-14 year old children is **6% (116/1932)**.

In "Diet and Chronic Constipation in children: the role of fiber" in the Journal of Pediatric Gastroenterology and Nutrition of 1999, you describe a detailed study done on the same randomly selected Greek population of 2-14 yr old children. You discuss several correlations between the diet and being constipated (based on the same diagnostic criteria as in the article you published in the Hellenic Journal of Gastro-enterology in 1999). Looking at the data it must be that the same population of children was used for both studies, which is very understandable, however **the prevalence of constipation in the Diet study gives a totally different figure: 291/1893 which is over 15%**.

I am currently doing a paediatric prevalence study here in Ireland, which gives a figure close to the 15% and not near the 6%, although I use different criteria (Rome II criteria). I am comparing the prevalence figures of all the 20 children's prevalence studies ever published and would like to know which of the two (6 or 15%) I should quote in my dissertation and subsequent publication. I would be grateful for a reply, preferably before the end of September because the dissertation will be submitted then. By e-mail would be great so I can communicate with you quicker if needed be.

Thanks very much,

Yours sincerely,

Dr Nick van der Spek
MB BCH DCH MRCPCH MRCP (UK)
Consultant Paediatrician

APPENDIX 3.10

Ethics Research Committee Approval

APPENDIX 3.11

School:

Bowel Problems in Children Study
May 2003



Dear Parent or Carer,

Thank you for helping us to find out how common bowel problems are in school aged children. We would be grateful if you could return the form to school when you are finished.

1. CHILD AND FAMILY DETAILS:

- 1a)** How old is your child now? years
1b) What is your child's gender (sex)? Boy Girl
1c) What is your (carer or parent) current profession?
Mother: _____
Father: _____

2. GENERAL BOWEL QUESTIONS:

- 2a)** There are a variety of opinions on what it means to be constipated. What does constipation mean to you? Tick as many opinions as you think.
- Hard stools/bowel motion
 - Straining in connection with bowel movement
 - Pain when passing a bowel motion
 - Infrequent bowel movements
 - Needing to use laxatives
 - Other Please specify:
.....
- 2b)** **Do you think your child has ever been constipated for at least a few weeks or more?**
- Yes
No
Still is constipated
- 2c)** **If your child has been constipated for a few weeks or more, how old was he/she then?**
He/she was about..... years old (it doesn't have to be accurate)

3. CURRENT BOWEL COMPLAINTS QUESTIONS: PLEASE ASK YOUR CHILD IF YOU AREN'T SURE.

- 3a)** **In the last four weeks had your child any abdominal pain?**
- Yes
No
Don't know
- 3b)** **Has your child had any discomfort (e.g. straining or pain) in the last four weeks when passing a bowel motion?**
- Yes
No
Don't know

Continued....

School:

3c) **Has your child had any blood in his/her motion OR had blood on toilet paper in the last four weeks?**

- Yes
No
Don't know

4. **WE WANT TO KNOW WHAT YOUR CHILD'S MOTIONS LOOKED LIKE ON AVERAGE OVER THE LAST FOUR WEEKS:**

4a) **What has the size of the motion been? TICK ONE BOX ONLY:**

- Like a Pencil
- Like a Sausage
- Like a small Cucumber
- Don't know
- Motion too loose to describe

4b) **What has the consistency of the motions been? TICK ONE BOX ONLY:**

- Runny like water
- Soft like toothpaste
- Firm like a sausage
- Firm or hard like pebbles
- Don't know

4c) **How often does your child move his/her bowels? TICK ONE BOX ONLY:**

- At least once a day
- Every other day
- Twice a week
- Once a week
- Less often than once a week

4d) **Does your child leak any solid or loose motions (soiling) in his/her underpants? TICK ONE BOX ONLY:**

- No, never
- Yes, approximately once a month
- Yes, approximately once a week
- Yes, daily

5. **OTHER QUESTIONS:**

5a) **Does your child have any medical illness?**

- Yes
No

If yes, please specify (e.g. hypothyroidism, epilepsy, asthma etc.)

.....

Continued....

School:

5b) Has your child used any medicine, tablets, drugs or regularly prescribed medication etc. during the last four weeks?

