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The Prevalence of Autism (including Asperger's Syndrome) in School Age Children in Northern Ireland 2015

INFORMATION ANALYSIS DIRECTORATE



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- *to disseminate findings widely with a view to stimulating debate, promoting effective decision-making and improvement in service provision; and*
- *be an expert voice on social care information.*

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About Community Information Branch

The purpose of Community Information Branch (CIB) is to promote effective decision making in children and adult social services by providing quality information and analysis.

We collect, analyse, and publish a wide range of community information that is used to help monitor the delivery of personal social services policy. Information collected by CIB is used to assess HSC Trust performance, for corporate monitoring, policy evaluation, and to respond to parliamentary/assembly questions.

Information is widely disseminated through a number of regular key statistical publications and ad hoc reports details of which are available online.

We gratefully acknowledge the assistance of colleagues working within the Department of Education, Demography and Methodology Branch and Public Health Information and Research Branch in producing this publication.

Key Findings

1. The figures provided by the Northern Ireland School Census have shown that the estimated prevalence of autism has increased by 0.9 percentage points across all Health and Social Care Trusts between 2009/10 and 2014/15, from 1.3% of the compulsory school age population to 2.2%.
2. There is a significant difference in the estimated prevalence rates of ASD between the genders, with males almost five times more likely to be identified with ASD than females. However the analysis has indicated that the female ASD population (of compulsory school age) in recent years has increased at a slightly higher rate than the male population.
3. The urban Northern Ireland population has a statistically significant higher prevalence rate than the rural population. This result was not fully replicated at HSC Trust level, with only the Southern Trust consistently showing year on year significance between location and the number of children identified with ASD.
4. Those children in the least and most deprived areas appear to have the highest prevalence rate of ASD, with those children in MDM deciles closer to the middle of the scale having lower rates of ASD prevalence. There are exceptions to this (Decile 4) which indicates this area may require further study. As many of the most and least deprived MDM deciles are located in urban areas there is likely some cross cutting relationship with the results seen for ASD prevalence and the urban rural split (see appendix 2).
5. Looking at prevalence across school years over time we can see that the estimated prevalence of ASD has increased across all school years, between 2009/10 and 2014/15, with the greatest increases in the numbers of children identified with ASD occurring in the youngest (5 – 8 year olds) and oldest (13 – 16 year olds) groups of children.
6. The data shows that the majority of children with ASD have been assessed to be at Stage 5 of the Special Educational Needs assessment process in each year. The 6 year trend analysis indicates that there is a small but constant decrease in the relative percentage of identified children at Stage 5 during the school census snapshot.

Introduction

Purpose of the Report

The need to develop and improve health and social care services for people of all ages who are affected by Autistic Spectrum Disorder (ASD) including Asperger's Syndrome has been apparent for some time. In order to provide effective services knowing the incidence (new cases) and prevalence (new and existing cases at a point in time) of ASD including Asperger's is clearly important. Throughout this report, for ease of reading, the abbreviation ASD is used to signify Autistic Spectrum Disorder (ASD) including Asperger's Syndrome.

This report aims to show prevalence rates of ASD amongst compulsory school age children (attending grant-aided schools) (4 – 15 years old at the start of the school year), as it is clear that ASD persists and that children with ASD become adults with ASD, with their own individual needs.

What is ASD?

ASD is a developmental disability that influences a person's ability to communicate and relate to other people, as well as affecting how they make sense of the world around them. It is a spectrum condition, meaning that while all people with autism will have some similar problems, overall their condition will impact them in different ways. Some people may be able to lead fairly independent lives while others will require a lifetime of specialist support.

Children who have been identified with Asperger's Syndrome have been included in this study. Asperger's Syndrome shares some similarities with Autism; however people with Asperger's Syndrome do not generally experience the same language and learning disabilities associated with autism. They are more likely to have difficulties in the areas of social imagination, social communication and social interaction.

Recent Developments

The recent introduction of the Autism Act (Northern Ireland) 2011 and the accompanying increase in awareness via campaigns and consciousness raising events, many of which have been championed by the voluntary sector, may well contribute to a rise in the number of assessments carried out and positive diagnoses processing through the system. However it is too early to tell how much of an impact these developments will have on any underlying prevalence estimates.

The Health and Social Care Board have developed a routine monitoring process which identifies those children who have been assessed for ASD and those who have received a positive diagnosis. The results of the 2014/15 data collection can be found in appendix 6.

Current Prevalence Estimates

According to figures estimated by The National Autistic Society around 700,000 people in the United Kingdom may have autism equating to more than 1 in every 100 people in the population. If you include their families, autism affects the lives of over two million people. This estimate is based on two studies one of children (Baird, G et al., 2006¹) and the other of

¹ Baird, G et al. (2006) 'Prevalence of disorders of the autism spectrum in a population cohort of children in South Thames: the Special Needs and Autism Project (SNAP)' *The Lancet*, vol 368, no. 9531, pp. 210 - 215

adults (Brugha et al., 2009² & Brugha et al., 2012)^{3,4}. The proportion of males compared to females diagnosed with autism varies between studies however they always show a greater proportion of males. In a research review by Fombonne et al⁵ they found a mean of 5.5 males to 1 female.

² Brugha, S.T. et al. (2009) 'Autism spectrum disorders in adults living in households throughout England – Report from the Adult Psychiatric Morbidity Survey 2007

³ Brugha, S.T. et al (2012) 'Estimating the prevalence of autism spectrum conditions in Adults: Extending the 2007 Adult Psychiatric Morbidity Survey. London: NHS, The Health and Social Care Information Centre.

⁴ The National Autistic Society. 2015. How many people have autistic spectrum disorders? Available at: <http://www.autism.org.uk/about-autism/myths-facts-and-statistics/statistics-how-many-people-have-autism-spectrum-disorders.aspx>

⁵ Fombonne E, Quirke S, Hagen A. (2011) 'Epidemiology of pervasive developmental disorders' in : Amaral DG, Dawson, G, Geschwind DH, editors, Autism Spectrum Disorders. Oxford: Oxford University Press

Methodology

Northern Ireland School Census

The Northern Ireland School Census collects a large amount of information including demographic information (such as gender), free school meal entitlement, looked after children numbers, newcomer children numbers and assessment data. This includes disability and a breakdown of those children identified with ASD.

The Department of Education provided figures from their annual Northern Ireland School Census from 2009/10 through to 2014/15. These figures showed the number of children identified with Autism, including Asperger's, across Health and Social Care (HSC) Trusts, between urban and rural areas within Trusts and across Multiple Deprivation Measure (MDM) areas as well as supplementary information on gender and school year of the pupils.

All pupils on the rolls of grant-aided primary, post-primary and special schools were included in this return comprising each child who was a registered pupil in a school in October of each given year and who attended for at least one day.

The available data was analysed in a number of ways.

1. HSC Trust and urban/rural area. The classification of urban and rural areas is set out in the Report of the Inter-Departmental Group on Statistical Classification and Delineation of Settlements⁶.
2. MDM, with Decile One relating to the 10% most deprived areas within Northern Ireland and Decile Ten relating to the 10% least deprived areas⁷.
3. By gender of pupil.
4. By school year.
5. By Special Educational Needs stage.

Prevalence

In order to establish the prevalence of autism within the compulsory school age population, the number of children who were attending school and had been identified with ASD was divided by the total number of compulsory school age children attending school. This gave the proportion of children within the cohort who were identified with ASD.

Statistical Significance

The chi-square test can be used to establish whether or not two variables have any statistical relationship. A resultant p value of 0.05 or smaller indicates that the result of the chi-square test is significant and that there is a relationship between the variables in the process.

Inequalities⁸

Statistical techniques such as the slope index of inequality and the relative index of inequality have been used to analyse socioeconomic inequalities between children identified with ASD. More information on these can be found in the appendix.

⁶ NISRA, 2005

⁷ NIMDM 2010, NISRA

⁸This method was used to analyse ASD figures against the Multiple Deprivation Measure.

Limitations

There were a number of limitations to the data in this study and its use of establishing prevalence figures for ASD.

1. Data is sourced from the school census rather than a diagnostic source. While this is presently the most comprehensive data source available it only covers children of compulsory school age and those attending school. Figures for 2014 suggest that there were approximately 230 home taught children known to the education authority with no further details available.
2. The data only captures those children who have been assessed as having ASD. At any time, additional children may not have gone through the full assessment process and it is possible that a number of children may be identified with ASD at a later date.
3. There may be some sub regional data capture issues within the school census. For example it was not possible to place some children in either an urban or rural location or within a MDM Decile. However this is minimal, accounting for less than 1% of the ASD population, and is unlikely to have had a large effect on results.

It should be noted that there are many factors which can lead to variances in the apparent prevalence rates within the different breakdowns commented on in this report, not least the assumption that there is consistency of approach in the care pathways as managed by the different Trusts. In this regard, care should be taken when considering the findings, i.e. it is likely that at least some of the observed variation in prevalence may be attributable to differences in organisational structure and arrangements in place between/within Trust areas.

Findings

School Census Figures

The Northern Ireland School Census for 2014/15 found that 6,045 children were identified with ASD. This represented a prevalence rate of 2.2% of all school aged children.

Table 1 below shows the number of children identified with Autistic Spectrum Disorder and who were of compulsory school age and attending school in each of the last six years, the total number of children of compulsory school age attending school and the ASD prevalence rate. It can be seen that from the table that between 2009/10 and 2014/15 the prevalence rate rose by 0.9 percentage points. In terms of the number of children identified with ASD, this was an increase of 65%.

