



Health  
Western NSW  
Local Health District

## Parkes Healthy Kids Study: BMI at pre-school immunisation and Healthy Kids Check, nurse and parent perception and level of concern.

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## Acknowledgements

The author would like to gratefully acknowledge the opportunity that the HETI Rural Research Capacity Building Project has provided and both David Schmidt and Emma Webster for their excellent organisation of expert advice, facilitation, support, knowledge and continued wealth of information during the project period and workshops. The comradeship of the other candidates in my group, their interest, contributions and willingness to share resources is valued.

The advice, patience and analysis support from the program Biostatisticians over the two year period have been invaluable – Danushka Fox having the most influence latterly in my project and Taylor Harchak in the beginning. Kerith Duncan for her time and critique into initial research proposal and final report.

I am indebted to the local Community Nurses who assisted in data collection and their patience and enthusiasm with my endless conversations around the complexities of preventing childhood excess weight gain and supporting families; my management support, Liz Mitchell and to Kathy Gleeson who admirably steered the ship and stayed sane whilst I was on research leave and for all my Lachlan Community Health team for their interest and support when the chips were down!

I am very grateful to the Parkes Clarinda Street Medical Practice for agreeing so readily to participate in the project and for Practice Nurse Caroline Kennedy for her time and efforts to supply data to enable BMI calculation for sampling.

## List of abbreviations

<b>BMI</b>	Body Mass Index
<b>HKC</b>	Healthy Kids Check
<b>GP</b>	General Practice
<b>LGA</b>	Local Government Area
<b>PHK</b>	Parkes Healthy Kids
<b>IOTF</b>	International Obesity Taskforce
<b>CAFHN</b>	Child and Family Health Nurse – also refers to Maternal and Child Health Nurse
<b>ICIR</b>	Australian Immunisation Register
<b>US-CDC</b>	United States Centre for Disease Control
<b>WNSWLHD</b>	Western New South Wales Local Health District

The term '**Primary Health Care Nurses**' is used in this document to describe both state funded Community Health Nurses, Child and Family Health Nurses and federally funded Practice Nurses in GP Practices and Medicare Locals.

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## **ABSTRACT**

**PROJECT NAME:** Parkes Healthy Kids: BMI at pre-school immunisation and Healthy Kids Check, nurse and parent perception and level of concern.

**KEY WORDS:** BMI, child/ren, parent, nurse, perception, rural, pre-school,

**AIM:**

To determine whether there are any associations between pre-school children's BMI-for-age, nurse and parent estimation of weight status and parental concerns.

**METHODS:**

BMI was calculated on 107 children aged three to five, presenting for pre-school vaccination or Healthy Kids Check (HKC) in a rural GP practice (n=53) and Community Health Centre (n=54) between March 2012-2013 with a recalled group completing a parent survey.

In the recalled group, Community Nurses visually estimated child's weight status prior to measuring. Parents were asked to complete a paper survey indicating their estimate of child's weight status, level of concern and preferred sources for information/support.

Demographics were compared to assess generalisability using Chi-square tests, univariate logistic regression and Wilks-Shapiro test.

**RESULTS:**

Across all variables, except age, there were no statistical differences, suggesting findings are likely to generalise to the greater population of 3-5 year old in this rural NSW population.

Using CDC percentile chart classification for clinical settings, 36% of children had BMI's in the overweight/obese percentile. Using IOTF cut-offs for research and population surveillance, 26% of children had BMI's in overweight/obese category.

Visually, both parents and nurses significantly underestimated children's BMI in the overweight/obese category. Sources of support that parents of children aged three to five most identified were Friends and family (72%); Pre-school or childcare (70%); local health professionals (69%); Internet (56%); Parent groups (28%) and telephone support (6%). Child and Family Health Nurses were ranked most often as first preference local health professional with GP's ranked second.

**CONCLUSIONS:**

One in three pre-school children assessed in this rural clinical setting, were in the overweight/obese percentile and at higher risk for adult overweight/obesity. The HKC and immunisation point for children aged three to five is a crucial surveillance point and an opportunity for Primary Health Care Nurses to accurately screen, raise awareness and initiate management and supports for parents. Greater integration between state and federally funded health facilities, nurse education and development of local pathways and community partnerships will assist in consistent clinical practice under Australian Guidelines in the prevention and management of excess weight gain in pre-school children

## EXECUTIVE SUMMARY

### ***Implications***

#### **1. One in three children aged three to five years in rural central west NSW presenting to clinical settings to have their Healthy Kids Check or immunisation, have BMI in the overweight or obese percentile band**

This study revealed 36% (one in three) of the presenting children, measured in a clinical setting and using CDC percentile charts would be classified as overweight or obese, requiring appropriate individual intervention. Using International Obesity Task Force (IOTF) cut-offs, 26% (one in four) children were classified as overweight or obese. Both results are higher than recent national surveys which showed 18-20% of children aged 4-5 are overweight or obese. This indicates that this rural population of children have higher BMI's and are at a higher risk of overweight and obesity in adulthood and it's associated morbidities. This study adds some value that that this access point with health professionals provides useful BMI surveillance data and as a result, there is a need for increased community action in primary and secondary prevention in this population, targeting the pre-school (0-5 years) period.

#### **2. Parents of pre-schoolers with an elevated BMI are generally unaware or unconcerned about their child's weight status**

The PHK study revealed that parents of pre-schoolers with a BMI in the overweight/obese category, overwhelmingly underestimated their child's weight status. In addition, parents of children with BMI in overweight/obese percentile band, expressed low concern about child weight. Despite mounting public concern and debate, the 'normalisation' or low levels of parental awareness and concern are significant to engaging families with healthy lifestyle changes and provides some insight into local recruitment difficulties to secondary prevention programs.

#### **3. Parents of children aged three to five, identify friends and family, pre-school and local health professionals as the top three local sources of support.**

The PHK study identified preferred local sources of support, trusted by parents to assist them with managing weight and growth, healthy eating and physical activity with their families. When considering the provision of primary and secondary preventative strategies to address unhealthy weight gain, collaborative partnerships between these three agencies in particular, at the local level, will reinforce messages and maximise parental engagement.

#### **4. Parents of children aged three to five, currently identify Child and Family Health Nurses and GP's as preferred local health professionals for support with weight and growth management**

Of those parents who identified health professionals as sources of support, the disciplines most preferred were CAFHN and GP's. Results of this study suggest that Practice Nurses in Medicare Locals, who will be providing the majority of HKC and immunisation for children aged three to five years, would benefit by raising their community profile for this age group and establish multi-disciplinary linkages to maximise parental engagement and coordination of care. Both state and federal funded facilities need to employ the use of recall if they do not currently offer the HKC with immunisation.

**5. Child and Family Health Nurses (CFHN), whilst cognisant with routine assessment of weight and height for pre-schoolers and the use of percentile charts in discussion with parents, do not routinely calculate BMI and use BMI percentile charts**

It is routine practice, when performing infant and early childhood surveillance assessments, for CAFHN to measure, use and discuss weight-for-age and height-for-age charts with parents. It was observed, during the PHK study that it is not routine practice to calculate and use BMI-for-age reference values to guide assessment and discussions with parents and to follow consistent referral pathways for children identified in elevated percentiles. (For example; as recommended in the 2013 Clinical Practice Guidelines for the Management of Overweight and Obesity in Adults, Adolescents and Children in Australia.) This area requires further exploration with both CAFHN and Practice Nurses in Medicare Locals, who conduct or participate in HKC's.

**6. Utilise the value of locally obtained baseline anthropometric data to engage the community**

The results of the PHK study will be actively disseminated via local networks to engage the interest of local professionals, health council and community to launch community development strategies aimed at supporting families in Parkes across a range of settings. The prevention of obesity is a Western New South Wales Local Health District (WNSW LHD) key area where actions by health care organisations are likely to give the greatest benefits and strategies focusing on children aged three to five will be a Lachlan Community Health Service priority.

