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Cross-time comparison of adverse childhood experience patterns among Kenyan youth: Violence Against Children and Youth Surveys, 2010 and 2019

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Abstract

Background—Adverse childhood experiences (ACEs) are a global public health concern. Many children experience multiple ACEs. Patterning of multiple ACEs may change over time.

Objective—To assess latent classes of ACEs among male and female youth in Kenya and evaluate whether ACEs latent classes changed between surveys conducted in 2010 and 2019.

Participants and setting: We used data from Kenya Violence Against Children and Youth Survey, a repeated nationally representative survey of male and female youth aged 13–24: 2010 (n_f = 1227; n_m = 1456) and 2019 (n_f = 1344; n_m = 788).

Methods: Latent class analysis was used to estimate clustering of seven ACEs: orphanhood, experiencing physical intimate partner violence, physical violence by a parent/caregiver, physical violence by an adult community member, forced first sex, emotional (EV) and sexual violence (SV), stratified by sex and time.

Results: For females in 2010, identified classes included (1) SV only, (2) household and community physical violence (PV), EV and SV, (3) household and community PV only, (4) low ACEs, and (5) EV only. In 2019, classes included (1) SV only, (2) household and community PV only, and (3) low ACEs. Among males in 2010, the four-class model included (1) household and community PV with EV, (2) low ACEs, (3) household and community PV with SV, and (4) household and community PV only. In 2019, identified classes included (1) orphanhood and SV, (2) orphanhood and PV, (3) low ACEs, and (4) household and community PV only. For both males and females, across the two survey years, some classes demonstrated continuity (low ACEs and caregiver and community PV for both males and females, and SV for females). Orphanhood emerged as relevant to the ACEs latent class structure in 2019 compared to 2010 among males.

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Declaration of competing interest

The authors declare no conflict of interest.

Conclusion: Prevalence and changes in latent classes between 2010 and 2019 can point toward priority areas and subgroups for violence prevention and response in Kenya.

Keywords

Adverse childhood experiences; Kenya; Latent class analysis; Violence against children

Adverse childhood experiences (ACEs) are a global public health problem with considerable impact on health and wellbeing (Hughes et al., 2017). ACEs are potentially traumatic events that occur in childhood, such as experiencing violence, abuse or neglect, witnessing violence in the household or community, or household dysfunction and vulnerability such as orphanhood, or living with someone with untreated substance use or mental health disorders (Centers for Disease Control and Prevention, 2019). ACEs are prevalent worldwide. Globally, 1 billion children experience one or more forms of violence every year (Hillis et al., 2016). ACEs contribute to the global burden of disease and disability and have long-term effects on multiple health outcomes, including mental health, substance abuse, sexual and reproductive health, and infectious and chronic diseases (Hughes et al., 2017).

ACEs often co-occur. That is, youth who experience one ACE often experience other ACEs (Finkelhor et al., 2007). Experiencing multiple ACEs is associated with a greater burden of mental disorders and poor health during youth and later adulthood (Felitti et al., 1998; Hughes et al., 2017; Nguyen, Kegler, et al., 2019). Evidence on prevalence and determinants of multiple ACEs, and application of cutting-edge measurement approaches, is limited in low- and middle-income countries (LMICs) (Blum et al., 2019), even while the majority of the world's youth reside in the global South (UNICEF, 2019).

1. ACEs measurement

Most research on multiple ACEs in LMICs applies summative scores: summed binary responses to each ACEs item that produce a score value (Goodman et al., 2021; Reidy et al., 2021). Summative measurement of ACEs, sometimes referred to as the cumulative risk approach or the ACEs count score, demonstrates strong graded relationships with multiple adverse health outcomes in high- (Felitti et al., 1998) and low-income (Blum et al., 2019) countries. Summative measures are valuable for their simplicity and accessibility for lay audiences. In some cases, a summative approach may be applied within a priori estimated latent constructs. However. summative measures that do not take into account co-variance between indicators reflecting underlying latent constructs may mask how subgroups of youth experience distinct clustering of ACEs (Lian et al., 2022). Accounting for how ACEs co-occur across subgroups of youth can help uncover pattern-specific effects of ACEs on health sequelae and inform cost-effective and targeted intervention and prevention approaches (Miedema et al., 2022; Reidy et al., 2021).

Latent class analysis (LCA) can be a useful complement to summative ACEs measurement approaches. LCA is a person-centered latent variable mixture modeling analytic technique (Lanza et al., 2013). LCA can delineate latent subgroups of children with similar probabilities of ACEs exposure (Lanier et al., 2018; Lian et al., 2022). That is, LCA identifies discrete and distinct groups (classes) of children and youth who experience

specific patterning of ACEs compared to other classes of children and youth. LCA models seek to obtain best-fitting class structure solutions that maximize heterogeneity between and homogeneity within classes, such that classes are discrete from one another, but youth within classes share similar experiences (Lanza et al., 2013). Using LCA, we can observe classes of youth who experience exclusive and exhaustive combinations of ACEs. Use of LCA to identify distinct clusters of ACEs among youth is an increasingly applied approach in the field, and is useful to understand ACEs co-occurrence patterns within the population and how certain patterns of co-occurrence may be associated with health outcomes or other forms of adversity to inform prioritization and targeted response (Blum et al., 2019; Clarke et al., 2016; Lanier et al., 2018; Lian et al., 2022; Merians et al., 2019; Miedema et al., 2022; Stamatakis et al., 2022).

Application of LCA in LMICs can provide evidence on the patterning of how ACEs co-occur in understudied populations. For example, research using LCA across LMICs in Africa identifies discrete clusters of ACEs, depending on the setting and sample. Among youth aged 10–15 in a low-resourced region of Burkina Faso, Ismayilova et al. (2016) identified five classes of ACEs: two classes of youth living in non-extreme poverty with varied working conditions; one class of youth with high probability of abuse and exploitation; one class of youth with high probability of paid child labor; and one class of youth who reported minimal exposure to abuse in the family, community or at work. Class membership in the abuse and exploitation and child labor classes was associated with adverse mental health outcomes among youth compared to the “non-extreme poor” reference group (Ismayilova et al., 2016). Conversely, in Uganda, Clarke et al. (2016) found three classes of violence against children: one class characterized by high probability of physical, emotional and sexual violence; one class characterized by high probability of peer violence; and a final class comprised of high probability of physical violence from school staff, but low probability of any other form of abuse. Latent classes of ACEs vary depending on the context and available measures of adversity, although the existence of at least one low ACEs class is common across studies in LMICs (Blum et al., 2019; Clarke et al., 2016; Ismayilova et al., 2016; Miedema et al., 2022).

