DEPARTMENT OF PSYCHIATRY AND MENTAL HEALTH

A CLINICAL AUDIT OF THE MANAGEMENT OF ADHD IN CHILDREN AND ADOLESCENTS AND COMPARISON BETWEEN TWO TREATMENT SITES IN CAPE TOWN

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DECLARATION

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1. Abstract

Background: The diagnosis of Attention Deficit Hyperactivity Disorder (ADHD) at a prevalence rate of 5-8% has clear public health and service implications. Studies suggest that certain populations, especially those with lower socio-economic status, are not adequately identified and treated. Evidence-based guidelines aim to standardize practice, but implementing them in low-resource environments can be challenging. To assess compliance, clinical audits for ADHD management have been conducted in higher income countries, but, to our knowledge, there have been no such audits in sub-Saharan Africa. Here we performed a clinical audit of ADHD assessment and treatment and compared compliance between two clinic groups in Cape Town, South Africa.

Objectives: The primary aim was to measure compliance in a South African context using the National Institute for Clinical Excellence (NICE) guidelines for ADHD as the gold standard. The secondary aim was to compare compliance and socio-demographics between a 'central' group (attending a treatment site in an area associated with high socio-economic status) and a 'peripheral' group (attending in areas associated with low socio-economic status) in Cape Town.

Methods: A clinical audit was conducted (March-June 2013) on the case notes for 100 'active' cases of children or adolescents diagnosed with ADHD. The 'central' group consisted of patients attending the Red Cross War Memorial Children's Hospital Neuropsychiatry Clinic. The 'peripheral' group included cases from community clinics in Retreat, Vanguard, Heideveld, and Kensington. Fifty cases were randomly selected from each group. Data were captured using an audit template derived from NICE guidelines, and a socio-demographic template.

Results: Overall, of the 17 audit standards tested none showed 100% compliance. Compliance with four standards was rated 'good' (>80%): qualified diagnostician (86%), clinician contact with teacher (96%), side effect monitoring (84%), and offering Methylphenidate as first line treatment (80%). Compliance with five standards was 'fair' (50-79%): DSM-IV criteria documentation (60%), treatment plan including behavioral or psychological interventions (71%), attempted communication in the patient's primary language (69%), documentation of the child's perspective (76%), and monitoring treatment response on standard scales (71%). Compliance with eight standards was 'poor' (<50%): specification of ADHD severity (2%), history-taking (27%), parent group referral (31%), advice about transitioning to adult services for school-leaving adolescents (14%), written psycho-education for patients (1%) and caregivers (9%), physical work-up before diagnosis (5%), and growth chart plotting (29%). On group comparison, compliance with four standards showed significant differences. Attention was shown more frequently in the central than in the peripheral group to comprehensive treatment plan (82% vs. 60%, respectively; $\mathrm{p} = 0.015$); growth chart plotting (42% vs. 16%, $\mathrm{p} = 0.004$); side effect monitoring (96% vs. 54%, $\mathrm{p} < 0.0001$); and treatment response monitoring using standard scales (80% vs. 62%, $\mathrm{p} = 0.047$).

Conclusions: Overall, compliance with NICE guidelines for ADHD was low. The central group performed better than the peripheral group in key areas, offering a greater array of treatment options and safer monitoring. We recommend the introduction of structured protocols with re-audit as a tool to improve the quality of service delivery and present an audit checklist to be used in future audit cycles.

2. Introduction

2.1 Prevalence

Attention Deficit Hyperactivity Disorder (ADHD) is a common, chronic, pervasive neurobiological syndrome that typically presents in childhood. It is the most commonly diagnosed behavioral disorder of childhood, occurring in 5-8% of children and adolescents, according to epidemiological studies.[1-4] Longitudinal studies document the persistence of the condition over time,[5-8] with reported prevalence rates of adult ADHD greater than 4%.[9]

Emerging research from low-and middle-income countries (LMICs), together with that already established in high-income countries, supports the cross-cultural validity of the ADHD diagnosis, refuting criticism that it is a largely 'Western,' specifically American, construct.[10-15] A meta-analysis (including studies from Africa, Asia, Europe, North America, Oceania, South America, and the Middle East) identified relatively higher rates from Africa (8.5%) and South America (11.8%) compared to North America (6.2%) and Europe (4.6%). The estimated worldwide ADHD prevalence was 5.3%.[16] The authors, however showed that, despite international variation in ADHD prevalence rates, variation could be attributed to local methodological differences, although the role of culture could not be discounted.[16]

A review of the African literature (which included four South African studies in addition to two from Nigeria, two from the Democratic Republic of Congo, and one from Ethiopia) gave a prevalence rate for ADHD of 5.4%-8.7% in African school populations.[17] The same review noted even higher prevalence rates of ADHD in populations of African children with co-occurring conditions such as Intellectual Disability (45.5%), HIV (Human Immunodeficiency Virus) (88%), and Tuberculosis (TB) Meningitis (100%).[17]

The prevalence of ADHD varies depending on which diagnostic system is employed. For the purpose of this study we used the DSM-IV-TR (Diagnostic and Statistical Manual of Mental Disorders: Fourth Edition Text Revision),[18] the preferred system in North America (and South Africa) at the time of the study, although the DSM-5 has subsequently been published. The ICD-10[19] (International Statistical Classification of Diseases and Related Health Problems) is the preferred system in Europe.[20]

2.2 Epidemiological Risk Factors

Potential risk factors for developing ADHD include low socio-economic status (although findings for ethnic or racial differences are inconsistent), low parental education[21-22]; male gender (ADHD is three times more frequent in boys than girls)[23]; maternal smoking or alcohol use during pregnancy, birth complications, head injury, epilepsy, and HIV/AIDS.[21,24-26] Children of parents with a mental disorder have a higher likelihood of developing ADHD.[21,26-27] In addition, other variables such as family structure (increased family size, institutionalization), lack of family cohesion, and family conflict are known to contribute.[26,28] In environments of high adversity in which there is an aggregation of multiple risk factors the likelihood of ADHD and comorbid mental disorders has been shown to increase exponentially.[26] Comparison of findings from studies performed in various countries show similar risk factors in different cultural contexts, although the evidence base is less well established in LMICs.[26,29]

2.3 Disease Burden: A Public Health Issue

ADHD is characterized by symptoms in the core domains of inattention and/or hyperactivity-impulsivity. The high rate of comorbid conditions with ADHD necessitates a multimodal, multidisciplinary approach to management. A US national survey found that most children (67%) with ADHD had at least one comorbid disorder.[30] Children with ADHD and coexisting mental health disorders have more complex problems, a poorer prognosis, require more intensive care, and may need more medication.[31-32]

Over time, the disorder has a multidimensional effect on the functioning of the affected person, the family and society, potentially leading to significant health care costs, associated with co-occurring psychiatric conditions, more frequent unintentional injury, unemployment, and work loss.[33-35] Young people, especially those with inadequately treated ADHD, are at increased risk for academic failure, motor vehicle accidents, substance abuse, mood and anxiety disorders, conduct disorder, illegal behavior, and the subsequent development of adult antisocial personality disorder.[35-40] ADHD has a globally detrimental impact on social functioning. Increased parenting stress, difficult parent-child, sibling and peer interactions, and marital discord are common.[41]

Addressing ADHD thus constitutes a major public health problem. Lifelong care, with appropriate transitioning from child to adult mental health services, is often necessary. With the increased awareness of ADHD, there has also been increased pressure on ADHD assessment and treatment services. In the USA, ADHD accounts for 30-50% of child referrals to mental health services.[42-43] Sizeable increases have occurred in the use of diagnostic and treatment services for ADHD since the 1990s.[2,44-47] Reports indicate a rise in the percentage of mental health visits to primary care physicians and pediatricians for ADHD in other countries too. For example, a recent 2013 survey of Australian general pediatricians indicated that ADHD was the diagnosis most frequently seen, in up to 18% of presenting patients.[48]

Although South African studies detailing trends in ADHD disease burden are scant, ADHD also appears to be a substantial problem in South Africa. A 1998 study found that 7.2% of its North Sotho study population had a diagnosis of ADHD.[49] Another, by the same author, in 2004 found that 19.7% of South African school children studied had ADHD.[50] One 1997 study (of 1154 new patients presenting at two child psychiatry clinics in Johannesburg) showed that ADHD accounted for 70% of all male and 41% of all female new cases referred over one year.[51] A 2007 study, also performed at a Johannesburg child and adolescent mental health clinic over one year, found that 31% of 303 patients were give a diagnosis of ADHD.[52]

2.4 Treatment Challenges

Despite growing numbers, less than 50% of children with ADHD are being treated, according to US studies.[53-54] Treatment rates are even lower for specific groups such as girls (in whom the disorder often goes unrecognized due to lower rates of externalizing disruptive behavior), minorities (US 'non-whites'), the socio-economically disadvantaged, and those receiving public health care.[26,53-54] This is also likely to be the case in South Africa where poverty is widespread and health care infrastructure in the community presents challenges.[55] Several studies in South Africa and other LMICs have identified inadequate mental health care service delivery particularly to marginalized and vulnerable groups such as poor women and children, where mental health needs are often the greatest.[26,55-58]

Studies by the US Centers for Disease Control and Prevention (CDC) and others have suggested that the prevalence of ADHD is highest among poor children.[3,47,59-60] In a cross-sectional study, Froehlich *et al*. reported an adjusted odds ratio for ADHD prevalence of 2.3 (95% confidence interval [CI]: 1.4-3.9) for the poorest compared with the wealthiest quintile.[59] Moreover, a US national survey found that the risk for having three or more comorbidities was 3.8 times higher for poor versus affluent children (30% vs. 8%, respectively).[30] Functioning declined in a stepwise fashion with increasing numbers of comorbidities, while use of health and educational services and need for care coordination correspondingly increased.[30] However, there is evidence that ADHD is both under-recognized and undertreated in the poor.[26,59] The Froehlich study indicated that poor children, despite their greater need, were less likely than their wealthier peers to be treated consistently with medication (odds ratio: 3.4 [95% CI: 1.3-9.1]).[59]

Language barriers may further obstruct effective treatment delivery. Several studies, for example on American Hispanics, suggest that limited proficiency of the English language is associated with a substantial reduction in both access to care and the quality of services rendered.[61-63] In the South African context, Flisher *et al*. have highlighted the importance of providing culturally sensitive care, optimally conducting diagnostic interviews and providing psycho-education about ADHD to patients and their families in their own language and cultural idiom.[10]

Overall, these findings indicate a concerning situation where the children most in need of treatment may also be the ones most at risk for not receiving appropriate care. It is therefore imperative to ensure that all children with ADHD have equitable access to treatment. Treatment disparities should be identified and addressed as a public health priority, especially in lower income 'developing' nations where socio-economic deprivation is rife.

2.5 Practice Guidelines

To assist clinicians in meeting growing clinical demand and improving the quality of care, empirically supported practice guidelines have been developed in higher-income 'Western' countries: notably, the United Kingdom (UK) National Health Service (NHS) National Institute for Health and Clinical Excellence (NICE) Guidelines[64] and the American Academy of Pediatrics (AAP) American Academy of Child and Adolescent Psychiatry (AACAP) Practice Parameters.[65] Guidelines have been established by expert panel consensus across a variety of disciplines and have undergone an extensive peer-review process, both internally and externally. The published guidelines provide recommendations, detail their proper application, and describe the strength of evidence for their use. They are regularly updated, as new research becomes available. They are generally accepted as the gold standard of care.

Most of the principles of the NICE guidelines have been re-iterated for feasible application to the South African context by local specialists, although they do acknowledge the paucity of more localized ADHD research, especially random controlled trials (RCTs) in LMICs to date.[10] Recently, guidelines for the treatment of ADHD, stated by the authors to be broadly compatible with the NICE guidelines, have been published by the South African Society of Psychiatrists (SASOP).[66]

Guideline recommendations are based on prominent studies such as the often cited 1999 (US) large RCT, the National Institute of Mental Health Collaborative Multisite Multimodal Treatment Study of Children With Attention-Deficit/Hyperactivity Disorder (MTA Study)

involving 579 children aged 7-9 years old.[67] This long-term ADHD treatment study, with 14-month follow-up, definitively established that pharmacological intervention with stimulants is more effective than behavioral treatment alone in treating the ADHD core symptoms (i.e. hyperactivity, inattention, impulsivity). Adjunctive behavioral treatment was found useful, especially for more complex cases (with comorbid disorders and/or psychosocial stressors) in addressing other outcome domains (such as disruptive behavior, parent-child relations, social skills, and treatment adherence and acceptability). Children receiving public assistance (social grant system) and ethnic minorities (American 'non-whites') also showed better outcome with combined treatment.[67]

The MTA showed that once intensive study treatments ceased at 14 months the combined and medication-only groups lost some of their treatment gains, due in part to medication discontinuation or to a shift from the university clinics to community based management, with less careful monitoring and dose adjustment of medication.[67] Further RCTs are required to investigate long-term ADHD treatment outcomes.

2.6 Clinical Audit of Services

Although clinical guidelines are widely accepted as the gold standard of care, guideline adherence is known to be poor in higher-income countries.[48,68-83] Some reasons for poor compliance may include the following. Clinician self-reports against more objective measures indicate clinicians frequently over-estimate, or fail to apply, their knowledge of guidelines.[68,75,76,79] Recommended interventions may be perceived as time-consuming or expensive.[68,70] Office visits may be too short or infrequent for optimal dose titration.[67,68] Disagreement among clinicians over responsibility for physical monitoring of children contributes.[69,70] Despite a shift away from secondary to primary care for ADHD management, belief that ADHD remains a specialist domain, together with insufficient training, may leave clinicians unconfident in this capacity.[67,69,70] Some rely on medications while dismissing behavioral options, or vice versa.[67,68,71,76] Staff training workshops and regular chart reviews for tracking behavior require additional resources, which may be unavailable.[68,75,78,80]

The effectiveness of guideline implementation is properly evaluated by clinical audit. Clinical audit is a quantitative evaluation that measures compliance against a set of established standards.

In 'non-Western', including African, countries, there is a paucity of descriptive studies on the prevalence of ADHD and its determinants, as previously noted.[15-17,49-52] Additionally, survey of the literature failed to yield any South African or other African clinical audits (as defined above) of ADHD management.

Several international publications describing clinical audits for ADHD were available, predominantly conducted in the UK,[70-74] USA,[75-81] and Australia.[48,82-83] Generally, these audits revealed relatively low rates of guideline compliance at baseline measurement. However, re-audit studies, following the introduction of structured interventions to promote better clinical practice, have demonstrated improvements in compliance. Citing several other clinical improvement studies, Epstein *et al*. highlighted that assessment practices tend to be more successfully adopted than treatment practices.[75]

US studies have shown that the implementation of ADHD rating scales has been accepted by a large proportion of clinicians, although adherence to protocol appears higher for using scales in initial diagnosis than in treatment response follow-up.[75] For example, in their community intervention involving 19 practices in the Cincinnati area, Epstein *et al*. showed

an increase in rating scale use in initial assessment from 52-55% before protocol intervention to almost 100% afterwards.[75] Follow-up rating scale monitoring also showed some improvement, from 9% to 26-30%.[75] Similarly, in a community study examining two practices in rural Nebraska, the use of rating scales in initial assessment increased from 1-4% before 2000 (pre- AAP Guidelines and -protocol implementation) to 93-100% post-intervention.[78] However, long-term retention of improvements after intervention is unclear. For example, one UK (New Forest) re-audit expressed disappointment that the frequency of use of the ICD-10 checklist for ADHD diagnosis had decreased from 94% to 82% two years since the previous audit.[70]

It was observed that without a structured diagnostic process the likelihood of incorrect diagnoses increased. An Australian audit found that comprehensive, multidisciplinary team evaluation of children with suspected ADHD at baseline yielded an alternative primary diagnosis in at least one third of cases.[82] In the Epstein study, DSM-IV criteria adherence was also noted to be low (38%), before implementation of a protocol which enhanced compliance (77%).[75]

Treatment practices also showed varying compliance, depending on which audit standard was examined and whether the audit study had been conducted at baseline or following protocol intervention. For example, a UK audit examining compliance with the NICE guidelines of a specialist ADHD clinic in Thanet, South East Kent, identified that only 52% of cases had records of height and weight.[72] In contrast, in their re-audit study (in the New Forest, UK) Thompson *et al*. showed evidence of physical parameter monitoring in 90% and screening for cardiac history in 100% of children.[70] Methylphenidate (MPH) prescription as first line therapy was higher in the re-audit study (92%) than in others in Birmingham, UK,[71] and Australia,[48] which found MPH prescription rates of 65% and 40%, respectively. The Thompson re-audit also showed higher rates of compliance with a comprehensive treatment plan containing both behavioral and drug strategies (96%)[70] than in the South East Kent study (86%).[72] Likewise, the re-audit[70] demonstrated higher rates of family and other adjunctive interventions. Compared to an Australian study,[82] the re-audit study found higher rates of referral for both individual psychotherapy (22% vs. 17%) and family intervention (30% vs. 16%). In the re-audit, 64% of caregivers were referred to parent training programmes and 61% of caregivers were provided with written psycho-education materials.[70] Contact with the teacher was made in 90% of cases.[70]

Compliance with some standards was consistently poor in most studies. Notably, transitioning to adult services for young people with ADHD was frequently highlighted as a neglected area which needs addressing.[48,70,84] For example, in one UK audit no transition plan was in place for any of the eight individuals older than 14 years.[72] Thus, clinical audit is especially useful in focusing attention on any service areas which are markedly deficient and require future attention.

2.7 Study Motivation

Considering the paucity of South African ADHD studies in general and audits in particular, the current study provides an audit of ADHD clinical practices across two selected public health sector treatment settings in Cape Town. Though limited in scope, it may provide a platform on which future audits can build. Ultimately, this information may be utilized to improve clinical services and inform public health policy.

In the South African context, deprivation probably figures prominently in contributing to disease burden and creating obstacles to effective delivery of health services. A systematic

review which examined the relationships between poverty and common mental disorders, with an emphasis on LMICs, found that some dimensions of poverty are strongly associated with common mental disorders, namely lower socio-economic status, lower levels of education, food insecurity, inadequate housing, and financial stress.[85] The statistical strength of relation for other dimensions of poverty, such as income, employment, and consumption, proved equivocal.[85] Further mediating factors, such as rapid urbanization, overcrowding, violence including neighborhood crime and domestic violence, and the breakdown of traditional family structures, are also implicated in negative mental health outcomes.[85]

The interplay between poverty and mental illness is complex and intertwined. Myer *et al*. conducted a prominent nationwide South African study which examined various social determinants of mental illness.[86] Given that the study was cross-sectional, the temporal relationships between social determinants and mental illness were difficult to discern.[86] There are two hypotheses describing processes which probably act reciprocally: 'social causation,' whereby poor social circumstances exacerbate mental illness, and 'social drift,' whereby mental illness exacerbates poor social circumstances.[85] In addressing this vicious cycle, a systematic review of studies in LMICs (mostly RCT and cohort design) showed that while interventions targeting poverty alleviation may have a beneficial effect on mental health outcomes, mental health interventions are more robustly associated with improved economic outcomes.[87] The authors concluded that up-scaling of mental health clinical services in LMICs is a developmental priority.[87]

Since the end of Apartheid in 1994, and with the ushering in of the new Mental Health Care Act No. 17 of 2002, there has been a state-issued directive to reform mental health care services. Existing mental health care services, a legacy of Apartheid, were originally constructed along lines of racial segregation, with correspondingly inequitable, under-resourced services located in traditionally 'non-white' communities.[55,88] Accordingly, a process of de-centralization, which has as its goal "the integration of mental health into primary care,"[56,88] has been recommended. This involves down-scaling of centralized psychiatric institutions in favor of the development of more peripheral community-based services.[55,88]

In reality, however, community psychiatric services remain under-equipped in terms of both human and material resources.[55,57] Treatment levels are below those optimally projected, despite the favorable input of some tertiary psychiatric outreach services to the community.[55,57] A systematic review covering a decade of mental health care service delivery in South Africa identified the following factors thought to contribute to the treatment gap at primary care level: insufficient training of health care personnel, the limited time available for health care personnel to dedicate to each patient, insufficient support of personnel, a shortage of mental health care specialists, under-developed referral pathways, psychotropic medications not universally available at community clinics, and cultural factors such as language barriers limiting accessiblity.[55]

There is a recognized shortfall particularly in the provision of child and adolescent mental health services (CAMHS) in South Africa, as in other LMICs.[55,57-58] One South African study identified low staff to patient ratios as a problem in CAMHS.[58] In that study, 'staff' included psychiatric nurses, general nurses, occupational therapists, social workers, psychologists, medical officers, registrars, and psychiatrists.[58]

Improving standardization of care across populations and treatment sites, with an emphasis on scaling-up of community providers to meet growing needs, should be a clinical and political goal. Ongoing surveillance is critical to understanding public health needs, to the

organization of rational resource allocation, and to monitoring implementation of evidence-based interventions. Gaining this knowledge is especially useful in an under-resourced and over-burdened context, in which cost-effective targets must be carefully defined and validated.

2.8 Local Context

The Division of Child and Adolescent Psychiatry (DCAP) is part of the Department of Psychiatry and Mental Health, at the University of Cape Town (UCT) and Red Cross War Memorial Children's Hospital (RCWMCH), Western Cape Department of Health. DCAP provides services to the West Metro of the City of Cape Town and includes central and peripheral clinics.

RCWMCH is renowned for being the only comprehensive tertiary/quaternary children's hospital in Africa. The hospital is located in the southern suburbs of Cape Town, and serves a catchment population of about 2.8 million, representing the racial demographics of Cape Town. It serves the province and in some instances has a national function. For example, the hospital may receive patients from the Eastern Cape.

All patients falling in the RCWMCH catchment area are referred to the DCAP central site (at 'Sawkins Road'), where administrative functions serving all service sites are centralized. From there, the referrals are screened by a senior clinician, who, in consultation with colleagues, allocates each referral to one of the sites considered most appropriate.

DCAP provides a range of CAMHS, including general outpatient, specialist clinic, consultation-liaison, as well as community outreach services. There are two other similar outpatient services in the Western Cape, namely at Tygerberg and Lentegeur hospitals.

Children and adolescents are referred to DCAP either with suspected ADHD or a previously established diagnosis, which may have been made by a school doctor, a general practitioner, a general pediatrician, or specialist pediatrician, e.g. at the RCWMCH Neurodevelopmental Clinic. In these cases, DCAP assistance is frequently sought for optimization of symptom and behavioral control which has been difficult to manage elsewhere.

