

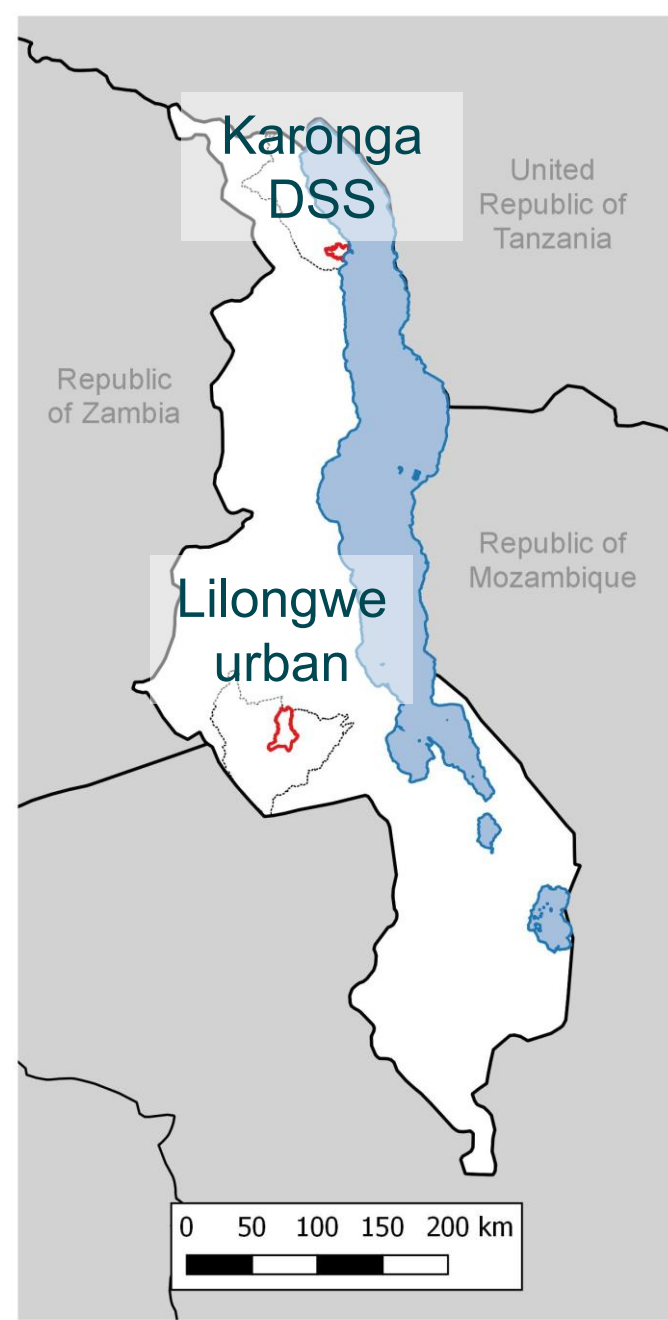
Evaluation of a school-based programme to reduce salt intake and blood pressure amongst adolescents and their parents: a cluster-randomised controlled trial in Malawi (ISRCTN: 13909759)



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Introduction:

- Salt (sodium chloride) intakes **regularly exceed recommended limits** (<5g/day), with global target to reduce population sodium intake by 30% by 2030¹
- Limited progress in implementation of sodium reduction policies² and a **lack of evidence** for contextually-relevant strategies in sub-Saharan Africa (SSA)³
- Primary schools are routinely used for delivery of basic health interventions in SSA (e.g. school feeding, deworming) and offer a **pragmatic platform for NCD prevention**
- School-based salt reduction demonstrated to be effective in China⁴, but **not previously evaluated in SSA** or a low-income setting.



Methods:

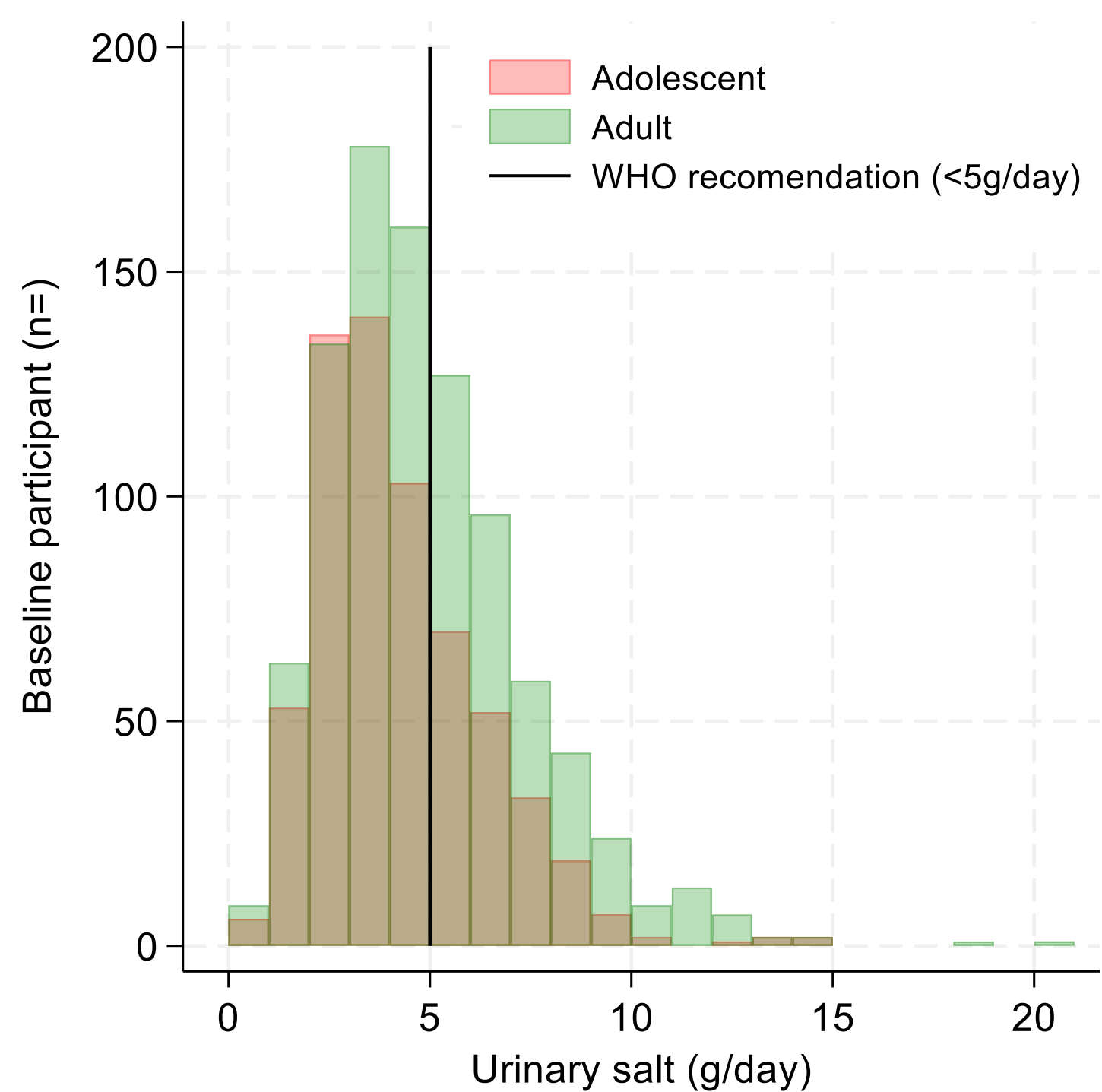
- Cluster-randomised trial** in 26 primary schools (clusters) in Karonga (rural) and Lilongwe (urban) areas of Malawi between September 2019 - January 2021
- Randomisation (1:1) to **school-based salt reduction programme** (intervention) or **routine curriculum** (control)
- 25 adolescents** (age 11-14 years) randomly selected, **plus 50 parents or caregivers** of the sampled adolescents, per school
- 24-hour urinary salt** and **blood pressure** assessed at **baseline** and **3 months**, and 12 months (blood pressure only)

Intervention:

- 10-week (1 term) programme** delivered by class teacher for 1 hour a week to all pupils in standard 6
- Comprised of 3 major elements (**classroom lessons, household activities, community meetings**)
- Adolescents supported to be **‘agents of change’** to promote salt reduction to their parent and caregivers
- Developed through **co-creation process** with stakeholders from health and education sectors, and **piloting**⁵



Figure 1: Baseline urinary salt of participants



- 732 adolescents** and **1236 adult** participants recruited for baseline assessment
- 30%** of adolescents and **41%** of adults with **baseline urinary salt ≥5g/day**
- Minimal loss to follow-up** of adolescents at 3 (2.1%) and 12 (10.4%) month assessments
- High level of participation in intervention (**mean attendance of 87.4%** by adolescents)