Latent class analysis using repeated nationally representative cross-sectional data, or latent transition analysis using longitudinal data, can also show how classes, and their relationships to outcomes of interest, may change over time at the population level (Blette et al., 2019; Chan et al., 2020; Villodas et al., 2016). In high-income contexts, exposures to early childhood adversity show patterns of both continuity and change over time (Fox et al., 2020; Villodas et al., 2016). Using longitudinal data on child welfare placements, Villodas et al. (2016) found that classes of youth in adopted or stable foster care settings retained their child welfare placements from childhood into early adolescence, while others transitioned into alternative caregiver scenarios (e.g., unstable living conditions). Youth with unstable placement patterns (i.e., changes in placement classes across time) were more likely to report physical and mental health challenges later in adolescence (Villodas et al., 2016). We were unable to identify studies using repeated nationally representative cross-sectional data to assess change in latent class structure of ACEs over time, although the analytic approach has been used for other health outcomes, for example adolescent substance abuse (Chan et al., 2020; Evans et al., 2020). Population-level ACEs latent class structures may evolve

over time as norms and behaviors regarding child-rearing and child development also shift. Continuity or change of ACEs latent classes over time may reflect the broader environment of child protection or community violence. Prevention intervention effectiveness may also reduce some ACEs but not others, which may contribute to changes in the patterning of ACEs experienced by youth over time. There is a global evidence gap on whether and how latent structures of ACEs change over time among youth in LMICs. As global efforts to prevent violence expand (Mercy, 2016; Wessells & Kostelny, 2021), evidence on patterns of adversity and how they change across time can be critical to inform responsive and targeted programs and policies to prevent and mitigate the harmful consequences of ACEs.

2. Childhood adversity in Kenya

ACEs are common in Kenya. Over 50 % of children and youth experience some form of violence during their lifetime (Ministry of Labour and Social Protection of Kenya, 2019). According to nationally representative prevalence estimates, two in five girls and one in two boys experience physical violence during childhood, and one in six girls experience sexual violence before age 18 (Ministry of Labour and Social Protection of Kenya, 2019).Witnessing community violence is also common: 37 % of girls and young women and 55 % of boys and young men witnessed violence in their communities before they turned 18 (Ministry of Labour and Social Protection of Kenya, 2019).

Some ACEs, such as violence against children, are declining in Kenya. Prevalence of lifetime physical, sexual and emotional abuse against children declined in Kenya between 2010 and 2019, likely due in part to implementation of national programming and policies to prevent violence against children (Annor et al., 2021; Ministry of Labour and Social Protection of Kenya, 2010). In 2010 Kenya passed a national policy banning corporal punishment, or the use of physical force as an effort to control or discipline children, in a range of settings including homes and schools (Global Partnership to End Violence against Children, 2020). Longitudinal data provides evidence of subsequent declines in caregiver physical abuse as a discipline tactic in Kenya as a result of the policy change (Alampay et al., 2021), although positive attitudes toward and use of corporal punishment appear to continue in other settings such as schools (Matofari, 2019). Other ACEs remain prevalent in Kenya. In 2012, there were an estimated 1.8 million orphans nationwide (Lee et al., 2014) exacerbated by the HIV pandemic, and rates of orphanhood have increased rapidly in the wake of the COVID-19 pandemic (Unwin et al., 2022).

Economic inequities and poverty may also exacerbate vulnerability and put youth at greater risk of ACEs (Peterman et al., 2017). Food insecurity, often used as a proxy for socio-economic status, is linked to childhood adversity (Jackson et al., 2019; Royer et al., 2022). A systematic review of research conducted in high-income settings found that food insecurity during childhood was consistently associated with ACEs, and often demonstrated a graded relationships, such that greater exposure to ACEs was associated with sequentially greater risk of food insecurity (Royer et al., 2022). ACEs may also have deleterious effects on economic prospects and security in adulthood (Sun et al., 2016; Testa & Jackson, 2020). Longitudinal data from the United States finds that youth who experienced ACEs during childhood were more likely to experience food insecurity as young adults (Testa & Jackson,

2020). Assessment of how food insecurity – as a proxy for economic insecurity – relates to patterning of ACEs among youth in Kenya can support validation of the latent class structure, and substantively pinpoint opportunities for economic policies and programs to both prevent ACEs and mitigate economic consequences of ACEs among young adults in low resourced settings.

The objectives of this study were to estimate latent classes of ACEs among male and female youth aged 13–24 in Kenya for two survey years (2010 and 2019), using comparable repeated cross-sectional nationally representative Kenya Violence Against Children and Youth Survey (VACS) data, to assess changes in the structure and prevalence of ACEs latent classes from 2010 to 2019, and to evaluate associations between food insecurity and ACEs latent classes in order to assess criterion validity of estimated latent class structures at both study timepoints. Food insecurity is an advantageous indicator with which to evaluate criterion validity of ACEs latent classes given consistent associations between ACEs and food insecurity in other settings (Royer et al., 2022). Overall, the present study contributes to filling gaps in research on ACEs in LMICs by leveraging nationally representative data on childhood adversity in a low-income setting at two time points to examine whether and how national-level latent patterning of ACEs may change over time.

3. Methods

3.1. Data

The VACS are nationally representative, cross-sectional, household surveys of 13–24-year-old male and female youth focused on lifetime and current experiences of violence. The VACS utilize a multi-stage, geographically clustered sample design. Based on national census sample frames, a random sample of geographic areas, or primary sampling units, are selected. Geographic areas are randomly designated for male or female surveys to ensure no overlap in female and male interviews in a primary sampling unit. Households are randomly selected within geographic areas, and one eligible youth is randomly sampled within households (Nguyen, Kress, et al., 2019). There is no replacement in cases of ineligible or unavailable households or youth. Using this sampling approach, the VACS capture a nationally representative random sample of youth aged 13–24. Interviewers receive extensive training on the procedural, ethical and safety protocols. Guardians/parents and participants complete consent forms. Participants are interviewed on a host of topics, including physical, emotional, and sexual violence victimization, service knowledge and uptake, risk and protective factors and health outcomes of violence. All participants are provided with a list of youth-friendly resources and those participants who meet survey criteria are offered a direct services referral (Nguyen, Kress, et al., 2019). The VACS has been implemented in over 20 countries in Africa, Asia, the Caribbean, Eastern Europe, and Latin America. The VACS have been repeated in select countries with the same sampling and implementation methods, including Kenya in 2010 and 2019 (Annor et al., 2021).