The Neuropsychiatry Clinic is a central DCAP clinic located at RCWMCH, in the suburb of Rondebosch (see map in Appendix 11.5). There are outreach services to various community health centres (CHC) in the periphery. Retreat CHC is situated south of Rondebosch, between Muizenberg and Constantia. Vanguard CHC and Heideveld CHC are both east of Rondebosch towards Cape Town International Airport. Heideveld CHC is further away than Vanguard CHC in relation to the central clinic. Kensington CHC lies north of the central clinic, specifically north of Pinelands.

The map in Appendix 11.5 also shows the Socio-Economic Status Index (SES) color-coded for each suburb, whereby dark green indicates the highest socio-economic status and red the lowest. The SES is a composite indicator (see 5.2.2.1, 5.2.2.2.; for suburb values see Appendix 11.5) which has an inverse relationship with socio-economic status. According to the SES system, the central clinic in Rondebosch is located in an area with the highest socio-economic status (i.e. relatively lower SES = 11.04; color-coded dark green). The peripheral clinics located furthest away from the central clinic, namely Heideveld CHC and Retreat CHC, have the lowest socio-economic status of all the clinics (SES = 42.67 and 33.71, color-coded pink and yellow, respectively). The peripheral clinics located within intermediate distance of the central clinic, namely Kensington CHC and Vanguard CHC, have a socio-economic status given by an SES of intermediate value (SES = 26.25 and 22.87, color-coded yellow and light

green, respectively); the use of 'intermediate' here should not be interpreted synonymously with a concept of 'middle class.' Although the socio-economic status of each clinic location is variable, and the central clinic is the only one physically located on the premises of a tertiary facility (each peripheral clinic is located on the premises of a primary care facility), all clinics are technically classified as offering a tertiary psychiatric service under the auspices of RCWMCH.

Patients with ADHD seen centrally at DCAP's RCWMCH Neuropsychiatry Clinic may differ from those seen peripherally in that the specialized focus of that clinic is on neurodevelopmental disorders, including ADHD, Autism Spectrum Disorder, Epilepsy, Traumatic Brain Injury, and HIV, among others. The patients seen in the community usually live in close proximity to these clinics. Although an effort is made to provide an equivalent psychiatric service, the peripheral treatment setting may be relatively less structured, less supervised, with fewer resources and less developed infrastructure when compared with the central clinic. Factors such as transport and other cost considerations often influence attendance at both treatment settings.

It is theoretically possible for one patient to have been seen at more than one site in the system over time via cross-referral for clinical reasons (e.g. specialized needs, remission) or/and logistic reasons (e.g. patient change of address, clinic down-scaling, etc.).

2.9 Literature Search Strategy

The electronic databases Pubmed and Medline were searched using combinations of the following search terms: ADHD, children, adolescents, pediatric, diagnosis, treatment, therapy, audit, clinical guidelines, guideline implementation, protocol, quality of care, service delivery, quality improvement, diversity, health disparity, discrimination, inequality, inequity, South Africa, Africa, developing country, low income countries, middle income countries, cultural context, demographic, epidemiology, access to care, racial differences, socio-economic status, poverty, social determinants of mental health, and community health services. Search filters restricted articles to full text, freely available English language publications concerning humans, with publication date within the last ten years. Additional relevant publications, some of which fall outside the latter parameters, were identified from the reference lists of retrieved articles.

3. Aims and Objectives

Aims

The primary aim of the study was to perform a clinical audit to determine the overall compliance to standards of care for the assessment and treatment of ADHD in children and adolescents. In order to assess compliance, we performed an audit using an audit tool based on NICE guidelines. The secondary aim of the study was to compare compliance between two groups of patients – one a group seen at the tertiary hospital site (referred to as the 'central group') and the other a group of patients seen in peripheral clinics (referred to as the 'peripheral group').

Objectives

1) The first study objective was to ascertain the overall levels of adherence by staff in the Division of Child and Adolescent Psychiatry (DCAP) to established evidence-based clinical standards for the management of ADHD in children and adolescents using the UK NICE guidelines for ADHD as the gold standard.
2) The second objective was to compare clinical audit results between two treatment groups:
    A. Central Group, DCAP Red Cross War Memorial Children's Hospital (RCWMCH) Neuropsychiatry Clinic
    B. Peripheral Group, DCAP community services—namely, Retreat, Vanguard, Heideveld, and Kensington community health centres.
3) The third objective was to compare the study groups with reference to several socio-demographic variables identified as pertinent to ADHD pathophysiology and prognosis in the literature.
4) The fourth objective was to develop an audit checklist in order to standardize care across clinicians and service sites based on the audit findings.

4. Hypotheses

1) We hypothesized that, similar to previous studies, overall the degree of compliance would not meet standards set by the NICE guidelines.
2) The peripheral group was predicted to show lower rates of compliance with the standard than the central group, based on previous studies that indicated a relative shortfall of clinical services in the community.
3) The demographic profiles of the patients served by the two groups were predicted to differ. Peripheral cases, attending clinics in areas with lower socio-economic status, were predicted to be more complex in terms of a greater degree of socio-demographic risk markers associated in the literature with poorer ADHD outcomes. Central cases, referred to the RCWMCH Neuropsychiatry Clinic, were predicted to be more complex from a medical perspective, with a greater number of medical comorbidities.

5. Methods

5.1 Sampling

A clinical audit was conducted on a sample of 100 cases selected from 'active,' ongoing cases of school-age patients (age range 6-17 years) who had a confirmed diagnosis of ADHD at the time of the study. Case note inspection was conducted between March 2013 and June 2013. Preschool children younger than 6 years old as well as those aged 18 or older, classified as adults, were excluded. Cases already closed at the time of the audit were excluded.

'Active' ADHD cases were predominantly identified by accessing the computerized patient database, available at DCAP's central administration site, which includes data on all service sites. For each treatment group, a list of cases, listed in alphabetical order by surname, was computer-generated.

For the central treatment group, a case list of sufficient number for the purposes of the study was generated entirely from electronic records. This list was then submitted to randomized integer sampling (i.e. selecting every fourth patient from the list) until a total of 50 patients was reached. For the peripheral group, integer sampling was carried out on a combination of electronic records as well as case notes not yet listed on the electronic database until an equal 50 cases was reached.

Most of the selected case notes were retrieved from the relevant filing cabinets, also located centrally. Where case notes were not identified in the central service filing room, files were retrieved from clinicians' offices or off-site community health centres until all randomized files were collected for audit.

To avoid duplication, each patient was allocated to only one of the two study groups already introduced. Therefore, each patient was allocated to either group A or group B, as follows, according to the currently attended site at the time of analysis, regardless of previous clinic attendance history:

A. The central group: DCAP's Red Cross War Memorial Children's Hospital (RCWMCH) Neuropsychiatry Clinic
B. The peripheral group: comprised of DCAP's off-site community clinics - Retreat, Vanguard, Heideveld, and Kensington community health centres - sampled together.

5.2 Measures

Case note inspection with data capture using structured templates was performed on the central administration premises. All data were compiled by the primary investigator. Two tools (see Appendices 11.2 and 11.3) were used concurrently during assessment of the case notes, namely the 'Audit Tool based on NICE guidelines' and the 'Data Capture Form for Socio-demographic Factors,' as detailed below in sections 5.2.1.1 and 5.2.2.1.

5.2.1 Audit Standards and Additional Clinical Variables

5.2.1.1 The 'Audit Tool based on NICE guidelines' (developed closely following the concept provided for general use by the NICE guidelines; see Appendices 11.3 and 11.4) was used to capture relevant diagnostic and treatment data from the case notes. Each case was assessed for compliance with ten basic standards - the core of the clinical audit - derived from the NICE guidelines for the evidence-based diagnosis and treatment of ADHD. Seven additional

standards (also derived from NICE guidelines) considered clinically relevant to the local context were assessed (see Appendix 11.3).

The overall performance of the total study sample in meeting the gold standard as set by the NICE guidelines was measured. Thereafter, the two study groups (central and peripheral) were compared and analyzed for any significant statistical differences. Even though a typical standard for audit would be to show 100% compliance to an audit criterion, we selected to divide compliance into three main categories using a 'traffic light' approach. Where a criterion was met in >80% of cases, a criterion was given a 'green' code (signifying 'good' compliance); where 50-79% of cases met a criterion, an 'amber' code ('fair' compliance) was allocated; where fewer than 50% of cases met a criterion, a code 'red' ('poor' compliance) was allocated.

In addition to the ten core and seven additional audit standards, we also measured two additional descriptive differences (which were not assessed in terms of compliance to any set standard) to supply a richer perspective of resources provided. For a summary of the total 19 clinical variables see Table 1 below.

Table 1: Clinical Variables

Clinical Variables	
Core Audit Standards	
1	Suitably qualified ADHD diagnostician
2	DSM-IV criteria documented
3	Specification of ADHD severity
4	Full history before diagnosis
5	Referral to ADHD parent group
6	Methylphenidate (MPH) offered as first line therapy
7	Comprehensive treatment plan (including psychological/behavioral and educational interventions)
8	Advice about transition to adult services (for adolescents 16-17 years old)
9	Written psycho-education offered to patients
10	Written psycho-education offered to caregivers
Additional Audit Standards	
11	Communication in patient's primary language
12	Point of view of child documented
13	Contact with teacher
14	Full history and physical exam before diagnosis
15	Growth chart plotting
16	Side effect monitoring
17	Treatment response monitoring on standard scales
Additional Clinical Variables	
18	Current psychotropic drug regimen
19	Extra interventions offered (besides core drug and psychological/behavioral)

5.2.1.2 Definitions of selected Clinical variables

Selected clinical variables which may require further clarification are defined below:

Full history: Areas considered in 'full history' included the following sub-variables: a clear account of the presenting complaint, social and educational circumstances, co-existing

conditions, family medical history, patient developmental history, and mental health assessment of both child and caregiver/s (with referral of the latter, where necessary).

Comprehensive treatment plan (including psychological, behavioral modification, and educational interventions): Psychological interventions were initially defined by evidence of referral either to group or to individual Cognitive Behavioral Therapy and/or social skills training programmes. According to this strict interpretation of '**psychological' intervention**, a routine session with a clinician would not qualify as psychological intervention, even if some counseling may have been involved. A broader interpretation of the concept of psychological intervention might include any evidence of behavioral modification or supportive counseling. For the purposes of the study, both interpretations were considered and analyzed. In the interests of utility, the broader interpretation of 'psychological' was prioritized.

Growth chart plotting: Sufficient plotting was defined as at least two consecutive plots of height and/or weight, taking into account the number of clinic visits at which this would have been possible.

5.2.2 Socio-demographic Factors

5.2.2.1 The 'Data Capture Form for Socio-demographic Factors' (see Appendix 11.2) was developed for the purposes of this study in order to capture a range of socio-demographic variables identified as pertinent to ADHD pathophysiology and prognosis in the literature. This tool included variables for age, gender, race, language, religion, family size and structure, comorbidity, family history, and parental unemployment. Additionally, to determine socio-economic status (SES), the 'SES Index' system provided by the City of Cape Town was used (see Appendix 11.5).[89] The 'SES Index' for each residential suburb has been derived, after consideration of measures such as the percentage of adults with highest educational qualification lower than matric (i.e. who have not achieved high school graduation), the percentage of potentially economically active adults who are in fact unemployed, the percentage of households earning less than R19300 per annum (minimum household subsistence level), and the percentage of the labor force in unskilled occupations for that suburb.[89]

5.2.2.2 Definitions of selected Socio-demographic variables

Selected socio-demographic variables which may require further clarification are defined below:

SES Index: 'SES Index' is a composite indicator which varies inversely with socio-economic status (see described above in 5.2.2.1 and in Appendix 11.5 for reference).

Family size: The total number of biological siblings (half and full relations, including patient in that number) was used as a marker of reproduction, rather than the number of people living under one roof who may not be related.

5.2.3 Piloting of Measures

Measures used for data capture were revised subsequent to an initial pilot study. This involved trial application of the tools in the inspection of four randomly selected case note files, after which minor modifications were made. The average processing time of more than one hour per case, which had been initially identified, was reduced to approximately 30 minutes by eliminating some of the unnecessary variables.

5.3 Data Analysis

General descriptive statistics were used followed by tests for associations. For continuous variables, summary statistics (calculating mean, median, standard deviation, interquartile range, etc.) were followed by comparison of variables across groups using box-and-whisker plots and T-tests for normally distributed variables or the Mann-Whitney test, where appropriate, for non-normally distributed variables. For categorical variables, frequency tables (counts and percentages) were followed by comparison of variables across groups using clustered bar charts and chi-squared tests of association, together with the Fisher's exact test where appropriate (i.e. where cell counts in the frequency table were less than five). A p-value of <0.05 was set to indicate statistical significance and two-tailed tests were used throughout. Data were analyzed using STATA MP, Release 11.[90] A statistician was consulted to provide technical advice.

5.4 Ethics

This study complied with the ethical principles of the Declaration of Helsinki (World Health Organization 2008). The study protocol was presented at a departmental (Department of Psychiatry and Mental Health, University of Cape Town) protocol meeting after peer-review by two independent reviewers. Ethics approval was obtained from the UCT Faculty of Health Sciences Human Research Ethics Committee (HREC REF: 083/2013; see Appendix 11.1). Following ethical approval, official permission was obtained from the Chief Executive Officer of Red Cross War Memorial Children's Hospital (see Appendix 11.1).

Patient case notes were audited at the central administration site. Only information relevant to the current study was extracted. In order to ensure confidentiality, each patient name together with date of birth was allocated an independent research case number (1-100). Only the primary investigator had access to the corresponding codes. Data were securely stored on a password-protected computer, which was kept in a private location, to which only the principal investigator had access. Given that this was a retrospective case note audit, no patient consent was required. The potential harm to study participants was deemed to be negligible.

6. Results

6.1 Overall Results of Clinical Audit and Survey of Additional Variables

The overall results of the clinical audit and survey are detailed in sections 6.1.1-6.1.3 and summarized in Tables 2 and 3 below. In assessing compliance with the NICE guidelines, we elected to divide compliance into three main categories, as previously described, using a 'traffic light' approach. Where a standard was met in >80% of cases, a 'green' code was allocated; where 50-79% of cases met a standard, an 'amber' code was allocated; where fewer than 50% of cases met a standard, a code 'red' was allocated.

Overall, no standard had a 100% compliance in the sample, and only four standards were allocated a 'green' code. Five standards had an 'amber' code, while the remaining ten were 'red.' In addition to the 17 standards measured, there were also two items surveyed in terms of descriptive differences rather than compliance to a standard (see tables 2 and 3).

6.1.1 Overall Compliance to Core Audit Standards

Although individual clinicians rarely documented their qualifications in case notes, the auditor judged that - by the nature of their affiliation with a specialist clinic at the time of diagnosis - the diagnosis was made by a suitably qualified clinician (with training and expertise in making an ADHD diagnosis) in 86% of cases. Diagnosticians in specialist clinics were all specialist child and adolescent psychiatrists or junior/senior registrars under consultant supervision. Sufficient DSM-IV criteria for making an ADHD diagnosis were documented in 60% of cases. Although specific DSM-IV criteria regarding symptom duration, symptom pervasiveness, and functional impairment were generally relatively well documented (documented in 81%, 84%, and 85% of cases, respectively), it was noted that the number of symptoms required to make an ADHD diagnosis was the least frequently documented. In 64% of cases an insufficient number of symptoms (i.e. <6 symptoms) was recorded before diagnosing ADHD. ADHD severity was specified in 2% of cases. A full history (including caregiver mental health assessment) was taken in 27% of cases. Referral to a parent ADHD group was made in 31% of cases. Methylphenidate was the first line treatment in 80% of all cases. There was documentation of a comprehensive treatment plan offering behavioral and/or psychological, in addition to educational, interventions in 71% of cases. Of the seven adolescents of school-leaving age (16-17 years old), only one (14%) had documented advice regarding transitioning to adult care services. Written psycho-education was given to 1% of patients and 9% of caregivers.

6.1.2 Overall Compliance to Additional Audit Standards

There was evidence that clerking and management had been communicated, at least partially (either directly or via translator), in the patient's primary language in 69% of cases. The child's subjective point of view was explicitly explored in 76% of cases. Clinicians made contact (written, telephonic, or other) with the child's teacher in 96% of cases. Before making an ADHD diagnosis, a full medical history, with emphasis on cardiac risk factors, as well as physical examination, including parameter monitoring (height, weight, heart rate, blood pressure), was taken in 5% of cases. Height and/or weight was plotted on a growth chart in 29% of cases. Treatment response was monitored using standard rating scales, e.g. the Conners' Teacher and Parent Revised Rating Scales (CTRS-R/CPRS-R), in 71% of cases.

6.1.3 Overall Survey of Additional Clinical Variables

Analysis of current drug regimen at the time of data capture showed the percentage of patients taking a certain agent. Combinations of agents were not analyzed, so there may have been overlap with other agents. Sixty percent of patients were taking MPH short-acting formulation; 47% were taking MPH LA (long-acting); 17% were on antipsychotics; 3% were on antidepressants; and 13% had not been prescribed any psychotropic medications. Extra interventions (beyond core drug and behavioral treatment regimens) were offered in 76% of cases. Extra interventions included the following: referrals in 8% of patients for family psychotherapy, in 3% for individual psychotherapy (beyond routine supportive consultations), in 18% to occupational therapy, in 42% to social workers, in 26% for speech and language therapy; in 17% to the Neurodevelopmental Clinic at RCWMCH, and in 51% for further medical intervention, including specialist investigations and consultations. Thirty percent of patients were referred for three or more extra interventions; 16% were referred for two; 30% were referred for one; and 24% were not referred for any extra interventions.

Table 2: Overall compliance with the NICE guidelines

Variable		Compliance (%)	Compliance Rating GREEN: ≥80%: GOOD AMBER: 50-79%: FAIR RED: <50%: POOR
Core Audit Standards			
1	Suitably qualified ADHD diagnostician	86	
2	DSM-IV criteria documented	60	
3	Specification of ADHD severity	2	
4.1	Full history before diagnosis (+ caregiver assessment)	27	
4.2	Full history before diagnosis (- caregiver assessment)	47	
5	Referral to ADHD parent group	31	
6	Methylphenidate offered as first line therapy	80	
7.1	Comprehensive treatment plan (psychological + behavioral)	15	
7.2	Comprehensive treatment plan (psychological / behavioral)	71	
8	Advice about transition to adult services (for adolescents 16-17 years old)	14	
9	Written psycho-education offered to patients	1	
10	Written psycho-education offered to caregivers	9	
Additional Audit Standards			
11	Communication in patient's primary language	69	
12	Point of view of child documented	76	
13	Contact with teacher	96	
14	Full history & physical exam before diagnosis	5	
15	Growth chart plotting	29	
16	Side effect monitoring	84	
17	Treatment response monitoring on standard scales	71	

Table 3: Overall survey of additional clinical variables

Additional Clinical Variables		Percentage (%)
18	**Current Drug regimen**	
18.1	Methylphenidate short-Acting formulation (SA)	60
18.2	Methylphenidate LA (Long Acting) formulation	47
18.3	Antipsychotic	17
18.4	Antidepressant	3
18.5	No psychotropic medication	13
19	**Extra Interventions offered**	76
19.1	Family psychotherapy	8
19.2	Individual psychotherapy	3
19.3	Occupational therapy	18
19.4	Social work	42
19.5	Speech and language therapy	26
19.6	Neurodevelopmental Clinic	17
19.7	Medical consultation	51

6.2 Results of Clinical Audit and Survey: Group Comparison

Apart from the overall audit to evaluate compliance with the NICE core and extended criteria, we were interested in comparing compliance between the central and the peripheral group. Results of group-based comparisons are shown below.

6.2.1 Group Comparison of Compliance to Core Audit Standards

The results enumerated below (1-10) are summarized in Table 4.

1. ADHD diagnosis made by an appropriately qualified clinician: ADHD diagnosis was made by a suitably qualified clinician in 82% of the central group (group A) and 90% of the peripheral group (group B); for this variable, there was no significant association by group using test of proportions ($\mathrm{z} = 1.1528, \mathrm{p} = 0.249$).

2. DSM-IV criteria: DSM-IV criteria were demonstrably met in 64% of the central group and 56% of the peripheral group; no significant association was found by group ($\chi^2 = 1.6056$, $\mathrm{p} = 0.205$).

3. Specification of ADHD severity: In spite of the fact that the diagnosis of ADHD was clearly stated in 100% of cases in the central group and in 100% of the peripheral group, ADHD disease severity was specified in 0% of cases in the periphery and 4% of cases centrally; of the latter, 2% of central group cases were specified as having ADHD of moderate severity and 2% severe ADHD. For the variable of ADHD severity specification, there was no significant association found by group using Fisher's exact test ($\chi^2 = 2.0408,\ \mathrm{p} = 0.495$).

4. Full history-taking before diagnosis: A full history, including caregiver's assessment, was taken before ADHD diagnosis in 22% of central group and 30% of peripheral group cases; no significant association by group was determined in this respect ($\chi^2 = 0.8316,\ \mathrm{p} = 0.362$). Various component sub-variables contributing to the variable 'full history' (see 5.2.1.2 for definition) were scrutinized. There was evidence of mental health assessment of the child's primary caregiver/s in 34% of cases in the central group and 36% of the peripheral group; for this sub-variable, there was no significant association by group ($\chi^2 = 0.0176,\ \mathrm{p} = 0.895$).

A general family history was taken in 62% of central and 58% of peripheral cases; for this sub-variable of 'full history,' there was no significant association by group ($\chi^2 = 0.6359,\ \mathrm{p} = 0.425$). A psychiatric assessment of the child before making an ADHD diagnosis was documented in 88% of the central group and 76% of the peripheral group; for this sub-variable of 'full history,' there was a statistically significant association found by group using Fisher's exact test ($\chi^2 = 5.8732,\ \mathrm{p} = 0.03$). When the sub-variable 'assessment of caregivers' was excluded from the variable 'full history,' adequate history-taking was found in 48% of the central group and 46% of the peripheral group; this was not a significant association by group ($\chi^2 = 0.0401,\ \mathrm{p} = 0.841$).

5. Parent group (parent training/psycho-education programme): Parent group referral was made in 34% of cases centrally and 28% peripherally; statistically, there was no association by group ($\chi^2 = 0.4208,\ \mathrm{p} = 0.517$).