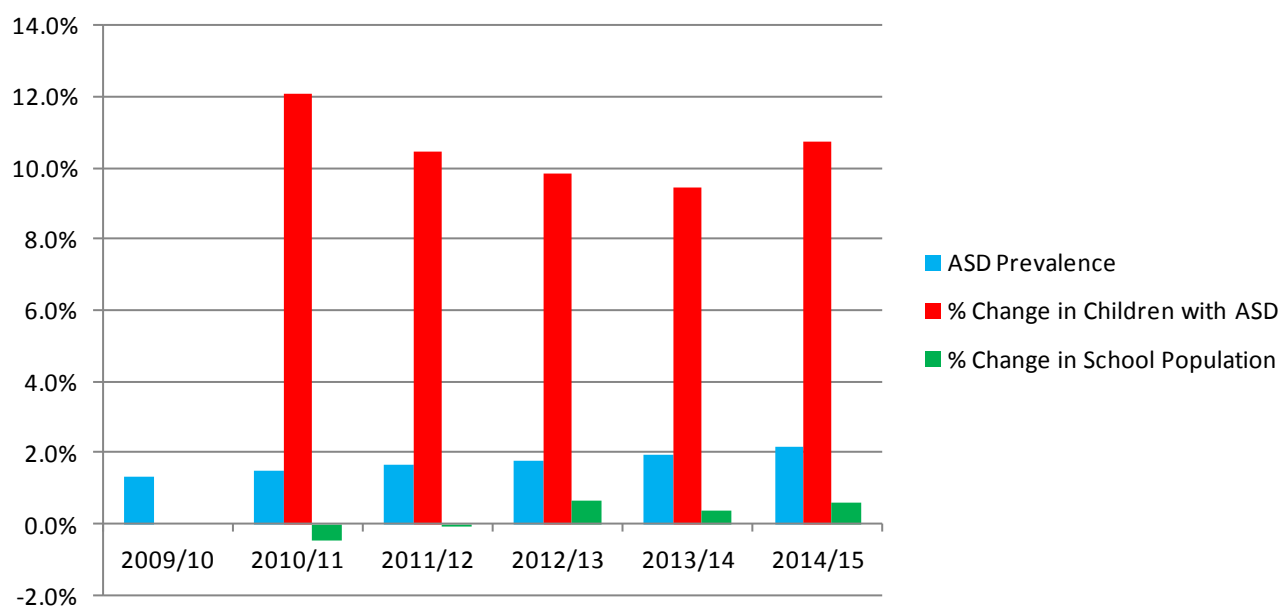
Table 1: The Number of Children with ASD, the Compulsory School Age Population and the ASD Prevalence Rate

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Children with ASD	3,668	4,111	4,540	4,986	5,458	6,045
Compulsory School Age Population	278,020	276,776	276,606	278,333	279,299	280,954
Prevalence	1.3%	1.5%	1.6%	1.8%	2.0%	2.2%

Source: Department of Education

The increase in prevalence rate can be linked to two factors illustrated in Figure 1. There has been an annual average increase of 11% in the number of children identified with ASD, while at the same time the general school population has remained relatively static between 2009/10 and 2014/15.

Figure 1: The ASD prevalence rate, annual percentage change in the number of children with ASD and the annual percentage change in the school population

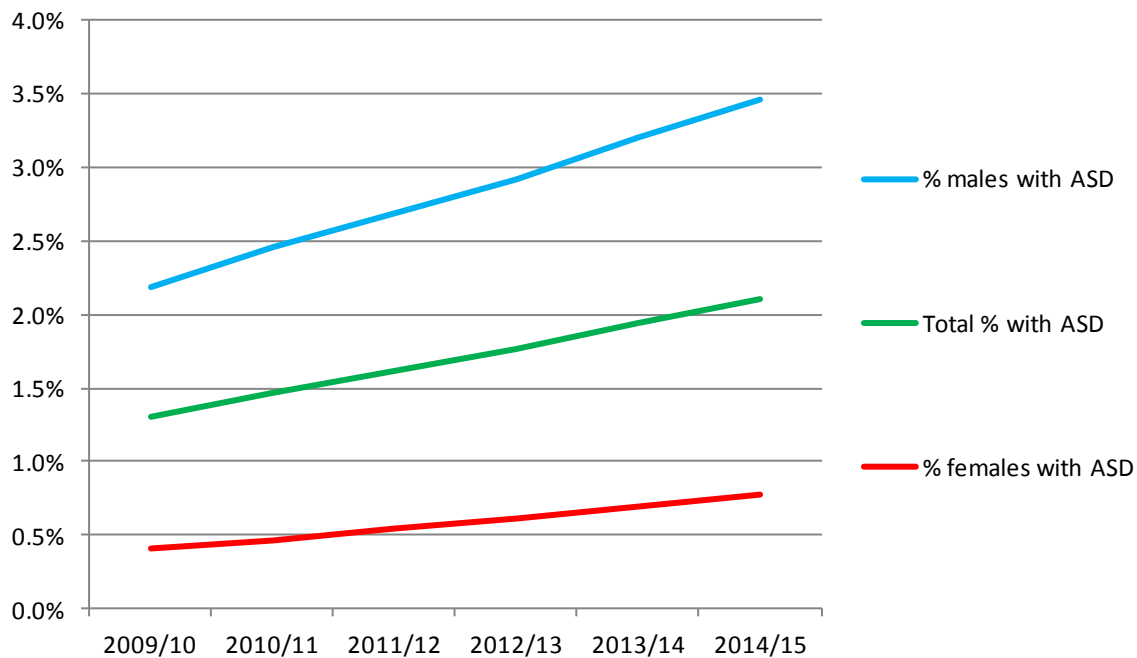


Source: Department of Education

Gender

ASD is found to be more prevalent amongst males than females in the general population with a 2007 study⁹ estimating that 1.8% of males were identified with ASD compared to 0.2% of the female population. The School Census data provided by the Department of Education gives a gender split for the years 2009/10 – 2014/15. Figure 2, below, shows a steady rise in the prevalence rate of ASD in both the male and female compulsory school age populations.

Figure 2: Prevalence Rates by Gender 2009/10 – 2014/15



Source: Department of Education

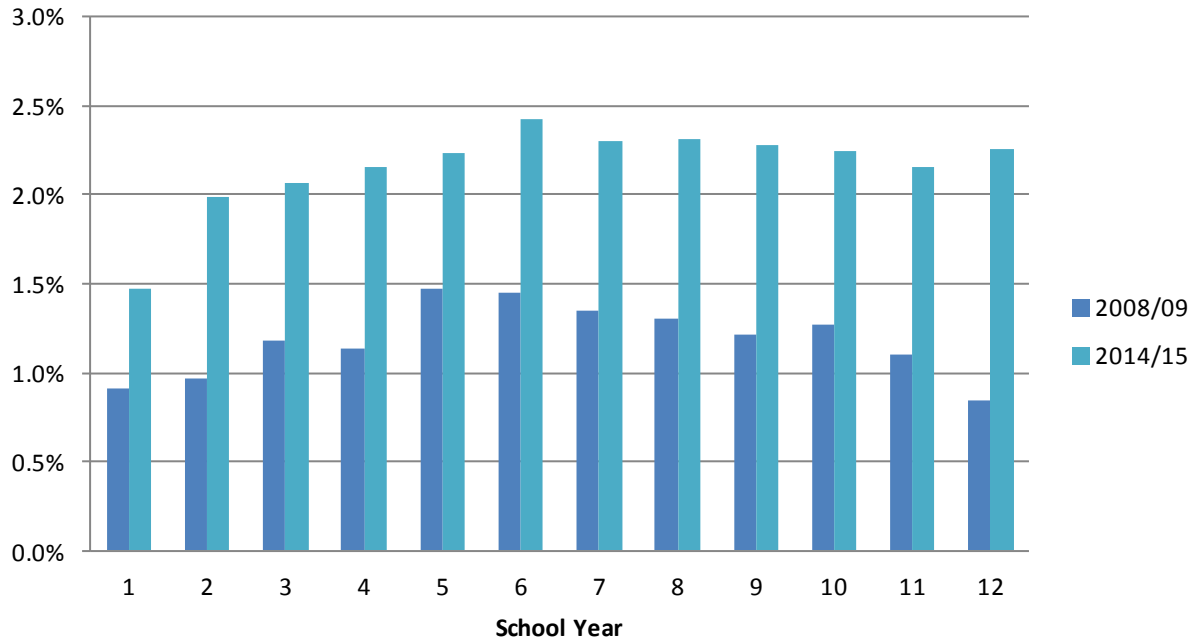
The 2014/15 figures show that Autism was almost five times more prevalent in the male school population (3.5%) than the female population (0.8%). The female population with ASD did however increase on average by 14% each year from 2009/10 to 2014/15; in comparison the male population with ASD saw an average increase of 10% over the same period.

⁹ <http://www.ic.nhs.uk/news-and-events/press-office/press-releases/one-in-a-hundred-adults-have-an-autism-spectrum-disorder-says-pioneering-new-study>

School Year

Data for children in each school year identified with ASD for 2008/09 and 2014/15 was provided from the Northern Ireland School Census. This information can be used to compare school year prevalence rates within and between school years.

Figure 3: Prevalence Rates by School Year for Compulsory School Age Children in 2008/09 & 2014/15



Source: Department of Education

Figure 3 shows that prevalence across all school years was higher during 2014/15 compared with 2008/09. During 2008/09, 1.5% was the highest prevalence rate (Year 5 – children aged 9) and 0.8% the lowest (Year 12 – children aged 16). In 2014/15, Year 6 had the highest prevalence rate (2.4%) while Year 1 had the lowest prevalence rate (1.5%). Year 12 had the largest percentage point change between 2008/09 and 2014/15 of 1.4 percentage points.

Looking at Years 1 – 4 (5 – 8 year olds) in 2014/15, as in 2008/09, there was a steady rise in the ASD prevalence rate. This may indicate that as awareness of autism has increased, there is an increased focus on early identification of the disorder with more children identified at this stage in their development. Table 2, below, would support this conclusion as some of the biggest increases in the numbers of children identified with ASD have occurred in Years 1 – 4.