The 2010 Kenya VACS was led by the Kenya Ministry of Gender, Children and Social Development, implemented by the Kenya National Bureau of Statistics with additional leadership and support from the Kenya VACS Technical Working Group and technical support by UNICEF and the U.S. Centers for Disease Control and Prevention (CDC). The

survey was funded by UNICEF and the U.S. President's Emergency Plan for AIDS Relief (PEPFAR). The study was reviewed and approved by the Kenya Medical Research Institute and CDC. The study yielded 1622 completed male interviews with an overall response rate of 80.4 % and 1306 completed female interviews with an overall response rate of 84.4 % (Annor et al., 2021; UNICEF CDC & Kenya National Bureau of Statistics, 2012).

The 2019 Kenya VACS was led by Ministry of Labour and Social Protection, Department of Children's Services and implemented by University of San Francisco, Population Council and LVCT Health with guidance from the Kenya VACS Steering Committee and technical support from CDC. The study was funded by PEPFAR. The study was reviewed and approved by the Kenyatta National Hospital/University of Nairobi ethical review board, and IRBs from the University of San Francisco, Population Council and CDC. The survey resulted in 788 completed male interviews with an overall response rate of 66.5 % and 1344 completed female interviews with an overall response rate of 74.0 % (Annor et al., 2021; Ministry of Labour and Social Protection of Kenya, 2019).

The 2010 and 2019 Kenya VACS applied the same sampling approach and included English, Borana, Kalenjin, Kamba, Kikuyu, Kisii, Luo, Luhya, Maasai, Meru, Mijikenda, Swahili and Somali as study languages in accordance with the standard approach for language inclusion in national surveys in Kenya. The surveys were professionally translated and back translated, and interviewers were hired accordingly for each language. Both VACS also used similar technique for calculating the sample weight – calculation of base weight, adjustments of base weight for differential non-response, and adjustment of the post-stratification weight to population census data.

3.2. Measurement

ACEs were measured using an adapted version of the Adverse Childhood Experiences International Questionnaire (ACE-IQ) (World Health Organization, 2018). We generated seven dichotomous variables to measure exposure to multiple forms of adversity before age 18 years. Among youth older than 18 years, ACEs dichotomous variables reflect childhood (i.e., before age 18) prevalence of ACEs. Among youth younger than 18 years, the ACEs variables capture any lifetime exposure to ACEs up to the time of survey administration. We retained the full sample of children and youth aged 13–24 due to low prevalence of some forms of abuse. ACEs included: (1) death of one or both parent(s), (2) physical violence by a parent/caregiver, (3) physical violence by an adult community member, such as teacher or police officer, (4) physical violence by an intimate partner, (5) emotional violence by an adult/caregiver/parent, (6) sexual violence by anyone, and (7) forced first sex. Death of one or both parent(s) was coded 1 if either the participant's mother, father or both died before age 18. Physical violence by a parent/caregiver and physical violence by an adult community member were coded 1 if participants responded yes to experiencing physical violence such as being punched, kicked, whipped or beaten; or if they had been threatened with or attacked with a knife or other weapon, by a parent/caregiver or adult community member, respectively. Among young women and men who reported ever being partnered (ever married, cohabiting or in a dating relationship) before age 18, physical violence by an intimate partner was coded 1 if a current or previous partner had ever physically abused

the participant, such as slapped or pushed; hit, kicked or beaten; or used or threated to use a knife or other weapon against the participant. Physical violence was separated out by perpetrator type (parental/caregiver, community member and intimate partner) in order to delineate contributions of physical violence occurring in different social spaces to latent classes of ACEs. Emotional violence was coded 1 if participants responded affirmatively that an adult had said or done something on purpose to humiliate them in front of others or made them feel unwanted. Sexual violence was coded 1 if participants reported any non-consensual touching, attempted forced sex, physically forced sex, or being pressured into sex against their will. All participants were asked sexual violence survey items, irrespective of whether they reported ever engaging in sexual intercourse. Among youth who reported engaging in sexual intercourse, forced first sex was coded 1 if participants had been pressured, lured, tricked, physically forced, or threatened into their first experience of sexual intercourse. We retained both sexual violence variables separately due to the difference in denominator.

Variables were selected to be comparable between the two survey years, although there remained several minor differences between years. Child physical violence measures in 2019 included slapping, pushing or shoving (by a parent/caregiver or by an adult community member) and choking, suffocating, and attempts to drown or burn (by an intimate partner) in addition to the behaviors defined above. Due to survey questionnaire sequencing and design, it was not possible to omit these items from measures of physical abuse in the 2019 survey data. Both the 2010 and 2019 VACS measured emotional violence, although the 2010 survey asked about emotional violence by any adults, while the 2019 survey asked about emotional violence by a parent, adult caregiver or adult relative. The 2010 VACS included survey questions on abandonment (did any adult ever threaten to abandon or abandon you) which were not included in the 2019 VACS. Abandonment questions were excluded from the present analysis to improve comparability of emotional violence measures between survey years. Survey questions on witnessing household or community violence and experiencing peer physical violence were included only in 2019 and thus could not be included in the present analysis.

A single, dichotomous variable captured food insecurity, although survey item wording varied slightly by survey year. In 2010, participants were asked whether they believed the household had enough money for basic things, such as food. Participants who responded “no” were coded as experiencing food insecurity. In 2019, participants were asked whether in the past month, there was a day that they went without food because there wasn’t enough food in the household. Participants who responded yes were coded as experiencing food insecurity.