6. Drug treatment as first line treatment for severe ADHD: Given that so few patients diagnosed with ADHD were assigned specifiers of disease severity (see core audit standard 3 above), it was not possible to ascertain compliance with the standard stipulating that drug treatment should be offered as the first line treatment in cases of severe ADHD. In general, 80% of patients in both the central and peripheral groups were prescribed Methylphenidate (MPH) as first line treatment; this was not statistically significant by group using Fisher's exact test ($\chi^2 = 0.7201,\ \mathrm{p} = 0.525$).

7. Comprehensive treatment plan: A comprehensive treatment plan, in which psychological interventions were interpreted as strictly distinct from behavioral modification (see 5.2.1.2 for definition) was offered in 22% (n=11) of the central group versus 8% (n=4) of the peripheral group; this did not show a significant association by group according to Fisher's exact test ($\chi^2 = 3.8431,\ \mathrm{p} = 0.091$). When psychological interventions were interpreted more broadly, however, it was found that 82% of cases in the central group versus 60% of those in the peripheral group met treatment expectations, constituting a significant association by group ($\chi^2 = 5.8766,\ \mathrm{p} = 0.015$). While educational interventions were achieved for 96% of the central group and 94% of the peripheral group, psychological and/or behavioral interventions were significantly less frequent in the peripheral group (64%) than in the central group (86%) ($\chi^2 = 6.4533,\ \mathrm{p} = 0.011$).

8. Transitioning to adult services for adolescents of school-leaving age (16-17 years old): Of the four adolescents in the 16-17-year-old age group in the central group, there was no evidence of guidance given to any of them regarding transitioning to adult services for further ADHD care. Of the three in the peripheral group, one received some form of transitioning facilitation. Given that the sample size for this age group was so small, no statistical comparisons were made.

9. Written psycho-education for patients: Patients were offered written psycho-education on ADHD in 2% of the central group and 0% of the peripheral group; this association was not statistically significant by group using Fisher's exact test ($\chi^2 = 1.0524,\ \mathrm{p} = 0.49$).

10. Written psycho-education for caregivers: Caregivers were offered written information on ADHD in 10% of the central group and 8% of the peripheral group; this association was also not significant by group using Fisher's exact test ($\chi^2 = 0.1715,\ \mathrm{p} = 0.738$).

Table 4: Summary NICE guideline core standard satisfaction by group (NS = not significant, Mod = moderate, Not Spec = not specified, Y = 'yes'/present)

Variable	Categories	Group		P-value	Conclusion (Significance)
		A=Central (n (Column %))	B=Peripheral (n (Column %))		
Suitably qualified ADHD diagnostician	Y	41(82%)	45(90%)	0.249	NS
DSM IV criteria documented	Y	32 (64%)	28 (56%)	0.205	NS
Specification of ADHD severity	MOD	1 (2%)	0 (0%)		
	SEVERE	1 (2%)	0 (0%)		
	NOT SPEC	48 (96%)	50 (100%)	0.495	NS
Full history before ADHD diagnosis	Y	12 (24%)	15 (30%)	0.362	NS
Referral to ADHD parent group	Y	17 (34%)	14 (28%)	0.517	NS
MPH as first line therapy for severe ADHD	Y	40 (80%)	40 (80%)		Un-determined
Comprehensive treatment plan	Y	41 (82%)	30 (60%)	0.015	Significant
Transitioning to adult services	Y	0(0%)	1(33%)		Un-determined
Written psycho-education (patients)	Y	1 (2%)	0 (0%)	0.49	NS
Written psycho-education (caregivers)	Y	5 (10%)	4 (8%)	0.738	NS

6.2.2 Group Comparison of Compliance to Additional Audit Standards

Compliance to additional audit standards is detailed below (1-7). For summary, see Table 5.

1. Communication in the primary language of the patient: There was evidence that clerking and management had at least partially been communicated in the patient's primary language in 76% of the central group and 62% of the peripheral group. In this regard, there was no significant association by group ($\chi^2 = 0,\ \mathrm{p} = 0.995$).

2. Subjective point of view of child: The child's point of view was documented in 84% of the central versus 68% of the peripheral group. Although this represented a higher proportion centrally versus peripherally, this was not statistically significant ($\chi^2 = 3.5088,\ \mathrm{p} = 0.061$).

3. Clinician contact with teacher: Most clinicians handling cases in the central group (98%) as well as the peripheral group (94%) made contact with the child's teacher; this was not significant using Fisher's exact test ($\chi^2 = 1.0417,\ \mathrm{p} = 0.617$).

4. Full medical history (emphasizing cardiac risk factors) and physical examination (including physical parameters) before commencing MPH: A medical history and adequate

physical work-up pre-MPH was completed for 4% of the central and 6% of the peripheral group patients; this was not a significant association by group ($\chi^2 = 0.1443, \mathrm{p} = 1$).

4.1 Physical monitoring ever: See Figure 1 below for summary of physical monitoring over the entire course of treatment. When monitoring was considered longitudinally (pre- as well as post-MPH), and component sub-variables were analyzed, it was found that physical examination had only ever been documented in 38% of central vs. 26% of peripheral patients ($\chi^2 = 1.6544,\ \mathrm{p} = 0.198$); cardiac history had been documented in 12% of central vs. 18% of peripheral patients ($\chi^2 = 0.7059,\ \mathrm{p} = 0.401$); the latter two variables did not show significant associations by group. Several other variables did show significant associations, whereby the peripheral group demonstrated poorer performance in terms of overall monitoring over time: blood pressure was eventually measured in 92% of the central group vs. 60% of the peripheral group ($\chi^2 = 14.0351,\ \mathrm{p} < 0.0001$, by Fisher's exact test); pulse in 90% of the central vs. 52% of the peripheral group ($\chi^2 = 17.5328,\ \mathrm{p} < 0.0001$); height in 98% of the central vs. 68% of the peripheral group ($\chi^2 = 15.9461,\ \mathrm{p} < 0.0001$, by Fisher's exact test); and weight in 100% of the central vs. 70% of the peripheral group ($\chi^2 = 17.6471,\ \mathrm{p} < 0.0001$, by Fisher's exact test).

5. Plotting on growth chart: Weight and/or height growth chart plotting was performed for 42% of central group versus 16% of peripheral group patients; this was a significant association by group ($\chi^2 = 8.2079,\ \mathrm{p} = 0.004$).

6. Side effect monitoring: There was evidence of monitoring for potential side effects of MPH in 96% of the central group versus 54% of the peripheral group; this showed a significant association by group by Fisher's exact test ($\chi^2 = 24.3345,\ \mathrm{p} < 0.0001$).

7. Treatment response monitoring on standard scales: Treatment response was monitored using standard scales in 80% of the central group versus 62% of the peripheral group; this was a statistically significant association by group ($\chi^2 = 3.9339,\ \mathrm{p} = 0.047$).

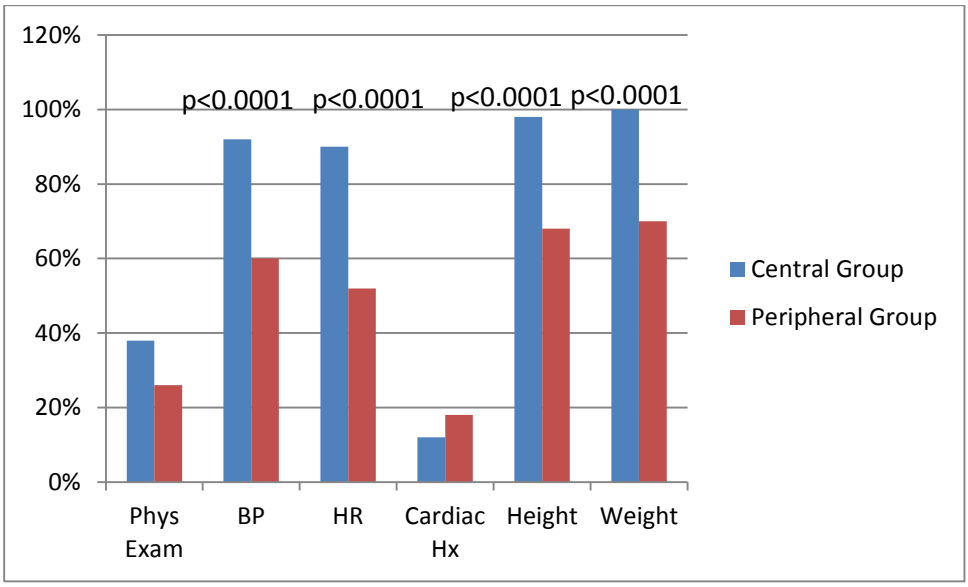

Figure 1: Physical monitoring over the entire course of management by group (Phys Exam = physical examination, BP = blood pressure, HR = heart rate, Cardiac Hx = cardiac history)

Table 5: Summary compliance to additional audit standards by group (NS = not significant, NA = not applicable, Y = 'yes'/present)

Variable	Categories	Group		P-value	Conclusion
		A=Central (n(Column %))	B=Peripheral (n(Column %))		
Communication in the primary language of the patient	Y	38 (76%)	31 (62%)	0.995	NS
Point of view of child documented	Y	42 (84%)	34 (68%)	0.061	NS
Clinician contact with teacher	Y	49 (98%)	47 (94%)	0.617	NS
Full history and physical exam pre-drug initiation	Y	2 (4%)	3 (6%)	1	NS
Growth chart plotting	Y	21 (42%)	8 (16%)	0.004	Significant
Side effect monitoring	Y	48 (96%)	27 (54%)	<0.0001	Significant
	NA	2 (4%)	9 (18%)		
Standard scales monitoring	Y	40 (80%)	31 (62%)	0.047	Significant

6.2.3 Group Comparison for Survey of Additional Clinical Variables

1. Current drug regimen: Sixty percent of patients in both the central and peripheral groups were taking MPH short-acting formulation; this was not a statistically significant association by group ($\chi^2 = 0,\ \mathrm{p} = 1$). Significantly more in the central group (60%) than the peripheral group (34%) were taking MPH LA; ($\chi^2 = 6.7844,\ \mathrm{p} = 0.009$). There were also significantly more in the central group (28%) taking antipsychotics than in the peripheral group (6%) as shown by Fisher's exact test ($\chi^2 = 8.5755,\ \mathrm{p} = 0.006$). Very few in either the central (6%) or peripheral (0%) group were on antidepressants; this was not a significant association by group by Fisher's exact test ($\chi^2 = 3.0928,\ \mathrm{p} = 0.242$). There was a higher proportion in the peripheral group (20%) than the central group (6%) who were not prescribed any psychotropic medications, although this association was not significant by group using Fisher's exact test ($\chi^2 = 4.3324,\ \mathrm{p} = 0.071$).

2. Extra interventions: Extra interventions (beyond core drug and behavioral treatment regimens) were offered to more patients in the central group (88%) than the peripheral group (64%); this was a significant association by group ($\chi^2 = 7.8947,\ \mathrm{p} = 0.005$). Fifty-four percent of the central group compared to 6% of the peripheral group were offered a total number of three or more additional interventions; 22% of the central versus 10% of the peripheral group were offered two; 12% of those in the central versus 48% in the peripheral group were offered one; and 12% of the central versus 36% of the peripheral group were offered no additional interventions; the stratified number of interventions demonstrated a significant association by group with Fisher's exact test ($\chi^2 = 38.25,\ \mathrm{p} < 0.0001$). Regarding the specific extra interventions (analyzed as sub-variables), it was found that 74% of the central versus 28% of the peripheral group patients were referred for further medical

intervention; this was a significant association by group($\chi^2 = 21.1685,\ \mathrm{p} < 0.0001$). Referral to speech and language therapy was made for 44% of those in the central versus 8% in the peripheral group; this showed a significant association by group with Fisher's exact test ($\chi^2 = 16.8399,\ \mathrm{p} < 0.0001$). Referral was made to occupational therapy for 30% of central versus 6% of peripheral patients; this showed a significant association by group with Fisher's exact test ($\chi^2 = 10.0773,\ \mathrm{p} = 0.002$). Twenty-eight percent of the central group versus 6% of the peripheral group patients were referred to the Neurodevelopmental Clinic at RCWMCH; this showed a significant association by group with Fisher's exact test ($\chi^2 = 8.3279,\ \mathrm{p} = 0.006$). Referral to social work was made for 46% of central versus 38% of peripheral group patients; this was not a significant association by group ($\chi^2 = 0.6568,\ \mathrm{p} = 0.418$). Fourteen percent of the central group versus 2% of the peripheral group patients and their families were referred for family psychotherapy; this did not show a significant association by group with Fisher's exact test($\chi^2 = 4.8913,\ \mathrm{p} = 0.059$). Six percent of the central group versus 0% of the peripheral group patients were referred for individual psychotherapy (over and above routine supportive consultations); this did not show a significant association by group with Fisher's exact test($\chi^2 = 3.928,\ \mathrm{p} = 0.242$).

6.3 Results of Socio-demographic Survey

6.3.1 Socio-demographic profile Overall

STUDY GROUP COMPOSITION BY CLINIC Current study group composition at the time of analysis showed that 100% of group A - the central group - were, by definition, attending the RCWMCH Neuropsychiatry Clinic. Of the patients attending community health care clinics, sampled together in group B - the peripheral group - 40% were attending at Retreat, 28% at Vanguard, 20% at Heideveld, and 12% at Kensington.

AGE, GENDER, LANGUAGE, RACE, RELIGION The mean age of the total sample was 10.82 years (SD: 2.79 years). Seventy-two percent of the sample fell in the age category 6-12 years; 28% were in the adolescent range 13-17 years old. Eighty-seven percent of the sample were male; 13% were female. Thirty-seven percent gave English as a first language; 29% Afrikaans; 14% isiXhosa; 1% as a language other than the latter three; 5% bilingual; and 14% were unspecified. Race was unspecified in 45% of the total sample; 37% were designated 'Coloured' (mixed race); 13% Black; 3% White; and 2% Indian. Religion was unspecified in 48%; 29% were Christian; 22% Muslim; and 1% religion other than the latter two.

SOCIO-ECONOMIC STATUS AND UNEMPLOYMENT The median SES (for definition, see 5.2.2.1, 5.2.2.2 and Appendix 11.5) for the sample was 40.04 (IQR: 29.01-50.1). At least one or both parents was specified as unemployed in 60% of cases; both parents were specified as employed in 16%; unemployment data was unrecorded in 24%.

FAMILY SIZE AND FAMILY STRUCTURE In terms of family size (see 5.2.2.2 for definition), 52% of patients came from families of three or more biological siblings (including patient); 41% were from families of less than three biological siblings (including patient); family size data were missing in 7% of the sample. In terms of family structure, 61% came from families with separated or divorced biological parents; parental marital status was unspecified for 2%. One or both biological parents were deceased for 10% of children at the time of sampling; data were missing for this variable in 2%. Overall, only 29% of children came from households where both biological parents were present; 71% had alternatively-headed household structures (single parent [separation/divorce/death], step-parent, relative other than parent, foster/adoptive parent, deceased parent/s, and institutionalization).

FAMILY HISTORY A family history of ADHD was identified in 12% of cases. Mental illness other than ADHD was noted in family members of patients in 46% of cases. A family history of substance abuse (including alcohol and illicit drugs) was given in 50%. A family forensic history was identified in 14%. A severe family medical (other than mental) illness was noted in 62%. Data were missing in 7% of cases for all these categories of 'family history.'

COMORBID CONDITIONS Eighty-four percent of patients presented with one or more total comorbidities, including general medical (axis III) and psychiatric (axis I/II) conditions. Seventy-one percent of patients presented with psychiatric comorbidities. Stratification of the number of total comorbidities (including both medical and psychiatric) showed that 32% of patients had three or more comorbidities; 29% had two; 23% had one; and 15% had no comorbidities; 1% data were missing for this variable. The most commonly occurring specific comorbidities for the entire sample were Oppositional Defiant Disorder (35%), Learning/Speech Disorder (31%), and Intellectual Disability (including borderline intellectual functioning) (23%). Other comorbidities sampled included Conduct Disorder (7%), Mood Disorder (1%), Anxiety Disorder (5%), Tourettes/Tic Disorder (3%), Pervasive Developmental Disorder/Autism Spectrum Disorder (7%), Substance Disorder (including cigarettes, alcohol, and illicit drugs) (8%), Epilepsy (6%), Head Injury (10%), HIV (3%), sensory disability (3%), physical disability (0%), and other medical disorders (43%). Twenty-four percent of children were attending special needs schools; 76% were attending mainstream schools. 84% of children were referred for cognitive testing.

6.3.2 Socio-demographic profile Group Comparison

We found no significant association by group, indicating no statistically significant differences between the two study groups, for the variables of age, gender, language, race, religion, family size, SES Index, or family history in terms of ADHD, substance, forensic, or medical history. However, variables for unemployment, family structure, family history of mental illness other than ADHD, and distribution of comorbid conditions all showed a significant association by group (see Table 6 and Figure 2 below).

SOCIO-ECONOMIC STATUS AND UNEMPLOYMENT The median SES in the central and peripheral groups was 34.89 (IQR: 26.25-48.56) and 46.72 (IQR: 33.71-50.1), respectively. Since the SES Index varies inversely with socio-economic status, the higher SES Index denoted a relatively lower socio-economic status for the peripheral group compared with the central group, although this was not statistically significant using test of proportions ($z = -1.945$, $p = 0.0518$). At least one or both parents was unemployed in 68% of central versus 52% of peripheral group cases, a statistically significant association by group ($\chi^2 = 7.2691$, $p = 0.007$). There were missing data for parental unemployment status in 26% of cases in the central group and in 22% of the peripheral group.

FAMILY STRUCTURE Seventy percent of the peripheral vs. 52% of the central group cases came from families with separated or divorced parents; this association was significant ($\chi^2 = 4.5592$, $p = 0.033$). One or both biological parents were deceased for 10% of children in both groups; this was not statistically significant by group ($\chi^2 = 0.0046$, $p = 0.946$). Overall, only 40% of central and 18% of peripheral patients came from two-biological-parent-headed households; this association was significant by group ($\chi^2 = 5.3077$, $p = 0.021$).

FAMILY HISTORY There was a family history of ADHD in 16% of the central group and 8% of the peripheral group; this was not a significant association by group ($\chi^2 = 1.2502$, $p = 0.358$). A family history of mental illness other than ADHD (excluding substance disorders) was recorded in 38% of the central versus 54% of the peripheral group; this was a significant association by group ($\chi^2 = 3.873$, $p = 0.049$). A family history of substance abuse was

given in 52% of the central and 48% of the peripheral group; this was not a significant association by group ($\chi^2 = 0.0065,\ \mathrm{p} = 0.936$). There was a family forensic history in 10% of the central and 18% of the peripheral group; this was not a significant association by group ($\chi^2 = 1.6681,\ \mathrm{p} = 0.251$). A severe family medical (other than mental) illness was noted in 62% of both groups; this was not a significant finding by group ($\chi^2 = 0.1937,\ \mathrm{p} = 0.66$).

COMORBID CONDITIONS Eighty-eight percent of patients in the central group and 80% in the peripheral group presented with one or more comorbidities (Axis I/II/III); this was not a significant association by group ($\chi^2 = 0.7805,\ \mathrm{p} = 0.377$). Seventy-four percent of patients in the central group and 67% in the peripheral group presented with one or more psychiatric comorbidities (Axis I/II); this was also not a significant association by group ($\chi^2 = 0.5289,\ \mathrm{p} = 0.467$). When the number of general comorbidities (I/II/III) was stratified, the central group demonstrated a significantly higher number of comorbidities compared to the peripheral group using Fisher's exact test ($\chi^2 = 16.2923,\ \mathrm{p} = 0.001$). Forty-two percent in the central vs. 22% in the peripheral group had three or more comorbidities; 38% of the central vs. 20% of the peripheral group had two; 8% in the central vs. 38% in the peripheral group had one; 12% in the central vs. 18% in the peripheral group had no other diagnosis besides ADHD. When the number of psychiatric comorbidities (Axis I/II) was stratified, there was no longer a significant association by group ($\chi^2 = 5.7007,\ \mathrm{p} = 0.127$). The discrepancy in significance for stratified comorbid count (with respect to total comorbidities compared to psychiatric comorbidities) can be attributed to a higher number of general medical conditions in the central group. Ten percent in the central versus 8% in the peripheral group had three or more psychiatric comorbidities; 38% of the central versus 18% of the peripheral group had two; 26% in the central versus 40% in the peripheral group had one; 26% in the central versus 34% in the peripheral group did not have a psychiatric comorbidity. The only comorbidity surveyed which demonstrated a significant association by group was Intellectual Disability, which occurred with statistically greater frequency in the central group (34%) than the peripheral group (12%) ($\chi^2 = 6.5672,\ \mathrm{p} = 0.01$). There was also a significantly higher frequency of patients in the central (40%) compared to the peripheral group (8%) attending special needs schools; Fisher's exact test ($\chi^2 = 14.0351,\ \mathrm{p} < 0.0001$). Cognitive testing referral was recorded in 88% of the central and 80% of the peripheral group; there was no association by group in this regard ($\chi^2 = 0.7805,\ \mathrm{p} = 0.377$).