**7. Develop closer integration between LHD Community Health facility and the Medicare local agencies to implement the 5A's approach**

The PHK study suggests that, as a result of the discovery of inconsistent use of BMI across Primary Health Care Nurses involved in the HKC, there may also be an inconsistent awareness of and implementation of the 5A's approach (Ask and Assess, Advice, Assist and Arrange) described in the Clinical Practice Guidelines for the Management of Overweight and Obesity in Adults, Adolescents and Children in Australia (editions 2003, 2008 and 2013). Primary Health Care Nurses from both state and federally funded facilities, when performing the HKC, need to initiate the recommended pathways and practice points where appropriate, as recommended in the guidelines.

**Context**

Children who are at risk of excess weight gain often go unnoticed by their parents and health workers, which impedes the effective recruitment of children at risk into effective support pathways or health promotion programs.

The Australian Federal government has invested significantly in the Healthy Kids Check (HKC), the majority of which will be offered through GP practices and Medicare locals (Practice Nurses, GP's and Aboriginal Health Workers) but also supported by Child and Family Health Nurses funded in each state.

Existing research suggests there is inconsistent detection and management of overweight children by health professionals in positions to screen children in the primary health sector.

Inconsistencies include; health workers knowledge and confidence levels with identifying and discussing unhealthy childhood weight with parents; use of accurate BMI-for-age tools and the co-ordination of clinical practice and local pathways across facilities to follow Australian Clinical Practice Guidelines.

The HKC and immunisation for children aged three to five years is an ideal clinical opportunity to identify families at risk of unhealthy weight gain, to raise awareness and implement supports which target the benefits of family focused healthy lifestyle changes before morbidity occurs. The HKC and immunisation may also present an opportunity for a universal point of access to record and monitor the BMI of pre-school children at a population surveillance level.

## **Approach**

The primary aim of the PHK study was to determine;

1. The age/weight/height/BMI distribution of pre-schoolers presenting to a rural GP Clinic for their four year old immunisation or HKC.
2. The age/weight/height/BMI distribution of pre-schoolers recalled to a Community Health Centre following presentation for their four year old immunisation or HKC.
3. The demographics of children presenting for recall compared to those who present to a GP Clinic in the area for four year old immunisation or HKC to ascertain generalisability of the samples to the general population of children, aged three to five years in Parkes.
4. Amongst survey participants recalled, whether there were any associations between children's BMI-for-age, parents and nurse's estimation of weight status and parental concerns for child weight, and if so, the strength and direction of these associations.

A secondary aim was to determine rural parents of children aged three to five, preferred sources for information and support on children's growth and weight management and healthy lifestyle behaviours.

## **Results**

Across all variables, except age, there were no statistical differences, suggesting the findings of this study outlined above, are likely to generalise to the greater population of children aged three to five years old in this rural NSW population.

## **Further research**

**1. Extend study for a further 6 months** to allow the prospective BMI collection and parent survey for all children presenting at all Parkes GP practices and Community Health Centre for their HKC or immunisation. This secondary phase will build on the initial retrospective phase, to gauge parental and nurse responses to the survey contemporaneously in routine clinical practice. This extension could then be linked to research suggestion number two and three.

**2. BMI identification, management, referral and clinical pathways education** is particularly required for primary health care nurses involved in HKC/immunisation of Australian children

aged three to five, in order that this universal point of access with the health system, is utilised for the prevention and management of excess weight gain to its full potential.

**3. Influence or impact of primary health care nurses identifying elevated early childhood BMI's with parents of children aged three to five attending HKC's.** Further research is required to inquire if existing programs like Go4Fun or Triple P Healthy Lifestyle program can be evaluated and expanded for use as either primary or secondary prevention programs at this early childhood stage?

**4. Replicate data collection and analysis in different rural locations.** This study indicates an opportunity for ongoing exploration into BMI collected at the HKC in both state and federally funded services, possibly in other selected and urban sites in order to contextualise the study data for HKC.

### **5. Publish Results**

This report will be publicly available on the NSW HETI website and distributed to Western NSW Local Health District Child and Family Health Nurse, Dietetic and Paediatric Staff Specialist disciplines for study results and recommendations to be commented and critiqued for value in clinical practice. The report will also be distributed to the Western Medicare Local Network for feedback. Study results will be submitted to appropriate conferences and journals for potential dissemination and publication.

## INTRODUCTION

The prevalence of overweight and obesity in the Australian population has been progressively increasing in the last 30 years. Lifestyle behaviours are shaped early in life and excessive weight gain in infancy and childhood increases the risk of overweight in adulthood with its associated long term co-morbidities.

Children who are at risk of excess weight gain often go unnoticed by their parents and health workers, which impedes the effective recruitment of children at risk into effective support pathways or health promotion programs.

Significant evidence supports obesity prevention in adults and school-aged children. Although researchers are suggesting that prevention should be beginning in these early years of pre-school life, there is less evidence to support this theory.

The Australian Federal government has invested significantly in the promotion of and is expanding the Healthy Kids Check (HKC), the majority of which will be offered through GP practices and Medicare locals (Practice Nurses, GP's and Aboriginal Health Workers) but also supported by Child and Family Health Nurses funded in each state.

Existing research suggests there is inconsistent detection and management of overweight children by health professionals in positions to screen children in the primary health sector. Inconsistencies include; health workers knowledge and confidence levels with identifying and discussing unhealthy childhood weight with parents; use of accurate BMI-for-age tools and the co-ordination of clinical practice and local pathways across facilities to follow Australian Clinical Practice Guidelines

The HKC and immunisation for children aged 3-5 years is an ideal universal platform to record and monitor the BMI of pre-school children at a population level. It is also an ideal clinical opportunity to identify families at risk of unhealthy weight gain, to raise awareness and implement supports which target the benefits of family focused healthy lifestyle changes.

This research will provide a baseline of pre-school BMI, nurse and parent estimations of weight status and parents preferred sources of support in a rural community, gathered via pre-school immunisation and HKC. The results will provide a valuable baseline to launch local community development strategies to address the prevention of excess weight gain and may contribute to the body of knowledge to potentiate this universal access point in the prevention of unhealthy weight gain in the population.

## **BACKGROUND**

### **Research Question**

***What are the BMI of Australian Children presenting for four year old vaccinations in rural NSW and are there associations between actual BMI-for-age, nurse & parental estimation of BMI (or weight status) and parental concern regarding child weight?***

In 2011-12, approximately 60% of Australian adults were classified as overweight or obese, with over 25% being in the obese category (ABS 2012). It has been predicted that there will be continued increases on overweight and obesity levels across all age groups over the next ten years (Sassi et al 2009 in guidelines). Rates of overweight are predicted to rise by 35% by 2025 (Haby & Marwick 2008)

Overweight and obesity is more prevalent in specific population groups and include; people who experience socio-economic disadvantage; Aboriginal and Torres Strait Islander peoples; people from culturally and linguistically diverse backgrounds and rural and remote communities (NHMRC 2013).

In the Australian Health Survey (ABS), measured height and weight were collected to determine a person's Body Mass Index. BMI based on measured height and weight is considered to be more accurate than self-reported height and weight. In 2011-12, 63.4% of Australian adults aged 18 years and over were overweight or obese, comprised of 35.0% overweight and 28.3% obese. A further 35.2% were of normal weight and 1.5% were underweight.

The financial cost of obesity in Australia was estimated to be \$8.3 billion dollars in 2008 (Access Economics 2008). Overweight and obesity are major modifiable risk factors for chronic disease. The challenge to provide adequate health resources to manage chronic disease will therefore continue to grow. Therefore, it is a public health priority to prevent excess weight gain in all age groups, but as lifestyle factors are influenced early in life, focusing on the pre-school period is paramount.

### **School aged children**

Whilst the prevalence of overweight amongst Australian children doubled in the last twenty years and obesity trebled with previous Australian rates for childhood overweight and obesity in 1985 and 1995 being 11.5% and 20.7% respectively. The prevalence of childhood obesity was increasing at such an accelerated rate during this period that it was projected that Australian's life expectancy for children would fall two years by the time they were 20 years old (Holman & Smith 2008).

More recently, the NSW Schools Physical Activity & Nutrition Survey (SPANS) 2010 found that overall, overweight and obesity among school-aged children and adolescents had stabilised between 2004 and 2010. 22.8% of school aged children and adolescents were found to be overweight and obese in 2010 with increased prevalence amongst students

from more socio-economically disadvantaged areas and certain cultural groups such as students of Middle Eastern descent.