Yes

No

If yes, please specify the name(s):

.....

5c) We might like to contact you to ask you for clarification. Would you mind being contacted in such case?

Yes, I would mind (=I don't want to be contacted)

No, I don't mind to be contacted

If you don't mind to be contacted, please provide us with your contact details:

Name:

.....

Address:

.....

Telephone:

.....

PLEASE COULD YOU SEND THIS QUESTIONNAIRE BACK TO SCHOOL BEFORE FRIDAY 9TH OF MAY 2003?

Thank you,

Dr Nick van der Spek
Consultant Paediatrician

APPENDIX 3.12



North Bord
Eastern Slainte
Health An Oir
Board Thuaiscirt

Paediatric Department
Cavan General Hospital
Telephone: 049 437 6474
Fax: 049 437 6801
E-mail: nick.vdspek@nehb.ie

Date: Tuesday 6 May 2003
Subject: Children's Bowel Problems Study

Dear Parent(s) or Carer(s),

Thank you for reading this notice.

The Children's Department in Cavan General Hospital is doing an important study to find out what bowel problems there are in the children of our county. With the results of this study we hope to improve the services for the children in Cavan. We have selected your school to take part and we need your help to make this study a success.

We would like you to answer a few questions which you can find in the enclosed brief questionnaire. The school principal has given his approval for the questionnaire and approaching you in this way.

Your answers will be treated anonymously and in the strictest of confidence. We would appreciate it very much if you would spend a few minutes filling out the questionnaire. You are of course under no obligation to do so.

If you have any questions about this questionnaire, we would be very glad to answer them. You can contact our department anytime on the number given above and leave a message with our secretary Carol or on the 24 hour answering machine and we will get back to you as soon as possible.

If you have any medical concerns about your child after completing this questionnaire, we would advise you to have a word with your GP.

We would be grateful if you could hand the completed questionnaire back to your child's class teacher or school secretary as soon as possible this week.

Thank you very much.

Yours sincerely,

Dr Nick van der Spek

Consultant Paediatrician

Improved Questionnaire

School: ...

Bowel Problems in Children Study - 2

One Questionnaire per child please



Dear Parent or Carer,

Thank you for helping us to find out how common bowel problems are in school children. We would be grateful if you could return this form to school when you are finished.

1. CHILD AND FAMILY DETAILS:

- a) How old is your child now? years
- b) What is your child's gender (sex)? Boy Girl
- c) Mother's job title: (full details)
(e.g. plumber, homemaker, unemployed, not applicable etc)
Please tick how many people are working in the company the mother works in:
One/Self-employed ; Less than 25 people ; More than 25 people
- d) Father's job title: (full details)
(e.g. plumber, homemaker, unemployed, not applicable etc)
Please tick how many people are working in the company the father works in:
One/Self-employed ; Less than 25 people ; More than 25 people

6. GENERAL OPINIONS (not particularly about your child):

Please answer each statement by circling TRUE (Agree) or FALSE (Disagree).

It is not a test, I want to know your opinion about the symptoms of constipation:

- a) Passing **hard stool** is a sign of being constipated. TRUE / FALSE
- b) **Straining** (= pushing hard) to pass a stool is a sign of being constipated. TRUE / FALSE
- c) Having **pain** when passing a stool is a sign of being constipated. TRUE / FALSE
- d) **Sitting on the toilet very long** to pass a stool is a sign of being constipated. TRUE / FALSE
- e) Passing a stool **less than once a week** is a sign of being constipated. TRUE / FALSE
- f) Passing a stool **once or twice a week** is a sign of being constipated. TRUE / FALSE
- g) Passing a stool **three times a week** is a sign of being constipated. TRUE / FALSE
- h) Passing a stool **every day** is a sign of being constipated. TRUE / FALSE
- i) Needing to use **laxatives** to pass a stool is a sign of being constipated. TRUE / FALSE
- j) **Reminding** to tell the child to go to the toilet is a sign of being constipated. TRUE / FALSE
- k) **Other signs**: (please specify).....

Continued....

School: ...