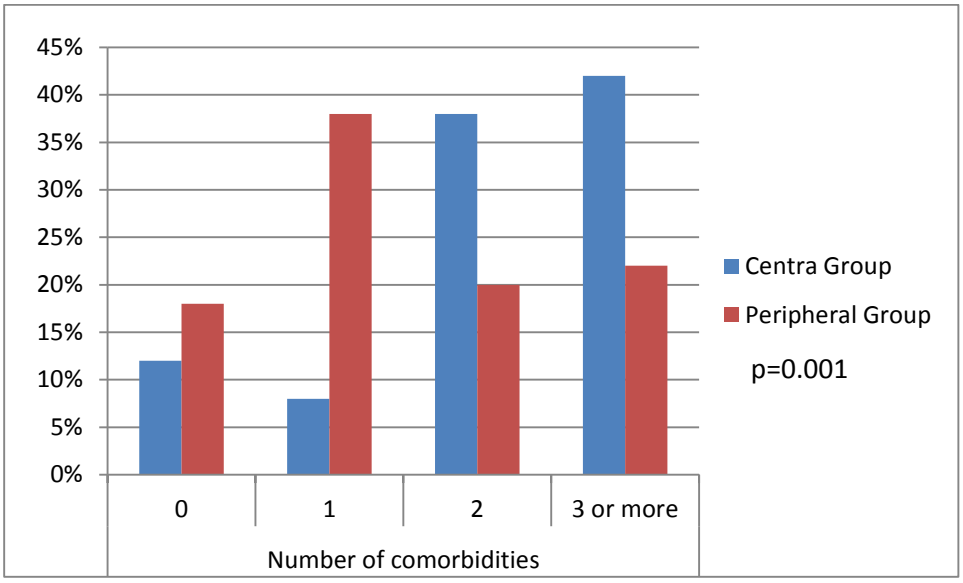

Figure 2: Number stratified comorbidities (Axis I/II/III) by group

Table 6: Socio-demographic variables by group (NS = not significant, Sep = separated)

Variable	Categories	Group		χ^2	P-value	Conclusion
		A=Central (n(Column %))	B=Peripheral (n(Column %))			
Age	6-12	35 (70%)	37 (74%)	0.1984	0.656	NS
	13-17	15 (30%)	13 (26%)			
Gender	M	43 (86%)	44 (88%)	0.0884	0.766	NS
	F	7 (14%)	6 (12%)			
Language	English	22 (44%)	15 (30%)	1.4747	0.931	NS
	Afrikaans	16 (32%)	13 (26%)			
	isiXhosa	8 (16%)	6 (12%)			
	Other	0 (0%)	1 (2%)			
	Bilingual	3 (6%)	2 (4%)			
	Missing	1 (2%)	13 (26%)			
Race	Black	6 (12%)	7 (14%)	2.6362	0.593	NS
	Coloured	17 (34%)	20 (40%)			
	White	2 (4%)	1 (2%)			
	Indian	2 (4%)	0 (0%)			
	Missing	23 (46%)	22 (44%)			
Religion	Christian	15 (30%)	14 (28%)	5.5455	0.05	NS
	Muslim	18 (36%)	4 (8%)			
	Other	1 (2%)	0 (0%)			
	Missing	16 (32%)	32 (64%)			
Unemployment	Nil	3 (6%)	13 (26%)	7.2691	0.007	Significant
	At least 1 or both Parents	34 (68%)	26 (52%)			
	Missing	13 (26%)	11 (22%)			
Family Structure	Both parents	20 (40%)	9 (18%)	5.3077	0.021	Significant
	Sep/Divorced	26 (52%)	35 (70%)	4.5592	0.033	Significant
	1+ Deceased	5 (10%)	5 (10%)	0.0046	0.946	NS
Family Size # biological siblings (including patient)	<3	19 (38%)	22 (44%)	0.2857	0.593	NS
	>=3	27 (54%)	25 (50%)			
Family History	ADHD	8 (16%)	4 (8%)	1.2502	0.358	NS
	Other Mental Illness	19 (38%)	27 (54%)	3.873	0.049	Significant
	Substances	26 (52%)	24 (48%)	0.0065	0.936	NS
	Forensic	5 (10%)	9 (18%)	1.6681	0.251	NS
	Medical	31 (62%)	31 (62%)	0.1937	0.66	NS

7. Discussion

7.1 Clinical Audit based on NICE guidelines: Overall Compliance

In this study we primarily set out to measure compliance with the NICE guidelines for the management of ADHD in a South African setting. As predicted, we found that compliance with the NICE guidelines was generally poor. These findings are in keeping with some international audit studies which have established relatively low rates of compliance at baseline before structured protocol interventions.[70,75,78] For our total study sample, compliance was rated as 'poor' on six of the ten core audit standards. Compliance was rated as 'good' on two and as 'fair' on two of the ten core standards. The sample performed somewhat better for the additional audit standards. Compliance was rated as 'fair' on three and as 'good' on two of the seven additional standards. Compliance was rated as 'poor' on only two of the additional standards.

7.1.1 Core Audit Standards: Overall Compliance

Overall, the diagnosis of ADHD was not documented systematically in that the diagnostic criteria and supporting history were not presented comprehensively by one clinician at one time. The audit revealed that sufficient DSM-IV criteria for having made an ADHD diagnosis had only been met in two thirds of cases. Our findings were consistent with other studies from the US[75] and Australia[82] in this respect. Specifically, clinicians in our study did not clearly identify the minimum number of symptoms before assigning an ADHD diagnosis. Given that some symptoms of ADHD are non-specific and frequently overlap with other disorders, diagnosis of ADHD may appear more frequent if diagnostic criteria are not applied with sufficient rigor or alternatively if the clinician making the diagnosis is unfamiliar with other conditions. For example, we might be under-diagnosing certain disorders such as Autism Spectrum Disorder, anxiety, and depression, which all showed lower rates in our study than in others.[48,70]

Diagnostic areas that require particular attention include history-taking and specification of ADHD disease severity. A frequently neglected area of the history was the mental health assessment of the child's primary caregiver/s, with referral where necessary. It was concerning that psychiatric assessment of the child before diagnosis, though present in 82% of cases, was also not done, or at least not documented, by clinicians 100% of the time.

One of the NICE standards could not be sufficiently evaluated: namely whether MPH had been prescribed as the first line treatment for cases of severe ADHD, given that ADHD disease severity was almost never specified in practice. Severity aside, our service evidenced a higher overall rate (80%) of prescribing MPH as the first line treatment than in some studies elsewhere.[48,71] Although MPH is the evidence-based first line treatment of choice for ADHD, and this standard was given a rating of 'good' in the audit, a high rate of prescription in our setting might not necessarily indicate best practice. Instead, this result might imply over-prescription of MPH, with accompanying overestimation of disease severity. Milder cases of ADHD, which may not have warranted immediate treatment with stimulants, may have gone unrecognized. Alternatively, it is highly likely that only those cases with severe ADHD were seen in the service due to limited health care facilities and limited accessibility to services. For clarification, we should specify disease severity for all cases and evaluate in future audit cycles.

One should also bear in mind that in some cases MPH had been initiated before publication of the NICE guidelines, hence a possible explanation for poor compliance. However, in most (75%) of the cases audited, MPH had been initiated after September 2008 (the date when the version of the NICE guidelines used in the audit was last updated). In 17% of cases MPH had been initiated after 2000 (the date of first publication of the NICE guidelines) but before September 2008. To more fairly assess compliance in future, it might be useful to have a mechanism in place for review of cases already in the system when new guidelines are published. For example, cases could be differentially audited in relation to the individual version of the NICE guidelines that was in place when MPH was first initiated. This might not be feasible in practice, however. Additionally, one could anticipate methodological problems if compliance is compared between cases which were audited using different sets of criteria.

Our audit also revealed that the transition to adult services for young people with ADHD is an overlooked area which needs addressing, as previously identified in other studies in Australia[48] and the UK.[72,84] According to the NICE guidelines, it is important to regularly assess patients with respect to treatment response and continuing need for drug treatment.[64] The MTA RCT prospective follow-up study, eight years later than the initial study, showed that some patients with ADHD seem to deteriorate in spite of medication, whereas others may show remission of symptoms and no longer require medication.[91] Although some patients may enter remission, it is estimated that up to 90% of young people diagnosed with ADHD will remain functionally impaired as they enter adulthood.[8] Periodic re-assessment of ongoing treatment needs is important to avoid giving unnecessary medication to those who may no longer require it as well as to plan appropriate care going forward for those who do. In this audit we did not assess the presence or absence of drug-free trial periods and what effect that may have had on the course of the illness. It might be interesting to investigate the use of and response to drug-free trial periods in future studies. As already mentioned, the long-term trajectory of the disease, particularly in relation to recommendations surrounding chronic drug treatment, is still a debated field that remains to be sufficiently clarified. Research studies of RCT design are best suited to answer these questions.

In our audit, other treatment areas that could be improved included referral to parent groups and providing written psycho-education to both caregivers and children. It is possible that more written information on ADHD was made available to children and/or caregivers than was documented. For example, patients and their caregivers may have been given information booklets placed in waiting rooms without a record in the file. It is also unclear whether patients and caregivers received information written in their own language, which has previously been identified as an important factor in accessibility and quality of care.[55,61-63] This highlights the need in general for improved documentation and monitoring of procedures. The importance of greater accountability has been identified in other audit studies that were able to achieve higher rates of compliance for most standards than in our study after audit protocols were implemented.[70]

Despite some areas of deficit, there were core audit areas in which the sample performed well. These included ADHD diagnosis by a suitably qualified clinician and offering a comprehensive treatment plan, in addition to a high rate of MPH prescription (in spite of the reservations already discussed). A suitably qualified clinician was judged to have made the diagnosis by reason of affiliation with a tertiary service, although clinicians generally did not document either their names or their qualifications in the notes. In this respect, documentation could also be improved. An adequate treatment plan was offered in 71% of cases, although a clear comprehensive treatment plan strategy was generally not formulated

after initial diagnosis by one clinician at one time. For the purpose of the audit the information was obtained by piecing together the treatment modalities that a patient had received over time. In this respect, compliance could be improved further. Other studies (which did not differentiate between psychological and behavioral interventions) attained similar or higher rates of compliance with comprehensive treatment plans, especially following protocol implementation.[70,72]

7.1.2 Additional Audit Standards: Overall Compliance

With the exception of physical monitoring, performance was generally better for the additional audit standards than for the core audit standards. The majority of clinicians attempted communication in the primary language of the child (and caregiver), documented the child's point of view, and contacted the child's teacher. Most clinicians monitored for side effects and monitored treatment response on standard scales.

We could potentially increase compliance further by improving the organization of the case notes. It was often difficult for the auditor to locate the standard scales, which were not filed systematically. This was conspicuous, as the CTRS-R/CPRS-R was frequently cited in the notes as the key document both supporting an ADHD diagnosis and informing assessment of treatment response with subsequent dose adjustment. However, the particular rating scale to which the clinician would refer (by making a general statement such as "mostly 2s and 3s on the Conners'") would not be immediately available for more detailed inspection. Despite these obstacles, our use of rating scales was still more frequent than in one UK audit (71% vs. 24%, respectively).[72]

The lack of physical monitoring was the most striking outcome, perhaps of the entire audit, and should be addressed as a matter of urgency. Previous studies have drawn attention to the tendency of psychiatrists to be less thorough in medical examination than pediatricians, while pediatricians conversely tend to be less comprehensive in mental examination.[70,83,92] The relative paucity of physical monitoring by psychiatric clinicians raises concerns of safety surrounding prescription of psychotropic medications in children. In our study, baseline physical work-up, including physical examination and screening for potential risk factors as part of the medical history, was only documented in 5% of cases. Follow-up monitoring of patients on stimulants was also inadequate. Plotting on a growth chart, in order to screen for potential MPH-associated growth stunting, was performed for only 29% of patients. This frequency was lower than that found in two UK audits against NICE guidelines performed at baseline.[71-72] In another study, physical monitoring was found in at least 90% after disciplined protocol implementation.[70] This highlights the need to re-audit.

7.1.3 Additional Clinical Variables: Overall Survey

The proportion of patients in our study on MPH LA (47%) was lower than that (87%) found in one US study examining treatment practices among general practitioners, which showed increasing trends of LA from 2000-2010, with correspondingly decreasing trends of SA use.[77] The lower rates of MPH LA use in our setting might be attributable to cost, which frequently informs availability and selection of medication in the South African public sector. In addition to the benefit of extending the duration of symptom control, the option of using long-acting formulations (either alone, or in combination with short-acting formulations) may enhance compliance by reducing the complexity of dosing schedules as well as by alleviating stigma for the child associated with having to receive medication at school.

Overall, a high number (76%) of patients were referred to adjunctive, more specialized treatment services (beyond the core pharmacological and behavioral interventions). Such extra interventions (see Table 3) are not explicitly required as an integral component of the NICE guidelines for ADHD, although the guidelines do highlight the importance of effective communication between different levels and modalities of care.[64] Thus, this may be interpreted as a good result for a LMIC public health sector setting where one might have expected that access to specialized services is limited.

There clearly is room for improvement, however, regarding referral for individual and family therapy and to social workers. Rates of formal psychotherapy for both patients and their families were found to be less frequent in our study than in others.[70,82] In our study, the referral to specialized social workers seemed relatively low (42%) in light of the extent of deprivation contributing towards disease burden in the South African context. Social mediators of disease include various dimensions of poverty such as low socio-economic status, lack of education, unsatisfactory housing conditions, unemployment, broken families, and high rates of sexual and other trauma, as already described.[85] Additionally, in their systematic review "Poverty and mental disorders: breaking the cycle in low-income and middle-income countries," Lund *et al*.[87] pointed out that "studies show[93,94,95] that individuals living with people with poor mental health are more likely to report worse mental health themselves. Poor mental health could have spillover effects, not only on the rest of the family, but also on society.[96]" This statement has profound implications for the reciprocal relationship between child and caregivers in terms of mental illness. Again, this highlights the importance of including a social history, family psychiatric history, and mental health screening of the caregiver, with appropriate psychiatric and/or social work referral for caregivers, as an integral part of the history of the child. A complete history provides not merely contextual but also potentially therapeutic information.

The relatively low rate of social work referral in our study might be due, in part, to the expectation in our service that clinicians, often inexperienced trainees, perform most social, educational, and psychological interventions themselves. Although a holistic approach is undoubtedly valuable, delegation of different clinical functions might be more expedient. Alleviating the case load on individual clinicians would allow each of them to focus on the clinical challenges for which each is best qualified. The low rate of social work intervention may also be explained by overwhelmed, understaffed existing social services. Or, alternatively, perhaps referral pathways are unclear. In future, enhancing access to formal social work services could be useful in providing more professional assistance.

7.2 Clinical Audit based on NICE guidelines: Group Comparison

A secondary objective of the audit was to compare NICE guideline compliance between a central and a peripheral group. The hypothesized difference between groups in terms of compliance was only partly borne out in practice.

Comparison of compliance between groups showed significant differences on only four out of 17 total audit standards. Contrary to expectation, the peripheral group performed almost as well as the central group on all of the core audit standards with the exception of evidence of a comprehensive treatment plan. On the additional audit standards the peripheral group showed poorer compliance than the central group, as predicted. In particular, the peripheral group showed lower compliance for growth chart plotting, side effect monitoring, and monitoring of treatment response using standard scales.

Taken together, these findings suggest that our tertiary psychiatric service is on the whole providing an equitable service, regardless of central or peripheral clinic location. The individual differences for clinic location in terms of the socio-economic status of the area or the health care level (tertiary vs. primary) of the facility housing the clinic seem to have less impact than anticipated.

7.2.1 Core Audit Standards: Group Comparison of Compliance

The only core audit standard that showed a statistical difference between groups was the provision of a comprehensive treatment plan, which was offered less frequently in the community. Analysis of the component non-pharmaceutical interventions showed that the main deficit lay in the offering of psychological or behavioral input. This was a rather surprising finding given that behavioral modification may be brief enough for a clinician to perform as part of a regular consultation, without requiring extensive expertise or formal referral. For example, this could entail advising parents about simple interventions such as a 'star chart' reward system for desirable behavior or 'time-out' strategies for disruptive behavior. It is possible that time and staffing pressures may have come into play, as previously identified as possible barriers to care in the community.[55,58] It is also possible that certain interventions took place without having been documented. Alternatively, clinicians in the periphery may prioritize re-issuing prescriptions rather than engaging in lengthy interactions with the caregiver. This interpretation could be supported by the observation that clinicians in the periphery also seemed to engage statistically less frequently with the child when analysis of sub-variables was considered.

Although the main core variable 'full history' did not show significant differences between groups, analysis of one of its sub- core variables did, namely 'mental health assessment of the child.' It was worrying that a psychiatric assessment of the child before diagnosis was documented less frequently in the peripheral group than in the central group. It is possible that this might also be due to understaffing, clinic volumes, and time constraints in the periphery, which might lead a clinician to ignore the child and prioritize the caregiver in order to obtain an abbreviated, narrative of the child's behavior. Alternatively, it is always possible that direct assessment of the child took place but was not documented, due to more cursory note taking in the periphery. It is less likely that clinicians in the periphery actually engaged less frequently with the child, since frequencies for 'documentation of the child's point of view' did not show significant differences between groups. Speculations aside, it will be essential to improve documentation, especially in the periphery.

7.2.2 Additional Audit Standards: Group Comparison of Compliance

Compliance was significantly poorer for the peripheral group than for the central group for three additional audit standards concerned with responsible treatment monitoring (plotting on growth chart, side effect monitoring, and treatment response monitoring on standard scales). In general, physical monitoring was omitted more frequently in the periphery. Because physical examination including parameter monitoring pre-MPH initiation was noted to be equally poor for both groups, analysis was extended to assess the frequency of monitoring over the entire course of management. After thorough audit of each folder cover to cover (often representing years under care), the omissions in the periphery became more striking (See Figure 1). It is concerning that 40% of children in the peripheral group appeared never to have had a single blood pressure reading, pulse had never been taken in 48%, height had never been measured in 32%, and 30% of children had never been weighed.

Some explanations to account for the observable differences in performance and/or documentation between the two groups have already been offered. Furthermore, it is possible that equipment is less readily available in the community. For example, scales or blood pressure cuffs may be scarce, broken, or not located conveniently. To compensate, outreach clinicians often bring their own portable scales, blood pressure cuffs, and height measurement charts with them to the peripheral clinics. This is not an optimal solution, and it is likely that clinicians will not reliably bring each of these items with them on a regular basis.

In contrast, the central clinic has access to more resources. At the Neuropsychiatry Clinic at RCWMCH there is more than one working measuring device located in a fixed, central position for convenient access. In addition, the clinic is organized more systematically, so that there is a division of labor, which is clearly understood. There is a dedicated secretary who receives patients and their caregivers in the waiting room, triages as necessary, and makes follow up bookings. There are multiple clinicians, both junior and senior, supervised by one to two consultants on any occasion. In comparison, there are usually not more than two clinicians, usually junior, attending each community clinic at a time. There is no secretary, no on-site supervision (although there is telephonic support available), and usually no dedicated nursing support. In contrast, nursing support staff at the central clinic routinely do height and weight measurements and record readings in the case notes as part of their duties before the child goes in to see the treating clinician. The treating clinician in turn plots the pre-recorded measurements on the growth chart.

The stepwise system employed at the central level is more efficient than the informal system at community level where the treating clinician is expected to assume sole responsibility for most operations simultaneously, which increases the probability of omission. This emphasizes the need to find ways of standardizing care across different contexts.

7.2.3 Survey of Additional Clinical Variables: Group Comparison

We also considered two descriptive differences that were not measured to any standard. Current drug treatment regimen and extra adjunctive services were surveyed. Significant group differences were found for both of these variables and several of their sub-variables. These results seemed to indicate a greater availability of specialized resources centrally. Alternatively, it is also possible that the two groups had different treatment needs and therefore accessed certain treatment modalities with different frequencies.

There appeared to be a greater array of drug treatment options in the central group compared to the peripheral group. The use of MPH LA was more frequent in the central group. The advantages of using MPH LA have been previously discussed. The use of antipsychotics was also more frequent in the central group, which might be concerning given that the NICE guidelines unequivocally states that antipsychotics are not indicated for use in children and young people with ADHD.[64] In one US study, examining treatment practices among general practitioners in the decade from 2000-2010,[77] the use of antipsychotics was 3%, similar to the proportion found in our peripheral setting, but much less than that found in our central clinic (28%), perhaps indicating a greater degree of case complexity seen in our central clinic. It is possible that antipsychotics were used appropriately or alternatively 'off-label' for conditions other than ADHD. For example, at the Neuropsychiatry Clinic one might expect a greater number of cases with comorbid pathology such as head injuries, epilepsy, HIV, intellectual disability, and so on, for which antipsychotics are often added to the

treatment regimen to tackle intractable behavior disturbance not controlled by stimulants alone.

Referrals for occupational therapy, speech and language therapy, the Neurodevelopmental Clinic, and specialist medical consultations and investigations were significantly higher in the central compared to the peripheral group. Again, it makes sense that specialist treatment services such as these would be required for those with a greater number of co-occurring conditions. The central group might also have an advantage in that these services are located in proximity to the central clinic (specialist intervention units are all physically located at RCWMCH). For example, it is possible to obtain an ECG (electrocardiogram) immediately adjacent to the Neuropsychiatry Clinic and have it read by a cardiologist on the same day; Neurodevelopmental Clinic consultants work in close conjunction with Neuropsychiatry consultants, and attend many of the same meetings; neurologists are close by, etc. Of course, patients may be referred to these same services from the periphery, but the lack of proximity might impede accessibility. Generally, patients at the central clinic have better access to specialized resources, patient and parent groups, and an on-site multi-disciplinary team.

7.3 Socio-demographic Survey

A third objective of the study was to compare the groups in terms of a variety of demographic markers. Contrary to expectation, the two groups resembled each other on most variables. Our hypothesis that the peripheral group would be characterized by lower socio-economic status than the central group was not supported statistically. In agreement with our original hypothesis, central cases were more complex medically, in terms of an increased frequency of comorbid (general medical) conditions, although rates of psychiatric comorbidities were comparable. While SES did not differ markedly between the two groups, other dimensions of poverty were found to be significantly different. On the one hand, peripheral cases were more complex socially, as predicted, in terms of having a greater frequency of non-traditional family structures (i.e. alternatives to a two-biological-parent-headed household), including more fractured families (with a higher frequency of parental separation or divorce), and a higher incidence of family mental illness other than ADHD. On the other hand, parental unemployment was significantly associated with the central group rather than the peripheral group - although a quarter of the data were missing for this variable, which complicated interpretation, especially when considered in conjunction with the SES data outcomes (see detailed discussion to follow).

7.3.1 Socio-demographic: Overall profile

At a male to female ratio of about 7:1, males were diagnosed with ADHD more frequently than females. This ratio was consistent with that found in some other studies,[3,70-71] although the gender ratio usually quoted for ADHD is lower than that, in the order of 3:1.[23,97] This might indicate a referral bias for boys, so that girls affected with ADHD are not readily accessing the system, perhaps due to less disruptive manifestations of ADHD in girls (e.g. predominantly inattention symptoms such as ‘daydreaming’) which may not trouble family and teachers as much.

It is difficult to comment accurately on racial distribution and whether this was representative of the general population as there were 45% missing data for race. Perhaps considering the delicate sensibilities post-Apartheid, clinicians tended to shy away from specifying race in the notes. Therefore, the following observations ought to be interpreted

with caution. The percentage of black children found in our sample appeared lower (13%) than expected. This proportion was not representative of black racial demographics for either Cape Town (38.6%)[98] or South Africa (79.6%),[99] perhaps indicating that black children may not be readily accessing our services. The percentage found for black children was similar to that found for isiXhosa speakers (14%). isiXhosa is the predominant language spoken by black people in the provinces of the Western and Eastern Cape. The figures for language distribution might be relatively more reliable than race as only 14% were missing data. The distribution of 'coloured' (mixed race) individuals (37%) was more representative of the Cape Town population (42.4%)[98] but not the general South African population (8.9%).[99] Fewer white individuals (3%) were represented than in either the Cape Town (15.7%)[98] or South African (8.9%)[99] population. This finding may be attributable to increased access to private health care among white families. The distribution of Asian individuals (2%) was representative of both Cape Town (1.4%)[99] and South African (2.4%)[98] demographics.