Table 2: The Number of Children Identified with ASD by School Year (2008/09 & 2014/15)

School Year	1	2	3	4	5	6	7	8	9	10	11	12
2008/09	202	209	256	246	326	337	320	318	283	303	270	208
2014/15	367	503	524	518	513	555	520	511	505	498	493	539
% Change	82%	140%	104%	110%	57%	64%	63%	61%	78%	64%	83%	159%

Source: Department of Education

Note: The percentage change is based on absolute values, the base population for the academic years is different

Special Educational Needs Stage

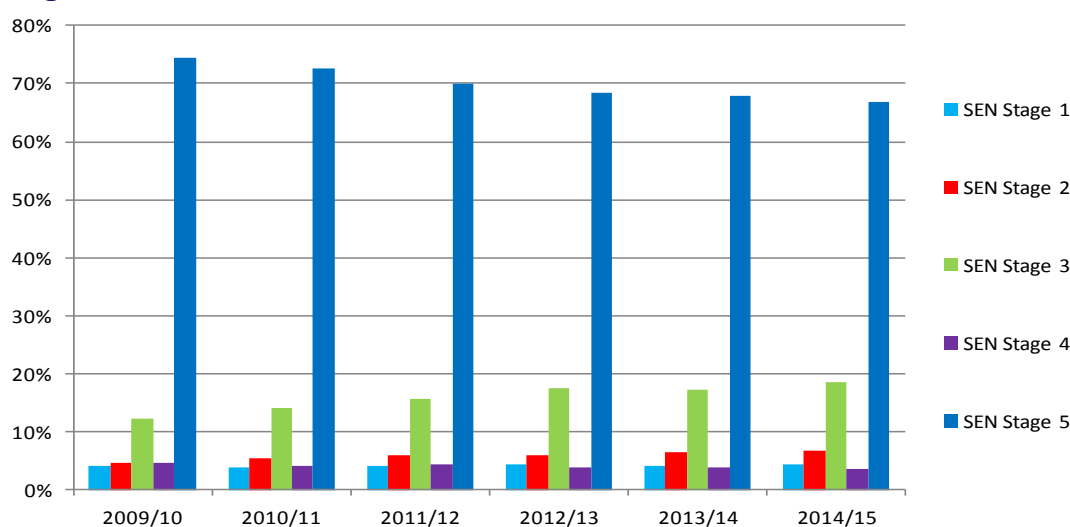
Data for those children with a diagnosis of ASD from 2009/10 to 2014/15 was provided from the Northern Ireland School Census against stages 1 – 5 of Special Educational Needs assessment.

The 'Code of Practice on the Identification and Assessment of Special Educational Needs'¹⁰ implements a five stage approach to the identification of children with learning difficulties, the assessment of their educational need and the making of whatever special educational provision is necessary to meet those needs. The opening three stages are based within the school, while at stages 4 and 5 the requisite Education Authority shares responsibility with the school. The stages are as follows:

- Stage One - teachers identify and register a child's special educational needs and, working with the schools special educational needs (SEN) co-ordinator, take initial action.
- Stage Two – the (SEN) co-ordinator leads in collecting and recording information and for co-ordinating the child's special educational provision.
- Stage Three – teachers and the SEN co-ordinator are supported by specialists from outside school.
- Stage Four – the Education Authority considers the need for a statutory assessment and may make a multi-disciplinary assessment.
- Stage Five – the Education Authority consider the need for a statement of special educational needs; if necessary it makes a statement and arranges, monitors and reviews provision.

Children are reviewed on a yearly basis and may move up or down the assessment scale, depending on performance.

Figure 4: Prevalence Rates of ASD by Special Educational Needs Assessment Stage



Source: Department of Education

¹⁰ http://www.deni.gov.uk/index/support-and-development-2/special_educational_needs_pg/special_needs-code_of_practice_pg.htm

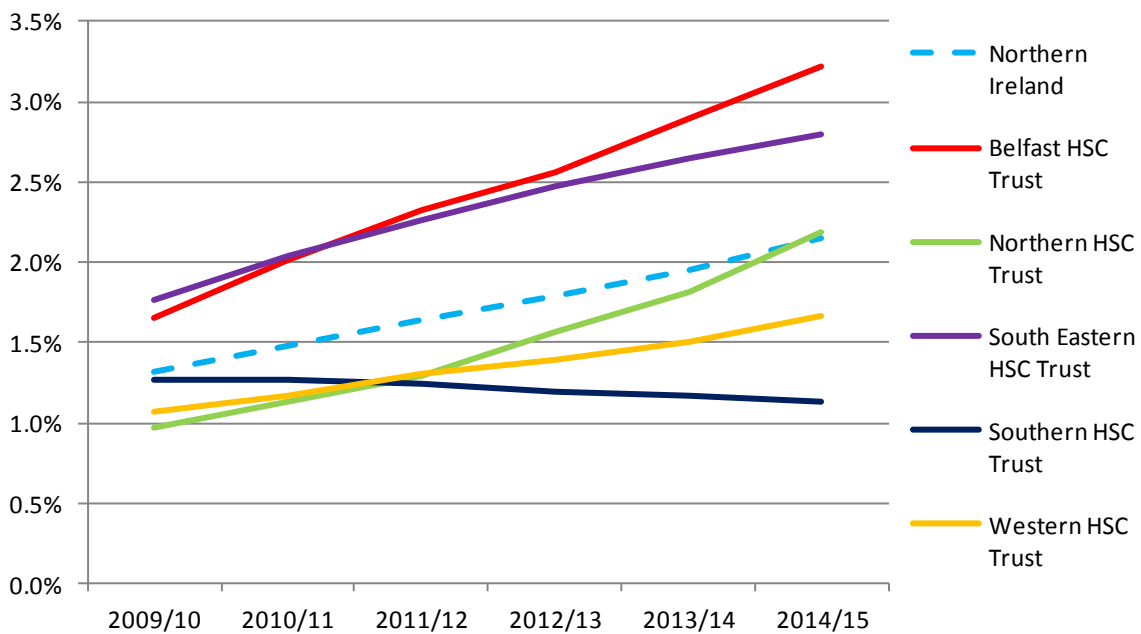
Figure 4 shows that the majority of children, identified with ASD have been assessed to be at Stage 5 of the special educational needs assessment process as at the time of the annual school census. There has been a small but noticeable decline in the relative percentage of children at stage 5 as opposed to stage 3, over the 5 years analysed. This could indicate that of all the children identified a lesser percentage require the level of intervention warranted by a Stage 5 statement. It must be remembered that the overall numbers of children identified with ASD have increased so while the relative percentage of Stage 5 children has decreased the absolute number has increased.

As the SEN process is dynamic with children moving between stages this "snapshot" graph must be treated only as indicative.

Health and Social Care Trust

The overall prevalence rate for ASD in children of compulsory school age in Northern Ireland rose steadily between 2009/10 and 2014/15 by 0.9 percentage points overall. Figure 5 illustrates that the majority of HSC Trusts saw a rise in the prevalence of school children identified with Autism, except for the Southern HSC Trust in which there has been a small decline of 0.1 percentage points. The largest change occurred in the Belfast HSC Trust which saw a 1.5 percentage point increase in those identified with ASD, from 1.7% in 2009/10 to 3.2% in 2014/15.

Figure 5: Prevalence Rates for ASD (children of compulsory school age) by Health and Social Care Trust



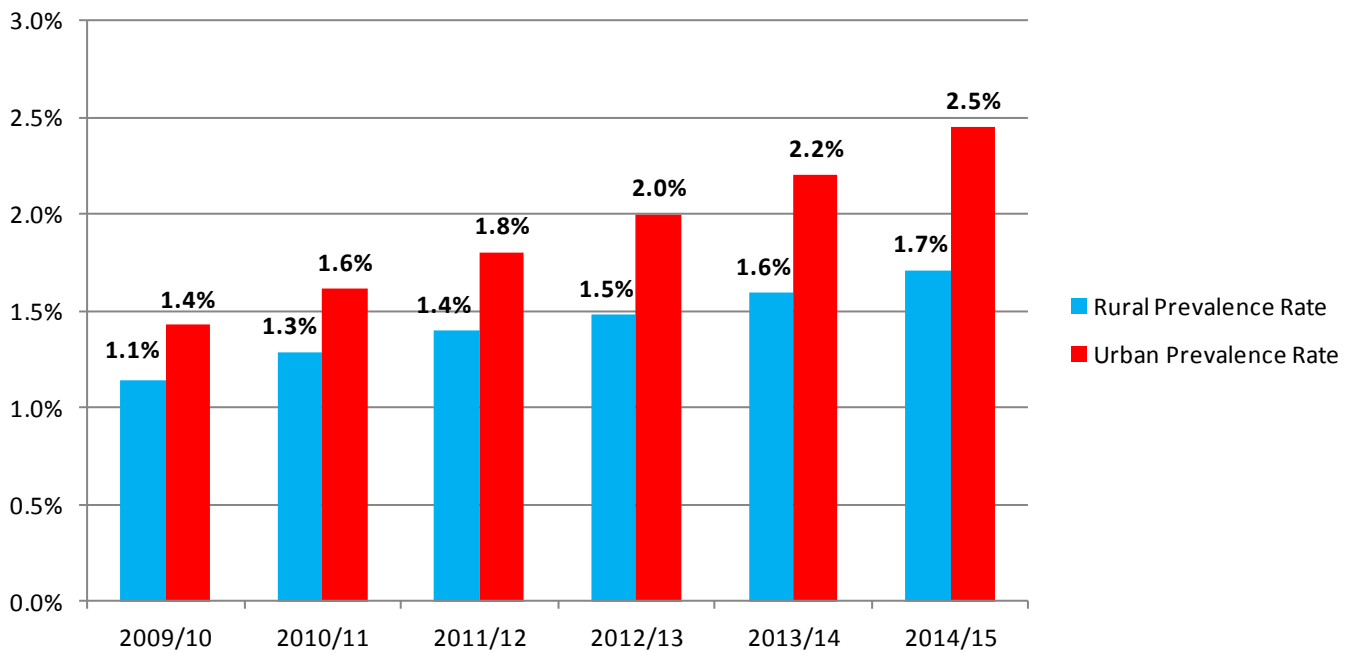
Source: Department of Education

It is also of note, in Figure 5, that the prevalence levels in the Belfast and South Eastern HSC Trusts were consistently higher than the Northern Ireland average. These are the two Trust areas which have a significantly larger urban than rural population (see appendix 3).