Figure 2: Change in adolescent urinary salt

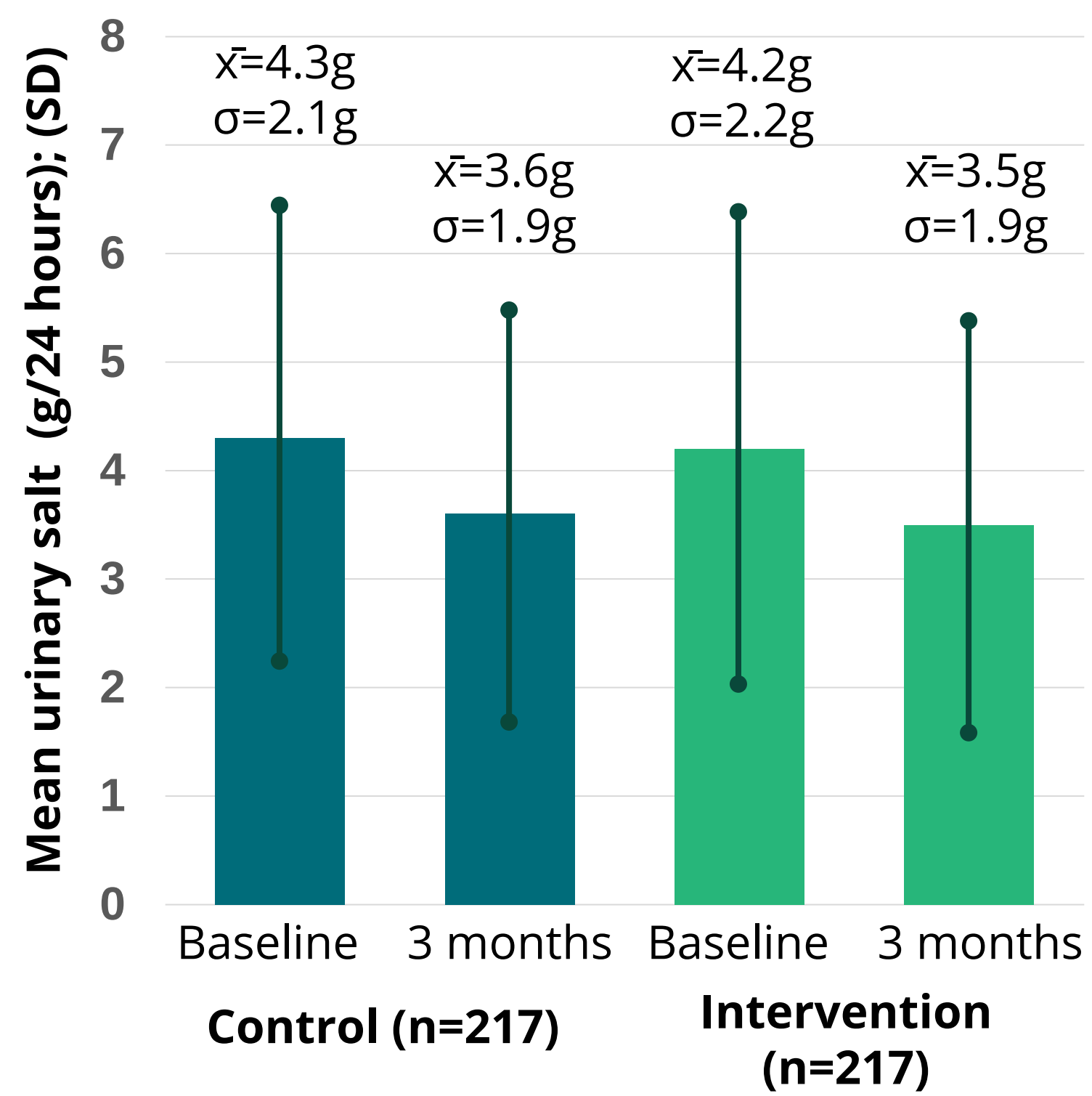
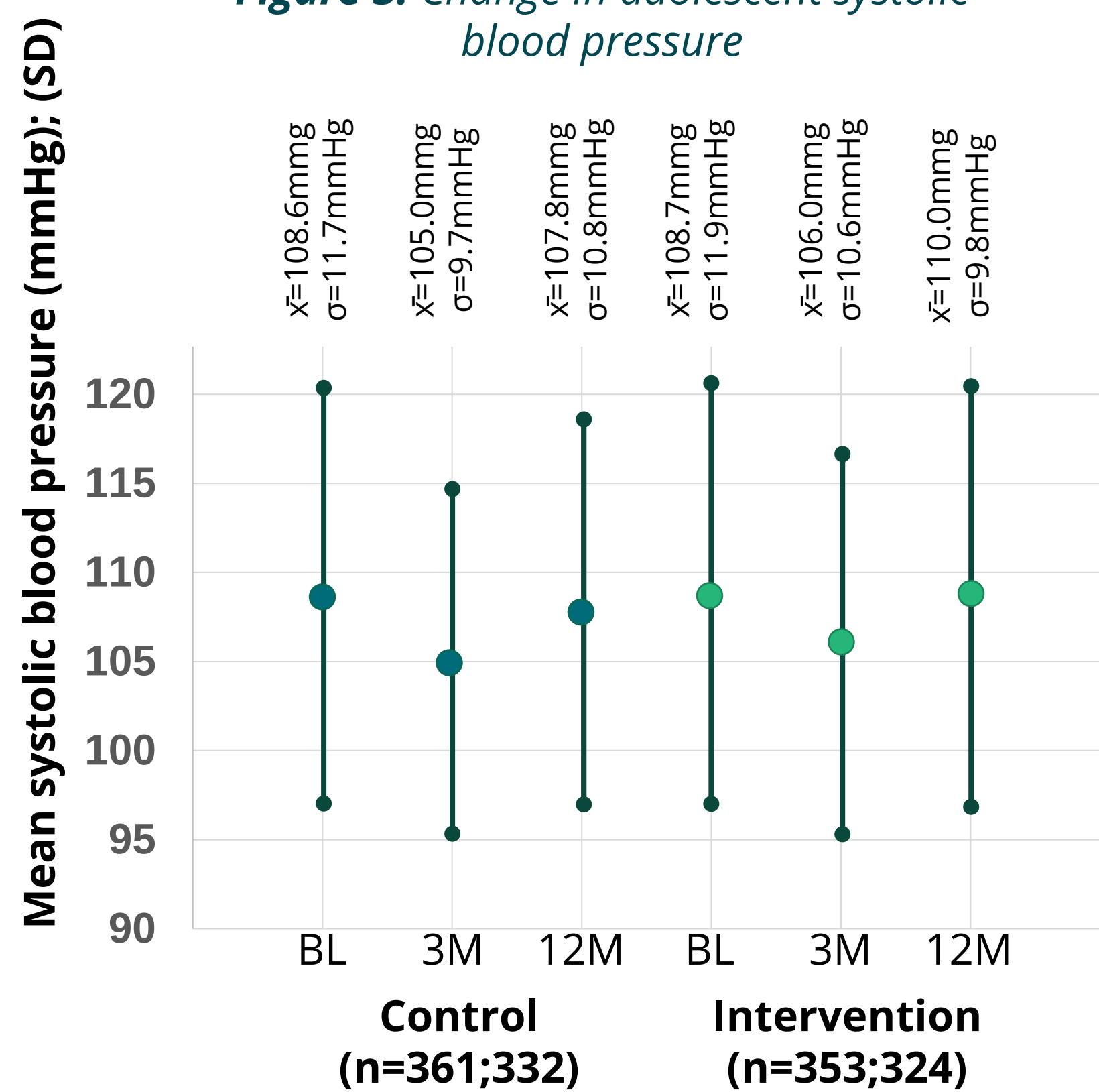


