South Asian individuals' experiences on the NHS low-calorie diet programme: a qualitative study in community settings in England

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Title: - South Asian individuals' experiences on the NHS low calorie diet programme: a qualitative study in community settings in England.

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Word count: abstract 298, manuscript 4253

Conflicts of Interest: All authors confirm that they have no conflicts of interest to declare. LE has received funding from NIHR, MRC, Leeds Council and OHID/PHE in the last 3 years, and has had an honorary contract with OHID. CB is a primary care advisor to the national diabetes programme for NHS England.

Funding information: This work was supported by the National Institute for Health Research, Health Services and Delivery Research [NIHR 132075]. The NHS England Low Calorie Diet Pilot is funded by NHS England.

Contributor and guarantor information

"The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted."

Transparency statement: The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

Abstract

Background: Existing literature examines barriers to the provision of ethnically diverse dietary advice, however, is not specific to total diet replacement (TDR). There is a lack of literature from the United Kingdom (UK), limiting the potential applicability of existing findings and themes to the UK context. This study addresses this gap in research by interviewing participants of South Asian ethnicity who have undertaken the National Health Service (NHS) Low Calorie Diet programme (LCD) for people with type 2 diabetes living with overweight or obesity. This study explores factors that may affect the uptake and acceptability of its total diet replacement, food re-introduction and weight maintenance stages. This aims to provide rich data that can inform effective tailoring of future programmes with South Asian participants.

Objective: To explore the perspectives of individuals of South Asian ethnicity on an NHS programme using total diet replacement approaches for the management of T2D.

Design: Qualitative study.

Setting: Individuals in the community undertaking the NHS LCD programme.

Participants: Twelve one-to-one interviews were conducted with individuals from a South Asian ethnicity participating in the NHS LCD.

Main outcome measures: Qualitative semi-structured interviews conducted through different stages of the programme. Reflexive thematic analysis was used to analyse the transcripts.

Results: Key themes highlighted positive and negative experiences of the programme: 1. More work is needed in the programme for person-centeredness 2. It's not the same taste. 3. Needing motivation to make changes and feel better. 4. A mixed relationship with the coach. 5. Social experiences. 6. Culture-related experiences.

Conclusion: This study provides important experience-based evidence of the need for culturally tailored T2D programmes. Action to address these findings and improve the tailoring of the NHS LCD may improve experience, retention and outcomes on the programme for people of South Asian ethnicity and thereby reduce inequalities.

Strengths and limitations of the study.

- The study captured participant experiences at different stages of the programme allowing an exploration of experiences and how their views may changeover the programme course, thereby providing an understanding of the challenges and strengths at each stage.
- The research was unable to explore the differences within South Asian ethnicities and how there are differences within ethnicities and cultural traditions.

- Despite intending to do so, not all service providers of the NHS LCD are represented in the sample as there was a lack of uptake by service users and thus a lack of representation of service providers.

Introduction

The prevalence of type 2 diabetes (T2D) is increasing, with 2 million people at an increased risk of T2D in the United Kingdom.(1) T2D disproportionately affects certain ethnic groups such as South Asian and Black ethnicities, with age-standardised prevalence of 13%, 20% and 15% in people of Indian, Pakistani or Bangladeshi ethnicity respectively and 11% and 14% and 11% in people of Black Caribbean and Black African ethnicity respectively, compared to 6% in people with Chinese ethnicity and 6% in people with White British ethnicity.(2) Evidence suggests ethnically diverse populations face barriers in accessing and adhering to behavioural weight management or diabetes support programmes, leading to suboptimal outcomes and increased health disparities.(3, 4) Understanding the reasons for poorer uptake and adherence in these populations is critical to developing targeted interventions and improving health equity. Although research indicates culture has a strong influence on diet, relatively little is known about the experiences and perceptions towards low calorie diets using total diet replacement in people of South Asian ethnicity.(5, 6) Culture is a multifaceted concept that encompasses the shared values, beliefs, customs, traditions, and behaviours of a particular group or society.(7) It serves as a framework through which individuals experience community, interact with one another, and pass down their collective heritage to future generations, encompassing a dynamic, evolving entity that is influenced by historical, social, economic, and environmental factors.(8)