Urban/Rural Location

Both the urban and rural ASD prevalence rates in Northern Ireland, from 2008/09 to 2014/15, have continued to rise (Figure 6). However it is evident that prevalence has been consistently higher in the urban population than the rural population with the largest difference registered in 2014/15 (0.8%). This is due to the year on year growth in the rural ASD population slowing from 13% between 2009/10 and 2010/11 to 8% between 2013/14 and 2014/15. Over the same period of time the urban ASD population has continued to increase at a steady rate of between 11% and 12%.

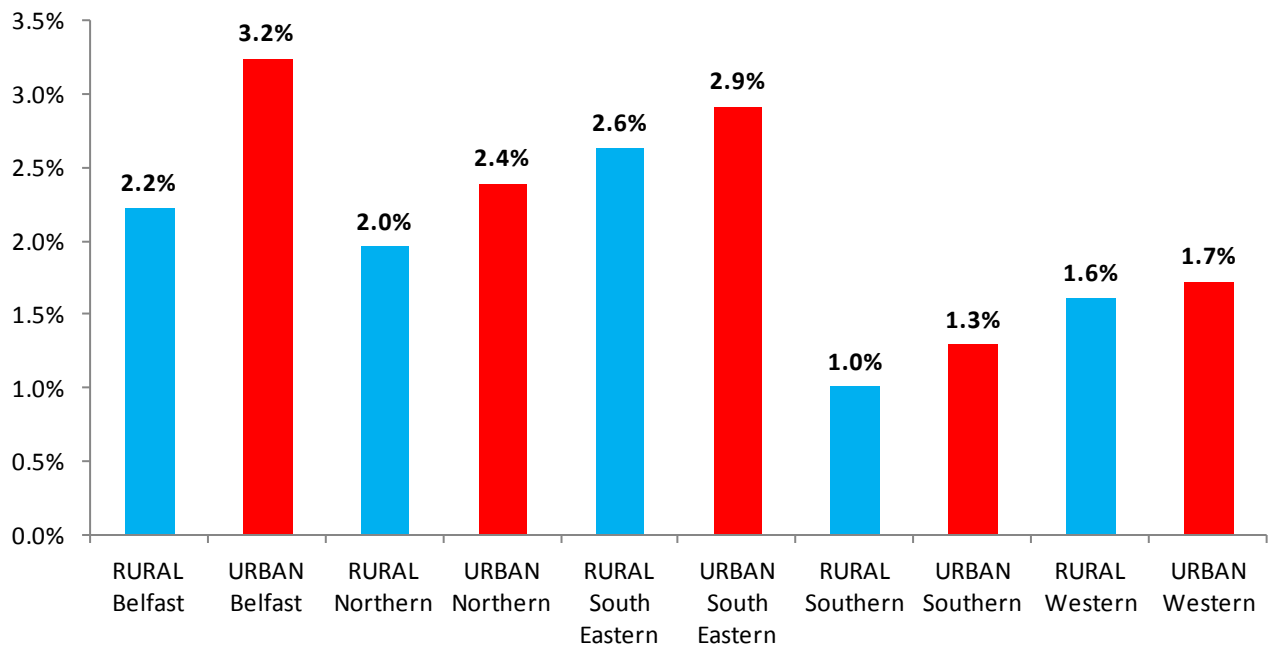
Figure 6: Rural and Urban Prevalence Rates in Northern Ireland (2009/10 – 2014/15)



Source: Department of Education Figures

Figure 7 shows the Urban/Rural difference in prevalence rates across all of the HSC Trusts. The Trust with the largest difference between its Urban and Rural populations was the Belfast HSC Trust; however the Belfast Trust has a very small rural population which may skew the results (see appendix three). In the other HSC Trusts there was a much more even split between the populations. However it can be seen in the chart below that ASD is also more prevalent in the urban population in the Northern, South Eastern and Southern HSC Trusts. The Western Trust had similar prevalence rates in their urban and rural populations.

Figure 7: Prevalence Rates for ASD (children of compulsory school age) by HSC Trust and Urban/Rural Location (2014/15)



Source: Department of Education

Note: Appendix One contains a figure detailing the prevalence rates by urban/rural location and HSC Trust for 2009/10 – 2014/15

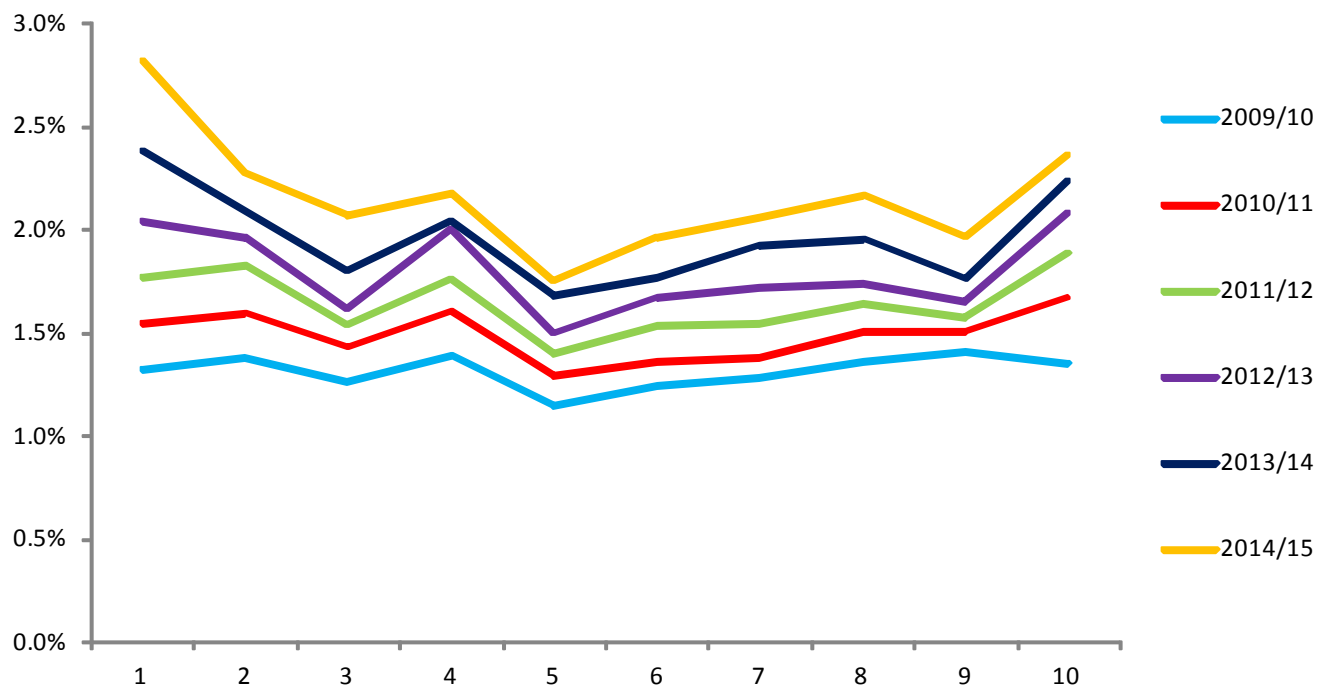
Multiple Deprivation Measure Deciles

As set out in Figure 8, year on year across all MDM Deciles there was an increase in the prevalence rates of ASD at the regional level. It is difficult to interpret a pattern in Figure 8, however it appears the extreme deciles appear to have higher prevalence rates.

This pattern may exist due to access to services, with those in the most deprived areas having a greater level of state intervention in their lives, while those in the least deprived areas have greater levels of resources which allow them better access to services.

A majority of the most and least deprived deciles are located in urban areas (see appendix 4). This correlates with previous findings where the prevalence of autism was higher in urban populations.

Figure 8: Prevalence of ASD by Year and MDM Deciles



Source: Department of Education

Inequality Gap

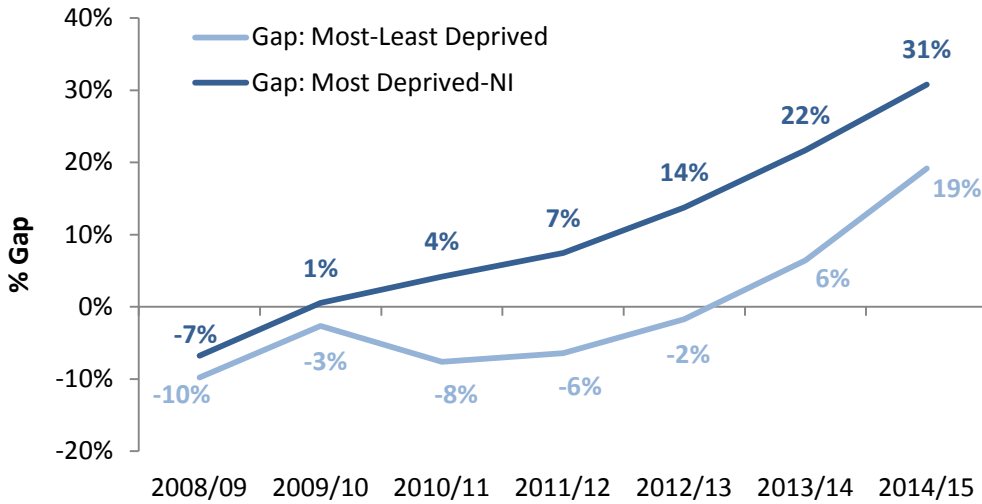
The following analysis of the ASD inequality gap was carried out through the NI Health & Social Care Inequalities Monitoring System (HSCIMS)¹¹ within IAD which provides in-depth assessment of inequality gaps across a range of health and social care indicators.

The simple gap analysis shows that the rate of ASD in school aged children in the 10% most deprived areas in Northern Ireland stood at 2,818 cases per 100,000 population in 2014/15. This was a third higher than the regional average, 2,155 cases per 100,000, and almost a fifth higher than the rate in the 10% least deprived areas 2,365 per 100,000.