Figure 3: Change in adolescent systolic blood pressure



Co-primary outcome: No significant difference in change from baseline to 3 months between groups for adolescent urinary salt (**-0.17g/day, 95% CI -0.63 – 0.29, p=0.44**) or adolescent systolic blood pressure (**0.59mmHg, -1.80 – 2.97, p=0.61**). Suspected incomplete 24-hour urine samples excluded if ≥2 voids reported missing or below minimum threshold values for urine volume or urinary creatinine concentration. Analysis by ITT. Mixed model (random intercept for school) of dependent variable on treatment, baseline, and trial stratification factors

Figure 4: Change in adult urinary salt

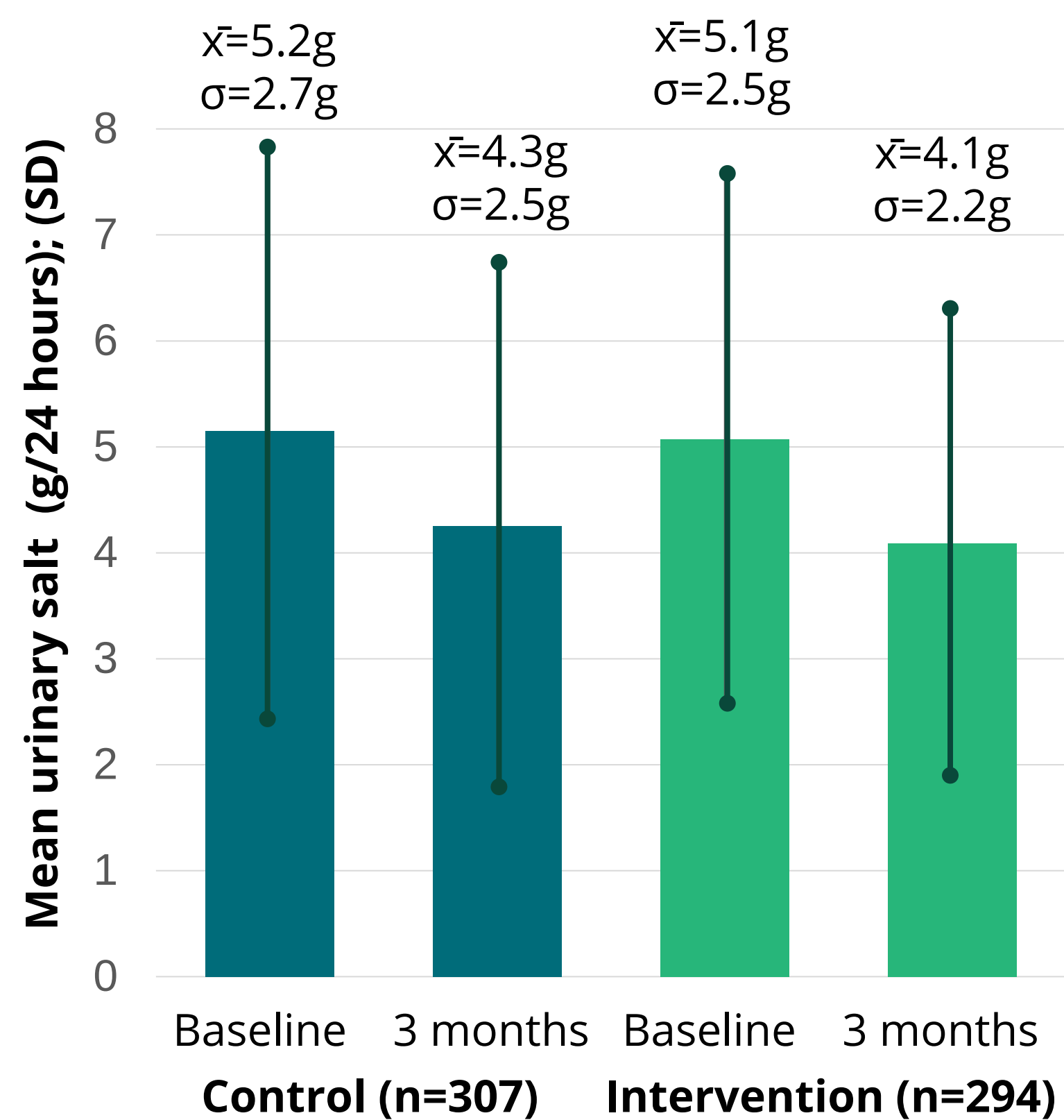
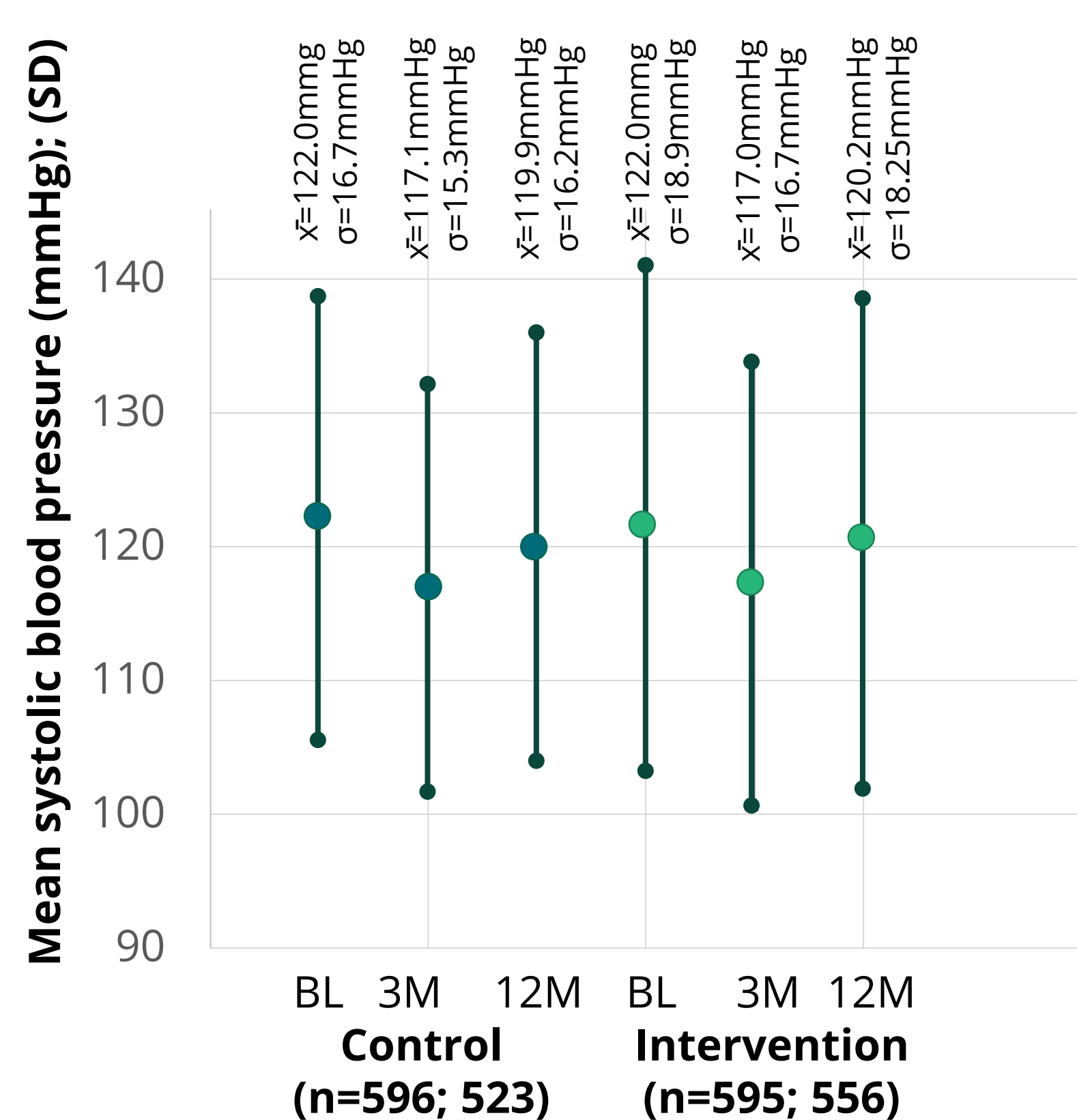