3) **OPINIONS ABOUT YOUR OWN CHILD** (one answer should be TRUE for your child)

Please answer each statement by circling TRUE (Agree) or FALSE (Disagree):

- a) "I think my child has **NEVER** been constipated for a period of a few weeks or more." TRUE / FALSE
- b) "I think my child is constipated **NOW (or still is)** and has been for at least the last few weeks or more." TRUE / FALSE
- c) "I think my child has **EVER** been constipated in the **PAST** for a period of a few weeks or more, **but is not anymore.**" TRUE / FALSE

d) Please complete: **If** your child has ever been constipated for a few weeks or more in the past, how old was he/she then? He/she was about years old. (it doesn't have to be accurate)

4. **BOWEL COMPLAINTS QUESTIONS: PLEASE ASK YOUR CHILD IF YOU AREN'T SURE. TICK ONE BOX ONLY.**

Never means never (0%); **Rarely** means about once a month (1-25%); **Sometimes** means once or twice a week (25-50%); **Often** means three times a week or more often (50% of more).

a) **In the last four weeks has your child had any abdominal (tummy) pain?**

- No, never
- Yes, but rarely (about once a month)
- Yes, sometimes (once or twice a week)
- Yes, often (three times a week or more often)
- Don't know (please check with your child)

b) **In the last four weeks has your child had any discomfort (e.g. straining or pain) when passing a bowel motion?**

- No, never
- Yes, but rarely (about once a month)
- Yes, sometimes (once or twice a week)
- Yes, often (three times a week or more often)
- Don't know (please check with your child)

c) **In the last four weeks has your child had any blood in or on his/her motion OR had any blood on the toilet paper?**

- No, never
- Yes, but rarely (about once a month)
- Yes, sometimes (once or twice a week)
- Yes, often (three times a week or more often)
- Don't know (please check with your child)

Continued....

School: ...

5. WE WANT TO KNOW WHAT YOUR CHILD'S MOTIONS USUALLY LOOKED LIKE (ON AVERAGE) OVER THE LAST FOUR WEEKS: PLEASE ASK YOUR CHILD.

a) What has the size (thickness) of the motion been? TICK ONE BOX ONLY:

- Usually thin like a Pencil
- Usually small like a ordinary breakfast Sausage
- Usually thick like a banana
- Usually very big like a Cucumber
- Usually looks like small balls or pebbles
- Usually the motion is very loose and thin but once a week or so it is very big like a large Cucumber (and could even block the toilet)
- Usually the motion is too loose to describe
- Don't know (please check with your child)

b) What has the consistency of the motions been? TICK ONE BOX ONLY:

- Usually runny like water
- Usually soft like porridge
- Usually firm like a cooked sausage
- Usually rock hard
- Don't know (please check with your child)

c) How often does your child move his/her bowels? TICK ONE BOX ONLY:

- At least once a day
- Every other day
- Twice a week
- Once a week
- Less often than once a week

d) Does your child leak any solid or loose motions (soiling) in his/her underpants? TICK ONE BOX ONLY:

- No, never
- Yes, approximately once a month
- Yes, approximately once a week
- Yes, at least a few days a week

Continued....

School: ...

6. OTHER QUESTIONS:

a) Does your child have any medical illness?

- Yes

- No

If yes, please specify (e.g. hypothyroidism, epilepsy, asthma etc.)

.....
.....

b) Has your child used any laxatives during the last four weeks?

- Yes, he/she has used laxatives during the last four weeks.

- No, he/she has not used any laxatives during the last four weeks.

c) Has your child taken any medicine, tablets, drugs or used regularly prescribed medication etc. during the last four weeks?

- Yes

- No

If yes, please specify the name(s):

.....
.....

d) We might like to contact you to ask you for further clarification. Would you mind being contacted in such case?

- Yes, I would mind (= I don't want to be contacted)

- No, I don't mind to be contacted

If you don't mind to be contacted, please provide us with your contact details:

Name:

Address:

Telephone number(s):

PLEASE COULD YOU RETURN THIS QUESTIONNAIRE TO SCHOOL

BEFORE

Thank you,



Dr Nick van der Spek
Consultant Paediatrician

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