In the Australian Health Survey 2011-12, 25.3% of children aged 5-17 years were overweight or obese, comprising of 17.7% overweight and 7.6% obese. The proportion of girls who were overweight or obese was higher than that of boys (27.1% compared with 23.6%). There has been no change in the proportion of children who were overweight or obese between 2007-08 and 2011-12 which supports the levelling of the previously upward trends found in other Australian population surveys.

### **Pre-school aged children**

In Australian pre-school aged children, about 20% of 4-5 year old children in the nationally representative Longitudinal Study of Australian Children (LSAC) were found to be overweight or obese in 2004. SPANS 2010 found that 18.7% of children in kindergarten were overweight and obese suggesting a need for prevention interventions to occur early in the pre-school years. Good for Kids survey 2007 found that 16% of boys and 18% of girls in childcare were overweight or obese.

Gardiner et al (2009) longitudinal study found that the highest amount of weight gained before puberty occurred before five years of age and that weight at five years is predictive of weight at nine years of age.

Lifestyle behaviours are shaped early in life and excessive weight gain in infancy and childhood increases the risk of overweight in later life by 25-50%. (Ref Cite in panorg). Children with a high BMI in childhood are at a high risk of obesity in adulthood (Singh et al 2008) with its associated long term co-morbidities of type 2 diabetes, hypertension, stroke and cancer (Ref)

### **Risk factors for unhealthy weight gain**

There are many variables in our modern ‘obesogenic environment’ which make it more likely for people to eat more and be less physically active and, consequently, gain excess body weight (SPANS 2010). Factors which are modifiable include physical activity, sedentary activities, transport options and dietary habits. Parents are a powerful influence on their child’s eating and activity habits and can be empowered to mediate the impact of this obesogenic environment on their own family. (Brennan & Matthews 2011)

Reilly et al (2005) identified eight childhood risk factors correlating to the development of obesity – birth weight, parental obesity, sleep duration, television viewing, and size in early life, weight gain in infancy, catch-up growth and early BMI rebound - risk factors which are appropriate targets for preventative health strategies. Other risk factors (panorg ref) include early cessation of breastfeeding, early introduction of bottle which may influence infant ability to self-regulate, early introduction of solids, elevated maternal BMI and low socio-economic status.

Factors contributing to overweight and obesity are complex and excess weight gain is influenced by a wide range of factors including inherited biological factors, early life experiences, environmental, demographic, social and individual. A single factor cannot be

addressed without affecting other factors; therefore a whole of system approach is required to address the issue.

### **Effects of unhealthy weight gain**

There has been strong evidence (Baird et al 2005) linking childhood and adult weight status, making it clear that obesity in childhood increases the risk of obesity in adulthood.

Excess weight gain increases the risk of developing chronic diseases including cardiovascular disease, diabetes and cancer. (refs)

The financial cost of obesity in Australia was estimated to be \$8.3 billion dollars in 2008 (Access Economics 2008). This burden will increase in the next twenty years as projections suggest that 18% of Australians will be obese by 2025 (Boxall 2009). Overweight and obesity are major modifiable risk factors for chronic disease. The challenge to provide adequate health resources to manage chronic disease will therefore continue to grow.

### **Body Mass Index (BMI)**

BMI is a reasonable, easily determined surrogate measure for adiposity in children and adolescents. It is a weight to height ratio defined as weight (kilograms)/height (metres) x height (metres). (ref)

BMI in children changes significantly with age and differs according to gender, therefore any calculation of BMI must be adjusted for age and sex. BMI-for-age may not be accurate in children who have highly developed muscles or who are especially tall or short for their age. BMI in children may also be affected by racial differences. (Espinel and King 2009, PANORG and NHMRC Guidelines). The BMI is not diagnostic and is intended to contribute to the overall clinical assessment of the child. Single measurements are not likely to be informative enough and other factors need to be explored in any clinical assessment.

In clinical settings currently in Australia, BMI calculation is recommended on the United States Centre for Disease Control (US-CDC) BMI-for-age and gender growth charts by health clinicians to obtain a percentile ranking. Percentiles indicate the relative position of a child's BMI number among children of the same age and gender. Using US-CDC percentiles, a BMI above the 85<sup>th</sup> percentile is categorised as overweight and a BMI above the 95<sup>th</sup> percentile is categorised as obese. (ref) It should be noted that this definition with percentiles is arbitrary and whilst a more appropriate definition is needed and is being reviewed, is not yet available. Growth charts are recommended to assess individual size and growth patterns in the clinical setting but are not suitable for population monitoring (Espinol and King, Australian National Health Data Dictionary & Guidelines).

For epidemiological purposes, the International Obesity Taskforce (IOTF) published a classification system (Coles et al) which uses category cut-offs for children aged 2-17 years to redefine childhood overweight and obesity with lower sensitivity and specificity differences between boys and girls (Reilly et al 2000). This classification system is the most appropriate measurement of adiposity in children for research and population monitoring purposes, as it allows comparison on an international level (ref).

Larger national population surveys are often based on self-reported data for both adults and children, necessary in achieving larger numbers required for population data. It is acknowledged that there is a significant discrepancy between self or parent reported data and actual measured bodyweight. Individuals will often report weight to be lower and height greater than actual measurement (ref).

Immunisation and the HKC for children aged three to five, already provide universal and non-stigmatised points of contact with health professionals. Linking the HKC and/or immunisation with BMI surveillance on a population level and utilising the Australian Childhood Immunisation Register (ACIR) is conjectured to be an efficient and anthropometrically sound option for the collection and monitoring of early childhood BMI in Australia using existing resources. It is unknown at the time of report, whether this conjecture has merit or is being investigated in Australia and is beyond the scope of this author and study, however a trial linking BMI collection with immunisation was conducted in San Diego, United States in 2009/2010 (DeGuzman 2010) and further developed in Michigan, with the release of the Registry-Based BMI Surveillance: A Guide to System Preparation, Design, and Implementation in June 2011 (Shea et al).

### **Health professional estimations**

Despite mounting public health concerns about increasing population overweight and obesity, the researcher had observed ambivalence from health staff and continued difficulty recruiting participants for secondary prevention programs like Go4Fun, which targets children above the healthy weight range.

Go4Fun is a free healthy lifestyle program supporting children to become fitter, healthier and happier. The program is fun and interactive, supporting 7-13 year old children and their families to adopt a long lasting and healthy approach to life. The program is currently being run in towns across NSW and offered by a mixture of state health facilities and Medicare Locals. The program has been specifically designed for children aged 7-13 years who are above a healthy weight, and their parents. The program consists of 20 sessions, twice a week for two hours. The program includes weekly games and activities for children, interactive discussions to on effective ways to improve children's nutrition, physical activity and self-esteem and practical demonstrations, games and tips about healthy foods, label reading and portion sizes.

It had been noted by the researcher that there was continued difficulty with both active and passive recruitment in that children were not being actively referred by other professionals and families were not enrolling themselves from passive advertising efforts. Therefore, it was hypothesized that locally, there were issues with both health staff and parents not recognising children and families who could benefit from increased awareness and support. It was also observed both in clinical practice and service provision by state and federally funded health services, that the identification and management of families at increased risk was not consistent.

The most significant benefit of weight management in childhood is to offer the opportunity to learn positive lifestyle behaviours to prevent overweight and obesity in adulthood and reduce their risk of diabetes and cardiovascular disease. The recognition of, by both health

providers and parents, of children at risk of unhealthy weight gain and a consistent approach to weight management are the first crucial points. The National Health and Medical Research Council (NHMRC) has recently reviewed and released clinical guidelines providing evidence-based recommendations and practice points when managing overweight and obesity and improve health outcomes.

Health providers with regular contact with pre-school aged children may not always recognise children who are overweight (Perrin et al 2004, ) as a result of inaccurate measuring equipment, not calculating BMI or a normalisation or acceptance of overweight in the general population. Some clinicians also report ambivalence, lack of confidence or knowledge in what is perceived to be a delicate conversation about childhood unhealthy weight gain. Suggested factors impacting confidence may be in relation to the clinician's perception of their own body image, the parent's perception and anticipated reaction about body image as well as the child's which leads to a minimisation of concern about overweight in younger children (Isma et al).