¹¹ <http://www.dhsspsni.gov.uk/index/statistics/health-inequalities.htm>

In the years prior to 2013/14, rates were slightly higher in the least deprived areas than in the most deprived areas. However in the last two years the rate of ASD amongst children in the most deprived areas has increased at a faster rate than in the least deprived. This has resulted in higher rates of ASD being identified in the most deprived areas and a widening of the inequality gap, as shown in Figure 9 below.

Figure 9: Children with ASD per 100,000 population: Deprivation Time Series



Further analysis using the Slope Index of Inequality (Sii) and the Relative Slope of Index (Rii) can be found in Appendix 5.

Appendices

Appendix One – Statistical Significance

Statistical Significance – Test One - Gender

The following hypotheses were devised to establish any statistical significance in a relationship between the diagnosis of ASD and *gender*.

Null: The proportion of children identified with ASD is *independent* of gender

Alternative: The proportion of children identified with ASD is *associated* with gender

For each year of this study we can say that there is a significant relationship between the proportion of children identified with ASD and gender, as the chi-square scores were consistently significant at less than the 0.001 level. We therefore accept the alternative hypothesis.

Table 3: Chi Square Scores for Gender Statistical Significance Test

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Chi Square Score	X ² (1, N=278,020) =1704.60, p=<0.001	X ² (1, N=276,776) =1873.80, p=<0.001	X ² (1, N=276,606) =1973.93, p=<0.001	X ² (1, N=278,333) =2098.21, p=<0.001	X ² (1, N=279,575) =2285.30, p=<0.001	X ² (1, N=280,954) =2403.88, p=<0.001

Source: Department of Education

Note: Significance figures less than 0.05 are statistically relevant.

Statistical Significance – Test Two - Location

To test if a diagnosis of ASD was independent of Urban or Rural location null and alternative hypotheses were established.

Null: The proportion of children identified with ASD is independent of location (urban/rural)

Alternative: The proportion of children identified with ASD is associated with location (urban/rural)

In each year from 2009/10 to 2014/15, at a regional level, the chi square statistic located on the chi square distribution significance table gave a score lower than 0.05. This means that the alternative hypothesis is accepted and that the proportion of children identified with ASD is associated with their location, i.e., urban or rural at the Northern Ireland level.

Table 4: Northern Ireland Chi Square Scores for Urban Rural Location Statistical Significance Test

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Chi Square Score	X ² (1, N=274261) =41.361, p=<0.001	X ² (1, N=273,555) = 48.22, p=<0.001	X ² (1, N=273,819) = 67.83, p=<0.001	X ² (1, N=275,881) = 100.68, p=<0.001	X ² (1, N=278,702) = 129.60, p=<0.001	X ² (1, N=280,480) = 175.38, p=<0.001

Source: Department of Education

Note: Significance figures less than 0.05 are statistically relevant.

Performing this test at HSC Trust level resulted in varied outcomes. The results for the Southern HSC Trust consistently indicated that there was a relationship between the proportion of children identified with ASD and rurality. However no significant relationship was established in either the Belfast or South Eastern HSC Trusts in any of the years studied.

The Northern and Western HSC Trusts produced mixed results. In the Northern HSC Trust the results for the last three years (2012/13, 2013/14 & 2014/15) of the study indicated a relationship between children identified with ASD and location. The Western Trust showed an association between the proportion of children identified with ASD and location for the first year of the study (2009/10).

Table 5: Belfast HSC Trust Chi Square Scores for Urban Rural Location Statistical Significance Test

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Chi Square Score	$\chi^2(1, N=46,355) = 1.61, p=0.21$	$\chi^2(1, N=45,998) = 1.85, p=0.17$	$\chi^2(1, N=46,107) = 2.37, p=0.12$	$\chi^2(1, N=46,613) = 2.08, p=0.15$	$\chi^2(1, N=47,250) = 2.71, p=0.10$	$\chi^2(1, N=47,867) = 3.11, p=0.08$

Note: Significance figures less than 0.05 are statistically relevant

Table 6: Northern HSC Trust Chi Square Scores for Urban and Rural Location Statistical Significance Test

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Chi Square Score	$\chi^2(1, N=69,927) = 0.01, p=0.91$	$\chi^2(1, N=68,998) = 0.46, p=0.50$	$\chi^2(1, N=68,612) = 2.42, p=0.12$	$\chi^2(1, N=68,938) = 8.14, p<0.01$	$\chi^2(1, N=70,483) = 6.57, p=0.01$	$\chi^2(1, N=70,640) = 15.54, p<0.001$

Note: Significance figures less than 0.05 are statistically relevant

Table 7: South Eastern HSC Trust Chi Square Scores for Urban and Rural Location Statistical Significance Test

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Chi Square Score	$\chi^2(1, N=51,339) = 0.01, p=0.92$	$\chi^2(1, N=51,286) = 0.11, p=0.74$	$\chi^2(1, N=51,352) = 0.03, p=0.86$	$\chi^2(1, N=51,690) = 0.28, p=0.60$	$\chi^2(1, N=51,690) = 0.28, p=0.60$	$\chi^2(1, N=52,309) = 3.70, p=0.054$

Note: Significance figures less than 0.05 are statistically relevant

Table 8: Southern HSC Trust Chi Square Scores for Urban and Rural Location Statistical Significance Test

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Chi Square Score	$\chi^2(1, N=57,778) = 17.04, p<0.001$	$\chi^2(1, N=58,038) = 14.74, p<0.001$	$\chi^2(1, N=58,541) = 6.49, p=0.01$	$\chi^2(1, N=59,546) = 10.55, p=0.001$	$\chi^2(1, N=60,603) = 17.64, p<0.001$	$\chi^2(1, N=61,338) = 10.97, p=0.001$

Note: Significance figures less than 0.05 are statistically relevant

Table 9: Western HSC Trust Chi Square Scores for Urban and Rural Location Statistical Significance Test

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Chi Square Score	$\chi^2(1, N=48,852) = 5.43, p=0.02$	$\chi^2(1, N=48,469) = 0.002, p=0.97$	$\chi^2(1, N=54,307) = 7.10, p=0.008$	$\chi^2(1, N=48,000) = 0.002, p=0.96$	$\chi^2(1, N=48,400) = 0.48, p=0.49$	$\chi^2(1, N=48,326) = 0.94, p=0.33$

Note: Significance figures less than 0.05 are statistically relevant

Statistical Significance – Test Three – MDM Deciles

The following hypotheses were devised to establish any statistical significance in a relationship between the diagnosis of ASD and the MDM score of the area in which the child was living.

Null: The proportion of children identified with ASD is independent of MDM Deciles

Alternative: The proportion of children identified with ASD is associated with MDM Deciles

For 2009/10 the chi square score produced was not significant. For this year the Null hypothesis was accepted meaning that the proportion of children identified with ASD was independent of MDM Deciles. However for all the other years tested the opposite was true with significance levels less than 0.05, meaning that for these years the alternative hypothesis was accepted, the proportion of children identified with ASD was associated with MDM Deciles.

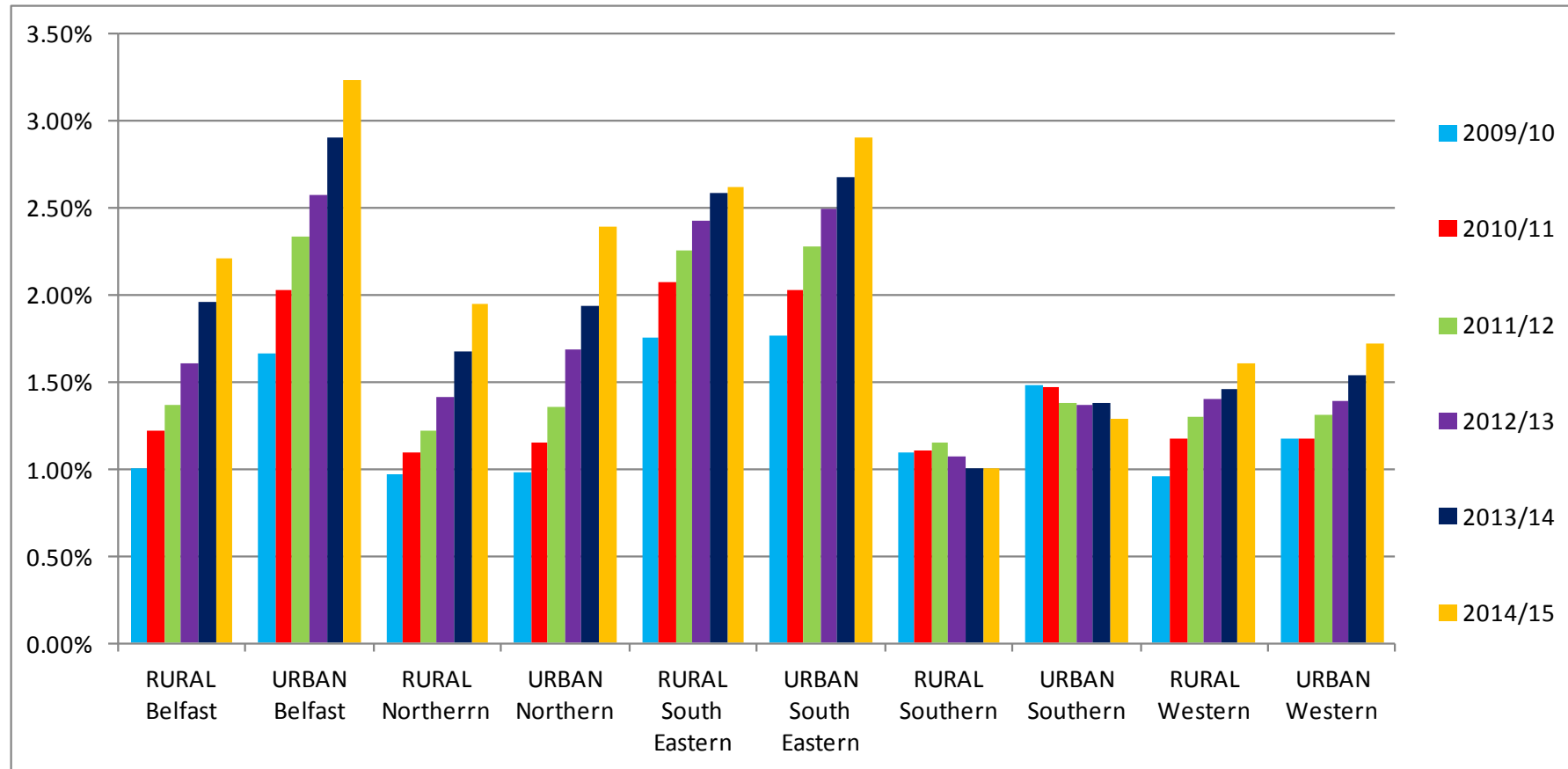
Table 10: Chi Square Scores for Multiple Deprivation Measures Deciles Statistical Significance Test