The parental unemployment rate in our sample was much higher (60%) than the unemployment rate (calculated as the proportion of the labour force that is unemployed) given by Census 2011 statistics for Cape Town (24%).[98] Our sample also had a higher parental unemployment rate than that found in a higher income country (UK audit) sample (24%).[70]

A family history of ADHD (12%) was identified at a lower rate than in other studies.[70,82] An Australian audit found a positive family history of ADHD in a first degree relative in 61% of cases.[82] Up to 25% of mothers screened in a UK audit showed underlying features of ADHD.[70] The lower frequency in our study might be attributable to the neglect of caregiver mental health and family history in general. The low rate of ADHD pick-up in families in our study might be indicative of a low level of awareness of the disease generally. This highlights the need for improving screening for ADHD in both children and adults.

On the other hand, the high frequency (46%) of family mental illnesses other than ADHD (excluding substance disorders) in our study was particularly striking. In comparison, a UK audit identified evidence of a family mental illness other than ADHD in 26% of their sample.[70] Additionally, marked rates of family substance abuse (50%) and family forensic history (14%), usually paternal criminality, were present in our sample. A high degree of genetic and environmental loading in our context will have implications for reinforcing the poverty-mental illness cycle. As far as possible, family members should be psychiatrically assessed, supported, and referred.

In agreement with other studies,[30,48,70,82] there was a high frequency of comorbid conditions with ADHD. Our frequencies were even higher (84%) than those detected internationally (67%),[30] because general medical (Axis III) conditions were included in our initial analysis. Other studies usually define 'comorbid' as psychiatric (Axis I/II) disorders exclusively. Re-analysis of our sample for psychiatric comorbidities showed values equivalent to other studies.[30]

In keeping with prior studies, the most commonly occurring specific comorbid conditions for the entire study sample were Oppositional Defiant Disorder, learning and speech disorders, and intellectual disability.[30,82] As already noted, frequencies of Autism Spectrum Disorder, depression, and anxiety disorders were lower in our study compared to others.[48,70,71] It is possible that these conditions are under-diagnosed in our setting.

7.3.2 Socio-demographic: Group Comparison

No significant differences were found between groups across the variables of age, gender, language, race, religion, or family size. Results for the poverty markers SES and parental

unemployment were not in agreement. The unemployment data showed a significant association by group ($p = 0.007$), indicating a greater proportion of parental unemployment, and, by extension, presumably lower comparative socio-economic status in the central group. SES Index analysis, however, showed a relatively lower comparative socio-economic status for the peripheral group, although this was not significant ($p = 0.0518$).

Complicating definitive interpretation, there were missing data for parental unemployment in 26% of the central and 22% of the peripheral group. Speculatively, had the data been more comprehensive, the association observed may have ceased to be significant. In comparison, the SES Index data were almost complete, missing only 1% for the total study sample. Unlike unemployment, the SES is a composite indicator, representing the contribution of several parameters, including, but not exclusively employment status. Therefore, the SES could be considered a more reliable indicator than a single parameter. Internationally, analogous census-derived (postal-code-based) indexes have been used in studies as reliable indicators of socio-economic status.[48]

However, relying on an umbrella indicator for an entire suburb, affiliated with the address given for a given patient, can only be a rough estimate of any individual's socio-economic status. Potential unreported address change or informal dwelling (impermanent shack/shanty/'wendy house'), erected on the premises of an address officially considered of formal standard, would also not be reflected. For the purposes of this study, wherever there was a discrepancy in SES value for formal versus informal housing for a given suburb, where the exact nature of the housing could not be determined on the basis of the available information, the value given for formal housing was selected (for some settlements in Cape Town, SES values for both formal and informal housing have been supplied; see Appendix 11.5, e.g. for the suburb Langa). By potentially underestimating the SES, the study may have overestimated the socio-economic status of some individuals. However, ambiguities surrounding SES assignment were rare (only two cases in the central group and four cases in the peripheral group), so this is probably a minor consideration.

In conclusion, although it had been expected that the peripheral group would be associated with lower socio-economic status than the central group, this could not be demonstrated. It is likely that a similar cohort of patients in terms of socio-economic status attends each site.

Groups showed differences in family structure. The families of children in the peripheral group showed comparatively more non-traditional arrangements than in the central group. One might expect that a higher frequency of parental separation, and hence single-parent-headed households, would suggest households of lower earning potential for the peripheral group compared to the central group, although this expectation was not corroborated by the other poverty markers. Broken families would likely create more inter-personal stress in the family and be destabilizing for the child.

The families of children in the peripheral group were more frequently afflicted with a mental illness other than ADHD than those in the central group. The explanation for this association is unclear. A higher frequency of family mental illness might be related to lower socio-economic status in the peripheral group, although the unemployment and SES findings did not support this. As described by Patel *et al*.,[26] the dynamic inter-relationship between deprivation and mental illness could be mediated by factors such as increased exposure to stressful life events, concurrent chronic illness, societal marginalization, lower educational and earning potential, limited access to services, poor mental health literacy, stigma, and impaired occupational and social functioning. Whatever the etiology, exposure to a higher rate of family mental illness in the periphery would further disadvantage these children.

Although patients in the peripheral group generally had more complicated domestic situations, patients in the central group demonstrated more complex cases medically. Almost double the patients in the central group compared to those in the peripheral group had three or more comorbid conditions (see Figure 2). The higher number of general medical conditions presenting centrally accounted for this discrepancy. It is reasonable to assume that children requiring advanced management of medical complications too challenging to be handled at primary care level would be preferentially referred to a specialized tertiary facility (RCWMCH). An alternative explanation for the observed association might be that patients already attending a tertiary facility would be receiving better care *a priori*. They would presumably have access to more thorough investigations and sophisticated referral pathways, with ensuing higher pick-up rate and earlier identification of conditions.

The only specific comorbid condition which demonstrated a statistically significant association by group was Intellectual Disability (including borderline intellectual functioning), which occurred, as would be expected, with greater frequency in patients attending the central Neuropsychiatry Clinic. Surprisingly, no statistically significant association by group was found for Learning/Speech Disorder or Head Injury, considering that specialized rehabilitation facilities designed to address these deficits are located centrally. This may indicate that patients in the periphery, though similarly affected, have limited access to specialist facilities. This could be due either to inadequate referral or inability to attend centrally for logistic reasons such as transport costs. Alternately, it is always possible that referral for specialist consultation had been made without having been documented.

Fittingly, there was a significantly higher frequency of patients in the central group compared to the peripheral group attending special needs schools. Approximately an equivalent proportion of patients in each group had been referred for cognitive testing. Despite the apparently high percentage of referral, this finding should be regarded with some reservation. Referral does not necessarily mean that tests were ever actually completed, only that testing had been indicated. Anecdotally, it was noted on case note inspection that extensive delays (of up to two years, in some cases) by the school system responsible for psychometric testing were characteristic. This service deficit was not formally quantified nor analyzed statistically.

7.4 Limitations

It is important to be mindful that this study represented a clinical audit on a very particular subset of patients with ADHD in a South African setting. Data were collected from only 'state sector' patients served by the ADHD services of the University of Cape Town in the West Metro of the City of Cape Town. Selection may also have created a bias towards poorer populations, traditionally managed by state health facilities. In some respects, one might anticipate a bias towards more complex cases associated with lower socio-economic status. We can therefore not assume that results can be generalized to private sector patient groups. It would however be very interesting to compare findings in this audit to similar tertiary centres around the country that may face similar challenges. All reasonable efforts were made to select a random sample for audit, but it is possible that, due to practicalities and administrative challenges, this may not have been entirely random.

The comparative study design merging all outlying clinics together in one group may have missed possible variation among community service providers in the periphery. For instance, certain peripheral clinics are led by a consultant psychiatrist in child and adolescent psychiatry, while others are led by less experienced clinicians such as junior registrars. Moreover, there may have been other organizational factors that could have affected

services differentially. For example, at the time of the audit, the CAMHS provided by DCAP at Kensington CHC was in the process of scaling down, necessitated by DCAP staffing cuts. However, this particular service change is unlikely to have impacted care dramatically within the time-frame covered by this audit. At the time in question, a senior specialist had taken charge of that clinic in order to provide continuity of care.

Given that current address was used for SES Index classification, it is possible that inaccurate addresses may have led to incorrect SES classification. It is also possible for one patient to have been seen at multiple sites in the system over time, introducing a potential contamination effect in the retrospective comparative study design, which used only current site of attendance as criterion for group membership. Attendance at multiple sites over time did not occur commonly, however. Seventy-two percent of the total sample had attended one site exclusively, either centrally or peripherally. Only 6% of the central group had previously attended any of the peripheral clinics. Thirty-two percent of the central group had previously attended at the 'Sawkins' site. This is unlikely to have been a confounder in the study design as both the Neuropsychiatry Clinic and 'Sawkins' offices are considered central sites; indeed, they are within walking distance of each other, across a central common. For the peripheral group, only 2% had previously attended the Neuropsychiatry Clinic. Ten percent of the peripheral group had previously attended at the 'Sawkins' central location, which may have introduced a minimal contamination effect.

Only the management of ADHD after referral to DCAP was addressed. Care pathways into the system were not taken into account. Moreover, an analysis on the level of systems infrastructure, including such potentially pertinent factors such as transport, staffing, pharmaceutical stocking, and other resource allocation, is, although undoubtedly critical, beyond the scope of this project.

A certain statistical limitation may arise from the problem of multiple measurements. We performed so many statistical tests on multiple variables and their sub-variables that the likelihood of a type I error was high. As the number of tests increases, so does the likelihood of detecting a chance association and falsely rejecting the null hypothesis. No Bonferroni correction was made.

Then, there is the issue of whether it is appropriate to apply the same expectations and standards as detailed in a tool such as the NICE guidelines, generated in a high income country, to measuring the performance of a lower- to middle- income country with limited resources. Such a pessimistic view is not advocated by prominent ADHD specialists representing the South African Society of Psychiatrists (SASOP).[66] In fact, they recommend application of NICE guideline principles, with some contextual modifications, such as expanding the repertoire of communications in the patient's primary language.[10,66] In comparison to some audits in higher income countries, we actually had equivalent or better compliance for several standards, showing that the successful practice of evidence-based medicine need not be expensive nor elaborate. The example given earlier of offering brief 'commonsense' parenting advice illustrates this concept. It is likely too that using an evidence-based focus will prove more cost-effective in the long run than a less rigorous approach.

Finally, as this is a retrospective case review study, accurate data collection and subsequent interpretation were determined by the quality of the existing written records. For example, some events may have happened but not been recorded, or clinician writing may have been illegible. Note keeping in the files was unsystematic which required extensive review of the files by the auditor. This may have resulted in incomplete data capturing for the audit.

Because the study was undertaken retrospectively, patient and parent satisfaction with services was not assessed; the long term trajectory of the illness and its management was not tracked. In spite of the above, we are confident that we have meticulously audited the available notes for each case and gathered a large amount of useful, original clinical data which will surely have beneficial implications for future clinical management.

8. Conclusions and Recommendations

The study outcomes with respect to the four main study objectives are summarized below:

1) Overall, the audit demonstrated poor compliance with the NICE guidelines for the assessment and management of ADHD in children and adolescents in our setting. This outcome was in keeping with other studies conducted internationally. In our study, low levels of compliance were observed for both the core audit standards as well as the additional audit standards. Only four out of 17 total audit standards met a compliance rating of 'good' (>80%). The remaining 13 standards were given a rating of 'poor'-to-'fair' (<80%). Both diagnostic and treatment practices were implicated and several have been highlighted for improvement (see bulleted list below). Physical examination stood out as an area of special concern.
2) On clinical comparison, the two study groups showed equitable compliance when core audit standards were considered. However, when additional audit standards were considered, the central group performed better than the peripheral group in key areas, offering a greater array of treatment options and safer treatment monitoring. The reasons for this discrepancy in compliance between the two groups were not entirely clear. It is possible that, as initially posited, there may be a relative paucity of material and/or human resources in the periphery which may impact care.
3) On socio-demographic comparison, the two study groups were more alike than expected, especially in terms of socio-economic profile, which was independent of the setting of the respective treating clinic. However, as anticipated, patients in the central group were more complex medically, while patients in the peripheral group were more complex socially. Specifically, patients in the periphery were affiliated with more fragmented family structures as well as a higher rate of mental illness among their relatives. In view of the absence of corroborating socio-economic data, it was not possible to give a comprehensive explanation for the observed social discrepancies. The greater number of general medical (i.e. non-psychiatric) comorbidities in the central group compared to the peripheral group was consistent with the expected referral for these complications to the specialized tertiary facility located centrally.
4) Given that compliance with the NICE guidelines has been inconsistent, the fourth objective of the study was to create solutions in order to standardize care across treatment sites and clinicians. Based on the knowledge that structured protocol interventions with re-audit have been effective elsewhere,[70,75,78] we generated a checklist in an attempt to improve adherence to good practice guidelines.

   To encourage guideline implementation, the development of simple, user-friendly assessment tools for use by clinicians is recommended. These should be reviewed at intervals, and updated, as necessary, taking into account the latest available guidelines. We propose that each patient file (either suspected or confirmed ADHD) should have a checklist to facilitate clinician self-monitoring, communication between clinicians, and service quality assurance control. The checklist could be a useful tool for re-auditing. For convenience going forward, we have provided such a checklist (see Appendix 11.6). The checklist has largely been based on the audit tools created for use in the current study (derived from the NICE guidelines; see Appendices 11.2 and 11.3). Examples of protocols proposed for use by international studies were also consulted.[100]

In view of multiple areas of deficit, priority areas have been identified for upgrading. Going forward, it is imperative to:

- Document clinician's name and qualifications.
- Document diagnosis and treatment plan comprehensively.
- Document DSM-5 criteria clearly.
- Specify ADHD severity for all cases.
- Enhance awareness of alternative and comorbid diagnoses in the context of ADHD. Actively screen for these.
- Improve history-taking. Give special attention to the mental state of both patients and their caregivers. Refer caregivers to adult services if necessary.
- Pay attention to physical examination and cardiac history pre-MPH initiation.
- Monitor patients physically on follow up. Measure blood pressure and pulse three-monthly[64]; weight and height six-monthly.[64] Screen for adverse effects routinely.
- Complete growth chart (at least 6-monthly) and standard rating scales regularly (especially after dose changes) to track the progress of treatment.
- Reassess need for continued drug treatment annually.[64]
- Negotiate with relevant authorities for upgrading equipment in the periphery.
- Refer caregivers to parent-training groups.
- Promote supply of written psycho-education in the primary language of patient and caregiver. Document exchange.
- Offer brief behavioral interventions, especially in the periphery.
- Address transitioning to adult services for adolescents of school leaving age.

Our ADHD clinical audit is, to our knowledge, the first of its kind in Africa. It is intended as a first step towards laying the foundation for future audit cycles in our local context, and may inform similar studies planned elsewhere. While additional investigation into ways of improving South African mental health services is required, especially at community level (as represented by the comparatively poorer performance of the peripheral study group here), we anticipate that proposed structured interventions such as the checklist provided are likely to help effect change in our context. We are optimistic that patient care should benefit by introducing a measure of greater standardization and accountability. Re-audit studies elsewhere have clearly shown improvements after protocol intervention. After instituting such measures locally, further audit will be necessary to assess their impact.

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11. APPENDICES

11.1 Letters supporting Study Approval

Western Cape Government
Health

Dr TA Blake
Manager: Medical Services
Email: Thomas.Blake@pgwc.gov.za
Tel: +27 21 658 5788 fax: +27 21 658 5166

Dr K Vrba
Psychiatry Registrar

Dear Dr Vrba

APPROVAL OF RESEARCH

PROJECT: CLINICAL AUDIT OF THE MANAGEMENT OF ADHD IN CHILDREN AND ADOLESCENTS

It is a pleasure to inform you that approval is hereby granted to conduct above-mentioned clinical audit at the Child and Adolescent Psychiatry Department and Red Cross War Memorial Children's Hospital Neuropsychiatry Clinic.

Yours sincerely,

signature removed to avoid exposure online

Dr Thomas Blake
Manager: Medical Services
Date: 15 March 2013

UNIVERSITY OF CAPE TOWN

Faculty of Health Sciences
Faculty of Health Sciences Human Research Ethics Committee
Room E52-24 Groote Schuur Hospital Old Main Building
Observatory 7925
Telephone [021] 406 6338 • **Facsimile** [021] 406 6411
e-mail: sumayah.ariefdien@uct.ac.za
www.health.uct.ac.za/research/humanethics/forms

07 February 2013

HREC REF: 083/2013

Dr K Vrba
c/o Dr W Vogel
Department of Psychiatry
Valkenberg Hospital
Observatory

Dear Dr Vrba

PROJECT TITLE: A CLINICAL AUDIT OF THE MANAGEMENT OF ADHD IN CHILDREN AND ADOLESCENTS, A COMPARISON BETWEEN TWO TREATMENT SITES IN CAPE TOWN

Thank you for submitting your study to the Faculty of Health Sciences Human Research Ethics Committee for review.

It is a pleasure to inform you that the HREC has **formally approved** the above mentioned study.

Approval is granted for one year till the 15 February 2014.

Please submit a progress form, using the standardised Annual Report Form, if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please quote the REC. REF in all your correspondence.

Yours sincerely

signature removed to avoid exposure online

PROFESSOR M BLOCKMAN
CHAIRPERSON, HSF HUMAN ETHICS

Federal Wide Assurance Number: FWA00001637.

sAriefdien

Institutional Review Board (IRB) number: IRB00001938

This serves to confirm that the University of Cape Town Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Convention on Harmonisation Good Clinical Practice (ICH GCP) and Declaration of Helsinki guidelines.

The Research Ethics Committee granting this approval is in compliance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and FDA Code Federal Regulation Part 50, 56 and 312.

11.2 DATA CAPTURE FORM for Socio-demographic Factors

Site	A		B		

Case No.		

1	**Age**	6-12		13-17								
2	**Gender**	M		F		U Unknown						
3	**Suburb**	Specify Name								U		
4	**Socio-economic Status**	SES Index (for Suburb)				U						
5	**Race**	Black		Colored		White		Indian		Other / U		
6	**Language**	English		Afrikaans		Xhosa		Other		U		
7	**Religion**	Christian		Muslim		Jewish		Other/ U				

8	**Family Structure**	Single Bio Parent heading household		Two Bio Parents heading household		Step-Parent with Bio Parent heading household		Parents Separated / Divorced	
		One Or Both Parents Deceased		Adult Bio Relative Other than bio parent heading household		Foster / Adoptive parent heading household		Institution-alized (Children's Home)	
		Other		U					
9	**Number Siblings** (Including pt & bio- and half-sibs)	Specify number		U					
10	**Parental/ Caregiver Unemploy-ment**	One		Both		None		U	

11	**School**	Mainstream		Special Needs		Not Attending		U	
12	**Cognitive ability**-- Estimated	Normal		Abnormal		U			
13	**Cognitive ability**-- Referred for Cognitive Testing	Y		N					

14	**Comorbidity—** Axis I, II, III other than ADHD	Y		N					
15	**Comorbidity—** Specify Number	0		1		2		3 or more	
16	**Comorbidity—** Specify Type	ODD		CD		Mood Disorder		Anxiety Disorder	
		Tourettes Or Tic Disorder		Epilepsy		TBI Or Head Injury		HIV	
		Physical Disability		Sensory Impair-ment		Learning/ Speech Disorder		I.D./ Borderline IQ	
		PDD /Autistic Spectrum		Substance Disorder (including cigarettes)		Other			

17	**Family Hx**	ADHD		Mental illness other than ADHD (Excluding substances)		Substances		Forensic Hx		Significant Illness Other than mental	
		Nil of note		U							

18	**Referral process--** Source	Doctor				Social Worker		Psycho logy		Nursing	
		Educator				Other		U			
19	**Referral process--** Source	Public sector		Private sector		U					
20	**Referral process—** Prior Attendance Alternative DCAP Site	Y		N							
20.1	**DCAP Site Currently attending**	VHW CHC		Kensing-ton CHC		Retreat CHC		Heide-veld CHC		Van-guard CHC	
		RXHN		Sawkins		CHC Pooled					
20.2	**DCAP Sites Ever Previously attended**	VHW		Kensing-ton CHC		Retreat CHC		Heide-veld CHC		Van-guard CHC	
		RXHN		Sawkins		CHC Pooled					

11.3 AUDIT TOOL based on NICE guidelines

Site	A		B		

Case No.		