Nurses, GP's and other health workers who have the opportunity to screen children cannot accurately determine of weight status by visualization alone, therefore all children should have weight and height measured and BMI correctly interpreted (Spurrier et al 2006. Wake and McCallum (2005 cited in spurrier and Golley et all cited in spurrier) found that few GP's routinely weight children attending their practices.

Mention study that showed high trust in ECN's and Healthy Beginnings Research in Sydney.

Redsell et al found that GP's were less confident about giving advice about infant feeding than nurses but more knowledgeable about health risks of obesity. A recent Australian study into Practice Nurse roles, attitudes and current practices (Robinson et al 2012) found that Practice Nurses, whilst interested in the prevention of childhood obesity reported lack of confidence and perceived parental lack of interest.

The current Medicare Healthy Kids Check, commenced in July 2008 and soon to be expanded, checks physical health, general wellbeing and development in children over the age of three and under the age of five years, to ensure they are healthy, fit and ready for school. The Australian Government is promoting the Medicare HKC for all pre-school children. It is at present voluntary, however, there is an additional incentive for families receiving income support and who receive Family Tax Benefit Part A. In order to get the \$726 end-of-year Family Tax Benefit Part A supplement, parents who are on income support must get their four year old children checked for health issues such as hearing or sight impairment before they start school as well as a completed immunisation schedule (ref)

Acceptable health checks for the purposes of the Healthy Start for School measure in New South Wales (NSW) are;

1. State and Territory based health assessments - A 3 year old check or 4 year old check – outlined in the Personal Health Record by a CAFHN for example.
2. A general health check provided by a local GP  
A Healthy Kids Check provided under the Medicare Benefits Scheme (Ref)

84 % of immunisation in area provided by GP's (ABS ref) and with the promotion of the Medicare HKC, it is envisaged that the majority of the HKC will also be attended by Practice Nurses either alone or in consultation with a GP.

State and federal funded health facilities offering HKC and immunisation have varying systems of offering HKC and immunisation. Some agencies offer both services together at the same appointment or separately. Currently, some facilities like Medicare Locals have recall systems to achieve higher response/participation rates where the state funded community health centres usually do not.

#### **Parent estimations**

Despite mounting public awareness and concern about childhood obesity, most parents do not perceive that their overweight child as different from their peers or having a health issue requiring changed behaviours (Campbell et al 2006). Parents of overweight children can exhibit the lowest accuracy of their child's weight status (Etolson et al 2003). Maynard found that mothers are more likely to identify daughters who are at risk of overweight as being 'overweight' than they are their sons. This has implications for interventions that rely on acknowledgement of child overweight as a first step to change. One of the key challenges for the primary health care sector is that awareness of an issue in the general public does not necessarily translate into concern on an individual level. There are many factors which relate to the readiness to make change – recognition of the issue is the first step.

#### **Parent level of concern**

One of the most challenging aspects of implementing targeted interventions is the recruitment of participants, particularly when parents/carers have to be engaged in the program as well.

Parents generally value the importance of healthy nutrition and physical activity for children but may not be particularly well informed about the prevention of excess weight gain in children (Zehle et al)

Parents of younger children (pre-school) tend to be less concerned than parents of children who are older (5-12) (ref). Parents are more likely to seek help if they were worried that their child was being bullied for their appearance, that they physically could not keep up with other children or their child was being alienated (isma).

Davis et al (2009) qualitative research identified five themes around the central concept that overweight is a problem among children that it is worthy of attention. Parents expressed a bias against other people's children that if they were overweight, it was because they were lazy or did not exercise or made poor food choices but did not have this bias about their own children. Parents often made excuses for their own children suggesting that their child did exercise enough, ate healthily and were mystified by their continued weight gain. Parents of overweight children did express some concern but feared addressing it directly with the child for fear of damaging self esteem or cause an eating disorder and instead hoped that they would outgrow the problem. Some parents also expressed an acceptance

that their child would be overweight no matter what was tried due to genetics or inheritance.

### **Rurality**

As this study has been supported by a program which recognises and assists rural research, it is worthy to mention that rurality is recognised as a factor which can increase the prevalence of excess weight gain. This could be due to decreased access to health services, availability of affordable child appropriate physical activity outlets or availability of food choices. Rural Healthy People (2010) indicate cultural limitations of higher dietary fat and caloric consumption, lower rates of exercise, higher rates of screen time and lower education levels. Structural limitations can include lack of nutrition education, poor access to dietitians, limited resources and fewer affordable outlets for exercise. Demographics of rural areas include lower income and lower education levels than urban areas – both factors which have shown to be positively associated with higher obesity rates.

### ***Rationale for PHK study***

The four year old HKC and immunisation are points of contact with state and federally funded health providers which are universal, free and non-stigmatised. Immunisation particularly has had a high participation rate. There have been recent changes by the Australian government to potentiate this early childhood point and expand the HKC with Medicare Locals.

This study was identified as a trial of linking this point of contact, using existing resources to collect early childhood anthropometric data, which would form valuable baseline data for this local rural community. It was anticipated that the baseline data would contribute to the local health needs analysis, currently being conducted by the newly formed Medicare Locals. The data would also be used as a vehicle for health professionals to engage other agencies, groups and individuals to commence coordinated community development strategies at the local level. A trial of linking this contact point to BMI sampling may contribute to the wider body of knowledge regarding BMI surveillance and weight management in the primary health care sector.

Information on parent and nurse estimations, parent level of concern and preferred sources of support which could be easily incorporated into the survey was identified as potentially useful information for health planning.

### ***Rationale for target group***

Children presenting for their three to five year old vaccination or HKC were selected for the study because;

- 1) It is a universal point where parents will access a health service with their child both for rural and metropolitan areas.
- 2) Both the four year old vaccination and HKC have been linked by the Australian government to family tax advantages for parents receiving income support, which has provided additional incentive for parents to remember to complete and would hopefully return a higher participation rate or sample of that age cohort.

- 3) GP practices receive Medicare incentives to complete HKC so there are system incentives to recall children and parents in this age-group to encourage higher participation.
- 4) Measuring height and weight are generally well accepted by parents of this age and who are interested and receptive to information - there is fewer stigmas attached to conducting height and weight measures at this age as there might be in a school environment.
- 5) A parent or carer is always with the child at the four year old vaccination or HKC making information collection or dissemination easier. Once children start school, it is more challenging to access parents and the child at the same time. Parents have a strong influence on role modelling and managing their children's growth and lifestyle behaviours
- 6) The four year old vaccination or HKC is usually conducted by nursing or medical professionals who are familiar with conversations around growth management. Parents are also expecting a conversation around their child's health – unlike other screenings done in pre-school, childcare or school settings.
- 7) Pre-school and school entry age is a transitional time where children and parent's exposure to food choices and physical activity levels are increasingly influenced by external factors like peers at pre-school and school, media, organised sports, electronic or screen games or television viewing.
- 8) The collection of anthropometric data could easily be accommodated within usual work practices and staffing resources.

**The objectives of the study were to:**

1. Establish baseline dataset of BMI of three to five year olds in a rural community
2. To increase the understanding of parental understanding of their child's weight status and corresponding level of concern
3. To increase the understanding of nurse estimation of weight status
4. To increase the understanding of parental preference for supports when managing family weight and growth, healthy eating and physical activity.

## **METHODOLOGY**

**Study Design**

An observational study was conducted to measure the BMI of rural children aged three to five and survey their parents who were presenting to primary health care facilities for the four year old vaccination or HKC.

Original study methodology included a prospective data collection for twelve months at both Parkes and Forbes communities to optimise sample size but participation agreement could not be achieved at all sites. As a result the methodology was altered to a retrospective study of BMI from two facilities in one community with a recalled prospective sample to gain parents and nurse estimations. The two facilities included a state funded Community Health Centre and a federally supported GP Practice. The changed methodology, for the purpose of this initial report, limits the robustness of the study and its statistical power.

In order to assess the accuracy of parent and nurse perceptions of weight status in pre-schoolers, all parents of pre-school aged children that had presented to a Community Health Clinic for a HCK or a 4 year old immunisation in Parkes between March 2012 and March 2013 were invited to revisit the clinic and take part in a survey.