3.3. Analytic design

We estimated weighted prevalence of all ACEs measurements among female and male youth for both survey years using Stata/SE 17. To identify the best-fitting latent class structure of ACEs for each sex at each time point, we used Mplus 8.5 to estimate sequential latent class models ranging from two to six classes with 1000 sets of random starting values for all four samples (2010-female, 2010-male, 2019-female, 2019-male) (Muthén & Muthén,

1998–2017). We applied a latent class approach, rather than a latent transition approach, given the cross-sectional nature of the data. All models accounted for the complex survey design of the 2010 and 2019 Kenya VACS, taking into account sample weights, as well as the geographic clustering and stratification of the survey (Annor et al., 2021). The author team convened to compare models and generated consensus on final model selection for each sex X timepoint. To select the best-fitting latent class model, we compared model fit using the likelihood ratio chi-square, Akaike's information criterion (AIC), sample-adjusted Bayesian information criteria (BIC) and the entropy value. We also sought to identify models with high homogeneity of item response probabilities and adequate latent class separation (Lanza et al., 2013). Model selection was also informed by interpretability of patterning of latent classes in the Kenya context. For all models, latent class descriptions were based on item-response probabilities >0.5 (Lanza et al., 2013).

We assessed reliability of models in two ways. First, we re-estimated the selected class structure in a random 2/3 split sample to assess whether we could recover the same class solution. Second, we generated a random split half sample group variable to predict class membership. Insignificant associations between the group variable and class membership indicate that class membership is reliable and not capitalizing on chance variation in the sample. To assess model validity, we used a single indicator of food insecurity to predict class membership. Validity was evaluated based on whether food insecurity and class membership were associated in the anticipated direction, and whether the latent class structure remained stable with the additional covariate.

4. Results

4.1. Prevalence of ACEs

Prevalence of ACEs was high among male and female youth for both survey years (Table 1), although as previously published (Annor et al., 2021), prevalence of violence against children did decline between 2010 and 2019. In the 2010 survey, for both male and female youth, physical violence by a community member was the most prevalent ACE (female: 62 %, male: 64 %), followed by physical violence by a parent or caregiver (female: 56 %; male: 60 %). One in four female youth and one in seven male youth experienced sexual violence before age 18. Orphanhood was prevalent, with 22 % of both males and females experiencing the death of one or both parents. In the 2019 survey, 25 % of female youth experienced physical violence by a parent or caregiver, 17 % experienced physical violence by a community member, and prevalence of sexual violence was 16 %. In 2019, 18 % of female and male youth reported the death of one or both parents. Among male youth in 2019, the most prevalent ACE was physical violence by a parent or caregiver (32 %), followed by physical violence by a community member (21 %). Fewer than one in ten (7 %) of male youth experienced sexual violence before age 18 in 2019.

4.2. Latent class solutions

Fit indices and reliability testing informed the selection of final models (Table 2; results of reliability testing available upon request). Class prevalence and item-level probabilities were generated for the best-fitting models. For females in 2010, the five-class model was the best

fitting model (Table 3 and Fig. 1). The five-class latent models identified were labelled as (1) sexual violence only (SV, 4 %); (2) household and community physical violence, with sexual and emotional violence (PSEV, 9 %); (3) household and community physical violence only (PV, 40 %); (4) low ACEs (LA, 40 %); and (5) emotional violence only (EV, 8 %). The five-class model performed well in reliability testing, although we did observe significant differences by random split-sample group for PSEV class membership, suggesting that class membership could be due in part to random variation in the data set. However, given the salience of poly-victimization in Kenya (Chiang et al., 2018; Nguyen, Kegler, et al., 2019), and consistency of PSEV class identification in sequential latent class models, we retained the five-class model as the best-fitting model. For females in 2019, the three-class model best fit the data and performed well in reliability testing (Table 3 and Fig. 1). While fit indices improved for the four-class model (compared to the selected three-class model), the four-class model did not perform well in validity testing (results not shown), indicating poor model stability. The three-class model latent classes were labelled as (1) household and community physical violence only (PV, 19 %); (2) low ACEs (LA, 65 %); and (3) sexual violence only (SV, 16 %).

For male youth at both time points, the four-class model best fit the data and performed well in reliability testing. In 2010, identified latent classes were labelled as (1) household and community physical violence with emotional violence (PEV, 9 %); (2) low ACEs (LA, 48 %); (3) household and community physical violence with sexual violence (PSV, 5 %); and household and community physical violence only (PV, 38 %) (Table 4, Fig. 2). In 2019, the four latent classes were labelled as (1) orphanhood and sexual violence (OSV, 1 %); (2) orphanhood and physical violence (OPV, 4 %); (3) low ACEs (LA, 81 %); and (4) household and community physical violence only (PV, 14 %) (Table 4, Fig. 2).

4.3. Food insecurity and ACEs class membership

Across female and male youth in both years, a single-item measure of food insecurity was generally found to be of the expected magnitude and direction of association with ACEs class membership (Table 5). For female youth in 2010, the additional covariate did not change the latent class structure. While associations between food insecurity and ACEs class membership were in the expected direction, we observed no significant differences by class membership. Among male youth in 2010, we similarly observed no change in latent class structure. An increase in food insecurity was associated with increased likelihood of being in the PEV class ($\beta = 0.665$, $p = 0.023$) and decreased likelihood of being in the PV class ($\beta = -0.557$, $p = 0.025$), compared to the reference LA class. For female youth in 2019, we observed no change in latent class structure with the additional covariate. Associations trended in the expected direction and relative magnitude. We observed a significant association between food insecurity and SV class membership ($\beta = 0.638$, $p = 0.046$), compared to the LA class. Among male youth in 2019, the additional covariate substantively altered the item-level probabilities for the OSV class, which demonstrated low probability of orphanhood and higher probability for household and community physical violence compared to the unadjusted model. These results may in part be due to low n of the OSV class, which precludes robust assessment of the validity of that class. As such, results of the validity test for this class should be interpreted with caution. However, OSV class was

consistently present across sequential models, signaling its relevance to patterning of ACEs among male youth in 2019. We observed a significant association between food insecurity and the OPV class (β = 3.578, $p = 0.036$).

5. Discussion

In repeated nationally representative samples, Kenyan female and male youth aged 13–24 were grouped into distinct latent classes of ACEs. The best-fitting latent class structure of ACEs shifted between 2010 and 2019, although we observed some continuity in latent classes of ACEs for both female and male youth. In terms of continuity, the presence of an LA class was consistent across sex and time, and prevalence of class membership increased between survey years. The increase in prevalence of the LA class between time points was greater for male youth (48 % to 81 %) than for female youth (40 % to 65 %), although class prevalence cannot be directly compared between time points due to variation in class structure between years. However, overall, increased prevalence of young male and female youth in LA classes in 2019 is consistent with evidence demonstrating declines of childhood adversity in Kenya (Annor et al., 2021).