Core Standards

21	**ADHD Dx should only be made by** specialist psychiatrist, paediatrician or other appropriately qualified health care professional with training & expertise in ADHD Dx	Y		N		U	
22	**DSM IV Criteria**-- Have DSM IV Dx Criteria been demonstrably met?	Y		N		U	
22.1	**DSM IV Criteria**—Cut-offs: at least 6 out of 9 Inattention Sx and/or at least 6 out of 9 Sx Hyperactivity/ Impulsivity*	Y		N		U	
22.2	**DSM IV Criteria**— Symptom Duration: at least 6 months	Y		N		U	
22.3	**DSM IV Criteria**— Pervasive: Some impairment is present in at least 2 settings (e.g., at school [or work] and at home)	Y		N		U	
22.4	**DSM IV Criteria**— Functional Impairment: Clear evidence, based on interview and/or direct observation, of interference with developmentally appropriate social, academic or occupational functioning.	Y		N		U	

22.5	**DSM IV Criteria— *Inattention Sx**	Fails to give close attention to details/ careless mistakes		Difficulty sustaining attention		Does not seem to listen when spoken to directly	
		Poor follow through on instructions/ failure to finish tasks (not due to oppositional behaviour or failure to understand)		Difficulty organizing tasks and activities		Avoids tasks that require sustained mental effort	
		Loses things		Easily distracted		Forgetful	
22.6	**DSM IV Criteria— Hyperactivity/ *Impulsivity Sx**	Fidgets/ squirms		Leaves seat when remaining seated is expected		Running or climbing in inappropriate situations/ subjective restlessness	
		Difficulty playing/ engaging quietly		On the go/ Driven by motor		Excessive talking	
		Blurts out		Difficulty Awaiting turn		Interrupts/ intrudes	
23	**Specification** of ADHD **Severity**	Moderate ADHD		Severe ADHD		U/ Not specified	

24	**Full Hx**— Before Dx	Y		N		U	
24.1	**Full Hx**— included	Pt needs, clear Presenting problem		Social Circumstances		Educational Circumstances	
		Co-existing Conditions		Family Hx Illnesses		Developmental Hx	
		Child's M.S.E.		Assessment of Parents'/ Caregivers' Mental Health, including Referral if necessary			

25	**Referral to a <u>parent-training/education programme</u>** **For Parents of school-age children (6-17)** with **moderate to severe** impairment Parents / carers should be offered referral to a **group parent-training/education programme** either as a stand alone programme or a group treatment for the child or young person	Y		N			
26	**Drug treatment offered as the first line Rx** (For school-age children with severe ADHD Drug treatment should be offered as the first-line Rx)	Y		N		U	
27	Drug Rx for children and young people with ADHD should always form part of a **comprehensive treatment plan** that includes psychological, behavioral & educational advice and interventions	Y		N		U	
27.1	Interventions included	Psycho-logical		Behav-ioral Modifi cation		Educat-ional	

28	For a young person of school leaving age (16-17), if continuing Rx is needed, arrangements for **Transition to Adult services** (discussions, care options)	Y		N		U	
		N/A					

29	**Psycho-education— <u>Written patients</u>** offered written information about their condition, Rx options	Y		N		U	
30	**Psycho-education— <u>Written</u>** To **<u>caregivers</u>** about the pt, as above	Y		N		U	
30.1	**Psycho-education— Written** Given, but unspecified to whom	Y		N		U	

Additional Standards and Descriptors

31	**Language of patient**— Evidence of clerking via translator or in primary language of pt	Y		N		U	
32	**Point of view of child**— documented	Y		N		U	
33	Clinician **Contact** with child's **Teacher**: Evidence (feedback forms, telephonic, meeting, classroom observation)	Y		N		U	

34	**Drug Rx declined**	Y By carer		Y By child		Y By un-known		N	

35	**Current Drug Rx**— (antipsychotic not recommended for ADHD in children and young people)	MPH (SA)		MPH LA		Concerta		Atomox-etine	
		Risperidone or other antipsychotic		Fluox-etine or other Antidepr-essant		Other		None	
35.1	**Date Initiation MPH**								
35.2	**Age at Initiation MPH**								

36	**Before** drug initiation, **Full Hx and Physical Exam** – Including cardiac hx & exam, bp, HR, height, weight	Y		N		U	
36.1	**Full Hx and physical exam BEFORE** drug initiation	Physical Exam, Including CVS		BP		HR	
		Cardiac Hx		Height		Weight	
36.2	**Full Hx and physical exam** At any time **AFTER** drug initiation	Physical Exam, Including CVS		BP		HR	
		Cardiac Hx		Height		Weight	
37	P**lotting on Growth Chart** (at least 2 successive measurements)	Y		N			
38	**Side Effect Monitoring--**	Y		N		N/A	
39	Monitor Rx **response** on **Standard scales**— e.g. Conners' teachers / parents (at least 2 successive measures)	Y		N			
39.1	Date of baseline **Conners' (Pre-MPH** Initiation)						
39.2	Date of subsequent **Conners' (Post-MPH** Initiation)						

40	**Other Interventions** offered besides drug Rx and behavioral Rx	Family PsychoRx		Individual PsychoRx		O.T.		S.W.	
		Speech and Language Rx		Neuro-Develop-mental Clinic		Medical Specialist/s		Other	
41	**Other Interventions** besides drug Rx and behavioral Rx	Y		N					
42	**No. Extra Interventions** (other than drug and behavioral therapy)	0		1		2		3 or more	

Notes

11.4 Audit Tool Template provided by NICE guidelines

Objective of the audit

The objective of this audit is to measure current practice in attention deficit hyperactivity disorder against the recommendations in the guideline. The audit criteria and data collection tool are intended to be used as part of a local audit project, by either using the whole tool or relevant parts within a local audit template.

Audit criteria and standards

This document provides audit criteria based on the guideline's key priorities for implementation for use in clinical audit. Users can cut and paste these criteria into their own programmes. The standards given are typically 100% or 0%. If these are not achievable in the short term, a more appropriate standard should be set based on discussions with local clinicians. However, the standards given remain the ultimate objective.

Data collection tool

A tool is provided that can be used or adapted by the Trust, service or practice for the data collection part of the clinical audit cycle. The tool is in two sections. The first is based on the key priorities for implementation relating to clinical activity and the second on those relating to organizational priorities. Suggestions on where you might find relevant information are included, although this may be different in your organization.

Patient groups and sample

Children and young people with attention deficit hyperactivity disorder, including those in transitional services. An appropriate sample should be selected in line with your local clinical audit strategy.

A separate document has been produced for services for adults with ADHD based on recommendations relevant to adults. This can be found at www.nice.org.uk/CG72.

Data sources

The audit criteria may require data to be collected from a range of sources, including policy documents and patient records. Suggestions are indicated on the tools.

Re-audit

Whether or not the audit findings meet the standard, re-auditing is a key part of the audit cycle. If the first data collection and analysis shows room for improvement, an action plan should be developed and the audit re-run once changes to the service have had time to make an impact. Depending on the nature of the changes, this could take weeks or months. This process should be continued until the results of the audit meet the standards.

Further guidance

Click here for further guidance and generic templates to support the reporting and monitoring of the audit of NICE guidance in your organization

Clinical criteria for attention deficit hyperactivity disorder in children and young people

Criterion 1	**For a diagnosis of ADHD, symptoms of hyperactivity/impulsivity and/or inattention should:** • **meet the diagnostic criteria in DSM-IV or ICD-10 (hyperkinetic disorder) and** • **be associated with at least moderate psychological, social and/or educational or occupational impairment based on interview and/or direct observation in multiple settings, and** • **be pervasive, occurring in two or more important settings including social, familial, educational and/or occupational settings.**
Exceptions	None
Standard	100%
Definitions	See Appendix I for DSM-IV and ICD-10 diagnostic criteria. The ICD-10 exclusion on the basis of a pervasive developmental disorder being present, or the time of onset being uncertain, is not recommended.
Criterion 2	**As part of the diagnostic process, include an assessment of the person's needs, coexisting conditions, social, familial and educational circumstances and physical health.** **For children and young people there should also be an assessment of their parents' or carers' mental health.**
Exceptions	None
Standard	100%
Definitions	None
Criterion 3	**Parents or carers of pre-school children with ADHD should be offered a referral to a parent-training/education programme**
Exceptions	None
Standard	100%
Definitions	Parent-training/education programmes should be first line treatment if the parents or carers have not already attended such a programme or the programme has had a limited effect.

Clinical criteria for attention deficit hyperactivity disorder in children and young people

Criterion 4	**If the child or young person with ADHD has moderate levels of impairment, the parents or carers should be offered referral to a group parent-training/education programme either:** • **as a stand alone programme or** • **with a group treatment programme for the child or young person**
Exceptions	**A** Child is under school age
Standard	100%
Definitions	A group treatment programme would involve CBT and/or social skills training
Criterion 5	**In school-age children and young people with severe ADHD, drug treatment should be offered as the first line treatment.**
Exceptions	None
Standard	100%
Definitions	None
Criterion 6	**Parents of school-age children and young people with severe ADHD should be offered a group-based parent-training/education programme.**
Exceptions	None
Standard	100%
Definitions	None
Criterion 7	**Drug treatment for children and young people with ADHD should always form part of a comprehensive treatment plan that includes psychological, behavioural and educational advice and interventions**
Exceptions	None
Standard	100%
Definitions	None

Clinical criteria for attention deficit hyperactivity disorder in children and young people

Transition to adult services	
Criterion 8	**A young person of school leaving age, should be reassessed to establish the need for continuing treatment into adulthood**
Exceptions	None
Standard	100%
Definitions	None
Criterion 8a	**If continuing treatment is needed, arrangements should be made for a smooth transition to adult services with details of anticipated treatment and services that the young person will require**
Exceptions	None
Standard	100%
Definitions	None
Criterion 9	**During the transition, full information about adult services should be provided to the young person**
Exceptions	None
Standard	100%
Definitions	None
Criterion 10	**During transition, if the person is aged 16 or over, the care programme approach (CPA) should be used as an aid to transfer**
Exceptions	None
Standard	100%
Definitions	None

Clinical criteria for attention deficit hyperactivity disorder in children and young people

Criterion 11	**Patients should be offered written information about:** • **their condition** • **the treatment and care they should be offered, including being made aware of the 'Understanding NICE guidance' booklet** • **the service providing their treatment and care.**
Exceptions	None
Standard	100%
Definitions	Patients should be offered written information to help them make informed decisions about their health care. This should cover the condition, treatments and the health service providing care. Information should be available in formats appropriate to the individual, taking into account language, age, and physical, sensory or learning disabilities.
Criterion 12	**Carers should be offered written information about:** • **the patient's condition** • **the treatment and care the patient should be offered, including being made aware of the 'Understanding NICE guidance' booklet** • **the service providing the patient's treatment and care.**
Exceptions	B. Where there is no carer involved C. Where sharing information may compromise the patient's confidentiality or wishes
Standard	100%
Definitions	Carers and relatives should have the opportunity to be involved in decisions about the patient's care and treatment, unless the patient specifically excludes them.
Number of criterion replaced:	**Local alternatives to above criteria (to be used where other data addressing the same issue are more readily available)**
Exceptions	
Standard	
Definitions	

Organisational criteria for attention deficit hyperactivity disorder

Criterion 13	**Specialist ADHD teams should jointly develop age-appropriate training programmes for the diagnosis and management of ADHD for mental health, paediatric, social care, education, forensic and primary care providers and other professionals who have contact with people with ADHD.**
Exceptions	None
Standard	100%
Definitions	None
Number of criterion replaced:	**Local alternatives to above criteria (to be used where other data addressing the same issue are more readily available)**
Exceptions	
Settings	
Standard	
Definitions	

Patient data collection tool for attention deficit hyperactivity disorder in children and young people

Complete one form for each patient.

Patient identifier:	**Sex:** M / F	**Age:**	**Ethnicity:**

Crite-rion No.	Data Item No.	Criterion	Yes	No	NA/ Exceptions	NICE guideline ref.
Diagnosis and assessment						
1		Is there evidence that the patient's symptoms at the time of diagnosis met the diagnostic criteria in:				1.3.1.3
	1.1	• DSM-IV	☐	☐		
	1.2	• ICD-10[1]	☐	☐		
		(Data source: patient record)				
		Is there evidence that the level of impairment resulting from symptoms of hyperactivity, impulsivity or inattention were:				1.3.1.3
	1.3	• associated with at least moderate psychological, social and/or educational or occupational significance based on interview and/or direct observation in multiple settings	☐	☐		
	1.4	• pervasive, occurring in two or more important settings including social, familial, educational and/or occupational settings.	☐	☐		
		(Data source: patient record)				
2		Is there evidence that diagnosis included assessments of:				1.3.1.3
	2.1	• the person's needs	☐	☐		
	2.2	• coexisting conditions	☐	☐		
	2.3	• social circumstances	☐	☐		
	2.4	• family circumstances	☐	☐		
	2.4	• educational circumstances	☐	☐		
	2.6	• physical health	☐	☐		
		(Data source: patient record)				
	2.7	Have the parents/carers had an assessment of their mental health?	☐	☐		1.3.1.3

[1] The ICD-10 exclusion on the basis of a pervasive developmental disorder being present, or the time of onset being uncertain, is not recommended.

Patient data collection tool for attention deficit hyperactivity disorder in children and young people

Crite-rion No.	Data Item No.	Criterion	Yes	No	NA/ Exceptions	NICE guideline ref.
Treatment						
3	3.1	If the child is of pre-school age, have the parents/carers been offered a referral to a parent-training/education programme?	☐	☐	**A**	1.5.1.3
		If yes:				
	3.2	• was it first line treatment?	☐	☐		
	3.3	• was it the parents/carers' first referral?	☐	☐		
	3.3.1	o if not, what was the reason for referral?				
4	4.1	If the child/young person has moderate levels of impairment, were the parents/carers offered a referral to a group parent-training/education programme?	☐	☐		1.5.2.4
		If yes, was it:				
	4.2	• a stand alone programme	☐	☐		
	4.3	• with a group treatment programme for the child or young person	☐	☐		
		If the child/young person is of school-age and has severe ADHD,				1.5.3.1
5	5.1	• was drug treatment offered as the first line treatment?	☐	☐		
6	6.1	• were the parents offered a group-based parent-training/education programme?	☐	☐		
7	7.1	Did/does drug treatment form part of a plan including:	☐	☐		1.7.1.4
	7.2	• psychological advice and interventions	☐	☐		
	7.3	• behavioural advice and interventions	☐	☐		
	7.4	• educational or occupational advice and interventions? (Data source: patient record)	☐	☐		

Patient data collection tool for attention deficit hyperactivity disorder in children and young people

Crite-rion No.	Data Item No.	Criterion	Yes	No	NA/ Exceptions	NICE guideline ref.
Transition from CAMHS to adult services						
8	8.1	Is the young person of school leaving age?	☐	☐		1.6.1.1
	8.2	If yes, have they been reassessed to establish the need for continuing treatment into adulthood?	☐	☐		
	8.3	If no to 8.2, are there plans to reassess them in the near future?	☐	☐		
8a	8a.1	If continuing treatment is needed, have arrangements been made for a smooth transition to adult services, including:	☐	☐		1.6.1.1
	8a.2	• anticipated treatment required	☐	☐		
	8a.3	• anticipated services required?	☐	☐		
9	9.1	If the young person is moving from CAMHS to adult services, have they been provided with full information about adult services?	☐	☐		1.6.1.2
10	10.1	If the young person is aged 16 or over, is CPA being used as an aid to transfer?	☐	☐		1.6.1.2
Person-centred care						
11		Was patient offered written information about:				Person-centred care
	11.1	• their condition	☐	☐		
	11.2	• the treatment and care they should be offered	☐	☐		
	11.3	– including being made aware of the 'Understanding NICE guidance' booklet	☐	☐		
	11.4	• the service providing their treatment and care.	☐	☐		
		(Data source: patient records)				
12		Was carer(s) offered written information about:				Person-centred care
	12.1	• the patient's condition	☐	☐		
	12.2	• the treatment and care the patient should be offered	☐	☐		
	12.3	– including being made aware of the 'Understanding NICE guidance' booklet	☐	☐		
	12.4	• the service providing the patient's treatment and care.	☐	☐		
		(Data source: patient records)				

Data collection completed

Organisation/service:	

Crite-rion No.	Data Item No.	Criterion	Yes	No	NA/ Exceptions	NICE guideline ref.
Training						
13	13.1	Is there a specialist ADHD team?	☐	☐		1.1.3.1
		If yes, does it run training programmes covering:				
	13.2	• diagnosis	☐	☐		
	13.3	• management	☐	☐		
		Is the training appropriate for:				
	13.4	• mental health professionals	☐	☐		
	13.5	• paediatric professionals	☐	☐		
	13.6	• social care professionals	☐	☐		
	13.7	• education professionals	☐	☐		
	13.8	• forensic professionals	☐	☐		
	13.9	• primary care providers	☐	☐		
	13.10	• other professionals who have contact with people with ADHD	☐	☐		

Data collection complete

11.5 COMPOSITE INDICATOR OF SOCIO-ECONOMIC STATUS[89]

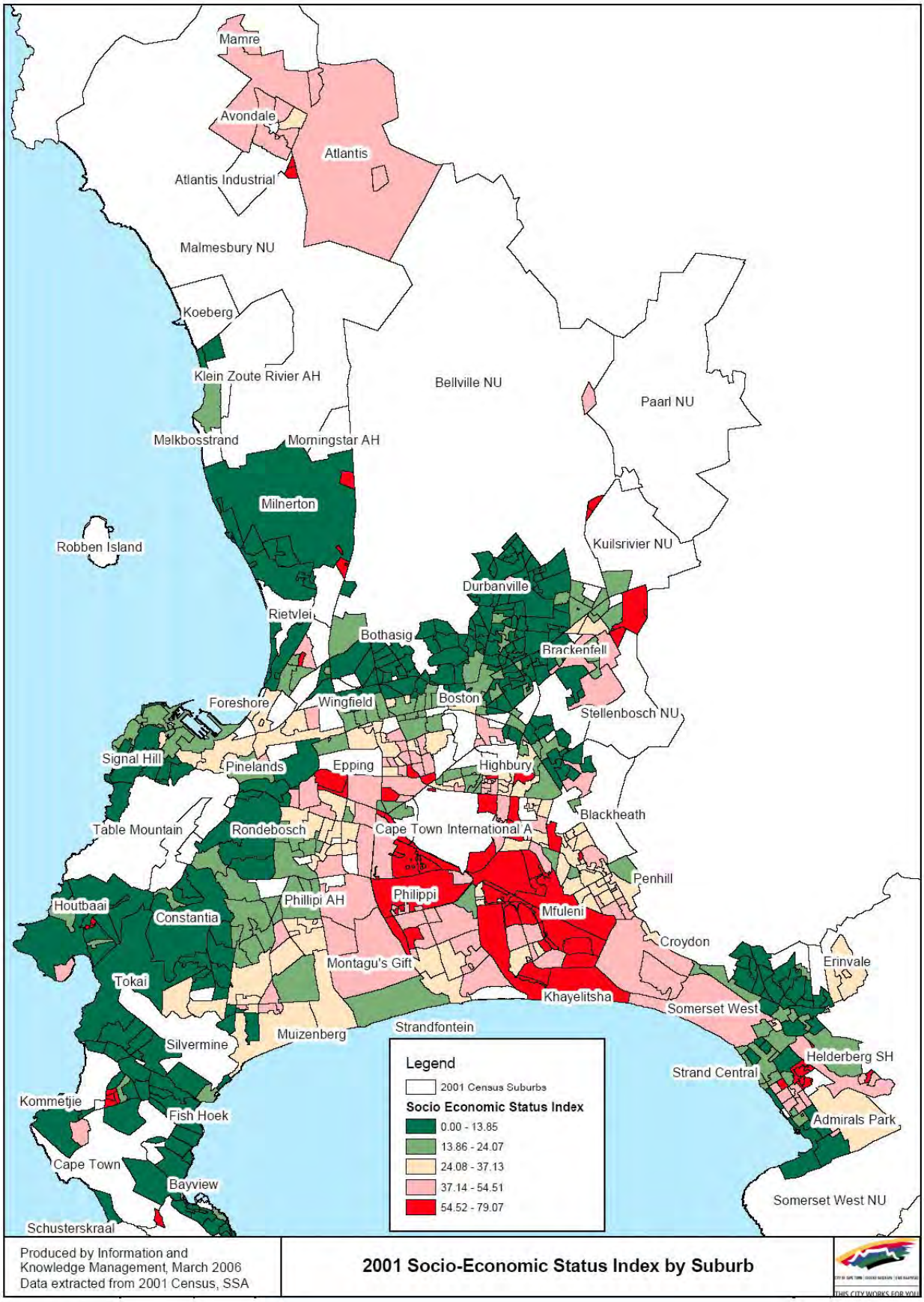
The overall aim of development is to improve people's quality of life. A concept that has been regarded as an important measure of quality of life is socio-economic status (SES). Socio-economic status has in general been defined as referring to the following aspects:

income
education
occupational status.

To measure socio-economic status in the City of Cape Town municipal area, the following indicators were used:

- *% of households earning less than R19,200 per annum*
  The figure of R19,200 per annum approximates the Household Subsistence Level for urban areas for 2001 (R12,000 for 1996) as calculated by the Institute for Planning Research, University of Port Elizabeth. Accordingly this indicator represents the proportion of households earning below the minimum level for household subsistence.
- *% of adults (20+) with highest educational level less than matric*
  This indicator represents the number of adults (20+) with less than a matric education, as a percentage of all adults. A matric level of education is increasingly regarded as the minimum level required for post-school training. Adults (18+) was used in 1996.
- *% of the economically active population that was unemployed*
  This indicator represents the number of adults who are unemployed and actively seeking work as a percentage of all adults available for work. This excludes those not seeking work, such as homemakers, students and retired people.
- *% of the labor force employed in elementary/unskilled occupations*
  The indicator of occupational status used was the number of people employed in elementary/unskilled occupations as a percentage of all employed.

These indicators were combined into a composite indicator by calculating the arithmetical average of the four indicators. Although relatively crude, this composite indicator provides a useful basis for comparison across the metropolitan area.