At presentation to the Community Health Clinic, the age, height and weight of the child was recorded along with a parental and nurse estimate of their BMI and an indicator of parental level of concern.

### **Setting and participants**

Children aged three to five (inclusive) were recruited from the rural town of Parkes to participate in the study.

In order to obtain a representative sample of the age cohort over a 12 month period, data was a combination of retrospective data from medical records and recall.

Retrospective Data from medical records;

1. Data on age (month and year of birth), month & year of vaccination/health check height, weight and gender of children who presented for their 4 year old vaccination or HCK at GP practice over a twelve month period between 2012 and 2013 was obtained from GP medical databases retrospectively.
2. Data on age, height, weight and gender was also obtained from the Child & Family Health records retrospectively at the Parkes Community Health Centre.

Contemporaneous Data;

3. A convenience sample of the population was obtained by recalling the parents and children who had presented for the four year old vaccination and HCK clinics at the Community Health Centre over a twelve month period between 2012 and 2013 (inclusive) to ascertain nurse and parental perceptions. Recall was obtained by phoning each parent and asking if they would like to participate in the study. Parents of the children who had presented to the GP Clinic were not contacted for recall as the researcher did not have ethical approval to contact them, the data supplied to the researcher to calculate the BMI was de-identified and the time constraints.

On presentation at the recall clinic, parents were provided with a paper survey that asked for their estimation of their child's weight status, their level of concern and their preferred sources of support. Weight status was first estimated by the nurse then weight and height was measured. BMI was later calculated by the researcher.

Information packs on the 5 Ways to a Healthy Lifestyle from the *NSW Healthy Kids – Eat Well, Get Active* Health Promotion Campaign was given to each participant.

### ***Exclusion criteria:***

1. Children who presented for their vaccination or HCK who were younger than 3 years or older than 5 years (older children may have missed their scheduled vaccination and need to 'catch up' their immunisation schedule).

2. Children, parents/carers or nurses who did not consent to participate or who withdrew from project
3. Children who had a physical condition that prevented the accurate measurement of their weight or height (i.e. unable to stand)
4. Parents/Carers who were unable to give informed consent due to intellectual disability
5. Parents/Carers whose primary language was other than English and was unable to speak/read or understand English.
6. Children, whose unique code suggested that they have had their measurements included twice from two different centres/practices in the same town – only one set of measurements would be included in the study.

### **Ethics**

Approval for the study was obtained from the Greater Western Human Research Ethics Committee (HREC) in June 2012

WFWHREC Reference No: HREC/11/GWAHS/55

SSA Reference No: SSA/12/GWAHS/55

Three variations regarding the study process were accepted by the research governance officer over the course of the planning phase of the study.

### **Recruitment**

Participants were recruited from families who presented for their four year old vaccination or HKC at a WNSW LHD Community Health facility or GP practice over a twelve month period. Community nurses at Parkes Community Health Service as well as GP practice nurse were also participants.

The primary recruitment strategy involved both retrospective BMI data from medical records at both facilities.

A secondary recruitment strategy involved recall of families who had presented to the Community Health facility during that period. Recall was obtained by phoning the families and asking for their participation to return to the centre for measurement and parent/carer survey. In families where first person contact could not be established, a message was left on the phone service explaining the project and the invitation to contact the Health Centre if they wished their child to participate. Families who did not return contact during the data collection period were deemed loss to follow up.

Unique codes based on facility access, letters in names and month and year of birth were utilised to screen for potential participants who may have been exposed to the study more than once, from attendance at both facilities during that twelve month period.

### **Selection of resources**

The parent survey form (Appendix 1) consisted of four questions designed to illicit a variety of quantitative parental responses on parent estimate of their child's weight status, their level of concern for their child's weight status and their preferred sources of support to

assist them in managing child and family weight and growth, healthy eating and physical activity.

The Healthy Kids – eat well, get active factsheets are part of the interactive NSW Health Healthy Kids website and are available on [www.healthykids.nsw.gov.au](http://www.healthykids.nsw.gov.au). Information is centred around 5 key ways to a healthy lifestyle. There are Healthy Kids fact sheets available on each of the 5 key messages as well as a fact sheet that summarises all of the 5 key messages. These fact sheets included:

- 5 Ways to a Healthy Lifestyle
- Get Active Each Day
- Choose Water as a Drink
- Eat More Fruit and Veggies
- Turn Off the TV or Computer and Get Active
- Eat Fewer Snacks and Select Healthier Alternatives

All of the six factsheets were provided to each parent/carer who participated in the recalled sample.

### **Timeline for study**

The retrospective height and weight measures, gathered by practice nurses at the GP Clinic in the twelve month period from March 2012-13, were collated by the author between in May 2013.

The recall sample of parents and children, who had presented to the CHC for a HKC and/or immunisation between the same time period, was conducted between April and June 2013.

BMI calculation and analysis was conducted in June 2013.

### **Outcome Measures**

1. Age was calculated in years and months on the day of measurement.
2. Weight was measured in kilograms to the 100g on Wedderburn Tanita HD351 digital scales whilst wearing light clothing and socked feet
3. Height was measured in centimetres on a portable stadiometer with 0.1cm increments.
4. BMI was calculated by the formula  $BMI = \text{weight (kg)} / (\text{Height (m)} \times \text{Height (m)})$  to two decimal points. Each BMI, adjusted for age and sex, was then classified as either underweight, healthy weight, overweight or obese.

Note: As this was a small study using anthropometric data from clinical settings, the BMI-for-age for each child was calculated using the US-CDC BMI calculator for children and teens, which gives exact percentiles. The primary classification system for this study used US-CDC percentile cut-off points to classify underweight, healthy weight, overweight and obesity, currently recommended for use in clinical settings in Australia. However, a secondary demographic description of the population using IOTF cut-off points have been also been included for reasons of research, national and international comparison and the benefit of interested readers who reference that classification.

5. Nurse estimation of BMI-for-age or weight status was described by the nurse prior to measuring, as either underweight, healthy weight, overweight or obese
6. Parent/carer estimation of their child's weight status-for-age and height was expressed as a healthy weight, under the healthy weight, over the healthy weight or very over the healthy weight.
7. Parent level of concern was expressed as not concerned about my child's weight, concerned about my child not weighing enough, a little concerned about my child weighing too much or very concerned about my child weighing too much

Categories of nurse estimation, parent estimation and level of concern all had four variables which corresponded to the four BMI percentile range classifications of underweight, healthy weight, overweight and obese.

Additional secondary outcome measures were collected which, whilst not in the primary aim in this study of the study were deemed to be helpful to local health planning for childhood excess weight gain prevention strategies. These included parent/carer preferences for support in managing child and family weight and growth and ranking who they would source from local available health professional options.

### **Demographic data**

Parkes is a rural population in New South Wales, Australia which has a local government (LGA) population of 14,594 (ABS 2011). 8.2% of the shire population identify as Aboriginal or Torres Strait Islander and the most common ancestries identified in Parkes LGA were Australian 36.6%, English 31.4%, Irish 9.2%, Scottish 6.5% and German 2.8%. Parkes LGA has an Australian Standard Geographical Classification-Remoteness Area (ASGC-RA) of RA3 (Outer Regional). The estimated four year old age cohort in Parkes LGA is approximately 200 (ABS 2011 census).

Data used to describe the demographic profile of the study samples included the following;

- Age in years and months, gender, BMI

### **Data Analysis**

Data entry for the demographic data and parent surveys were conducted by the researcher, using Excel.

Statistical analysis was performed by the researcher and Danushka Fox, NSW Health Biostatistics Trainee, with consultation and advice from Patricia Correll, a Senior Epidemiologist with the Centre for Epidemiology and Evidence, NSW Ministry of Health.

Demographics of the cohort of pre-schoolers presenting to the GP clinic, and those recalled to the Community Health Centre to participate in the research study were compared to assess generalisability of this study. For categorical variables, Chi-square tests and univariate logistic regression were used as appropriate. For continuous variables, the Wilks-Shapiro test was used to assess normality of each variable within GP and Recalled participants. Variables meeting the normality assumption were tested using independent two-samples t-tests, while those failing to meet the normality assumption were tested using the non-parametric equivalent, a Wilcoxon rank sum test.