For both females and males, the household and community physical violence classes also remained consistent between the two survey years. Continuity of a latent class of youth experiencing violence in the home and community may indicate that common forms of physical violence, such as corporal punishment meted out by parents, caregivers, or teachers, remain significant issues facing children and youth in Kenya (Alampay et al., 2021; Matofari, 2019) despite the introduction of new policies banning corporal punishment (Global Partnership to End Violence against Children, 2020). While laws and policies to protect children and youth are considered to be a key strategy to prevent and end violence against children (Alampay et al., 2021; World Health Organization, 2016), integrating these legal frameworks with other forms of violence prevention programming in communities, schools and families can be highly effective, for example through social norm change toward less violent forms of child discipline (Lokot et al., 2020), or parenting programs to promote positive parenting skills and discipline techniques (Ward et al., 2020; World Health Organization, 2016). In Kenya, while a legal prohibition on corporal punishment in 2010 (Kenya Law Reform Commission, 2010) may have contributed to declines in caregiver physical violence (Alampay et al., 2021), complementary programmatic violence prevention efforts may also be helpful given that attitudes and norms endorsing corporal punishment continue in other settings (Matofari, 2019),

Sex-specific patterns of continuity and change also emerged across survey years. For females, the presence of a sexual violence only class in 2019 illustrates the continued salience of sexual violence to the patterning of ACEs among young girls and women in Kenya, despite overall decreases in sexual violence prevalence and increases in help seeking behaviors after incidents of sexual violence (Annor et al., 2021). The salience of sexual violence among latent classes of ACEs among young females across years highlights a potential role for programmatic efforts aimed at reducing sexual violence for adolescent girls and young women in Kenya. Through the Determined, Resilient, Empowered, AIDS-free, Mentored and Safe (DREAMS) program (Saul et al., 2018) in Kenya, PEPFAR

has scaled up layered protection for adolescent girls and young women, including sexual and physical violence prevention. Mathur et al. (2022) found marked declines in partner and non-partner sexual and physical violence among DREAMS recipients in Kenya. No Means No IMPower, a self-esteem and self-defense course for AGYW, has similarly shown declines in annual incidence of sexual assault of 38 % in a Nairobi cohort (Sarnquist et al., 2014). These interventions, and other evidence-based violence prevention approaches, can be key strategies to continue achieving declines in sexual violence among female youth in Kenya. Sexual violence prevention efforts are more limited among male youth. Our study results suggest that scaled up and adapted interventions may be helpful also to prevent sexual violence among boys and young men.

Among males, the presence of two orphanhood classes – OSV and OPV – and co-occurrence with sexual and physical violence, respectively, suggest that orphanhood has become more relevant to the patterning of childhood adversity among young males in Kenya between survey years. Notably, these results do not suggest that orphanhood prevalence increased in Kenya between 2010 and 2019. As shown in Table 1, orphanhood declined slightly for both male and female youth. Rather, the results suggest that vulnerabilities related to orphanhood appear to be more closely linked to co-occurrence of other ACEs in 2019. The greater salience of orphanhood in ACEs latent classes between survey years may be in part due to national trends in urbanization, as well as gender norms related to masculinity. Rapid urbanization, as Kenya has seen over the past decades, may contribute to a lack of social cohesion and safety nets for the most vulnerable in society (Dodman et al., 2017). Kiambi and Mugambi (2017) argue that the extended family network that traditionally supported orphans and vulnerable children in Kenya has collapsed due to urbanization. Gender norms related to masculinity may also inhibit help-seeking behaviors among vulnerable male youth. In patriarchal societies, socially embedded expectations of masculinity and maleness may inhibit health promoting behaviors (Olanrewaju et al., 2019). A study among Kenyan college students found that measured constructs of hegemonic masculinity were associated with adverse health (e.g., substance abuse) and behavioral (e.g., risk taking behaviors, limited use of preventative health care) outcomes (Mahalik et al., 2006).

Finally, validity testing showed associations between food insecurity, as a proxy for poverty, and specific latent classes for both females and males, particularly in 2019. Food insecurity has shown to be associated with greater exposure to ACEs in prior studies (Jackson et al., 2019; Testa & Jackson, 2020). For male youth in 2010, food insecurity was associated with increased likelihood of PEV class membership but decreased likelihood of PV class membership. Given that we observed a slightly higher item-response probability for community physical violence in the PV class compared to the PEV class, this result may be due to less exposure among food insecure youth to community spaces where corporal punishment is often meted, such as school (Matofari, 2019). Alternatively, current food insecurity – as an indicator of economic stress – among youth in 2010 may also be related to unmeasured correlates such as emotional and physical neglect, which may be more likely to be prevalent in classes with greater co-occurrence of other ACEs, particularly emotional violence (Turner et al., 2019). In Kenya in 2019, food insecurity was associated with greater likelihood of being in the SV class (for both females and males), and the OPV class for

males. Implementation of economic interventions may be strategic to reduce ACEs in the Kenya context. Multiple poverty reduction or economic strengthening interventions have demonstrated effectiveness of reducing and preventing child abuse and neglect in LMICs (World Health Organization, 2016). For example, cash transfers and microfinance programs have shown effects in reducing sexual violence against children and women (World Health Organization, 2016). Evidence from high-income countries shows that poverty reduction interventions can also have positive effects on infant brain activity (Troller-Renfree et al., 2022), which may help mitigate the adverse effects of ACEs on brain development among children later during development.