This research contributes to the Re:mission study, a national evaluation assessing the impact of the NHS Low Calorie Diet (LCD) programme. The NHS LCD Programme (as of June 2023, renamed the NHS Type 2 Diabetes Path to Remission Programme), is commissioned by NHS England (NHSE). The NHS LCD programme is available to adults (18-65 years living with a BMI ≥27kg/m² (adjusted to ≥25kg/m² for Black, Asian and other ethnic groups) and T2D diagnosis within the last 6 years, living within the pilot localities.(9) It is based on evidence that using total diet replacement (TDR) and behaviour change approaches can be effective in achieving T2D remission (HbA1c < 48 mmol/mol, without the use of glucose-lowering medications) in individuals with T2D (≤6 years).(10, 11) The 52-week programme was initially piloted across 10 socio-demographically diverse areas in England, and included a 12-week TDR phase which consists of micronutrient-complete foods such as bars, shakes and soups of various flavours (estimated 900kcal/day) for the first 12 weeks, followed by a 6-week stepped food reintroduction phase and weight maintenance support until programme end. The intervention was delivered through different formats including face-to-face or online (1:1 or group) and digital delivery, with a single modality for each pilot area. Supplementary file 1 provides further background information on the programme including the demographic information on the population living with diabetes and briefly an overview of the three stages of the programme.

The NHS LCD service specification details on maximising completion rates through tailored goals to suit individual participant requirements and that delivery of the service should be

tailored to the cultural context of participants be sensitive to different culinary traditions, including where possible for the TDR products themselves.(12) While the underpinning trials which informed the design of the NHS LCD Programme, DiRECT and DROPLET, lacked ethnic diversity among participants(10, 11), the STANDby trial has shown comparable weight loss and T2D remission rates in an ethnically South Asian population in the UK.(13) However, there has been a lack of qualitative work in this area; a study exploring participant experiences of the intervention only included people of White British ethnicity, limiting the potential to reliably extrapolate findings to other population groups.(14)

Preliminary data from the NHS LCD Programme highlights that 18% of referrals were made for people of Asian ethnicity vs 64% of referrals for people of white ethnicity. The preliminary data suggests that individuals from a South Asian ethnicity have lower programme uptake than those of white ethnicity (60% vs 74%) and lower 12-month weight loss (6.8% vs 10.3%).(15) Supplementary file 1, table 3 provides ethnicity data at pilot site level. Given these inequalities, this work seeks to further explore barriers to uptake and engagement to improve future service delivery. This is the first study to explore the experiences and perceptions of people of South Asian ethnicity participating in the NHS LCD Programme. The aim of this study is to explore the perspectives of individuals of South Asian ethnicity participating in the NHS LCD for T2D. Specifically, the research focuses on understanding the factors influencing the uptake and acceptability of the programme, with the aim of providing insights that can inform further tailoring and to improve the equity and impact of future service delivery.

Methods

The study is reported according to the consolidated criteria for reporting qualitative research (COREQ) checklist (see supplementary file 2). The project aim is to 'deliver a coproduced, comprehensive qualitative and economic evaluation of the NHS Low Calorie Diet pilot, that will be integrated with the NHSE quantitative analyses, to provide an enhanced understanding of the long-term cost-effectiveness of the programme and its implementation, equity, transferability and normalisation across broad and diverse populations'.(16)

A qualitative research design was employed which centres the subjective views of the participants while recognising that these experiences may be shaped by underlying structural, cultural, and contextual factors.(17) Interviews and data analysis were conducted by PD who identifies as a female of Indian ethnicity.

The study was conducted over a period of 12 months, allowing for engagement with participants across the three stages of the programme, while also providing time for data collection, analysis, and interpretation within the broader context of the research objectives. Interviews were completed which captured participants at different stages of the programme including TDR, food reintroduction (FR) and the weight maintenance (WM) phase.

Recruitment and sampling

Participants (n=12) were recruited through purposive sampling, directly through service providers who are commissioned by NHSE to deliver the programme. The service providers sent out invitation by email upon request of the research team directly to participants who met the eligibility criteria regarding interest in this study. The email included the consent form, participants information sheet and a video of the lead research discussing the study in Hindi and English. Participants were informed in the email that the interview could be undertaken in their first language. Eligibility criteria included being from a South Asian ethnicity and participation in the NHS LCD programme. All participants of the interviews were sent a £10 shopping voucher as a token of appreciation for their time.