## **Conflict of Interest**

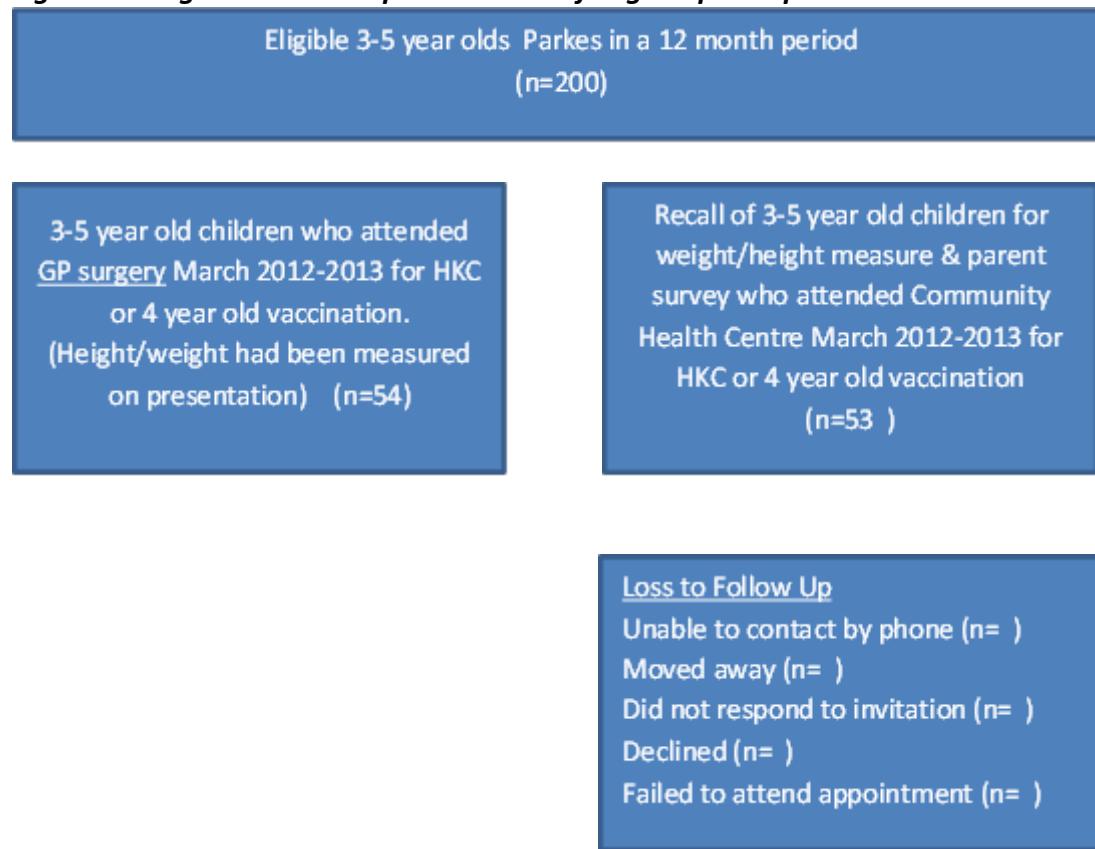
Funding for this research was provided by the Health Education and Training Institute (HETI) Rural Directorate as part of their Rural Research Capacity Building program (RRCBP)

## **RESULTS**

Recruitment of participants to the PHK study is outlined in Figure 1. Of the approximate 200 children in a 12 month age cohort who would be eligible to present for a four year immunisation or HKC in the twelve month period, 54 attended the participating GP Practice and had their BMI recorded and X presented to the Community Health Centre. Of the X who had presented to the Community health Centre, X were attempted to be contacted to offer invitation to participate in the recall and X were excluded prior to attempted contact.

Parents who could not be contacted by phone, had moved from the area or did not respond to the phone message inviting participation were allocated to loss to follow up. Three parents stated they did not wish to participate.

***Figure 1: Diagrammatical representation of eligible participants***



## **Demographic Data**

Demographic data was collected for the two groups and displayed in Table 1. There is a difference in the age distribution between children who presented at the GP clinic and those who presented for recall. On average, children who presented at the GP are approximately

5.5 months younger than those presenting for recall. This is most likely a reflection of the time between initial presentation at the CHC and recall for BMI assessment.

Across all other variables, there are no statistical differences between children who present at the GP practice and those presenting to the CHC for recall. This suggests that findings from this work are likely to generalise to the greater population.

**Table 2: Demographics of preschoolers in Parkes**

Variable	Level	GP vs. Recall				P-value	
		Recall (N=53)		GP (N=54)			
		N	(%)	N	(%)		
Sex	Female	25	(47.2)	24	(44.4)	49	(45.8)
	Male	28	(52.8)	30	(55.6)	58	(54.2)
IOTF Classification <sup>#</sup>	Underweight or Healthy						
	Weight	41	(77.4)	38	(70.4)	79	(73.8)
	Over weight/Obese	12	(22.6)	16	(29.6)	28	(26.2)
	Underweight or Healthy						
CDC Percentile <sup>#</sup>	Weight	35	(66.0)	33	(61.1)	68	(63.6)
	Over weight/Obese	18	(34.0)	21	(38.9)	39	(36.4)
Estimated difference (95% CI)							
[Recall-GP] P-value							
Age (Months) <sup>†</sup> , Median (IQR)		57	(51-59)	49	(49-51)	5.5(3.0, 8.0)	<0.001
Actual BMI <sup>^</sup> , Mean (Std. Dev)		16.4	(1.4)	16.5	(1.8)	0.7(0.6)	0.872
		108.		107.		0.9(-)	
Height (cm) <sup>^</sup> , Mean (Std. Dev)		2	(5.4)	3	(4.6)	1.0(2.9)	0.342
			(17.7-			0.5(-)	
Weight (kg) <sup>†</sup> , Median (IQR)		19.3	(20.8)	19	(16.8-20.2)	0.6(1.5)	0.423

<sup>#</sup> Univariate logistic regression  
<sup>†</sup> Two sample t-test  
<sup>‡</sup> Wilcoxon rank sum test

For reporting purposes, children were grouped in either the underweight/healthy percentile category or overweight/obese percentile category. Overall, using CDC percentile chart classification from both the GP and CHC samples, 36% of children had BMI's which were in the overweight or obese percentile for their age and gender.

When the two samples were categorised overall using IOTF classifications to allow comparison to population surveys, displayed in Table 2, 26% of children had BMI's which were overweight or obese.

**Table 2: Ratio of GP & CHC and overall BMI (using IOTF Classification)**

BMI Classification (IOTF)	Recall group	GP group	Total
Underweight/Healthy Weight	77	70	74%
Overweight/Obese	23	30	26%

### **Perceptions**

Of the sampled children presenting for recall, there were no differences in the sex and age distributions of children BMI-for-age was classified in the underweight/healthy classifications compared to those BMI-for-age classified in the overweight/obese category.

For privacy of reporting in a small sample, classification for the four groups of underweight, healthy, overweight and obese were collapsed into two groups of either underweight/healthy or overweight/obese.

For all children with BMI classified into overweight/obese category, all parents and nurses in this sample underestimated the BMI of children, judging them to be underweight or of a healthy weight.

For children with BMI classified into overweight/obese category (n=18), 17 parents reported not being concerned about their child's weight.

### **Nurse Estimation**

Community Nurses were asked to estimate each child's weight status as either underweight, healthy, overweight or obese. Children's BMI were later calculated and also classified into 4 of the same categories according to US-CDC percentile bands for their age and gender. In reporting the 53 children in the recall group with two collapsed groups, when the child's actual BMI was underweight/healthy, (n=35) of nurse estimations correctly matched the child's BMI category. When the child's actual BMI was in the overweight/obese percentile, the nurse's visual estimation's were underestimated as healthy (n=18).

### **Parent/Carer Estimation**

Parents were asked to estimate their child's weight to be one of four categories - under the healthy weight, healthy weight, over the healthy weight or very over the health weight for their age and height. These four estimates corresponded to the BMI percentile bands of underweight, healthy weight, overweight or obese and for reporting purposes were also collapsed to two groups of underweight/healthy or overweight/obese. Parents estimations matched the nurses estimations with 66% of parents correctly estimated their child's weight status to be underweight/healthy. However, like nurse estimations, 34% of parents underestimated their child's weight status, in that they identified their child was a healthy weight but their actual BMI was in the overweight or obese percentile.