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Chi Square Score	$\chi^2(9, N=274,261) = 13.51, p=0.14$	$\chi^2(9, N=273,555) = 25.30, p<0.01$	$\chi^2(9, N=273,819) = 35.98, p<0.001$	$\chi^2(9, N=275,881) = 57.46, p<0.001$	$\chi^2(9, N=278,702) = 65.14, p<0.001$	$\chi^2(9, N=280,480) = 99.84, p<0.001$

Note: Significance figures less than 0.05 are statistically relevant

Appendix Two

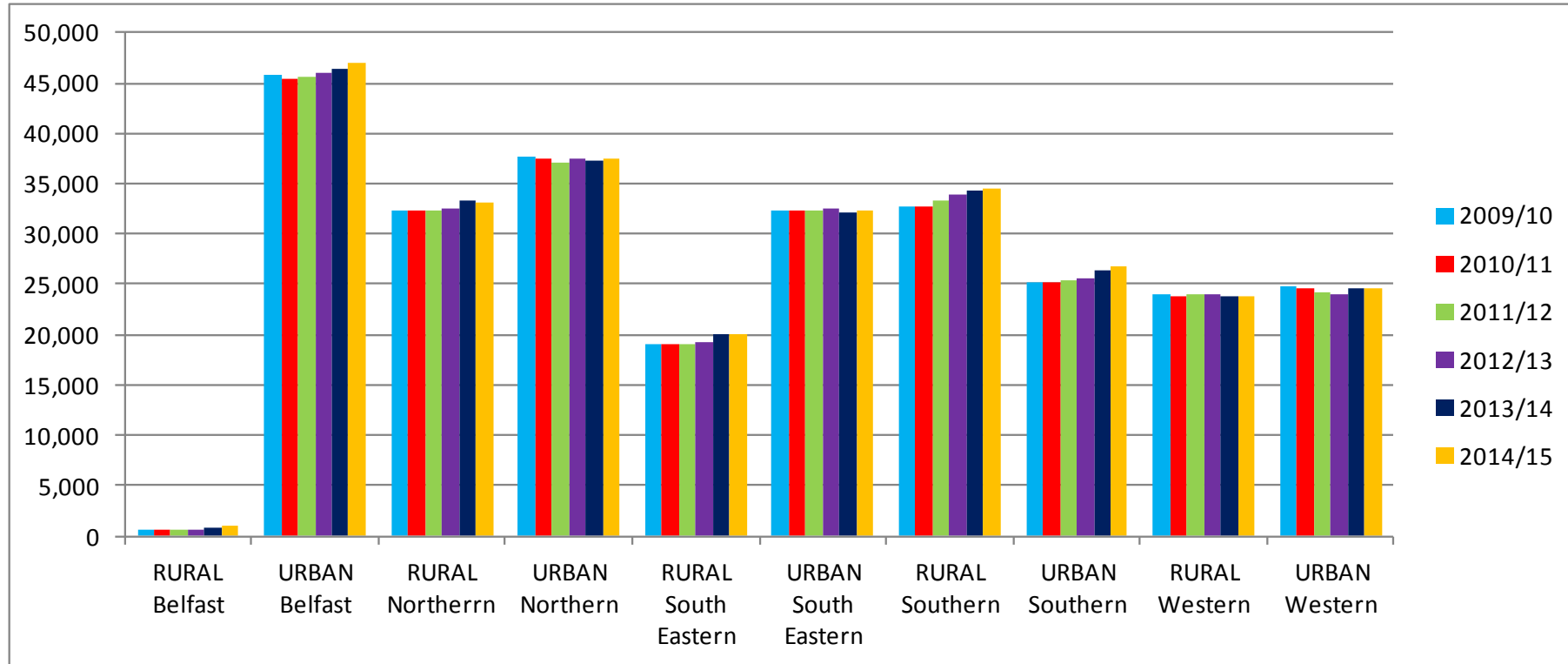
Figure 10: The Prevalence of ASD in the Rural and Urban Populations (Compulsory School Age Children) in each Health and Social Care Trust 2009/10 – 2014/15



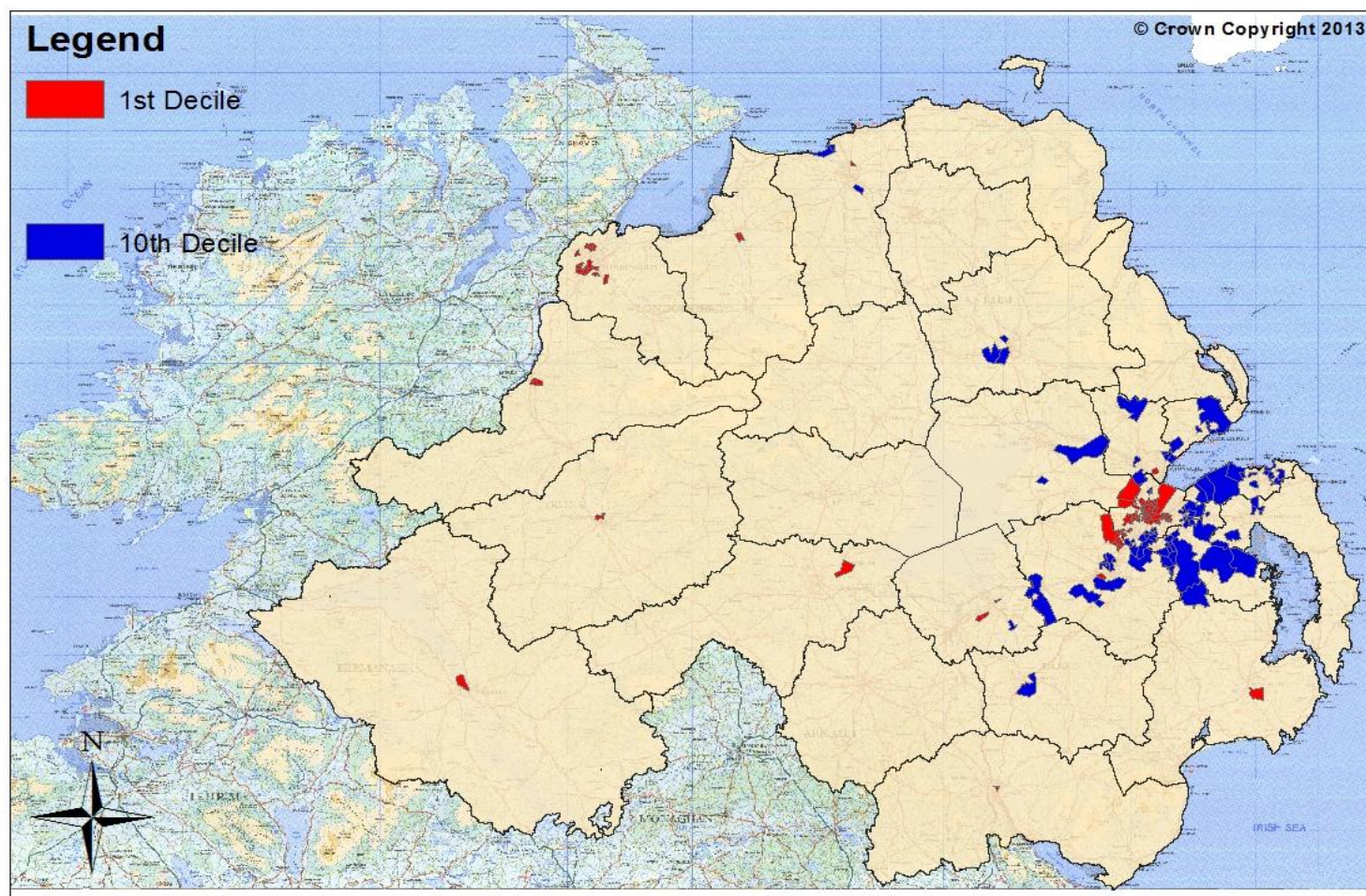
Source: Department of Education

Appendix Three

Figure 11: The Rural and Urban Populations (Compulsory School Age Children) of each Health and Social Care Trust 2009/10 – 2014/15