Malterud, Siersma, and Guassora's (2016)(18) concept of information power can be used within reflexive thematic analysis as an alternative to data saturation as described by Braun and Clarke (2021). This approach allows an interpretive judgement regarding study size related to the purpose and goals of the analysis.(19)

Amongst those of South Asian ethnicity recruited, there were a mixture of self-reported cultural identities including Muslim or Pakistani (n=6), Indian (including Gujurati and Hindu) (n=4) and Bangladeshi (n=2) and there were slightly more females (n=7) than males (n=5) in the study. These identities were as self-reported by the participants as descriptions of ethnicity, reflecting differing interpretations of this term in the participants surveyed. The participants were at different stages of the programme, TDR (n=3), FR (n=1), WM (n=2) and finished (n=5), one participant did not disclose their stage of the programme.

The table below details the demographic data of the participants. Ethical approval was gained from Leeds Beckett University (LBU 102077), written informed consent was obtained from participants. The Re:Mission study was approved by Health Research Authority (20) on 5 July 2021, REC ref: 21/WM/0136. See supplementary file 3 for the consent form.

Table 1: Background information

Participant number	Programme delivery	Self-reported cultural identity	Gender
1	Online group	Muslim	Female
2	Online group	Muslim	Female
3	Nil information	Muslim	Male
4	Online group	Muslim	Female
5	Online	Indian- Gujurati	Male
6	Online group	Indian- Hindu Gujurati	Female
7	Online	Indian	Male
8	Online group	Pakistani	Male
9	Online group	Bangladeshi	Female
10	Online group	Bangladeshi	Female
11	Online	Indian- Muslim	Female
12	Online group	Indian	Male

Materials and procedures

The interview questions broadly covered participants' experience of the programme. See supplementary file 4 for interview guide. Written consent and socio-demographic information were obtained prior to the interviews and the participants were informed that they were free to answer the interview questions in Hindi, Urdu, Punjabi or English; two of the participants requested the interview be conducted in Urdu. All of the semi-structured interviews were conducted by PD via Microsoft Teams which lasted 40-90 minutes. All the interviews were audio-recorded (with permission); the Urdu interviews were transcribed verbatim by PD and an external transcriber transcribed the remainder of the interviews.

Patient and Public involvement

In this study, we sought insights from the Re: Mission PPIE group during the development of the interview schedule. The PPIE group did not participate in any other aspect of the study.

Data analysis

Interview data were anonymised during transcription, and all transcripts were checked for accuracy by one researcher (PD). Interview field notes enhanced this reflective process. NVivo (version 12) software was used to facilitate data management. Six steps of reflexive thematic analysis proposed by Braun and Clarke were followed.(21) PD read and re-read the transcripts multiple times to gain familiarity, whilst annotating relevant extracts and noting ideas that could aid the coding in the subsequent stages. Codes and themes were generated and revised on multiple occasions; these were also discussed with MM.

Reflexive thematic analysis was used given the diverse cultural backgrounds and multi-dimensional identities of the participants and the identity of the lead author. This method allows for a thorough examination of the richness and depth of their perspectives across the different stages of the programme.(21) The COREQ checklist highlights further detail on the reflexive process – see appendix 1.

Results

Six themes were identified which are described below. The theme development is shown in Appendix 5. The analysis of the themes below is supported by direct quotes, which are followed with a quote label of the participants' self-reported cultural identity, gender and participant number.

1. More work needed in the programme for person centeredness.

Many participants reported feeling their religion and culture were considered with dietary products being halal and that their religious circumstances were accommodated through being provided advice for undertaking Ramadan during the programme. It is important to note that the only examples provided from participants were in regard to Ramadan and TDR being halal, despite having a diverse range of participant ethnicities, and that this was across all of the providers.

> *' '…on the app they had like you know, how to deal with it if you're in Ramadan.' (P5, Indian Gujurati, Male)*

"...it wasn't tailored to me, it wasn't individual to me." (P10, Bangladeshi, Female,)

Despite these religious considerations being acknowledged to some extent, participants also described the guidance provided within the programme to be oriented toward a Western diet. The absence of recipes and meal plans tailored to South Asian cuisines and other cultural practices left participants struggling to effectively apply the programme recommendations to their familiar ethnic foods. Participants reported a sense of responsibility to independently modify recommendations to align with their ethnicity and cultural dietary practices.

2. It's not the same taste.

The participants' described during the TDR stage, a significant barrier of disliking the taste of the TDR products. This sentiment was compounded by the challenge of refraining from cultural foods and the lack of diverse flavours in the products. The findings highlight the importance of acknowledging the role cultural preferences play in dietary adherence.

I think it's not the food, it's the taste that, that was a big barrier." (P3, Muslim, Male).

Participants described for future that incorporating more diverse and culturally resonant flavours could make the dietary transition more palatable and contribute to improved acceptability and sustainability of the programme.