6. Limitations

This study has several limitations. First, the 2010 and 2019 Kenya VACS were cross-sectional surveys, and do not capture change in latent class membership of individual participants over time. Second, ACEs measurement in the Kenya VACS was limited. Some commonly measured forms of ACEs, such as living with someone with untreated substance use or mental health disorders, were not included in the VACS. Further, a few measures were not worded identically between the 2010 and 2019 surveys. We took this into consideration as discussed in the methods section. In some cases, our definitions of ACEs varied slightly from the prevailing measurement approaches. For example, emotional violence as an ACE is generally limited to violence perpetrated by a parent or caregiver. In 2010, the survey asked more generally about emotional violence perpetrated by any adult, so the item may have been interpreted more broadly compared to the 2019 survey, which asked only about violence perpetrated by a caregiver/parent. Future surveys in LMIC settings may consider expanding the types of ACEs measured (Anda et al., 2010), and identifying opportunities for consistency in measurement over time. Third, we included both forced first sex and a general sexual violence indicator in LCA. Due to survey skip patterns, each indicator had a different denominator, which was our primary motivation to include them as separate indicators (rather than a single sexual violence exposure). Further, cross-tabulation indicted that while there was generally overlap between the two indicators, there was adequate variation in co-occurrence, and only moderate pairwise correlations, suggesting it was appropriate to include them as separate indicators in LCA. Fourth, the VACS do not measure programmatic or policy change that may have contributed to differences in classes over time. Fifth, while the survey followed identical protocols for to enter communities and approach households between the two time points, there was a decline in response rates in 2019. The demographic shifts of urbanization and the economic improvement from a low to middle income status could be impacting participants' availability and willingness to participate, a trend which is being observed in nationally-representative surveys in other settings (Czajka & Beyler, 2016). The primary reason for non-response was a selected participant not being at home. The 2019 data collection spanned the Christmas and New Year's holidays, which may have contributed to the lower response rates. However, response rates were still over 60 % and with sample weights, the final estimates were representative of the underlying national population.

7. Conclusion

We observed latent patterning of childhood adversity among female and male youth in Kenya. ACEs subgroups – or classes – differed for female and male youth, and the latent class structure of ACEs changed between survey years (2010 and 2019). Latent class approaches are useful to measure patterns of ACEs in LMIC populations and are complementary to common summative ACEs measurement approaches. Measurement of commonly co-occurring types of ACEs can help to identify key populations of youth for targeted violence prevention and response interventions, particularly in low-resource contexts. Tracking change in latent class structure over time is critical to measure the dynamic nature of childhood adversity, as the environments in which children live, grow, and thrive evolve. Poverty reduction and programs designed to reduce food insecurity may be effective to prevent certain constellations of ACEs clustering among female and male youth in Kenya.

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Data availability

Violence Against Children and Youth Survey data is publicly available via the Together for Girls website (https://www.togetherforgirls.org/)

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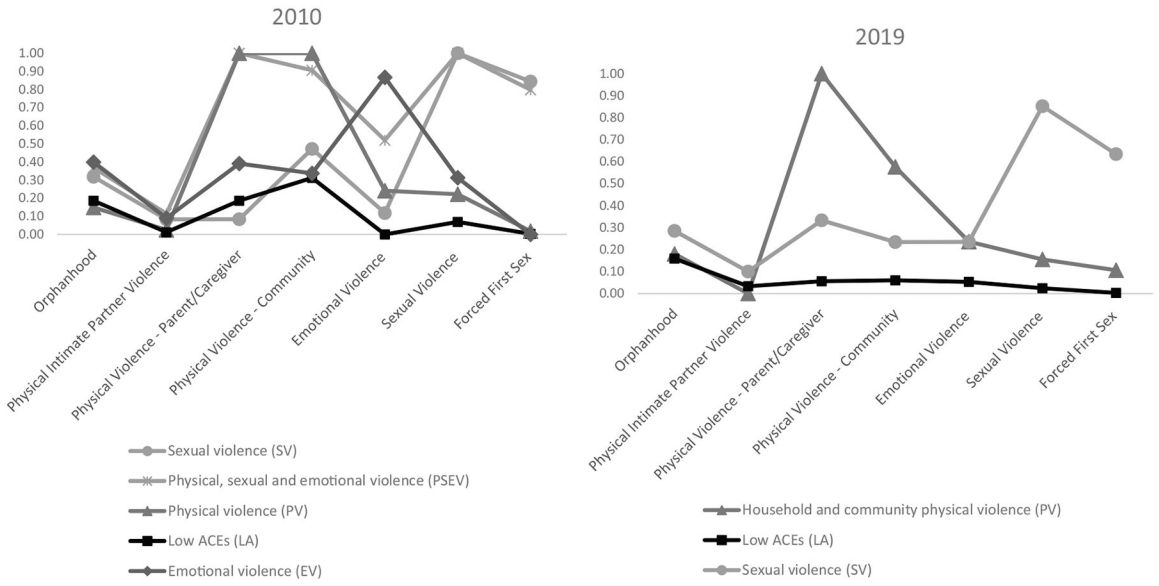

Fig. 1.

Latent classes of adverse childhood experiences (ACEs) among female youth aged 13–24, Kenya Violence Against Children and Youth Surveys, 2010 and 2019.

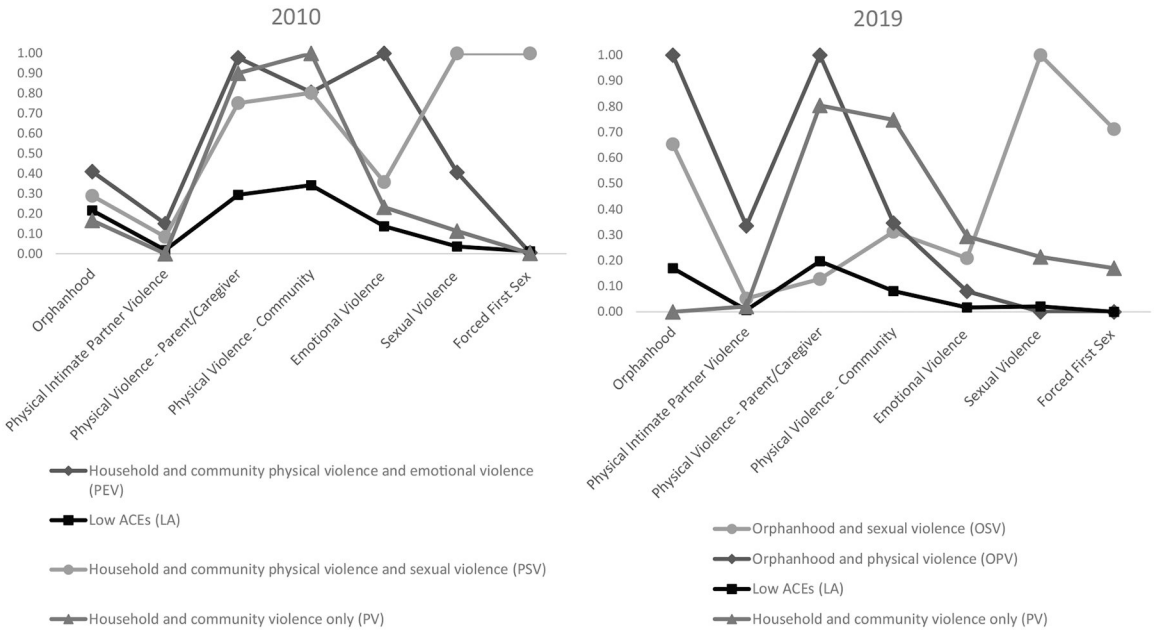

Fig. 2.