Figure 5: Change in adult systolic blood pressure



Secondary outcomes: No significant difference in change from baseline to 3 months between groups in adult urinary salt (**-0.22g/day, -0.59 – 0.16, p=0.26**) or adult systolic blood pressure (**0.81mmHg, -0.99 – 2.61, p=0.36**). Results consistent for all participants for SBP at 12 months and for diastolic BP at 3 and 12 months.

Supplementary analysis: Significant difference in change in urinary salt from baseline to 3 months between groups amongst adults with *baseline salt >4g/day* (**-0.57g/day, -1.09 – -0.05, p=0.03**)

Conclusions:

- Despite high participation, school-based salt reduction was not effective at reducing the salt intake of adolescents or their parents and caregivers overall
- Some evidence that school-based salt reduction was more effective amongst adults with higher baseline salt intake
- Future work should explore alternative school-based approaches to NCD prevention (e.g. school policies) or as part of a broader community-based strategy

1: WHO (2013); Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020
2: WHO (2023); Global report on sodium intake reduction
3: Muthuri et al (2016); Salt Reduction Interventions in Sub-Saharan Africa: A Systematic Review

4: He et al (2015); School based education programme to reduce salt intake in children and their families (School-EduSalt): cluster randomised controlled trial
5: Phiri et al (2023); Development and piloting of a primary school-based salt reduction programme: formative work and a process evaluation in rural and urban Malawi