'there is some masala that Asians eat, add some masala, like cumin seeds, they are healthy, what problem is there in them, so add a little bit it's okay' (P1, Muslim, Female).

3. Needing motivation to make changes and feeling better.

Participants highlighted the important role of motivation in making dietary changes. These changes encompassed altering portion sizes, reducing the quantity of staple foods, and adopting modified cooking methods.

Participants described the role of motivation as a driving force in adopting dietary adjustments and engaging in physical activities. This motivation correlated with observing weight loss outcomes, which subsequently fuelled their commitment to the programme. Motivation was also needed for overcoming the challenges in the programme including managing social interactions such as mealtimes. Motivation was also described as necessary for making changes in dietary behaviours, with one participant describing the need to refrain from cultural foods such as biryani, but needing motivation to do this. *'…motivation is needed to change your eating behaviours.' (P3, Male, Muslim)*

The observed dietary adjustments were associated with reported improvements in overall wellbeing. A common sentiment was the shift from feelings of tiredness prior to the programme to experiencing greater energy, including being able to partake in activities which were previously challenging, such as using the stairs and walking children to school. This shift translated into enhanced self-assurance, motivation, and increased vitality. *"I feel very confident, I feel energetic.." (P12, Indian, Male)*

4. A mixed relationship with the coach.

The relationship with the coach from participants' perspectives was complex. On one hand, participants praised the supportive role of coaches, commending their empathy, effective communication, and provision of resources. However, a lack of cultural understanding was also described, where coaches occasionally exhibited a lack of understanding regarding South Asian cultural nuances: *"Because I think the person I spoke to initially didn't really know what, what halal was." (P10, Bangladeshi, Female).*

This lack of understanding created barriers in participants being able to make changes and led to misunderstandings. This is highlighted from the interviews in which participants described reducing the quantity of cultural foods such as chappatis as they were associated with being 'unhealthy': *"I stopped eating like, you know, the like traditional food. Chapatis, even.." (P8, Pakistani, Male).*

However, when coaches shared the same cultural background and language, participants felt they were culturally compatible and this facilitated a more comprehensive understanding of diet and social situations, which enhanced the overall experience. This was resonant in the group whose programme was delivered in Urdu, as these individuals described how helpful it was to have the coaches deliver the programme in the same language and provide tailored information for them. These findings highlight a key point within the discourse on whether there is a preference for ethnic matching of health professionals and clients or instead a focus on cultural competency: *'It was good because the coach used to speak in our language.' (P1, Muslim, Female). " So [coach] used to always help out with it as she was into that culture as well.' (P4, Muslim, Female).*

5. Social experiences.

There was a tendency among participants to avoid engaging in social gatherings and familial events during the TDR phase. This avoidance behaviour emerged as a protective mechanism to mitigate exposure to potential dietary temptations and uphold their commitment to the programme: *'I was saying no to social events as much as possible.' (P11, Female, Muslim).*

Participants conveyed the multifaceted challenge of balancing mealtime routines with familial dynamics, which created feelings of emotional detachment and loneliness during TDR. The incongruity between dietary restrictions and familial culinary traditions often caused participants to partake in solitary meals, evoking a sense of emotional emptiness. Additionally, some participants, particularly the women, assumed a central role in meal preparation and cooking for the household. This was despite their inability to partake in these meals themselves, demonstrating the role adjustments necessitated by engagement with the dietary intervention.

6. Culture-related experiences.

Participants' experience of support and their culture were closely intertwined. A lack of encouragement from family and friends during their engagement with the programme was described. This lack of support was sometimes a result of participants' avoidance of social

occasions (as outlined in the previous theme) and refusal of foods when they did attend events, resulting in attempts by family and friends to persuade them to deviate from TDR. Participants attributed these negative encounters to cultural norms, familial expectations, and others' lack of understanding of the medical need for the diet. This occasionally led them to selectively withhold information due to the anticipation of negative feedback and as a protective mechanism. Participants described how this sense of being inadequately understood within their cultural environment fostered sentiments of isolation and feeling demotivated: *'The family members make it a problem, start making comments. You are doing this, doing that.' (P1, Female, Muslim).*

Conversely, fellow participants enrolled in the programme, particularly those who shared the same South Asian ethnicity, emerged as sources of support and encouragement. Reciprocal exchanges of meal ideas and empathetic encouragement were reported, with shared cultural insights facilitating a deeper comprehension of the social and cultural barriers encountered. The collective ethos among culturally akin participants fostered an environment of mutual support: *'We used to discuss everything about the culture like the way, way the culture is..' (P4, Muslim, female)*