Latent classes of adverse childhood experiences (ACEs) among male youth aged 13–24, Kenya Violence Against Children and Youth Surveys, 2010 and 2019.

Table 1

Weighted percentages of demographic characteristics and adverse childhood experiences (ACEs) among male and female youth aged 13–24, Kenya Violence Against Children and Youth Surveys, 2010 and 2019.

Survey Year	**2010**						**2019**					
Sex	**Female (*n* = 1227)**			**Male (*n* = 1456)**			**Female (*n* = 1344)**			**Male (*n* = 788)**		
	Mean/%	**95 % CI**		**Mean/%**	**95 % CI**		**Mean/%**	**95 % CI**		**Mean/%**	**95 % CI**	
Demographics												
Age (mean, in years)	18.22	17.96	18.48	17.83	17.56	18.11	18.10	17.90	18.31	17.98	17.72	18.23
Food insecurity	33.54	27.57	40.1	39.67	35.11	44.41	24.03	20.99	27.35	23.34	18.65	28.79
ACEs												
Orphanhood	21.90	17.76	26.68	22.04	18.50	26.03	18.21	15.55	21.21	18.49	15.23	22.25
Forced first sex *	16.65	13.00	21.07	7.43	4.59	11.81	13.83	10.96	17.32	4.75	2.25	9.77
Physical intimate partner violence ≠	4.37	2.83	6.69	3.30	2.02	5.34	3.95	2.48	6.23	2.53	0.74	8.24
Physical violence by parent or caregiver	55.60	49.39	61.63	59.70	55.69	63.58	25.27	22.12	28.71	32.47	28.00	37.29
Physical violence by community member	61.55	55.16	67.57	64.11	59.45	68.52	17.01	14.72	19.57	20.53	15.20	27.13
Emotional violence	22.79	19.89	25.98	26.40	22.76	30.39	11.10	9.29	13.20	6.98	4.32	11.09
Any sexual violence	28.02	23.59	32.93	14.83	12.18	17.94	17.36	14.83	20.23	7.11	4.93	10.16

Notes. CI = Confidence Interval;

* Among sexually active youth (n_f-2010 = 578; n_m-2010 = 636; n_f-2019 = 515; n_m-2019 = 317);

≠ Among ever-partnered youth (n_f-2010 = 675; n_m-2010 = 760; n_f-2019 = 710; n_m-2019 = 394); food insecurity = not enough money for basic goods, such as food (2010 survey year) or not enough food in household in past 30 days (2019 survey year); orphanhood = one or both parents died before age 18; forced first sex = participant was pressured, lured, tricked, threatened or physically forced into first sexual experience.

Table 2

Summary information for selection of latent class models of adverse childhood experiences (ACEs) among male and female youth aged 13–24, Kenya Violence Against Children and Youth Surveys, 2010 and 2019.

Number of latent classes	Likelihood ratio chi-square (*p*-value)	Df	AIC	BIC	Sample-adjusted BIC	Entropy
Female 2010 (n = 1227)						
2	203.37 (<0.001)	107	7543.52	7620.21	7572.56	0.65
3	114.55 (0.1863)	102	7378.51	7496.09	7423.04	0.76
4	90.78 (0.5749)	94	7354.28	7512.76	7414.29	0.84
5	**69.91 (0.8964)**	**86**	**7336.42**	**7535.80**	**7411.92**	**0.80**
6	61.81 (0.9233)	79	7336.66	7576.94	7427.64	0.80
Male 2010 (n = 1456)						
2	171.85 (0.0001)	108	8307.14	8386.40	8338.75	0.53
3	99.53 (0.5786)	103	8193.32	8314.84	8241.78	0.70
4	**69.86 (0.9753)**	**95**	**8163.20**	**8326.98**	**8228.51**	**0.72**
5	54.55 (0.9975)	87	8155.93	8361.99	8238.10	0.75
6	46.07 (0.9989)	79	8159.62	8407.94	8258.64	0.82
Female 2019 (n = 1344)						
2	177.12 (0.0001)	110	6111.04	6189.09	6141.45	0.54
3	**104.08 (0.4241)**	**102**	**6017.28**	**6136.96**	**6063.90**	**0.76**
4	77.82 (0.9000)	95	5994.81	6156.11	6057.64	0.86
5	59.96 (0.9881)	87	5986.73	6189.66	6065.78	0.88
6	48.81 (0.9977)	80	5986.10	6230.66	6081.36	0.89
Male 2019 (n = 788)						
2	88.37 (0.9358)	110	3159.27	3229.32	3181.68	0.62
3	70.77 (0.9921)	102	3146.25	3253.65	3180.61	0.74
4	**54.26 (0.9996)**	**93**	**3130.32**	**3275.08**	**3176.64**	**0.82**
5	42.00 (1.0000)	85	3129.13	3311.24	3187.39	0.91
6	31.67 (1.0000)	77	3129.86	3349.33	3200.08	0.84

Notes. Selected model is bolded.

Table 3

Item-response probabilities from selected latent class (LC) models of adverse childhood experiences (ACEs) among female youth aged 13–24, Kenya Violence Against Children and Youth Surveys, 2010 and 2019.