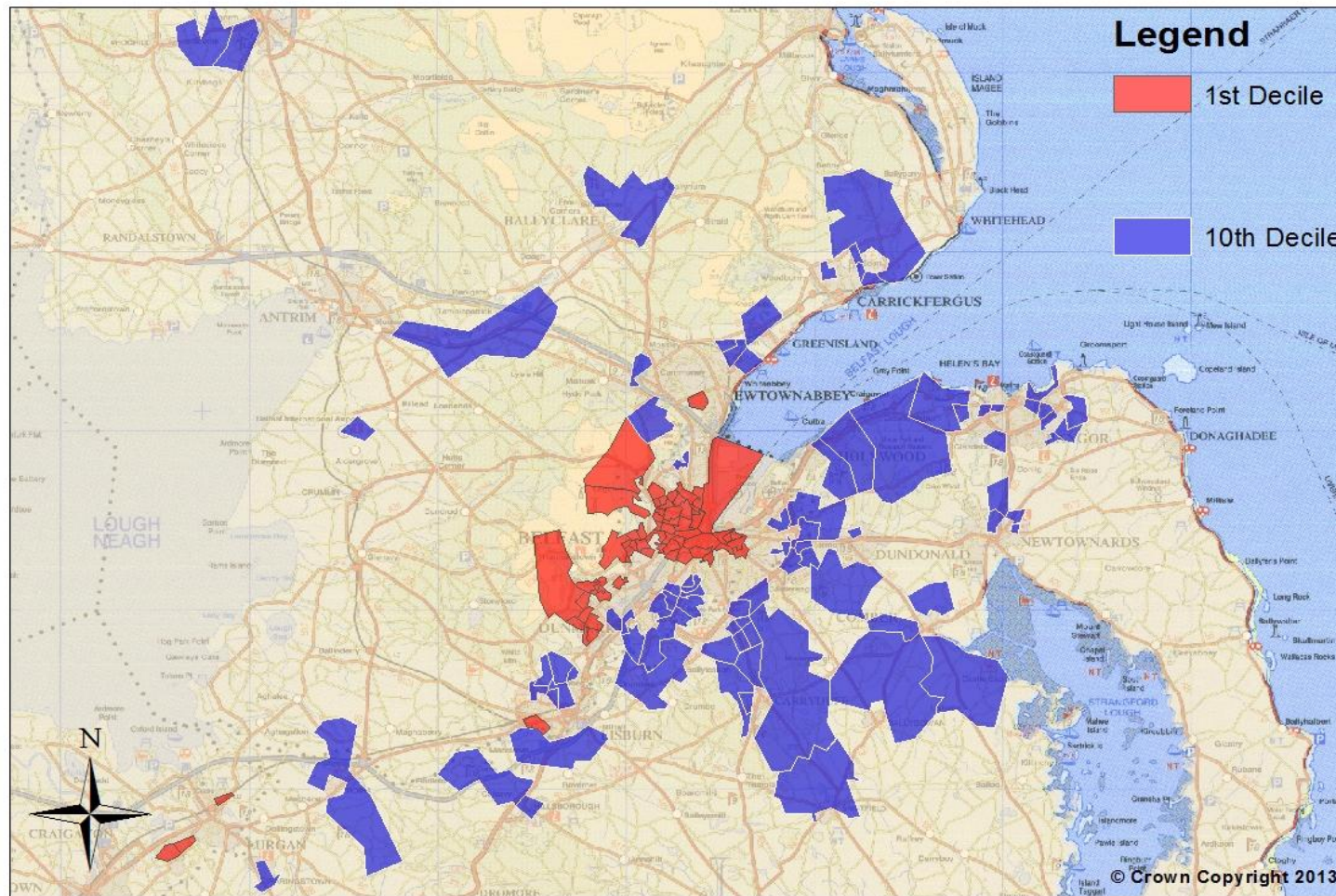


Source: Department of Education

*Appendix Four – Deprivation Maps***Figure 12: Map Showing the Most (Red) and Least (Blue) Deprived Areas in Northern Ireland (MDM 2010)**

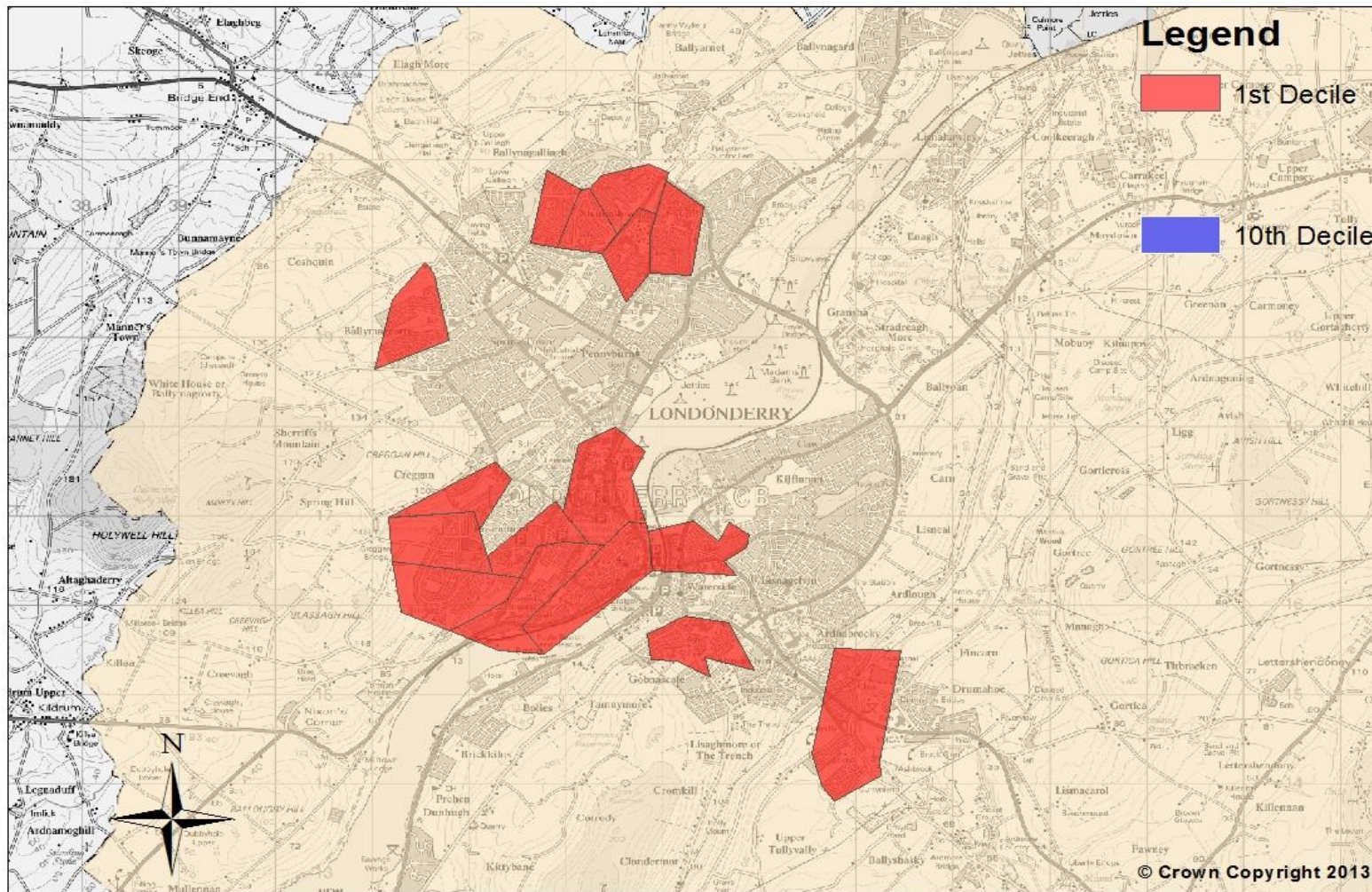
Source: NISRA – Demography and Methodology Branch

Figure 13: Map Showing the Most (Red) and Least (Blue) Deprived Areas in the Greater Belfast area



Source: NISRA – Demography and Methodology Branch

Figure 14: Map Showing the Most (Red) and Least (Blue) Deprived Areas in Londonderry



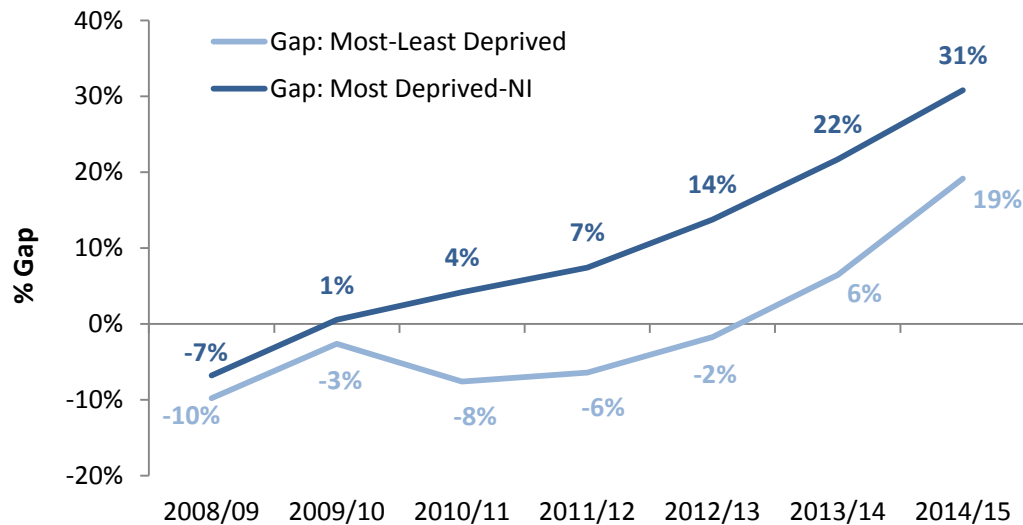
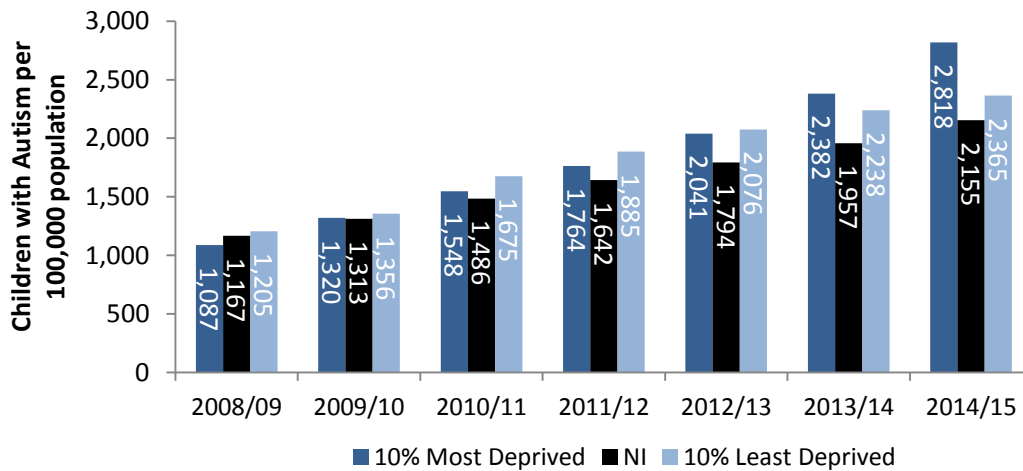
Source: NISRA – Demography and Methodology Branch