Discussion

This study provides a unique insight into the experiences of people from a South Asian ethnicity undertaking the NHS LCD Programme. Key themes were described around social and cultural experiences which encompassed relationships with families and coaches, cultural tailoring and support. The results highlight the challenges people of South Asian ethnicity face in balancing adherence to the programme's recommendations and their diverse cultural contexts, including challenges relating to cultural foods, social events, eating with family, maintaining motivation and applying advice and recommendations to their diet and lifestyle. The description of motivation resonates with the broader literature on behaviour change and its influence for adherence and adaption within health interventions.(22)

These findings suggest the intersectionality of multiple social identities, shape the individual challenges and needs faced by people of South Asian ethnicity.(23, 24) For example, the intersections between gender and ethnicity for South Asian women meant that they navigated the roles of being in charge of household duties like cooking, while simultaneously managing cultural challenges posed by family members concerning their participation in the programme. This overlap of identities underscores the layered complexity of their experiences, encapsulating how cultural expectations, gender roles, and familial dynamics intersect to shape their engagement with the LCD programme.(24)

The interviews provided a range of perspectives on the impact of coaches' ethnicity and how they are influenced by cultural competency of the coach, with some benefits seen following ethnic matching with participants.(25) Some participants discussed the advantages of having a coach who shared the same ethnicity, leading to shared understanding, reduced language barriers and ability to ask culturally specific questions. This is supported by previous research which found racial concordance to be positively

related with patient satisfaction, improved communication and better health outcomes.(26, 27) However, these studies are based in the United States of America (USA), did not include T2D programmes and there was no differentiation between 'Asian' participants.(26-28) By contrast, for some participants cultural competence was more important than ethnic matching. Different views on ethnic matching are supported in the literature, including a lack of clarity in research for cultural matching, instead evidence suggests more important than ethnic matching is cultural competency of the service provider. (29)

There was an emphasis on the value of culturally aligned peer support, with participants reporting benefit from connecting with others with whom they shared a mutual understanding and similar challenges. There were exchanges of meal ideas, encouragement and support. The importance of peer support in weight management and T2D management programmes has been documented, with participants citing the importance of having others who can understand their experience and provide support(30-32), however the distinct contribution of ethnically matched peer support is limited.(29, 33) Matched peer support may be successful is due to relatability and shared experience, with specific cultural nuances, traditions and dynamics potentially more effectively navigated within peer networks in a particular ethnic group as described in previous mental health research.(34, 35)

The required cultural tailoring described by participants included language support, tailored resources and how the programme itself is run. For example, participants in this study reported barriers to adherence to be related to the lack of culturally tailored information, lack of understanding from coaches and families, feelings of isolation and difficulty with motivation. The cultural adaptations that were in place indicate 'surface structure' adaptations(36) such as through the Urdu language group, and some ethnic specific resources such as for Ramadan. It is argued that such adaptations increase engagement with health-related messages; however, 'deep structure' adaptations go beyond superficial adjustments and incorporate understanding of cultural underpinnings. (36) Interventions which have been adapted at a deeper level align with guiding principles for cultural tailoring(37) and are more likely to result in behaviour change.(38) Deeper levels of cultural adaptation entail an understanding of social, cultural, environmental and psychological factors that influence health behaviour such as with social support including how to manage potential familial conflicts, family involvement and co-production of materials with target communities.(39) This highlights the importance of culturally sensitive and individualised dietary support within interventions for diverse populations, emphasising the need for a holistic approach that considers varying degrees of cultural and religious identification.(37)

A significant barrier to TDR was the taste of the products. Addressing these issues requires an approach which acknowledges individual taste preferences, a factor which goes beyond cultural considerations. Improving the palatability through inclusion of herbs and spices was a frequent suggestion, with many participants already adding additional flavours to the products. This was of particular significance for participants which had a limited availability of products (only soups and shakes). For others where meal replacements were available, they described the cultural foods such as the daal to have an unappealing taste and

inadequate seasoning. Products can be refined through addition of variety and flavours, and considering participants preferences, irrespective of cultural background.

To develop culturally tailored and appropriate interventions, it is imperative to have an in-depth understanding of how the factors influencing dietary behaviours may differ and interact in different populations within a low calorie diet programme.(38) Therefore, designing more appropriate policies and interventions may impact on health inequalities(40), however, to do this, participants views of the factors influencing management of their condition need to be better understood.