Mamre
Avondale
Atlantis
Atlantis Industrial
Malmesbury NU
Koeberg
Klein Zoute Rivier AH
Bellville NU
Paarl NU
Melkbosstrand
Morningstar AH
Milnerton
Robben Island
Kuilsrivier NU
Durbanville
Rietvlei
Bothasig
Brackenfell
Foreshore
Wingfield
Boston
Stellenbosch NU
Signal Hill
Pinelands
Epping
Highbury
Blackheath
Table Mountain
Rondebosch
Cape Town International A
Penhill
Houtbaai
Phillipi AH
Philippi
Constantia
Mfuleni
Croydon
Montagu's Gift
Erinvale
Tokai
Khayelitsha
Somerset West
Strandfontein
Muizenberg
Silvermine
Helderberg SH
Strand Central
Kommetjie
Fish Hoek
Admirals Park
Cape Town
Bayview
Somerset West NU
Schusterskraal
Legend
2001 Census Suburbs
Socio Economic Status Index
0.00 - 13.85
13.86 - 24.07
24.08 - 37.13
37.14 - 54.51
54.52 - 79.07
Produced by Information and Knowledge Management, March 2006
Data extracted from 2001 Census, SSA
2001 Socio-Economic Status Index by Suburb
THIS CITY WORKS FOR YOU

Suburb (2001)	% Adults (20+) with highest qualification < Matric	% of economically active unemployed	% Households earning < R19300 pa	% of labour force in unskilled occupations	S.E.S. Index
Acacia Park	22.27	13.02	5.48	10.58	12.84
Admirals Park	51.22	5.83	28.29	35.98	30.33
Adriaanse	90.08	49.68	55.31	34.73	57.45
Airport Informal	91.35	33.77	77.69	56.36	64.79
Amandaglen	14.77	6.16	15.31	6.54	10.70
Amandaglen Ext E15	13.31	3.54	14.33	8.20	9.85
Amandelrug	24.63	5.01	8.33	8.28	11.56
Amandelsig	22.24	1.10	12.65	8.21	11.05
Anchorage Park	30.47	3.90	11.90	4.00	12.57
Andas Estate	36.28	7.08	17.80	10.64	17.95
Arauna	33.80	4.80	6.64	9.01	13.56
Athlone	60.20	14.50	23.69	10.25	27.16
Atlantis	69.48	18.08	46.59	50.63	46.20
Aurora Ext D22	8.54	2.08	16.11	9.37	9.03
Aurora Ext D33	12.82	3.39	13.19	9.39	9.70
Austinville	63.43	20.42	17.92	25.61	31.85
Avon	76.89	23.94	31.94	14.13	36.73
Avondale (Atlantis)	77.86	30.79	29.14	23.78	40.39
Avondale (Parow)	35.42	5.71	13.26	4.15	14.64
Avonwood	85.25	44.14	37.75	27.78	48.73
Balvenie	73.60	27.63	31.34	18.93	37.88
Bantry Bay	19.98	3.72	23.05	23.73	17.62
Bayview	15.74	9.52	21.58	0.00	11.71
Bayview Village	25.10	12.07	10.16	12.19	14.88
Beacon Valley	81.29	29.60	31.98	22.99	41.47
Beaconhill	61.32	8.01	13.84	17.05	25.06
Beaconvale	54.08	8.32	14.15	10.08	21.66
Bel Ombre	18.18	0.00	0.00	18.18	9.09
Belair	21.73	2.93	7.51	7.39	9.89
Belgravia (Athlone)	59.40	18.51	25.52	12.61	29.01
Belgravia (Bellville)	28.40	5.43	14.93	3.42	13.05
Belhar	67.69	16.12	22.93	16.68	30.86
Belhar 1	51.83	3.99	14.98	14.11	21.23
Belhar 10	91.36	36.11	48.30	45.58	55.34
Belhar 11	88.57	7.05	46.51	24.24	41.59
Belhar 12	84.41	32.06	39.43	36.22	48.03
Belhar 13	86.78	52.84	55.01	22.59	54.31
Belhar 14	69.38	17.39	26.30	9.63	30.68
Belhar 15	83.71	22.32	38.77	22.41	41.80
Belhar 16	84.29	29.56	24.76	32.24	42.71
Belhar 17	43.20	11.46	16.18	10.94	20.45
Belhar 18	74.03	19.86	24.92	10.26	32.27
Belhar 19	76.67	25.06	20.59	19.20	35.38
Belhar 2	52.62	8.45	21.40	15.15	24.41
Belhar 20	73.46	13.23	23.68	17.91	32.07
Belhar 21	75.89	22.38	17.18	20.34	33.95
Belhar 23	77.38	19.95	26.46	24.72	37.13
Belhar 3	78.18	34.40	29.20	27.16	42.24
Belhar 4	55.97	17.04	19.72	9.97	25.68
Belhar 6	44.89	16.13	13.50	4.94	19.87
Belhar 7	53.33	13.43	11.72	11.49	22.49
Belhar 8	7.89	60.00	96.48	0.00	41.09

Suburb (2001)	% Adults (20+) with highest qualification < Matric	% of economically active unemployed	% Households earning < R19300 pa	% of labour force in unskilled occupations	S.E.S. Index
Belhar 9	83.88	18.09	21.94	28.00	37.98
Bellrail	54.09	1.46	16.19	16.59	22.08
Bellville Central	45.37	14.31	25.21	17.75	25.66
Bellville Ext 34	26.07	2.35	20.49	8.43	14.34
Bellville Ext 43	11.53	0.00	9.40	4.77	6.43
Bellville Ext 44	11.00	3.57	8.04	3.88	6.62
Bellville Park	30.00	3.85	33.33	8.33	18.88
Bellville South (Bellville)	73.16	23.19	33.62	25.82	38.95
Bellville South (Durbanville)	14.68	2.08	5.43	16.77	9.74
Belmont Park	55.42	11.51	18.32	11.02	24.07
Belthorn Estate	48.68	8.24	20.67	6.79	21.10
Belvedere Noordhoek	8.11	6.67	5.07	8.00	6.96
Berg-En-Dal	24.89	6.25	24.07	6.78	15.50
Bergvliet	16.51	4.11	9.46	5.20	8.82
Beroma	28.59	4.63	13.82	5.04	13.02
Beverley Park	75.06	24.70	23.55	30.47	38.45
Bishop Lavis	81.44	31.78	34.79	21.41	42.36
Bishopscourt	18.01	1.80	24.00	16.43	15.06
Bloekombos	88.90	68.60	90.77	44.63	73.23
Bloemhof	14.86	4.17	9.14	6.25	8.61
Blommendal	16.50	2.76	7.20	3.03	7.37
Blomtuin	28.90	3.78	16.21	9.50	14.60
Bloubergrant	14.82	9.26	17.32	4.65	11.51
Bloubergstrand	17.56	2.42	13.07	10.72	10.94
Bongweni	51.33	36.09	35.00	23.90	36.58
Bonnie Brook	40.34	4.20	8.89	3.68	14.28
Bonteheuwel	87.17	36.07	39.12	24.50	46.72
Bo-Oakdale	35.03	5.18	10.77	5.09	14.02
Bosman Estate	22.82	4.89	14.35	6.82	12.22
Boston	20.94	3.21	14.79	5.13	11.02
Bothasig	41.80	5.80	12.26	5.13	16.25
Boulders	39.29	0.00	17.65	0.00	14.24
Brackenfell	69.60	10.59	38.76	41.60	40.14
Brackenfell Heights	24.88	3.65	8.69	4.89	10.53
Brackenfell North	17.32	4.75	9.12	3.15	8.59
Brackenfell South	16.25	4.12	4.11	0.94	6.36
Brandwood	47.32	8.63	9.41	6.68	18.01
Brentwood Park	67.77	15.19	25.04	16.42	31.11
Bridgetown	78.15	18.94	29.34	13.12	34.89
Bridgewater Ext 1 (Lwandle)	80.22	62.11	93.22	58.58	73.53
Bridgewater Ext 1 (Somerset West)	23.67	9.51	15.01	4.76	13.24
Briza	18.26	3.52	8.28	6.99	9.26
Brooklyn	65.87	14.76	39.04	9.45	32.28
Camelot	71.60	23.21	21.93	30.54	36.82
Camphill Village	31.45	0.00	100.00	37.50	42.24
Camps Bay	18.04	3.17	13.13	12.67	11.75
Cape Town CBD	34.16	16.00	27.38	8.03	21.39
Cape Town Central	20.45	51.61	0.00	0.00	18.02
Capri Village	14.77	3.96	11.04	4.48	8.56
Casablanca	86.34	21.18	45.92	40.37	48.45
Cedardale	78.39	22.55	29.94	14.71	36.40
Chantecler	16.95	2.70	6.06	13.67	9.85

Suburb (2001)	% Adults (20+) with highest qualification < Matric	% of economically active unemployed	% Households earning < R19300 pa	% of labour force in unskilled occupations	S.E.S. Index
Chapmanspeak	13.51	4.88	20.92	14.46	13.44
Charlesville	49.19	15.06	10.90	7.65	20.70
Chris Nissen Park	100.00	58.33	68.77	80.00	76.78
Chrismar	33.48	4.19	14.63	5.94	14.56
Chrismar Ext 1	26.29	7.14	12.56	3.07	12.27
Churchill	55.11	14.10	29.45	9.01	26.92
Clairwood	66.26	3.31	22.30	16.34	27.05
Clamhall	36.59	5.56	7.43	2.48	13.02
Claremont	16.03	3.04	12.75	5.70	9.38
Clarkes	80.44	25.63	34.33	24.51	41.23
Clifton	21.31	4.76	12.40	17.26	13.93
Clovelly	10.55	0.00	4.54	3.07	4.54
Coniston Park	66.09	11.90	12.20	11.14	25.33
Connaught	83.12	36.32	34.68	24.79	44.73
Constantia	16.43	1.91	9.48	14.21	10.51
Country Places	17.82	4.03	4.33	5.67	7.96
Cravenby	50.31	13.36	23.21	16.97	25.96
Crawford	43.64	6.68	18.83	9.84	19.75
Crest	8.42	4.40	8.94	2.07	5.96
Crossroads (Formal)	77.53	52.45	72.75	47.70	62.61
Crossroads (Guguletu)	81.25	57.34	80.69	45.89	66.29
Crossroads (Informal)	84.84	55.89	85.43	46.51	68.17
Croydon	65.56	15.52	32.26	34.61	36.99
Dassenberg	21.01	5.26	5.49	0.00	7.94
De Bron	10.10	0.75	11.74	6.38	7.24
De Duin	20.30	2.38	4.95	7.30	8.73
De Grendel	21.83	2.99	2.06	0.00	6.72
De Kuilen	32.27	6.32	15.27	8.87	15.68
De Tijger	15.37	3.91	7.77	4.67	7.93
Delft South	81.48	56.57	70.88	34.31	60.81
Dennemere	65.14	11.65	13.83	16.35	26.74
Dennendal	10.51	0.00	0.00	3.13	3.41
Devon Park	50.62	12.45	10.80	12.26	21.53
Die Bos	23.12	4.88	12.56	5.57	11.53
Die Wingerd	17.95	3.35	8.05	3.64	8.25
Diep River	34.21	5.39	32.98	5.89	19.62
Door de Kraal	11.98	3.57	12.78	6.73	8.77
Dreyersdal	23.50	4.94	19.86	3.51	12.95
Drift Sands	77.91	63.42	81.15	34.35	64.21
Du Noon (Formal)	80.57	51.35	78.23	46.02	64.04
Du Noon (Informal)	92.15	69.77	89.31	45.28	74.13
Durbanville (Small Holdings)	11.27	9.30	12.62	5.88	9.77
Durbanville (Urban)	19.13	3.75	13.93	7.06	10.97
Durbanville Ext 13	13.51	4.94	9.63	7.89	8.99
Durbanville Ext 17	20.19	3.70	20.66	5.25	12.45
Durbanville Ext 2	20.14	3.76	16.60	11.45	12.99
Durbanville Hills	16.68	2.17	8.55	11.70	9.78
Durmonte	18.49	4.69	4.65	2.80	7.66
Durrheim	35.82	13.59	9.80	6.35	16.39
Duynefontein	23.10	4.91	9.98	8.28	11.57
Eastridge	82.94	30.76	31.02	24.72	42.36
Edenpark	24.72	6.19	14.48	5.08	12.62
Edgemead	21.97	3.22	7.54	3.16	8.97

Suburb (2001)	% Adults (20+) with highest qualification < Matric	% of economically active unemployed	% Households earning < R19300 pa	% of labour force in unskilled occupations	S.E.S. Index
Eersterivier South	79.23	32.53	24.49	29.12	41.34
Eikendal	68.09	22.75	22.74	24.92	34.63
Eindehoven	87.29	34.76	50.40	27.17	49.91
Ekuphumleni	58.74	30.78	37.72	34.32	40.39
Eldawn	13.52	4.38	11.16	6.20	8.82
Electric City	65.94	15.58	13.94	15.16	27.66
Elfindale	38.38	7.10	17.53	8.39	17.85
Elnor	63.88	20.78	23.24	17.77	31.42
Elsiesriver	69.31	19.88	26.68	17.73	33.40
Epping Forest	87.65	40.17	32.00	31.35	47.79
Erica	36.69	9.27	14.51	6.58	16.76
Erinvale	32.99	2.89	68.49	27.37	32.94
Erinvale Estates	46.65	13.78	22.20	30.28	28.23
Eureka	86.68	38.79	41.75	33.92	50.29
Eversdal	15.77	4.13	15.10	12.66	11.92
Eversdal Ext 1 (Bellville)	21.55	1.03	17.84	16.06	14.12
Eversdal Ext 1 (Durbanville)	22.09	3.19	14.80	15.60	13.92
Eversdal Ext 14	11.86	3.37	8.25	20.74	11.06
Eversdal Ext 3	10.69	6.55	15.51	10.82	10.89
Eversdal Ext 4	20.45	3.19	12.76	7.69	11.02
Eversdal Ext 8	25.07	6.16	5.03	6.87	10.78
Eversdal Heights	30.03	1.61	19.03	28.27	19.74
Excelsior	65.79	8.33	50.00	52.63	44.19
Ezimbacwini	78.70	48.06	75.71	54.34	64.20
Factreton	79.71	27.98	32.64	19.81	40.04
Fairdale	72.89	19.53	26.37	34.52	38.33
Fairfield Estate	42.56	8.34	14.42	6.15	17.87
Fairie Knowe	31.46	10.94	19.81	8.93	17.79
Fairways	38.45	6.11	8.77	5.89	14.81
Ferndale	26.21	7.17	7.03	3.07	10.87
Firgrove	59.01	8.47	13.02	15.00	23.88
Fisantkraal (Part 1)	92.01	38.71	72.75	56.28	64.94
Fisantkraal (Part 2)	91.10	44.29	64.51	48.86	62.19
Fish Hoek	23.19	6.06	16.61	4.44	12.58
Flat Acres	26.24	2.08	11.86	12.00	13.05
Florida	77.92	26.79	33.35	25.33	40.85
Foreshore	36.77	9.50	35.00	8.48	22.44
Forest Glade	59.86	17.77	10.59	17.15	26.34
Forest Heights	58.17	15.28	16.17	15.83	26.36
Forest Village	65.51	15.59	23.29	17.07	30.37
Fountain Village	50.52	19.00	14.10	10.15	23.44
Fresnaye	21.33	2.44	14.29	16.38	13.61
Froggy Farm	2.26	0.00	8.36	6.67	4.32
Frogmore Estate	26.15	5.52	8.14	0.77	10.15
Garden Village	84.04	30.28	40.17	34.28	47.19
Gardens	16.11	6.20	21.86	6.19	12.59
Gatesville	57.82	11.84	29.53	17.90	29.27
Gaylee	56.45	12.94	19.55	11.95	25.22
Gersham	51.42	21.78	22.35	17.75	28.33
Gill Cape	75.79	21.70	19.26	27.35	36.03
Glen Ive	15.42	2.45	7.82	7.93	8.41
Glencairn	25.20	5.08	21.48	2.04	13.45
Glencairn Heights	22.80	4.17	10.15	0.86	9.50

Suburb (2001)	% Adults (20+) with highest qualification < Matric	% of economically active unemployed	% Households earning < R19300 pa	% of labour force in unskilled occupations	S.E.S. Index
Glenhaven	29.95	6.26	12.22	6.02	13.61
Glenlily	47.17	7.57	17.18	6.58	19.63
Glenmarine	15.38	8.11	10.71	5.71	9.98
Glenwood	24.87	4.73	11.83	2.40	10.96
Goedgemoed Ext D36	8.26	1.29	6.42	2.05	4.51
Goedgemoed Ext D40	13.08	6.41	17.29	5.63	10.60
Golden Acre	24.83	3.06	13.27	13.08	13.56
Golden Hill	12.34	4.85	13.08	8.97	9.81
Goodwood Estate	46.98	7.17	9.75	6.77	17.67
Goodwood Park Ext	40.34	4.95	2.95	6.23	13.62
Goodwood Park Ext 1	37.82	6.93	9.99	3.30	14.51
Gordons Bay Central	21.93	7.04	14.57	5.50	12.26
Graceland	61.20	37.85	21.28	18.31	34.66
Grassy Park	60.27	12.80	19.98	13.36	26.60
Green Point	23.75	10.68	16.98	6.58	14.50
Greenfield	57.87	14.49	11.54	17.64	25.39
Greenlands	84.36	33.40	43.54	39.07	50.09
Greenways	23.99	5.56	12.53	7.41	12.37
Griffiths Mthenge	76.81	48.19	68.08	47.41	60.12
Groenvallei	30.14	6.96	19.83	4.96	15.47
Guguletu (Formal)	68.51	49.67	50.40	36.38	51.24
Guguletu (Informal)	81.84	55.20	84.19	50.24	67.87
Guldenland	24.37	9.68	21.54	7.99	15.90
Gustrow	76.11	20.38	36.41	28.57	40.37
Habour Heights	33.33	5.00	5.21	0.00	10.89
Hanover Park	86.32	38.09	47.68	28.96	50.26
Harare	76.66	50.55	73.49	42.87	60.89
Hazendal	77.52	28.57	36.04	18.71	40.21
Heather Park	73.91	18.68	21.67	25.38	34.91
Heathfield	48.11	8.59	15.21	6.29	19.55
Heemstede	32.81	0.00	7.79	5.41	11.50
Heideveld	80.18	31.41	37.90	21.20	42.67
Helderberg (Small Holdings)	40.85	8.51	24.50	21.62	23.87
Helderberg Estate	13.70	1.92	6.30	7.53	7.36
Helderberg Park	66.72	24.94	19.58	18.66	32.48
Helderberg Village	10.21	7.35	6.57	0.00	6.03
Heldervue	11.37	4.38	9.53	4.16	7.36
Helderzicht	52.16	9.40	10.40	9.29	20.31
Helena Heights	13.86	5.88	12.65	11.08	10.87
Helgarda Estate	20.47	6.41	12.17	18.42	14.37
Highbury	31.18	6.55	22.51	5.55	16.45
Highgate	79.16	24.99	30.95	33.33	42.11
Hillcrest Heights	75.08	19.86	24.27	22.20	35.35
Hillview	62.57	8.50	11.97	14.66	24.43
Hindle Park	74.70	20.76	22.97	25.84	36.07
Hoheizen Ext 20	30.33	1.66	11.01	9.99	13.25
Hohenort	5.71	0.00	0.00	15.79	5.38
Hoogstede	24.42	0.00	4.00	5.09	8.38
Hout Bay	12.11	1.84	11.34	6.57	7.97
Hout Bay Harbour	81.02	25.07	37.13	35.50	44.68
Humanshof Ext1	36.14	17.65	30.27	13.65	24.43
Hume Ext 29	18.29	0.00	0.00	0.00	4.57
Ikwezi Park	56.41	32.46	32.98	23.44	36.32

Suburb (2001)	% Adults (20+) with highest qualification < Matric	% of economically active unemployed	% Households earning < R19300 pa	% of labour force in unskilled occupations	S.E.S. Index
Imajamojea	90.87	47.97	77.85	51.66	67.09
Imhoff's Gift	13.33	8.33	5.83	0.00	6.87
Imizamo Yetho	80.19	45.99	70.26	57.68	63.53
Jacques Hill Estate	17.89	6.03	11.29	9.90	11.28
Jagtershof	27.98	5.64	8.42	5.96	12.00
Joe Slovo Park	80.74	42.61	68.19	43.68	58.81
Joostenberg	32.55	2.97	24.57	14.85	18.74
Kaapzicht	21.31	5.04	6.69	3.80	9.21
Kalamuda	12.84	9.78	34.88	11.73	17.31
Kalkbay	34.90	8.64	12.02	7.63	15.80
Kalkfontein	85.16	42.09	62.76	40.77	57.70
Kempenville	40.47	9.86	18.86	4.17	18.34
Kenever Ext 2	12.21	1.00	5.53	3.06	5.45
Kenilworth	17.05	4.33	13.32	5.87	10.14
Kenridge	17.26	1.50	22.34	9.73	12.71
Kenridge Ext 3	8.23	1.40	10.91	2.16	5.68
Kenridge Heights Ext	16.41	1.82	11.89	10.03	10.04
Kensington	60.50	14.00	20.10	10.38	26.25
Kewtown	83.69	33.23	33.71	21.37	43.00
Khayelitsha (Formal)	74.80	49.44	78.83	35.40	59.62
Khayelitsha (Informal)	80.36	54.12	83.34	47.34	66.29
Khayelitsha Site C (Part 1)	83.79	57.20	80.94	45.79	66.93
Khayelitsha Site C (Part 2)	81.25	56.11	71.18	51.02	64.89
Khayelitsha T1-V1	64.48	44.11	56.97	37.76	50.83
Khayelitsha T1-V2	61.59	43.16	44.72	39.17	47.16
Khayelitsha T1-V3	77.47	53.93	78.08	52.34	65.46
Khayelitsha T1-V4	79.07	52.86	78.81	48.51	64.81
Khayelitsha T2-V1	49.59	33.53	37.20	24.69	36.25
Khayelitsha T2-V2b	79.68	57.24	87.22	41.14	66.32
Khayelitsha T3-V3	80.32	51.31	72.34	44.55	62.13
Khayelitsha T3-V5	79.50	51.56	71.89	43.55	61.63
Killarney	26.50	5.45	9.66	6.16	11.94
King Edward Rest	17.42	9.17	9.40	6.22	10.55
Kingston	40.42	6.41	14.70	8.20	17.43
Kirstenhof	19.74	3.36	5.30	2.78	7.80
Kleinbosch	50.87	8.60	3.21	3.83	16.63
Kleinvlei	83.06	29.49	41.77	42.30	49.16
Klipdam	26.72	2.68	9.87	5.49	11.19
Kommetjie	19.85	5.78	11.09	3.59	10.08
Kraaifontein (Non Urban)	24.07	4.84	11.95	8.41	12.32
Kraaifontein East	93.94	48.32	81.04	62.66	71.49
La Rochelle	14.35	0.81	6.97	6.76	7.22
La Rochelle Ext 16	21.29	2.91	7.68	4.08	8.99
Labiance	34.03	5.39	17.55	6.27	15.81
Lakeside	19.34	2.65	7.90	0.65	7.64
Langa (Formal)	68.32	46.63	65.75	40.45	55.29
Langa (Informal)	80.81	56.05	85.15	46.10	67.03
Langeberg Ridge (Durbanville)	20.41	1.69	2.43	1.98	6.63
Langeberg Ridge (Kraaifontein)	17.73	4.20	6.61	3.01	7.89
Langerberg Glen	39.40	0.00	15.86	23.68	19.74
Langgewacht	12.76	6.25	5.59	4.88	7.37
Lansdowne	47.46	9.96	15.34	7.97	20.18