Appendix Five – Further Information

Children with Autism

Deprivation: Simple Gap analysis

Children with Autism/Asperger’s per 100,000 population: Deprivation Time Series



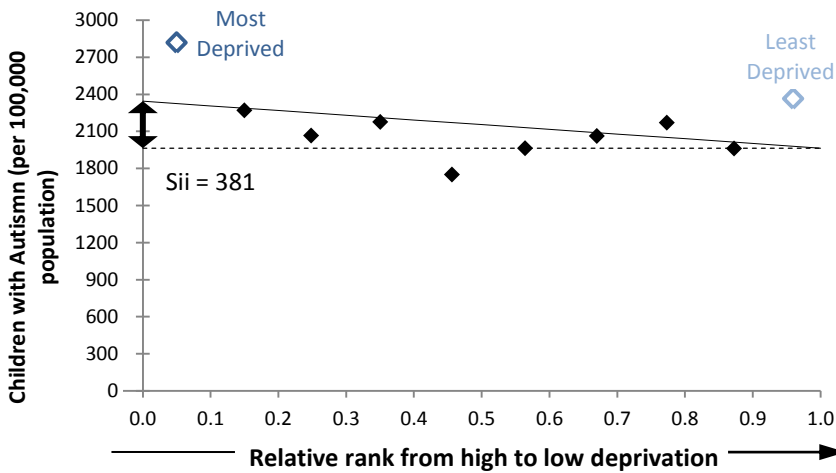
In 2014/15, the rate of autism amongst children in the 10% most deprived areas stood at 2,818 cases per 100,000 population which was a fifth higher than the regional average (2,155 cases per 100,000 population) and almost a third higher than the rate in the 10% least deprived areas (2,365 cases per 100,000 population).

Prior to 2013/14, rates were slightly higher in the least deprived areas than in the most deprived areas however in the last two years the rate of autism amongst children in the most deprived areas has increased at a faster rate than in the least deprived resulting in higher rates in the most deprived and a widening of the inequality gap.

Deprivation: Slope Index of Inequality

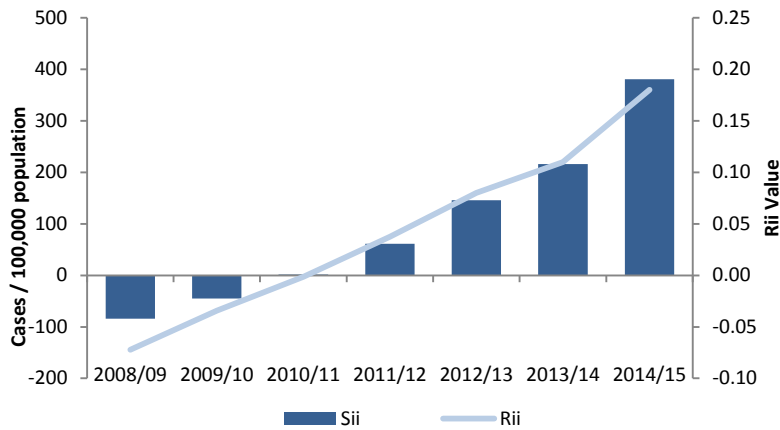
In addition to the simple deprivation gap analysis presented above, the following social gradient analysis has been undertaken to provide a fuller assessment of inequalities across all socio-economic groups in Northern Ireland. Further information on this follows the analysis below.

Slope Index of Inequality - Children with Autism/Asperger’s per 100,000 population (2014/15)



The slope index of inequality (Sii) shows that the absolute gap in the rate of autism amongst children between the most and least deprived was 381 cases per 100,000 population in 2014/15.

Year	Simple Gap (MD-LD)	Sii	Rii
2014/15	19%	380.8	0.18
2013/14	6%	216.2	0.11
2012/13	-2%	146.1	0.08
2011/12	-6%	61.3	0.04
2010/11	-8%	1.9	0.00
2009/10	-3%	-45.2	-0.03
2008/09	-10%	-84.4	-0.07



The relative index of inequality (Rii) gives a proportionate gap of 0.18 in 2014/15 i.e. the Sii gap is equivalent to 18% of the average rate of autism amongst children in NI. As with the simple gap analysis, Rii indicates that the deprivation gap has changed from negative (higher rates in least deprived than most deprived) to positive (higher rates in most deprived than least deprived) over the analysed period. However, despite the simple gap indicating that this change in direction has only occurred in recent years, Rii shows that this change occurred much earlier and that the deprivation gap has been gradually widening since 2010/11.

Social Gradient

Health and social care inequalities are often considered in terms of the gap between the most and least deprived quintiles/deciles of the population. However, this does not account for those areas of intermediate levels of deprivation that may also be relatively disadvantaged to some degree. This is reflected in the Marmot Review¹² which demonstrated that there is a social gradient in health and its wider determinants that runs from top to bottom of the socioeconomic spectrum. The social gradient is also a global phenomenon whereby socio-economic factors have considerable impact on the health and mortality of populations in low, middle and high income countries. The social gradient in health means that inequalities affect everyone.

The slope index of inequality (Sii) is a robust method for analysing and monitoring the socioeconomic inequalities in health and social care over time by measuring changes in the social gradient. This approach involves calculating the mean status of each socioeconomic group and then ranking classes by their socioeconomic status¹³. The Sii is then defined as the slope of the "best fit" regression line showing the relationship between the status of a particular group and that group's relative rank on the deprivation scale. An equal rate across all deprivation categories would give a horizontal line with a slope of zero (Sii=0) indicating that there is no evidence of inequality. The level of inequality is shown by the magnitude of the gradient, regardless of direction.

¹² *Fair Society, Healthy Lives: The Marmot Review* can be accessed at <http://www.marmotreview.org>

¹³ Deprivation deciles as defined by the Northern Ireland Multiple Deprivation Measure (NIMDM).

Relative Index of Inequality

The relative index of inequality (Rii) is a non-dimensional coefficient of inequality representing the proportionate change in the health outcome over the population by socioeconomic status. Rii is calculated by dividing Sii by the mean outcome for the health indicator across the entire population. It allows inequalities to be compared and contrasted across a number of different health indicators as well as over time, with higher Rii values indicating greater inequalities across the analysed deprivation groups. As with Sii, a value of zero for Rii indicates no evidence of inequality. The higher the Rii value is, the higher the level of inequalities that exist in the population. For example, a Rii of 1.5 means that the absolute gap between the most and least deprived is one and a half times the regional average for that indicator.

Sii vs. Simple Gap

The simple gap analysis presented earlier (i.e. difference between the most and least disadvantaged groups) is useful in that it is easy to produce and can be easily interpreted, however it is limited to an extent in that it only reflects the difference between the highest and lowest socioeconomic or deprived groups and can be potentially affected by extreme values for each of these groups. Sii however reflects on the experience of the entire population and is sensitive to the distribution of the population across all socioeconomic groups and for this reason the measures are not directly comparable. In addition, as outlined above, the Rii can be calculated from Sii allowing for inequalities to be monitored over time and to be compared and contrasted across a number of different health indicators. The gap analysis however retains value in that it is based on a relatively easy concept to understand and can be calculated easily without the need for statistical modelling. Comparing trends in the simple gap analysis outlined earlier in the report with trends in the social gradient generally shows similar patterns in inequalities in terms of narrowing, widening or remaining broadly constant.

Appendix Six – Additional Tables

These tables have been sourced from a quarterly collection of ASD data from the Health and Social Care Board. These tables will, in the future, be published on a quarterly basis on the Department's website and will help to establish the incidence rate of ASD within Northern Ireland.

Table 11: Number of accepted ASD referrals for children

HSC Trust	Qtr ending 30 June 14	Qtr ending 30 Sept 14	Qtr ending 31 Dec14	Qtr ending 31 March 15
Belfast	210	153	154	132
Northern	221	188	208	196
South Eastern	106	103	83	91
Southern	80	50	61	58
Western	119	79	97	100
Northern Ireland	736	573	603	577

Source: Health and Social Care Board

Please note that these figures refer to children aged 0 -17. The table above sets the number of referrals accepted after triage during the time period by the Health and Social Care Trusts

Table 12: Number of new ASD assessments for children (New seen)

HSC Trust	Qtr ending 30 June 14	Qtr ending 30 Sept 14	Qtr ending 31 Dec14	Qtr ending 31 March 15
Belfast	75	67	79	76
Northern	130	132	117	112
South Eastern	107	126	125	106
Southern	30	50	75	59
Western	75	32	71	53
Northern Ireland	417	407	467	406

Source: Health and Social Care Board

Please note that the outcome of an ASD assessment can be (i) a diagnosis of ASD; (ii) assessed and found not to have ASD; or (iii) inconclusive outcome. The above figures relate to those children who have outcomes (i) or (ii). Inconclusive outcomes have not been counted.

Table 13: Number of children diagnosed with ASD

HSC Trust	Qtr ending 30 June 14	Qtr ending 30 Sept 14	Qtr ending 31 Dec14	Qtr ending 31 March 15
Belfast	66	59	77	65
Northern	94	102	82	78
South Eastern	61	61	80	66
Southern	12	18	27	23
Western	53	23	49	40
Northern Ireland	286	263	315	272

Source: Health and Social Care Board

Please note that these figures refer to children aged 0 -17.

Additional Information

For further information on **The Prevalence of ASD in School Age Children in Northern Ireland**

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