This is the first study to collect qualitative data from participants of South Asian ethnicity on the NHS LCD Programme. However, previous research has looked at perspectives of people of South Asian ethnicity in dietary programmes and found similar results; individuals wanted multilingual support, peer support, and help with challenges around social and cultural factors such as family dynamics.(41-43) Furthermore, research exploring acceptability of TDR and low energy diets in South Asian populations found participants had a preference for culturally tailored low energy food-based diet and that spices needed to be included to support with their home culture.(44)

<u>Recommendations for practice.</u>

Specific recommendations to improve uptake and outcomes for people of South Asian ethnicity include:

- Incorporating a diverse flavour profile and variety of products during TDR such as food-based items to improve the taste, choice and allow for eating socially with family and friends.
- Working with local communities and utilising existing literature for tailored resources such as ethnic-specific Eatwell guides.
- Tailored behaviour change support to help overcome some of the social, and cultural barriers such as mealtimes and family gatherings.
- Where feasible, consideration of ethnically matched peer support.
- Cultural competency training for staff delivering programmes which considers social, cultural, environmental and socio-economic factors.

Further research is needed regarding the interaction of cultural norms and gender dynamics in the context of weight management programmes, including how cultural expectations surrounding gender roles may influence dietary changes. People of South Asian ethnicity have been underrepresented in large national diabetes studies, which has resulted in limited, culturally-appropriate evidence-based recommendations.(45) Furthermore, research is needed into the long-term sustainability and maintenance of outcomes of the

NHS LCD programme in people of South Asian ethnicity. This would allow exploration of how cultural, social and environmental factors contribute to sustained behaviour change.

Strengths and limitations

To our knowledge this is the first study of this kind, it provides insights into the participants' experiences, an area of research which is underrepresented within LCD and South Asian ethnicity.(46, 47) The findings can contribute to future changes in policy and practice within weight management interventions and in the context of health programmes for people from a South Asian ethnicity, informing culturally tailored and effective approaches. A further strength is PD's positioning within the community of study, as a South Asian researcher who conducted interviews in the same language and shares a cultural background with participants. Another strength is that this research captures participants at various stages of the programme, allowing an exploration of experiences and how they may evolve over the programme course, thereby providing an understanding of the challenges and strengths at each stage.

However, this could also present a limitation in how much their experiences reflect the full trajectory of the programme as participants were captured at different stages. The research was unable to explore the differences within South Asian ethnicities and how that may vary within ethnicity and cultural traditions. A further limitation is the lack of demographic data, which could restrict the understanding of sociodemographic contexts of the participants. Furthermore, despite trying to recruit participants from all service providers, there was a lack of uptake and not all service providers are represented.

Conclusion

There is a need for tailored and culturally appropriate T2D interventions for South Asian individuals which have a focus on being person-centred. This research highlights the important role of culture, motivation and community engagement. To effectively reduce inequalities, interventions should engage communities and target populations in the development of both the intervention and relevant resources to meet their unique needs and preferences, considering social and cultural environments.

In interventions such as the NHS LCD programme, consideration is required for how cultural competence is implemented, and for this to represent a deep level of understanding and adaptation which goes beyond language and resources. This research emphasises the need for person centred and culturally tailored strategies to provide equitable health interventions and outcomes for South Asian populations.

Declarations

The views expressed in this paper are those of the authors and not necessarily those of the NHS or the National Institute for Health Research.

Availability of data and materials

The datasets generated during this current study are not publicly available due to reasons of privacy and confidentiality, and because of the inability to de-identify the data. Additional

knowledge of the data can be available from the corresponding author on reasonable request.

Contributor statement

PD, MM, CH, KD and LE provided substantial contributions to the design of the work. PD, MM and KD provided substantial contributions to the interpretation of data for the work. All authors PD, MM, KD, CH, LE and CB drafted the work and provided revisions. All authors provided final approval of the version to be published and provided agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Competing interests

All authors confirm that they have no conflicts of interest to declare. LE has received funding from NIHR, MRC, Leeds Council and OHID/PHE in the last 3 years, and has had an honorary contract with OHID. CB is a primary care advisor to the national diabetes programme for NHS England.

Funding

This work was supported by the National Institute for Health Research, Health Services and Delivery Research [NIHR 132075]. The NHS England Low-Calorie Diet Pilot is funded by NHS England.

Ethics approval

Ethical approval was gained from Leeds Beckett University (LBU 102077), written informed consent was obtained from participants. The Re:Mission study was approved by Health Research Authority on 5 July 2021, REC ref: 21/WM/0136.

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