### **Parent level of concern**

The survey asked carers to indicate their level of concern about their child's weight. Of the recalled sample of 53 parents, 89% of parents expressed no concern about their child's weight and 11% were concerned that their child was underweight. In the group of parents who expressed concern that their child did not weigh enough, 83% of the children had BMI's in either the healthy or overweight/obese classification.

Of the children with BMI classifications of overweight/obese, none of the parents expressed concern about their child being overweight.

### **Parent preferred sources of support**

To identify preferred community agencies for partnership in local strategies, parents were asked to elect their preferences for support when managing weight and growth, healthy eating and physical activity for their families. The seven locally available options included one-on-one consultation with a local health professional, organised groups with other parents only, groups with parents and children, internet, family/friends, telephone support and pre-school/childcare. An eighth open option of 'other' was included to ascertain other possible options the author had not thought of.

The top three sources of support that parents identified were Friends and family (72%); Pre-school or childcare (70%) and local health professionals (69%). Telephone support (6%) was not rated highly at all and local groups with parents or children were preferred by only 28% and 26% parents respectively. The internet as a source of support and information was elected by 56% of parents. The open option of 'other' only revealed comments like 'use common sense'

Parents of pre-schoolers, who identified local health professionals as a preferred source of support, were asked to rank the order of which health professionals they would prefer to access – by numbering the five locally available options from one to five in order of preference for information and support for weight and growth management of their family. Child and Family Health Nurses were ranked most often as first preference with GP's ranked second most often.

## **DISCUSSION**

This study collected BMI data, nurse and parent perception and level of concern on children aged three to five presenting for their HKC and/or immunisation. Results show a prevalence of BMI in the overweight and obese percentile which is higher than national population prevalence; parents are generally unaware and unconcerned about their child's weight and primary health care nurses also underestimate weight status in children who have an elevated BMI.

### **BMI**

This component of the study had two primary outcomes: 1. To establish a baseline dataset of BMI of three to five year olds in a rural community and 2: Trial the linking of collecting and collating BMI with children presenting for their HKC and/or immunisation.

The results suggest that in this population of children, when presenting for this clinical assessment and having their BMI calculated with US-CDC percentiles by nurse clinicians, one in three would have a BMI in the overweight or obese category and would require intervention appropriate to the child and family. This result substantiates the demographic factor of rurality which can affect the health behaviour of individuals and whilst a slightly higher result was anticipated in this regional rural area, the actual BMI demographic is a concern. Rural communities may have reduced physical activity opportunities like less sporting varieties or elements of the built environment, such as walking paths. On the results of this study, it will be a priority of the Lachlan Health Service to initiate partnerships

with local council to develop community strategies to further assess and address these factors. There are a range of tools which can assist in the assessment of a community to determine how well the environment encourages and supports physical activity and the application of these will be explored further (Ref).

The researcher, whilst collecting data and discussing the research study with primary health care nurses observed that there was not a consistent approach to the collection and use of the BMI with children in this age group; the subsequent management, referral and monitoring of children identified with an elevated BMI in line with evidence based guidelines. Whilst not a primary component of this study, it was an unexpected discovery and has relevance to both future clinical practice in this community and nurse discipline and for future research.

The study showed that linking the collection and collation of BMI at the HKC/immunisation point, using existing resources and practice – provided valuable surveillance data for this community. Analysis of the sample groups suggested that results could be generalised to the broader community population and provides useful information which will be used to launch further community development. This study may add to the body of knowledge regarding BMI surveillance in the Australian population.

#### **Parent/Carer Estimation and level of concern**

This study showed that all parents except one, of children with a raised BMI, indicated that they thought their child was a healthy weight and were concerned. This lack of recognition and concern is inconclusive in identifying more descriptive information on the beliefs and attitudes of parents when discussing their child's health in relation to weight status but is consistent with previous studies that amongst parents of children with elevated BMI, many are unaware that their child's weight status is at higher risk or is cause for concern (Ref)

This result substantiates the researcher's observation of community ambivalence and low recruitment to Go4Fun programs in the WNSWLHD. It was the intention of the researcher to disseminate the results of the PHK study via local networks to engage the interest of local professionals, health council and community to launch community development strategies aimed at supporting families in Parkes across a range of settings in the prevention of unhealthy weight gain. The prevention of obesity is a Western New South Wales Local Health District (WNSW LHD) key area where actions by health care organisations are likely to give the greatest benefits and strategies focusing on children aged three to five will be a Lachlan Health Service priority.

#### **Nurse Estimation**

The results of this study is consistent with other studies that show that using visualisation, overweight children largely go unrecognised, by parents as well as health workers. It was unexpected that such a large proportion of children with elevated BMI's were estimated as having healthy weight by nurses and reinforces the recommendations by other studies (ref) that with each clinical assessment, BMI should be calculated according to Australian Guidelines.

It needs to be noted that it is not normal practice for CAFHN to use visualisation alone to determine weight status and this group of professionals would not initiate or omit clinical discussions on that basis alone. CAFHN are cognisant with anthropometric measurements for early childhood assessments at all ages and using weight percentile and height percentile, when discussing children's growth with parents. However, as described earlier, it was found that it is not routine practice for CAFHN to calculate BMI and plot on a BMI percentile graph (there is a BMI chart in the Personal Health Record) at childhood surveillance checks.

Gerard et al indicated that poor detection of overweight by health professional was probably due to the low use of BMI-for-age and subsequent low referral rates. Motivational interviewing was identified to be an important skill to assist health professionals support lifestyle behaviours with individuals and families.

Redsell (ref) found that amongst health workers, there was an attribution of childhood obesity to family environment, difficulties with recognition or lack of concern for infants at risk of becoming obese, prioritising relationships with parent over best practice in infant feeding and a lack of shared understanding for dealing with early year's obesity.

It may be equally possible for health professionals to have some discomfort with discussing excessive weight gain during a general health check when many development topics are discussed and the prevention of excessive weight gain in an otherwise 'healthy' child, especially when the parent has not raised it as a concern, may risk the relationship. Other barriers to discussion of BMI during immunisation clinics, are time and access to appropriate tools.

The value of the three to five year HKC and immunisation as a point to screen and initiate management for identified excess weight gain requires further research and support and training identified, specific to CAFHN, Practice Nurses and GP's to ensure consistency of clinical practice.

### **Parent preferred sources of support**

This study identified CAFHN, GP's and pre-schools are valued sources of support for parents with children aged three to five. In Australia, nurses have not spent a lot of time with parents in addressing the prevention of excess weight gain in childhood (Zehle etc al), but as trusted health professionals, particularly in the first five years of life, Primary Health Care Nurses, GP's and pre-schools have a significant part to play in not only the surveillance and management with parents with children aged three to five but in supporting behaviour change.

Current NSW Health secondary preventative programs target children aged 7-13 years. If the expanded HKC, to be rolled out in 2014 will identify more children with increased BMI's – there is a need for a standardised, validated program to refer this age group to. In regard to parent's preferred sources of support, this study would indicate that partnerships formed between CAFHN, Medicare Locals and pre-schools to deliver programs would assist in the coordination of service delivery and have high confidence levels from parents.

Public health impact of interventions depends upon proportion of the target group that is exposed to the intervention (Ref Gerards et al 2012 cited 9,10). The current Go4Fun program has experienced recruitment issues in rural communities in the WNSWLHD and WML. It is hypothesized that a secondary preventative program which aligns itself to the age group attending HKC , involves services most trusted by parents, involves the parents and targeted knowledge, skills and competencies (ref) that there will be a higher likelihood of active referral, recruitment and observable changes. Hesketh and Campbell (2010) found that the evidence for intervention effectiveness for the age group 0-5 is relatively sparse. Considering that unhealthy weight and the modifiable behaviours which contribute to excess weight gain have been shown to be prevalent in early childhood, the importance of early intervention in this age group is noted.

### **Limitations**

The time frame, necessitated by the parameters of the Rural Research Capacity Building Program was a limitation to this study in that the original proposed research methodology, in response to unforeseen non-participation by a major agency, had to be changed from prospective to retrospective to comply within the time frame.