Survey year	**2010 (n = 1227)**										**2019 (n = 1344)**					
Latent classes	**SV - Sexual violence only**		**PSEV - Household & community physical violence, sexual & emotional violence**		**PV – Household & community physical violence**		**LA - Low ACEs**		**EV - Emotional violence**		**PV – Household & community physical violence**		**LA - Low ACEs**		**SV - Sexual violence**	
Prevalence (n)	**3.69 (45)**		**9.04 (111)**		**39.50 (485)**		**39.95 (490)**		**7.82 (96)**		**19.16 (258)**		**64.97 (873)**		**15.87 (213)**	
Item-level probabilities	**p**	**SE**	**p**	**SE**	**p**	**SE**	**p**	**SE**	**p**	**SE**	**p**	**SE**	**p**	**SE**	**p**	**SE**
Orphanhood	0.32	0.08	0.37	0.13	0.15	0.02	0.19	0.03	0.40	0.07	0.18	0.04	0.16	0.02	0.29	0.06
Physical Intimate Partner Violence[≠]	0.08	0.06	0.11	0.06	0.03	0.02	0.01	0.02	0.09	0.08	0.00	0.00	0.03	0.02	0.10	0.05
Physical Violence - Parent/Caregiver	0.08	0.28	1.00	0.00	1.00	0.00	0.19	0.05	0.39	0.09	1.00	0.00	0.06	0.04	0.33	0.12
Physical Violence - Community	0.47	0.10	0.91	0.08	1.00	0.00	0.31	0.03	0.34	0.09	0.58	0.10	0.06	0.01	0.23	0.08
Emotional Violence	0.12	0.05	0.52	0.11	0.24	0.04	0.00	0.00	0.87	0.45	0.24	0.05	0.05	0.01	0.24	0.05
Sexual Violence	1.00	0.00	1.00	0.00	0.22	0.06	0.07	0.04	0.31	0.08	0.16	0.11	0.02	0.03	0.85	0.16
Forced First Sex[*]	0.84	0.41	0.80	0.26	0.02	0.01	0.00	0.00	0.00	0.00	0.11	0.07	0.00	0.02	0.63	0.10

Notes.

[*]Among sexually active youth (nf-2010 = 578; nf-2019 = 515);

[≠]Among ever-partnered youth (nf-2010 = 675; nf-2019 = 710); food insecurity = not enough money for basic goods, such as food (2010 survey year) or not enough food in household in past 30 days (2019 survey year); orphanhood = one or both parents died before age 18; forced first sex = participant was pressured, lured, tricked, threatened or physically forced into first sexual experience.

Table 4

Item-response probabilities from selected latent class (LC) models of adverse childhood experiences (ACEs) among male youth aged 13–24, Kenya Violence Against Children and Youth Surveys, 2010 and 2019.

Survey year	**2010 (n = 1456)**								**2019 (n = 788)**							
Latent classes	**PEV - Household & community physical violence and emotional violence**		**LA - Low ACEs**		**PSV - Household & community physical violence and sexual violence**		**PV - Household & community physical violence**		**OSV - Orphanhood & sexual violence**		**OPV - Orphanhood & household physical violence**		**LA - Low ACEs**		**PV - Household & community physical violence**	
Prevalence (n)	**9.38 (137)**		**48.19 (702)**		**4.93 (72)**		**37.50 (546)**		**1.35 (11)**		**3.70 (29)**		**81.40 (641)**		**13.55 (107)**	
Item-level probabilities	**p**	**SE**	**p**	**SE**	**p**	**SE**	**p**	**SE**	**p**	**SE**	**p**	**SE**	**p**	**SE**		
Orphanhood	0.41	0.10	0.22	0.03	0.29	0.08	0.17	0.04	0.65	0.37	1.00	0.00	0.17	0.02	0.00	0.00
Physical Intimate Partner Violence	0.15	0.06	0.02	0.01	0.08	0.05	0.00	0.00	0.05	0.06	0.34	0.27	0.01	0.01	0.02	0.03
Physical Violence - Parent/Caregiver	0.98	0.03	0.29	0.03	0.75	0.09	0.90	0.13	0.13	0.11	1.00	0.00	0.20	0.04	0.80	0.10
Physical Violence - Community	0.81	0.08	0.34	0.09	0.80	0.09	1.00	0.00	0.31	0.19	0.35	0.18	0.08	0.03	0.75	0.08
Emotional Violence	1.00	0.00	0.14	0.03	0.36	0.10	0.23	0.07	0.21	0.18	0.08	0.08	0.02	0.01	0.29	0.08
Sexual Violence	0.41	0.10	0.04	0.01	1.00	0.00	0.11	0.03	1.00	0.00	0.00	0.00	0.02	0.01	0.21	0.08
Forced First Sex	0.01	0.01	0.01	0.01	1.00	0.00	0.00	0.00	0.71	0.21	0.00	0.00	0.00	0.00	0.17	0.12

Notes.

*Among sexually active youth (n_m-2010 = 636; n_m-2019 = 317);

≠Among ever-partnered youth (n_m-2010 = 760; n_m-2019 = 394); food insecurity = not enough money for basic goods, such as food (2010 survey year) or not enough food in household in past 30 days (2019 survey year); orphanhood = one or both parents died before age 18; forced first sex = participant was pressured, lured, tricked, threatened or physically forced into first sexual experience.

Table 5

Associations between food insecurity and adverse childhood experiences (ACEs) class membership among male and female youth aged 13–24, Kenya Violence Against Children and Youth Surveys, 2010 and 2019.

2010			
	Female (n = 1227)		
Class	**β**	**S.E.**	**p-value**
Low ACEs (LA)	*Ref*		
Physical, sexual & emotional violence (PSEV)	0.384	0.648	0.554
Sexual violence (SV)	1.557	1.261	0.217
Household or community physical violence (PV)	0.21	0.283	0.458
Emotional violence (EV)	1.527	1.316	0.246
	Male (n = 1456)		
Class	**β**	**S.E.**	**p-value**
Low ACEs (LA)	*Ref*		
Household & community physical violence and sexual violence (PSV)	−0.307	0.512	0.549
Household & community physical violence (PV)	−0.557	0.248	0.025
Household & community physical violence and emotional violence (PEV)	0.665	0.293	0.023
2019			
	Female (n = 1344)		
	β	**S.E.**	**p-value**
Low ACEs (LA)	*Ref*		
Household or community physical violence (PV)	0.298	0.34	0.381
Sexual violence (SV)	0.638	0.32	0.046
	Male (n = 788)		
	β	**S.E.**	**p-value**
Low ACEs (LA)	*Ref*		
Sexual violence (OSV) (without orphanhood *)	2.192	0.585	<0.001
Orphan & household physical violence (OPV)	3.578	1.71	0.036
Household & community physical violence (PV)	0.341	0.47	0.468

Notes.

* Orphanhood did not meet the threshold for substantive inclusion in the OSV latent class, once adjusting for food insecurity, likely due to the low n for this class. Results of validity test for this class should be interpreted with caution.