Suburb (2001)	% Adults (20+) with highest qualification < Matric	% of economically active unemployed	% Households earning < R19300 pa	% of labour force in unskilled occupations	S.E.S. Index
Lavender Hill	85.94	33.24	46.16	28.89	48.56
Lekkerwater	91.21	55.63	84.27	62.74	73.46
Lentegeur	80.12	26.85	31.77	22.70	40.36
Leonsdale	84.92	38.57	44.77	29.93	49.55
Lionviham	28.22	6.17	18.32	8.36	15.27
Llandudno	13.20	4.00	12.74	16.67	11.65
Lochnerhof	26.33	5.62	15.76	4.63	13.09
Loevenstein	15.04	3.01	11.56	9.01	9.66
Lotus River	71.19	20.93	29.45	16.96	34.63
Lwandle (Formal)	79.71	41.88	58.09	48.15	56.96
Lwandle (Informal)	89.74	61.96	92.41	52.82	74.23
Mabille Park	31.95	5.46	10.60	5.56	13.39
Macassar	79.02	20.51	33.73	32.81	41.52
Maitland	62.90	18.86	23.26	12.72	29.44
Maitland Garden Village	85.73	31.37	29.51	28.20	43.70
Malibu Village	67.59	20.63	23.12	16.09	31.86
Mamre	75.59	28.63	34.66	29.06	41.99
Mandalay	36.02	17.24	8.40	8.67	17.58
Mandela Park	65.91	34.86	50.50	36.66	46.98
Manenberg	86.25	37.84	48.62	27.70	50.10
Marconi Beam	66.04	27.70	34.48	27.96	39.05
Marina Da Gama	27.74	6.53	10.83	5.01	12.53
Masiphumelele	78.86	60.55	83.68	55.67	69.69
Matroosfontein	73.00	18.28	30.21	15.66	34.29
Meadowridge	20.03	5.63	16.04	6.92	12.16
Melkbosstrand	26.48	7.48	17.96	10.88	15.70
Mfuleni (Formal)	78.52	51.26	70.75	45.82	61.59
Mfuleni (Informal)	88.27	64.89	88.87	53.24	73.82
Mikro Park	19.28	2.31	7.65	8.21	9.36
Milnerton	22.82	7.38	13.84	9.22	13.32
Milnerton Central	27.64	2.41	14.84	6.38	12.82
Milnerton Ridge	17.25	4.32	10.60	3.80	8.99
Modderdam	75.14	64.06	80.72	28.62	62.14
Montagu's Gift (Small Holdings)	82.18	12.39	51.24	59.38	51.30
Montagu's Gift (Urban)	74.24	20.90	26.97	19.09	35.30
Montana	42.95	18.73	7.36	3.04	18.02
Monte Vista	23.63	4.45	13.20	5.21	11.62
Morgenster	28.87	5.76	6.09	6.61	11.83
Morgenster Hoogte	20.53	3.14	2.66	3.41	7.44
Morningstar	81.69	18.83	31.98	43.34	43.96
Mouille Point	21.68	2.82	19.06	10.75	13.58
Mount Pleasant	28.02	6.67	5.88	3.73	11.08
Mountainside Estates	15.70	3.81	11.28	1.45	8.06
Mountainview (Cape town)	56.71	13.10	29.49	10.13	27.36
Mountainview (Strand)	85.15	18.45	22.74	42.96	42.33
Mowbray	12.43	6.42	29.81	5.10	13.44
Muizenberg	52.09	23.22	44.72	22.56	35.65
Murdock Valley	14.92	0.00	13.22	6.90	8.76
N1 City	38.49	2.99	6.21	3.44	12.78
Natures Valley	12.55	3.94	6.14	6.76	7.35
Nerina Ext D29	15.06	6.12	2.22	4.78	7.05
Newfields	66.15	20.14	19.74	12.21	29.56

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Newlands	11.73	2.98	13.96	8.07	9.19
Nomzano (Formal)	84.80	44.58	78.24	55.81	65.86
Nomzano (Informal)	82.95	54.23	86.12	60.49	70.95
Nooitgedacht	81.94	36.26	36.09	27.09	45.35
Noordhaven	17.10	3.92	21.83	10.00	13.21
Noordhoek	77.81	49.27	68.06	50.27	61.35
Noordhoek Manor	19.79	0.00	16.60	0.00	9.10
Northpine	51.36	9.48	7.40	9.24	19.37
Nutwood	14.52	5.49	12.82	6.85	9.92
Nyanga (Formal)	76.75	55.17	67.35	47.24	61.63
Nyanga (Informal)	84.09	58.80	84.31	48.81	69.00
Oakdale	16.70	5.42	7.10	4.64	8.47
Oakdene	39.79	10.05	10.89	10.85	17.90
Oakglen	20.55	1.89	8.03	3.64	8.53
Observatory	22.86	7.03	25.35	3.66	14.73
Ocean View	82.38	21.21	29.66	33.92	41.79
Old Oak	13.39	0.00	5.40	1.63	5.11
Onverwacht	35.13	10.81	33.11	8.52	21.89
Oosterzee	37.24	4.37	16.01	5.36	15.75
Oranjezicht (Part 1)	13.58	1.75	7.05	4.06	6.61
Oranjezicht (Part 2)	15.30	2.67	15.54	5.52	9.76
Ottery	40.32	7.79	9.28	7.11	16.13
Oude Westhof	9.59	0.00	2.02	1.24	3.21
Paarden Island	72.41	17.02	23.54	9.09	30.52
Panorama	23.50	1.75	7.60	9.91	10.69
Parel Valley	15.20	3.63	13.83	11.83	11.12
Park Estates	38.69	0.00	27.83	11.76	19.57
Parklands	15.82	3.69	7.64	4.13	7.82
Parkwood	86.08	33.03	41.32	31.07	47.88
Parow (Part 1)	50.04	8.31	15.64	8.86	20.71
Parow (Part 2)	49.05	10.47	16.12	11.52	21.79
Parow North	21.98	3.39	7.99	5.60	9.74
Parrowvallei	51.55	10.30	14.60	8.22	21.17
Peerless Park East	47.94	9.55	15.39	6.59	19.87
Peerless Park North	45.76	8.24	8.34	4.83	16.79
Peerless Park West	52.73	12.79	18.34	9.21	23.27
Peers Hill	24.02	6.19	6.11	7.61	10.98
Pelikan Park	57.32	20.57	26.78	12.52	29.30
Pella Mission Station	84.09	15.81	34.06	39.92	43.47
Penhill	33.62	4.85	18.69	8.03	16.30
Penlyn Estate	45.28	12.75	19.64	9.06	21.68
Penzance Estate	14.55	4.17	11.36	9.89	9.99
Perm Gardens	71.69	28.66	17.38	26.91	36.16
Philippi	79.59	59.00	82.95	46.29	66.96
Philippi (Agricultural Holdings)	86.72	12.19	67.60	51.53	54.51
Philippi East	73.72	37.22	42.06	31.02	46.01
Phoenix	50.59	14.26	13.31	14.19	23.09
Pinati	72.83	20.69	28.64	13.86	34.01
Pine Acres	19.91	1.96	14.90	5.90	10.67
Pine Place	71.15	18.98	20.94	30.19	35.32
Pinelands	16.78	3.60	9.27	4.13	8.45
Plattekloof 1	14.31	2.41	3.72	10.11	7.64

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Plattekloof 2	17.14	1.59	7.30	9.41	8.86
Plattekloof 3	20.48	2.99	9.79	13.69	11.74
Plattekloof Glen	23.53	1.12	6.82	3.62	8.77
Plumstead	32.93	6.32	12.58	3.99	13.96
Portlands	69.24	18.75	18.97	12.77	29.93
Primrose Park	57.49	14.32	15.90	9.28	24.25
Protea Hoogte	25.21	5.19	8.05	5.90	11.09
Protea Park	86.83	38.31	41.12	40.76	51.76
Protea Valley	9.97	0.94	8.14	7.03	6.52
Protea Village	29.69	11.82	7.88	6.47	13.97
Ravensmead	67.49	21.69	20.06	20.76	32.50
Red Hill	95.30	24.61	67.47	45.86	58.31
Retreat	71.36	19.42	27.93	16.13	33.71
Richmond	47.45	5.88	11.66	11.66	19.16
Richmond Estate	44.95	7.65	7.45	5.77	16.46
Richwood	32.17	6.25	8.02	7.14	13.40
Ridgeworth	14.71	2.85	9.96	5.62	8.29
Risi View	18.49	0.00	12.94	2.13	8.39
Riverton	62.77	14.58	27.48	12.49	29.33
Robinvale	76.28	32.46	36.29	28.91	43.49
Rocklands	76.60	18.87	19.95	18.80	33.56
Roma Glen	10.83	9.09	13.32	8.30	10.39
Rondebosch	15.10	2.52	20.19	6.36	11.04
Rondebosch East	35.79	5.25	13.97	9.80	16.20
Roosendaal (Blue Downs)	84.70	27.56	41.18	28.50	45.49
Rosebank	9.38	4.64	22.65	5.12	10.45
Rosedale (Blue Downs)	64.10	21.28	16.03	19.55	30.24
Rosedale (Dutbanville)	8.92	3.23	9.12	1.14	5.60
Rosendal (Bellville)	9.83	1.78	11.26	6.46	7.33
Roundhay	15.59	5.29	18.43	5.55	11.22
Royal Cape	44.72	4.88	17.20	1.38	17.05
Rugby	59.77	14.11	30.34	7.75	27.99
Russels Rest	59.48	15.25	20.86	26.00	30.40
Rustdal	34.52	6.89	11.40	4.83	14.41
Rusthof	75.35	25.20	34.25	25.00	39.95
Ruyterwacht	70.64	13.25	23.65	10.38	29.48
Rylands	50.47	8.65	24.21	16.17	24.88
Salt River	62.23	13.18	23.18	11.09	27.42
San Michel	8.02	0.00	1.74	2.98	3.19
Sandrift	50.06	12.70	17.27	5.10	21.28
Sanlamhof	24.00	4.93	17.67	2.06	12.17
Sarepta	65.05	14.52	23.35	20.57	30.87
Saxonsea	77.96	29.48	31.00	22.57	40.25
Schaap Kraal	77.57	25.53	53.43	52.44	52.24
Schotsche Kloof	52.49	17.89	21.30	12.20	25.97
Schusterskraal	17.17	0.00	17.04	4.86	9.77
Scott Estate	16.82	9.63	11.86	7.54	11.46
Scottsdene	76.95	23.46	25.25	36.94	40.65
Scottsville	61.24	20.09	20.60	21.42	30.84
Sea Point	24.70	5.66	25.44	12.29	17.02
Seaforth	27.82	2.63	8.33	12.42	12.80
Seawinds	84.34	25.93	36.13	27.47	43.47
Serepta	44.22	7.86	11.54	8.33	17.99

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Sheraton Park	78.30	23.86	30.80	28.81	40.44
Sherwood	80.68	29.35	30.36	23.41	40.95
Shirley Park	40.91	4.75	13.58	6.57	16.45
Signal Hill	17.02	3.45	16.41	14.58	12.87
Signal Hill/Lions Head	21.97	2.29	24.68	13.27	15.55
Sillwood Heights	72.37	26.89	17.85	33.78	37.72
Silver Oaks	31.70	0.00	9.23	6.96	11.97
Silverglade	23.38	5.84	10.49	5.23	11.24
Silversands	64.67	20.35	15.03	17.83	29.47
Silvertown	79.96	23.46	34.58	13.89	37.97
Simonskloof	7.98	0.00	9.92	0.00	4.48
Sir Lowry's Pass (Formal)	82.43	30.41	59.51	38.95	52.83
Sir Lowry's Pass (Informal)	89.76	25.25	69.17	54.50	59.67
Somerset West (Non Urban)	74.21	28.28	58.04	39.65	50.05
Soneike	22.82	5.42	6.31	3.19	9.44
Sonnendal	16.59	1.46	9.41	6.26	8.43
Sonstraal Ext E16	15.91	3.70	9.07	8.42	9.28
Sonstraal Heights	10.82	2.15	6.00	3.81	5.70
Southfield	41.79	6.33	11.01	5.42	16.14
Southfork	44.49	17.56	9.75	6.07	19.47
Springfield	30.15	0.00	7.18	5.45	10.70
St Dumas	28.62	6.28	3.36	4.27	10.63
St James	17.82	2.06	9.49	7.58	9.24
St Michaels	45.64	2.41	3.87	7.62	14.89
Steenberg	64.82	21.62	27.23	18.02	32.92
Steenbras View	12.75	3.75	8.22	9.69	8.60
Stellenberg	19.43	3.00	5.84	4.05	8.08
Stellenridge	15.67	1.43	8.08	3.69	7.22
Stellenryk	12.97	3.08	11.02	7.14	8.55
Stikland Hospital	53.82	0.00	0.00	0.00	13.46
Strand (Informal)	86.88	34.23	78.10	41.67	60.22
Strand Central	27.93	8.97	23.97	8.17	17.26
Strand Halt	34.74	6.04	12.33	6.63	14.94
Strandfontein	56.33	11.01	12.00	7.08	21.61
Strandvale	21.86	6.02	29.84	4.00	15.43
Stratford	72.90	15.75	21.92	26.32	34.22
Stratford Green	80.57	34.07	23.15	41.44	44.81
Stratford Park	67.95	9.37	17.03	23.79	29.54
Summer Greens	34.48	7.79	6.39	6.15	13.70
Sun Valley	30.64	6.06	11.03	4.16	12.97
Sunbird Park	60.48	17.67	22.45	15.23	28.96
Sunkist	31.89	5.31	12.89	3.93	13.51
Sunningdale	14.44	2.81	6.23	2.90	6.60
Sunnyacres	82.37	59.78	82.38	65.57	72.53
Sunnydale	22.77	4.72	9.23	4.15	10.22
Sunridge	22.43	4.60	12.55	1.27	10.21
Sunset Beach	10.42	2.44	6.77	7.16	6.70
Sunsetlinks	0.00	0.00	0.00	0.00	0.00
Surrey Estate	58.94	14.70	21.74	9.80	26.30
Sweet Valley	25.81	0.00	0.00	5.88	7.92
Sybrand Park	32.45	2.22	15.48	2.77	13.23
Table View	18.87	4.89	9.53	4.69	9.50
Tafelsig	86.96	38.65	43.55	25.50	48.67

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Tamboerskloof	12.66	2.54	13.70	4.36	8.32
Tarentaalplaas	89.15	30.02	52.02	43.30	53.62
Tembani	46.39	39.64	33.54	10.19	32.44
Thalmien	25.22	4.03	11.38	6.51	11.79
The Conifers	58.34	15.38	12.95	12.31	24.75
The Hague	88.48	46.13	63.03	28.54	56.55
The Lakes	24.34	6.06	12.78	3.31	11.62
The Links (Small Holdings)	46.07	6.35	16.45	12.28	20.29
The Links (Urban)	8.65	2.74	12.10	6.50	7.50
The Palms	19.40	7.74	13.42	12.41	13.24
The Range	85.60	38.42	37.22	24.00	46.31
Thornton	37.38	7.84	13.62	3.62	15.62
Three Anchor Bay	28.27	5.39	20.62	10.87	16.29
Tierboskloof	10.44	2.70	7.48	3.16	5.95
Tijgerhof	32.40	7.14	11.78	5.10	14.11
Tokai	13.63	5.73	6.99	6.70	8.26
Townsend Estate	42.21	8.33	11.37	5.83	16.94
Tuscany Glen	53.22	12.69	13.85	11.15	22.73
Tygerdal	35.19	4.77	7.06	4.33	12.84
Uitsig (Durbanville)	18.78	3.76	6.79	8.92	9.56
Uitsig (Elsiesrivier)	83.82	35.60	48.84	30.38	49.66
Uitzicht	13.68	3.66	7.13	1.98	6.61
Valhalla Park	89.56	43.68	58.47	33.65	56.34
Valmary Park	11.34	1.83	10.47	10.42	8.52
Van Riebeeckstrand	17.20	7.25	9.91	6.73	10.27
Van Ryneveld	24.15	7.24	21.83	5.73	14.74
Vanguard Estate	57.98	7.72	18.09	7.68	22.87
Vasco	61.39	9.77	33.29	11.25	28.93
Vasco Estate	47.15	7.65	13.35	4.30	18.11
Vergesicht	21.42	8.77	4.07	3.77	9.51
Vierlanden	20.16	0.78	24.60	9.85	13.85
Vierlanden Ext D44	11.59	4.23	22.72	5.61	11.04
Vierlanden Heights	11.88	1.12	5.59	7.14	6.43
Vissershok	100.00	75.03	93.86	47.37	79.07
Vogelvlei	84.86	47.97	65.86	39.83	59.63
Voorbrug	87.06	31.07	40.09	23.69	45.48
Vredehoek	18.03	5.01	13.79	5.37	10.55
Vredekloof	14.38	2.29	4.15	4.35	6.29
Vredelust	19.49	0.62	17.26	8.50	11.47
Vredenberg	29.20	7.69	3.72	4.33	11.24
Vygeboom	10.70	1.94	11.04	16.61	10.07
Wallacedene (Part 1)	85.59	51.72	79.54	54.97	67.96
Wallacedene (Part 2)	93.06	58.12	85.80	49.23	71.55
Welcome Estate	60.67	12.99	21.21	8.92	25.95
Welcome Glen	26.94	4.69	13.64	4.21	12.37
Welgedacht	10.84	1.33	17.38	11.27	10.21
Welgelee	19.72	5.76	6.70	2.99	8.79
Welgelegen	89.44	56.70	82.87	52.54	70.39
Welgelegen 1	17.79	5.93	4.84	5.72	8.57
Welgelegen 2	23.79	3.12	6.40	7.74	10.26
Welgelegen 3	21.34	4.11	5.25	5.49	9.05
Welgemoed	15.07	1.88	19.76	16.29	13.25
Wellway Park	15.15	3.47	14.51	5.95	9.77

Suburb (2001)	% Adults (20+) with highest qualification < Matric	% of economically active unemployed	% Households earning < R19300 pa	% of labour force in unskilled occupations	S.E.S. Index
Weltevreden (Mitchell's Plain)	72.49	50.32	69.68	35.00	56.87
Weltevreden (Strand)	70.49	31.98	45.36	27.93	43.94
Weltevreden Valley	66.11	34.96	47.65	19.67	42.10
Wembly Park	62.99	17.38	10.33	13.90	26.15
West Beach	15.08	2.57	6.33	4.43	7.10
Westbank	84.98	49.15	71.34	37.38	60.71
Westlake	40.45	16.77	23.29	16.83	24.34
Westridge (Mitchell's Plain)	68.15	17.73	16.94	12.13	28.74
Westridge (Somerset West	21.17	6.21	9.81	6.88	11.02
Wetton	46.45	6.99	8.76	8.94	17.79
Whispering Pines	36.59	11.76	16.43	2.50	16.82
Wimbledon	89.91	53.79	75.89	45.02	66.15
Windsor Estate	42.59	11.76	5.93	6.40	16.67
Windsor Park	42.40	6.70	8.45	4.78	15.58
Winford	7.69	0.00	33.33	8.33	12.34
Winston Estate	49.62	6.76	13.32	10.41	20.03
Witsand (Part 1)	81.40	46.11	83.86	39.70	62.77
Witsand (Part 2)	84.86	43.18	89.27	14.63	57.99
Wittenboomen	20.75	0.00	16.54	25.93	15.81
Woodbridge Island	16.96	4.88	15.63	1.31	9.70
Woodlands	76.10	28.53	31.86	18.94	38.86
Woodstock	53.53	15.37	23.45	10.72	25.77
World View	27.59	0.00	43.85	18.75	22.55
Wynberg Central	44.11	9.65	21.70	6.80	20.57
Zeekoeivlei	43.03	8.39	10.39	6.09	16.98
Zevendal	60.00	5.08	51.70	50.85	41.91
Zevenwacght	17.91	2.38	2.23	4.74	6.82
Zonnebloem	39.11	12.21	44.84	11.92	27.02
Total	**62.03**	**29.38**	**39.00**	**21.46**	**37.97**

Source: 2001 Census, Statistics South Africa

11.6 Proposed Checklist for ADHD Management

Patient name		**Date (1st consultation)**	
BASELINE SOURCES OF INFORMATION FOR ASSESSMENT			
1	**Parent interview**		
2	**Child interview** Document **child's point of view**		
3	Interview in **primary language** of child/caregiver (at least partially)		
4	**Parental rating scale**, e.g. SNAP		
5	**Teacher rating scale**, e.g. SNAP		
6	**Teacher report (descriptive)**		
7	Health care professionals should make **contact with child's teacher** (written, telephonic, or classroom)		
DSM-5 CRITERIA AND FULL HISTORY BEFORE DIAGNOSIS			
8	**Name** and **qualifications** of clinician making ADHD diagnosis		
9	**ADHD diagnosis** by **appropriately qualified clinician** with training & expertise in ADHD Diagnosis		
10	**DSM-5 Criteria**: Have **ALL** DSM-5 diagnostic criteria been met?		
10.1	—Evidence in case notes of at least **6 out of 9 Symptoms** of inattention **and/or** at least 6 out of 9 symptoms of hyperactivity/impulsivity		
10.2	—Symptom **duration**: at least **6 months**		
10.3	—Symptom **onset: <12** years old		
10.4	—**pervasive**: Some impairment is present in at least **2 settings** (e.g. at school and at home)		
10.5	—**Functional impairment**: Evidence, based on interview and/or direct observation, of interference with developmentally appropriate functioning		
11	**Specification** of ADHD **severity** (mild, moderate, severe)		
12	**Full history** before diagnosis: patient needs, clear presenting problem; social & educational circumstances; co-existing conditions (psychiatric & general medical); family history; developmental history; child's M.S.E.; and assessment of parents'/caregivers' mental health with referral as necessary		

PHYSICAL ASSESSMENT: BASELINE AND FOLLOW-UP		
13	**Before** drug initiation, **full medical history** and **physical exam**: cardiac hx, physical exam with baseline physical parameters (BP, HR, height, weight) and **plotting on growth chart**	
14	**After** drug initiation, **physical parameter** monitoring (BP & HR 3-monthly; Height & Weight 6-monthly) with **plotting on growth chart**	
15	**Side effect** monitoring— e.g. loss of weight/appetite, insomnia, head/ab-ache, tics	
PHARMACOLOGICAL AND BEHAVIORAL/PSYCHOSOCIAL INTERVENTIONS		
16	**Drug treatment** offered as **first line treatment** for **school-age children** with **severe** ADHD	
17	Drug treatment for children and adolescents with ADHD should always form part of a **comprehensive treatment plan** that includes **psychological / behavioral & educational** advice or interventions.	
18	**Group parent-training / education programme** (either as a stand-alone programme or a group treatment for the child or young person) for caregivers of **school-age** children (6-17) with **mod to severe** impairment	
19	**Psycho-education— written** information about ADHD and treatment options for **patients** and **caregivers**	
20	Monitor **treatment response** on **standard scales**—e.g. SNAP	
21	For a patient of **school leaving age** (16-17), if continuing Rx is needed, arrangements for **transition to adult services** (discussions, care options)	
22	Assess need for **?continued drug treatment** annually for all patients	