Due to the forced methodology change, this study during this program period was prone to bias in selection as the researcher, due to time constraints, ethical approval and de-identified data, was not able to offer recall to the families who attended the GP Clinic to participate in the parent survey. Therefore, the recall for parent survey was only offered to people who had attended the Community Health facility, which introduced some selection bias. Generalisability of results to the broader population beyond Parkes is limited by the cohort size and sampling.

By using retrospective methodology and recall, there was a higher loss to follow up as some parents were uncontactable by phone or did not respond to phone invitation. This would have given a lower response rate as parents had to be available for contact by phone, agree to recall and re-present, rather than being asked contemporaneously as they present for clinic, where there would be a higher degree of responding favourably.

As the data was collected retrospectively, there may have been some measurement or recording bias through the use of two different brand digital scales, stadiometers and nurses. Nurse's anthropometric techniques at the GP Practice were not able to be verified.

Data collection limitations included use of a written description of weight status on the paper survey rather than an image scale. This may potentially influence parents describing their children as below, above or very above 'healthy' weight as opposed to a visual scale of body size. Parents may not identify with those particular written terms and may normalise their child's weight status. Parents whilst acknowledging that their child is a certain weight on a sliding scale or percentile chart, elect that they are 'healthy' as parents may not identify good health in their children with weight (ref). Written scales may also influence parents not wishing to label their child using words or associations with overweight. (Pagnini 2007)

The children, being fully clothed in winter clothing might have made estimations by visualisation more difficult – however, the reality of clinical practice is that assessments are attended by most clinicians in light clothing. This strengthens the need for clinicians to calculate the BMI of the child during the consultation.

### **Strengths**

To the best of the author's knowledge, this is the first study to combine the primary aim of reporting of BMI of pre-school children attending HKC/immunisation at both GP practice and Community Health Centre, primary health care nurse and parent estimation and parent level of concern together in a rural Australian setting. The additional secondary aim of describing parent preferred sources of support was identified as important local health planning information, to guide health clinicians and managers target their primary health prevention in the local community. The preferred sources of support will enable increased local engagement in community partnerships to target parents of children aged 0-5 more effectively.

Inclusion for the study was based on presentation for the four year old vaccination or HKC, the immunisation particularly being a universal attendance where there is less association with weight status where parents might opt out of participating because of any perceived discomfort with weight status. Of the participants invited for recall – there was a strong response rate.

Analysis of the two groups showed that there were no statistical differences between children who present at the GP practice and those presenting to the CHC for recall. This suggests that findings from this work are likely to generalise to the greater population of children aged three to five in Parkes.

Blinding was achieved through both parents and nurses indicating their estimations of weight status prior to anthropometric measurements.

Notwithstanding the study's limitations, the results of the recalled sample indicate a 'normalisation' of weight status from visualisation alone with parents and health staff about children's weight status in relation to BMI and is consistent with previous findings with parent and health worker misperception and parental lack of concern (ref). It maybe possible for parents to be privately concerned and not wish to disclose this concern at the time of survey.

### **Implications and recommendations for future research:**

The findings of this study, consistent with broader surveys of high prevalence of increased BMI but as yet little morbidity, suggest that the preschool and school entry periods may be an optimal time to address excess adiposity, before health impacts develop (ref LSAC study). The HKC and immunisation which is due between years three and five, present opportunities for BMI identification at an individual level, at population surveillance level and an opportunity to coordinate clinical management of children at risk of excess weight gain.

In particular, in the context of the expanded HKC and the National Health Reform's increased integration between state funded community health facilities and federally funded Medicare Local facilities in addressing local health needs, the prevention of excess weight gain in early childhood needs further collaboration. CAFHN, Community Nurses, Practice nurses, GP's, Paediatricians and Dietitians need to develop local pathways which incorporates the 5A's Approach as recommended in the Guidelines.

Extension of the study for a further 6 months would facilitate the to a prospective BMI collection and parent survey for children presenting at all Parkes GP practices and Community Health Centre for their HKC or immunisation. This secondary phase will build on the initial retrospective phase, to gauge parental and nurse responses to the survey contemporaneously in routine clinical practice.

BMI identification, management, referral and clinical pathway education is particularly required for primary health care nurses involved in HKC/immunisation of Australian children aged three to five, in order that this universal point of access with the health system, is utilised for the prevention and management of excess weight gain to its full potential. It would be beneficial to research the influence or impact of primary health care nurses identifying elevated early childhood BMI's has with parents of children aged three to five attending HKC's.

This study was small therefore it would be useful to replicate data collection and analysis in different rural location. This study indicates an opportunity for ongoing exploration into BMI collected at the HKC in both state and federally funded services, possibly in other selected and urban sites in order to contextualise the study data for HKC.

This report will be publicly available on the NSW HETI website and distributed to Western NSW Local Health District Child and Family Health Nurse, Dietetic and Paediatric Staff Specialist disciplines for study results and recommendations to be commented and critiqued for value in clinical practice. The report will also be distributed to the Western Medicare Local Network for feedback. Study results will be submitted to appropriate conferences and journals for potential dissemination and publication.

It is beyond the scope of the researcher to explore the feasibility of linking the HKC and/or immunisation with BMI surveillance on a population level and utilising the Australian Childhood Immunisation Register (ACIR). It is unknown at the time of report, whether this conjecture has merit or is being investigated in Australia.

## **Conclusion**

Children have a high burden of overweight and obesity during the early childhood years, which increases as they enter school, with specific populations groups like this rural population of three to five year olds, who are more at risk of unhealthy weight gain.

Health professionals in primary health care are ideally situated for intervention for weight management and are a universal and trusted source of support. GP's, Practice Nurses and Community Nurses are a potential conduit to childhood obesity prevention programs particularly at the pre-school universal immunisation and childhood surveillance screening

points as there are high presentation rates of children with a parent or carer. There is a need for population and coordinated community-wide prevention and intervention strategies with state and federally funded health services and other community sources of support that parents identify strongly with.

The important message is that whilst all children are at risk of excess weight gain and interventions should be universal where possible, risk is not destiny and there are opportunities for local communities to examine ways to support parents support their children to reduce their risks of unhealthy weight gain.

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## APPENDICES

### Appendix 1: Parent/Carer Survey Form

#### Lachlan Healthy Kids Project Parent /Carer Survey

ID number \_\_\_\_\_

Child's Date of Birth: \_\_\_/\_\_\_/20\_\_\_ (please complete)

Today's Date: \_\_\_/\_\_\_/20 (please complete)

Sex of Child: Male/Female (Please circle one)

**1. Please tick your estimate of your 3-5 year old child's weight at the moment? (please tick one)**

- I think my child is a **healthy** weight (*for their age & height*)
- I think my child is **under** the healthy weight (*for their age & height*)
- I think my child is **over** the healthy weight (*for their age & height*)
- I think my child is **very over** the healthy weight (*for their age and height*)

**2. Please indicate your level of concern about your 3-5 year old child's weight? (please tick one)**

- I'm not concerned about my child's weight
- I'm concerned about my child not weighing enough
- I'm a little concerned about my child weighing too much
- I'm very concerned about my child weighing too much

**3. Where do you prefer to get ideas, information and support for weight & growth management, healthy eating and physical activity for my child & family, (please circle yes or no for every option),**

- Yes / No Individual sessions with a local Health Professional
- Yes / No Local organised group with other parents
- Yes / No Local organised group with other parents AND children
- Yes / No Internet information eg. [www.healthykids.nsw.gov.au](http://www.healthykids.nsw.gov.au)
- Yes / No Friends/family
- Yes / No Telephone support
- Yes / No Pre-school or childcare
- Yes / No Other - please state \_\_\_\_\_

**4. If you circled YES to sessions with "local Health Professional", please number 1, 2, 3 or 4 beside the ORDER of health professionals you would PREFER to contact for information & support for weight & growth management, healthy eating & physical activity for your child & family (eg 1 beside the first professional you would seek advice from)**

- Child & Family Health Nurse
- Dietitian

GP

Paediatrician

Practice Nurse (at GP surgery)

**Thank you ☺**

**Please fold survey and place in envelope, seal the**



